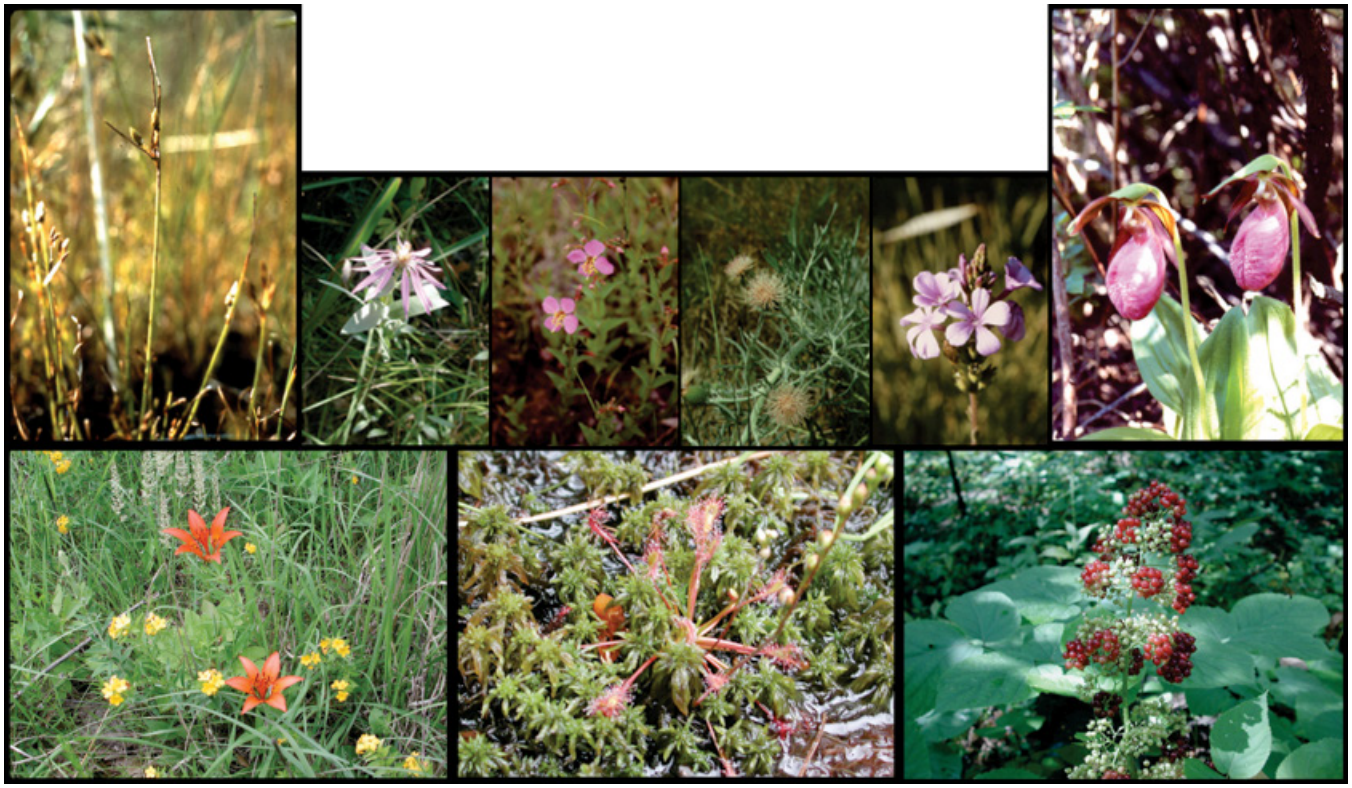
National Park Service
Department of the Interior

Natural Resource Stewardship and Science

Special Flora and Vegetation of Indiana Dunes National Park

Natural Resource Report NPS/INDU/NRR—2024/2622



ON THE COVER

Top row, left to right: *Schoenoplectiella hallii*, *Symphyotrichum oolentangiense* var. *oolentangiense*, *Rhexia virginica*, *Cirsium pitcheri*, *Buchnera americana*, *Cypripedium acaule*. Bottom row, left to right: *Lilium philadelphicum*, *Drosera intermedia*, *Aralia racemosa.*

All photos USGS/N.B. Pavlovic

Special Flora and Vegetation of Indiana Dunes National Park

Natural Resource Report NPS/INDU/NRR—2024/2622

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February 2024

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Contents

Page

Figures xi
Tables xiii
Appendices xv
Executive Summary xvii
Acknowledgements xix
Acronyms and Botanical Terms xxi
Introduction 1
Methods 7
Compilation of Plant Taxa 7
Floristic Survey Methods 11
Literature review 11
Herbarium searches 12
Field surveys 19
Floristic diversity and quality assessment 20
Vegetation mapping 22
Chapter Organization 23
Special Flora Summary 25
Results 25
The Presettlement Vegetation and Native Plant Communities 45
Presettlement Vegetation Descriptions 48
Wetland Communities 48
Terrestrial Communities 55
Annotated List of Special Flora 61
LYCOPODIOPSIDA: The Lycophytes 63
LYCOPODIACEAE — Clubmoss Family 63
SELAGINELLACEAE — Spikemoss Family 67
POLYPODIOPSIDA: The Ferns 68
OPHIOGLOSSACEAE — Adder's Tongue Family 68
EQUISETACEAE — Horsetail Family 71
PTERIDACEAE — Maidenhair Fern Family 72
BLECHNACEAE — Chain Fern Family 72
WOODSIACEAE — Wood Fern Family 73
POLYPODIACEAE — Polypody Family 75

Contents (continued)

Page

PINOPSIDA: The Conifers 76

CUPRESSACEAE — Cypress and Redwood Family 76

PINACEAE — Pine Family 77

MAGNOLIIDAE: The Flowering Plants—Class Liliopsida (Monocots) 80

ACORACEAE — Sweet Flag Family 80

ALISMATACEAE — Water Plantain Family 81

ALLIACEAE — Onion Family 81

ARACEAE — Arum Family 81

COLCHICACEAE — Colchicum Family 83

COMMELINACEAE — Spiderwort Family 83

CONVALLARIACEAE — Mayflower Family 83

CYPERACEAE — Sedge Family 84

ERIOCAULACEAE — Pipewort Family 111

IRIDACEAE — Iris Family 111

HYDROCHARITACEAE — Frog's Bit Family [includes Najadaceae from Swink and Wilhelm (1994)] 112

JUNCACEAE — Rush Family 112

JUNCAGINACEAE — Arrowgrass Family 115

LILIACEAE — Lily Family 115

NAJADACEAE — Naias Family [now included in Hydrocharitaceae] 116

NARTHECIACEAE — Asphodel Family 116

ORCHIDACEAE — Orchid Family 116

POACEAE — Grass Family 131

PONTEDERIACEAE — Pickerelweed Family 141

POTAMOGETONACEAE — Pondweed Family (ZOSTERACEAE in Swink and Wilhelm [1994]) 141

SPARGANIACEAE — Bur-reed Family 143

TRILLIACEAE — Trillium Family 144

XYRIDACEAE — Yellow-eyed-grass Family 145

MAGNOLIIDAE: The Flowering Plants—Class Magnoliopsida (Dicots) 146

ACANTHACEAE — Acanthus Family 146

ANACARDIACEAE — Cashew Family 146

APIACEAE — Parsley Family 148

APOCYANACEAE - Dogbane/Milkweed Family 149

AQUIFOLIACEAE — Holly Family 150

Contents (continued)

Page

ARALIACEAE — Ginseng Family 151

ARISTOLOCHIACEAE — Birthwort Family 152

ASTERACEAE — Aster Family 153

BETULACEAE — Birch Family (sometimes Corylaceae) 160

BORAGINACEAE — Borage Family 163

BRASSICACEAE — Mustard Family 164

CABOMBACEAE — Water-shield Family 166

CALLITRICHACEAE — Water-Starwort Family 167

CAMPANULACEAE — Bluebell Family 167

CAPRIFOLIACEAE — Honeysuckle Family 167

CARYOPHYLLACEAE — Pink Family 170

CELASTRACEAE — Staffweed Family 170

CERATOPHYLLACEAE — Hornwort Family 171

CISTACEAE — Rockrose Family 171

CONVOLVULACEAE — Morning Glory Family 173

CORNACEAE — Dogwood Family 173

CRASSULACEAE — Stonecrop Family 175

DROSERACEAE — Sundew Family 175

ERICACEAE — Heath Family 176

EUPHORBIACEAE — Spurge Family 184

FABACEAE — Bean Family (formerly LEGUMINOSAE) 185

FUMARIACEAE — Fumitory Family 189

GENTIANACEAE — Gentian Family 189

GERANIACEAE — Geranium Family 191

GROSSULARIACEAE — Currant Family (formerly included in the Saxifragaceae) 192

HALORAGACEAE — Water-Milfoil Family 192

HYPERICACEAE — St. John's Wort Family 192

JUGLANDACEAE — Walnut Family 193

LAMIACEAE — Mint Family (formerly Labiatae) 194

LENTIBULARACEAE — Bladderwort Family 196

LINACEAE — Flax Family 199

MELASTOMATACEAE — Melastoma Family 200

MENYANTHACEAE — Buckbean Family 201

MORACEAE — Mulberry Family 202

Contents (continued)

Page

MYRICACEAE — Wax Myrtle Family 202
OLEACEAE — Olive Family 202
ONAGRACEAE — Evening Primrose Family 204
OROBANCHACEAE — Broom-rape Family 205
OXALIDACEAE — Wood Sorrel Family 208
PAPAVERACEAE — Poppy Family 209
PHRYMACEAE — Lopseed Family 209
PLANTAGINACEAE — Plantain Family 210
POLYGALACEAE — Milkwort Family 211
POLYGONACEAE — Buckwheat Family 212
PORTULACACEAE — Purslane Family 214
PRIMULACEAE — Primrose Family 215
RANUNCULACEAE — Buttercup Family 216
RHAMNACEAE — Buckthorn Family 217
ROSACEAE — Rose Family 217
RUBIACEAE — Madder Family 221
SALICACEAE — Willow Family 222
SARRACENIACEAE — Pitcher Plant Family 224
SAXIFRAGACEAE — Saxifrage Family 225
SCROPHULARIACEAE — Figwort Family 226
ULMACEAE — Elm Family 226
VALERIANACEAE — Valerian Family 227
VERBENACEAE — Vervain Family 227
VIOLACEAE — Violet Family 227
VITACEAE — Grape Family 229

Park Units 231
Unit 1: Miller Woods and Green Heron Pond 231
Pannes 233
Special flora summary 260
Floristic summary 261
Conservation issues 261
Unit 2: Tolleston Dunes 266
Special flora summary 267
Floristic summary 288

Contents (continued)

Page

Conservation issues 289

Unit 3: Calumet Prairie State Nature Preserve 291

Special flora summary 292

Floristic summary 303

Conservation issues 303

Unit 4: West Beach 304

Special flora summary 305

Floristic summary 324

Conservation issues 326

Unit 5: Inland Marsh (Tolleston Dunes East), Coulter Prairie, and Yellow Birch Fen 329

Special flora summary 333

Floristic summary 352

Conservation issues 353

Unit 6: Bailly 355

Mnoke Prairie and Fen 358

Special flora summary 379

Floristic summary 379

Conservation issues 381

Unit 7: Cowles Dunes (formerly Dune Acres) 383

Little Lake 385

Blag Slough 387

Cowles Bog wetland complex 387

Lois Howes Prairie 389

Special flora summary 390

Floristic summary 424

Conservation issues 426

Unit 8: Indiana Dunes State Park 429

Dunes Nature Preserve 432

Dunes Prairie Nature Preserve 432

Special flora summary 461

Floristic summary 461

Conservation issues 461

Unit 9: Furnessville (formerly Visitor Center) 464

Furnessville Woods 466

Contents (continued)

Page

Special flora summary 467
Floristic summary 496
Conservation issues 497
Unit 10: Keiser 501
Special flora summary 502
Floristic summary 539
Conservation issues 539
Unit 11: Tamarack and Shirley Heinze Land Trust Tracts 544
Special flora summary 545
Floristic summary 571
Conservation issues 571
Unit 12: Heron Rookery 576
Special flora summary 586
Floristic summary 586
Conservation issues 587
Unit 13: Hobart Prairie Grove 587
Special flora summary 589
Floristic summary 604
Conservation issues 604
Unit 14: Hoosier Prairie 606
Special flora summary 629
Floristic summary 629
Conservation issues 630
Unit 15: Pinhook Bog 631
Special flora summary 633
Floristic summary 647
Conservation issues 647
Discussion and Conclusions Concerning Preserving Plant Diversity at the Indiana Dunes in the 21st Century 651
Current State of the Flora of the Indiana Dunes 651
Richness by Park Units 653
Special Flora 656
Adventive Species 656
Exotic and Invasive Species 662

Contents (continued)

Page

Future of the Flora of the Indiana Dunes 663
Human-Induced Global Warming 663
Dynamic Fire Regimes in a Fragmented Landscape 666
Disturbance and Succession 668
Hydrological Changes And Restoration 669
Pollution 669
Fragmentation 669
Poaching and Overexploitation 670
Recreation 671
Restoration and Reconciliation 672
Floristic Considerations 672
Conclusion 673
Literature Cited 675

Figures

Page

Figure 1. Survey units of the Indiana Dunes National Park, West Unit 2

Figure 2. Survey units of the Indiana Dunes National Park, East Unit 3

Figure 3. Locations of Chicago South Shore and South Bend Railroad stations in the 1920s, western area from Miller Station to Wilson Station 14

Figure 4. Locations of Chicago South Shore and South Bend Railroad stations in the 1920s, Dune Park Station to Tremont Station 15

Figure 5. Locations of Chicago South Shore and South Bend Railroad stations in the 1920s, Tremont Station to Johnsfield Station 16

Figure 6. Relationships between area and species richness: A) area vs. native richness (nr), B) log area vs. nr, C) log area vs. log nr, D) area vs. mean conservative score (mcs), E) log area vs. mcs, F) area vs. FQI, and G) log area vs. FQI. 21

Figure 7. Relationships within and among the general and specific community types found in Indiana Dunes National Park 23

Figure 8. Presettlement vegetation of the Indiana Dunes, as characterized by the Public Land Survey Office in the early 1830s. 49

Figure 9. Vegetation of Miller Woods Unit (west side) 232

Figure 10. Vegetation of Miller Woods Unit (east side) 233

Figure 11. Scenic beauty of wild lupine at Miller Woods savanna/woodland complex 265

Figure 12. Vegetation of Tolleston Dunes Unit 266

Figure 13. Vegetation of Calumet Prairie Unit 292

Figure 14. Vegetation of West Beach Unit 305

Figure 15. Vegetation of Inland Marsh Unit 330

Figure 16. Vegetation of Bailly Unit (west side) 356

Figure 17. Vegetation of Bailly Unit (east side) 357

Figure 18. Vegetation of Cowles Dunes Unit 385

Figure 19. Portion of Norman Bergendahl's annotated copy of the 1922 Goodman map showing the future entrance of the Dunes State Park from Tremont Road (north of Tremont Station; middle right of map) 428

Figure 20. Vegetation of Indiana Dunes State Park Unit 430

Figure 21. Vegetation of Furnessville Unit 466

Figure 22. Mapped representation of land use in the Furnessville area based on 1939 aerial photograph 499

Figure 23. Vegetation of Keiser Unit 502

Figure 24. Vegetation of Tamarack Unit 545

Figure 25. A northeast and southwest view of Mt. Baldy showing the savanna physiognomy of the dune vegetation and the ditching and farming of the Great Marsh in 1922. 575

Figure 26. Vegetation of Heron Rookery Unit 577

Figures (continued)

Page

Figure 27. Vegetation of Hobart Prairie Grove Unit 589

Figure 28. Vegetation of Hoosier Prairie Unit 607

Figure 29. Vegetation of Pinhook Bog Unit 632

Figure 30. Total number of native (***green bars***), adventive (***red***), and exotic (***orange***) species by unit at Indiana Dunes National Park. 656

Figure D1. Towns and roads in the west unit of Indiana Dunes National Park. 767

Figure D2. Lakes, ponds, and rivers in the west unit of Indiana Dunes National Park. 768

Figure D3. Towns and roads in the east unit of Indiana Dunes National Park. 769

Figure D4. Lakes, ponds, and rivers in the east unit of Indiana Dunes National Park. 770

Tables

Page

Table 1. Rabinowitz's three vectors of ecological scale 6

Table 2. Taxa from Wilhelm (1990) that have changed nomenclature so that the species is subsumed in another or has been split from another. 9

Table 3. Locations of historical plant collection sites and synonyms for those site names and other points of interest. 17

Table 4. Special flora of the Indiana Dunes 26

Table 5. Examples of semi-quantitative and quantitative abundance scales used in plant ecology. 62

Table 6. Summary of species verified and reported for Miller Woods Unit of INDU 234

Table 7. Sources of new species verified and reported from Miller Woods. 257

Table 8. Summary of floristic statistics by subunit of Miller Woods 260

Table 9. Summary of species verified and reported for Tolleston Dunes Unit of INDU 267

Table 10. Sources of new species verified and reported from Tolleston Dunes. 285

Table 11. Summary of floristic statistics by subunit of Tolleston Dunes 289

Table 12. Summary of species verified and reported for Calumet Prairie Unit of INDU 293

Table 13. Sources of new species verified and reported from Calumet Prairie. 303

Table 14. Summary of floristic statistics for Calumet Prairie 304

Table 15. Summary of species verified and reported at West Beach Unit of INDU 306

Table 16. Sources of new species verified and reported from West Beach. 323

Table 17. Summary of floristic statistics by subunit of West Beach 325

Table 18. Summary of species verified and reported for Inland Marsh Unit of INDU 333

Table 19. Sources of new species verified and reported from Inland Marsh. 351

Table 20. Summary of floristic statistics by subunit of Inland Marsh 353

Table 21. Summary of species verified and reported at Bailly Unit of INDU 358

Table 22. Sources of new species verified and reported from Bailly 377

Table 23. Summary of floristic statistics by subunit of Bailly 380

Table 24. Summary of species verified and reported at Cowles Dunes Unit of INDU 390

Table 25. Sources of new species verified and reported from Cowles Dunes. 420

Table 26. Summary of floristic statistics by subunit for Cowles Dunes 425

Table 27. Summary of species verified and reported at Indiana Dunes State Park Unit of INDU 433

Table 28. Sources of new species verified and reported from Indiana Dunes State Park. 458

Table 29. Summary of floristic statistics by subunit of Indiana Dunes State Park 462

Table 30. Summary of species verified and reported at Furnessville Unit of INDU 467

Table 31. Sources of new species verified and reported from Furnessville. 491

Tables (continued)

Page

Table 32. Summary of floristic statistics by subunit of Furnessville 496

Table 33. Summary of species verified and reported at Keiser Unit of INDU 503

Table 34. Sources of new species verified and reported from Keiser. 534

Table 35. Summary of floristic statistics by subunit of Keiser 540

Table 36. Summary of species verified and reported at Tamarack Unit of INDU 545

Table 37. Sources of new species verified and reported from Tamarack. 567

Table 38. Summary of floristic statistics by subunit of Tamarack 572

Table 39. Summary of species verified and reported at Heron Rookery Unit of INDU 578

Table 40. Sources of new species verified and reported from Heron Rookery. 585

Table 41. Summary of floristic statistics by subunit of Heron Rookery 586

Table 42. Summary of species verified and reported at Hobart Prairie Grove Unit of INDU 590

Table 43. Sources of new species verified and reported from Hobart Prairie Grove. 602

Table 44. Summary of floristic statistics by subunit of Hobart Prairie Grove 605

Table 45. Summary of species verified and reported at Hoosier Prairie Unit 608

Table 46. Sources of new species verified and reported from Hoosier Prairie at INDU. 628

Table 47. Summary of floristic statistics by subunit of Hoosier Prairie 630

Table 48. Summary of species verified and reported at Pinhook Bog Unit of INDU 633

Table 49. Sources of new species verified and reported from Pinhook Bog. 647

Table 50. Summary of floristic statistics by subunit of Pinhook Bog 648

Table 51. Total flora of INDU by taxonomic level (species, varieties, and hybrids) and origin (native, adventive, and invasive) 651

Table 52. Total flora of INDU by growth form, taxonomic level (species and varieties), and origin (native, adventive, and invasive) 652

Table 53. Species possibly extirpated from the Indiana Dunes. 653

Table 54. Summary of floristic statistics, by unit, at Indiana Dunes 654

Table 55. Potential for adventive species found at the Indiana Dunes National Park to behave like invasive species or become overabundant in the dunes 657

Table 56. Most invasive exotic plant species found at Indiana Dunes National Park 661

Table 57. Comparison of frequency of invasive woody plant species between two time periods at Indiana Dunes National Park 662

Table A1. Affiliations of people cited in this report 719

Table B1. Flora of the Indiana Dunes 727

Table C1. Species to include in future revisions of the special flora. 765

Table E1. Unique characteristics of Indiana Dunes flora and the numbers of each. 771

Appendices

Page

Appendix A. Affiliations of people cited in this report. 719

Appendix B. Flora of the Indiana Dunes. 727

Appendix C. Species not included in the special flora, but should be elevated to special flora status in future revisions. 765

Appendix D. Towns, roads, and hydrologic features (lakes, ponds, and rivers) in and around Indiana Dunes National Park. 767

Appendix E. Flora of the Indiana Dunes by the numbers. 771

Executive Summary

The Indiana Dunes (comprised of 15 geographic units (see Figure 1) which include Indiana Dunes National Park, Dunes State Park, and adjacent Shirley Heinze Land Trust properties) are remarkable in the Midwest and Great Lakes region for the vascular plant diversity, with an astounding 1,212 native plant species in an area of approximately 16,000 acres! This high plant diversity is the result of the interactions among postglacial migrations, the variety of soil substrates, moisture conditions, topography, successional gradients, fire regimes, proximity to Lake Michigan, and light levels. This richness is all the more significant given the past human alterations of the landscape resulting from logging; conversion to agriculture; construction of transportation corridors, industrial sites, and residential communities; fire suppression; land abandonment; and exotic species invasions. Despite these impacts, multiple natural areas supporting native vegetation persist. Thus, each of the 15 units of the Indiana Dunes presents up to eight subunits varying in human disturbance and consequently in floristic richness. Of the most significant units of the park in terms of number of native species, Cowles Dunes and the Dunes State Park stand out from all the other units, with 786 and 686 native species, respectively. The next highest ranked units for numbers of native species include Keiser (630), Furnessville (574), Miller Woods (551), and Hoosier Prairie (542). The unit with lowest plant richness is Heron Rookery (220), with increasing richness in progression from Calumet Prairie (320), Hobart Prairie Grove (368), to Pinhook Bog (380).

Significant natural areas, retaining native vegetation composition and structure, include Cowles Bog (Cowles Dunes Unit), Howes Prairie (Cowles Dunes), Dunes Nature Preserve (Dunes State Park), Dunes Prairie Nature Preserve (Dunes State Park), Pinhook Bog, Furnessville Woods (Furnessville), Miller Woods, Inland Marsh, and Mnoke Prairie (Bailly).

Wilhelm (1990) recorded a total of 1,131 native plant species for the flora of the Indiana Dunes. This was similar to the 1,132 species recorded by the National Park Service (2014) for the Indiana Dunes. Based on the nomenclature of Swink and Wilhelm (1994), Indiana Dunes National Park has 1,206 native plant species. If we include native varieties and hybrids, the total increases to 1,244 taxa. Based on the nomenclature used for this report—the Flora of North America (FNA 2022), and the Integrated Taxonomic Information System (ITIS 2022)—Indiana Dunes National Park houses 1,206 native vascular plant species.

As of this writing (2020), the Indiana Dunes is home to 37% of the species of conservation concern in Indiana (241 out of 624 Indiana-listed species): state extirpated = 10 species, state endangered = 75, and state threatened = 100. Thus, 4% of the state-listed species in the Indiana Dunes are extirpated, 31% endangered, and 41% threatened. Watch list and rare categories have been eliminated.

Twenty-nine species once documented from the Indiana Dunes may be extirpated because they have not been seen since 2001. Eleven have not been seen since 1930 and 15 since 1978. If we exclude these species, then there would be a total of 1,183 species native to the Indiana Dunes. Many of these are cryptic in their life history or diminutive, and thus are difficult to find.

Looking at the growth form of native plants, <1% (nine species) are clubmosses, 3% (37) are ferns, 8% (297) are grasses and sedges, 56% (682) are forbs or herbs, 1% (16) are herbaceous vines, <1% (7) are subshrubs (woody plants of herbaceous stature), 5% (60) are shrubs, 1% (11) are lianas (woody vines), and 8% (93) are trees.

Of the 332 exotic species (species introduced from outside North America), 65% (219 species) are forbs such as garlic mustard (*Alliaria petiolata*), 15% (50 species) are graminoids such as phragmites (*Phragmites australis* ssp. *australis*), 2% (seven

species) are vines such as field bindweed (*Convulvulus arvensis*), <1% (two species) are subshrubs such as Japanese pachysandra (*Pachysandra terminalis*), 8% (28 species) are shrubs such as Asian bush honeysuckle (*Lonicera* spp.), 1% (three species) are lianas such as oriental bittersweet (*Celastrus orbiculatus*), and 8% (23 species) are trees such as tree of heaven (*Ailanthus altissimus*).

Of the 85 adventive species, native species that have invaded from elsewhere in North America, 14% (11 species) are graminoids such as broom sedge (*Andropogon virginicus*), 57% (48 species) are forbs such as fall phlox (*Phlox paniculata*), 5% (six species) are shrubs such as Carolina allspice (*Calycanthus floridus*), 3% (two species) are subshrubs such as holly leaved barberry (*Berberis repens*), 1% (one species) is a liana (trumpet creeper (*Campsis radicans*), 3% two species) are herbaceous vines such as tall morning glory (*Ipomoea purpurea*), and 17% (15 species) are trees such as American holly (*Ilex opaca*).

A total of 436 species were found to be "special" based on political rankings (federal and state-listed threatened and endangered species), species with charismatic flowers, and those that are locally rare.

Acknowledgements

The gestation of this report equals at least twelve elephant pregnancies; 22 months per pregnancy. The project began in 1997 in the orthodox way, with a committee composed of P. Benjamin, R. Daum, and J. Stumpf of Indiana Dunes National Park (then Indiana Dunes National Lakeshore); N. Pavlovic of the U.S. Geological Survey's Lake Michigan Ecological Research Station; M. Newgent and B. Plampin from the Shirley Heinze Land Trust (then Shirley Heinze Environmental Fund); and G. Wilhelm of Conservation Design Forum and author of the first and second editions of *Special Vegetation of the Indiana Dunes National Lakeshore*. P. Benjamin, resource management botanist, was in charge and remained so until she left the national lakeshore in 1998. By that time, this project was taken over by Pavlovic because of lack of funds to purchase the services of G. Wilhelm. Since then, the product has been the responsibility of Pavlovic and Plampin and two tremendously helpful co-authors. It was the best and the worst of times to complete this project in 2019 and 2020. New information was available from a new generation of botanists. It was the worst of times due to the changing nomenclature as a result of modern genecology and advancements in plant classification and taxonomy. In addition, the 2017 completion of the mammoth Wilhelm and Rericha *Flora of the Chicago Region* necessitated a reassessment of plant nomenclature and a comparison of the nomenclature with other taxonomic treatments.

The authors thank the National Park Service, Great Lakes Natural Resource and Social Science Fund for a two-year, $16,380 grant to assist with producing rare plant surveys on new land acquisitions within the park. We also wish to thank the Shirley Heinze Land Trust for a $10,000 grant toward preparing this report. These funds were used to produce topographical maps of new national lakeshore acquisitions, and they enabled the national lakeshore to make payments for plant surveys by G. Wilhelm and for computer work by K. Quinlan. However, when funds ran out, this report became a labor of love, mostly executed on Pavlovic's time with the encouragement and support of the second author. The second author conceived the need for a new version of the *Special Vegetation*, and the number of new records to the flora of the park, units, and subunits justifies this revision.

We are indebted to G. Wilhelm, who wrote the first and second volumes of the "Special Flora" and who conducted additional surveys of the park in the 1990s for the Shirley Heinze Land Trust. Pavlovic began work on this project in 1998. Since then, the report was renamed the "Special Flora" to emphasize the flora rather than the former term "Special Vegetation" because the latter connotes plant communities rather than individual species. This perspective does not negate the fact that these species are components of plant communities or that our goal is to preserve the dune ecosystem with as many species as possible. In this regard, paleobotanical studies have consistently shown that plant communities that have no modern analog have existed in the past, suggesting that there is flexibility and redundancy in the organization of plant communities.

Wilhelm's new records and additions are recorded in this report by specimen notations or by the implicit *x*'s in the species list tables, but they are not otherwise readily distinguishable from his former discoveries. We have taken a slightly more liberal approach to Wilhelm's method of placing *x*'s only where he has seen the plant or the herbarium specimen. We have added reports from other reliable botanists by annotating their names and dates of discovery. We also conducted additional herbarium surveys at the Indiana Dunes National Park herbarium, besides recording our new discoveries. Otherwise, the report is entirely ours, and we have departed from Wilhelm's original *Special Vegetation* documents in form and in content. Comments in square brackets [ ] are our comments or corrections to the information previously provided.

K. Frohnapple created Figure 7 and made additional plant discoveries. M. Korte and

E. Pizza assisted with final statistics. A. Davies assisted with final edits before the manuscript was submitted to the National Park Service for final edits and formatting. R. Scribailo reviewed the aquatic species narratives for accuracy.

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We dedicate the third edition to the memory of the first botanists who explored the dunes: E. J. Hill, Henry Chandler Cowles, Donald Culross Peattie, Herman Silas Pepoon, Charles Clemon Deam, Reverend Marcus W. Lyon, and Floyd Swink. Thanks to E. Ehn who provided historical details for this report.

We also hold in our hearts the many people such as Beth Sheehan, Dorothy Buell, Paul Douglas, Herb and Charlotte Read, Lee Botts, and many others who all helped make the preservation of the Indiana Dunes possible. Without their tireless work, the flora would be greatly reduced if not all together destroyed. This report is dedicated to the former and second superintendent of Indiana Dunes National Park, Dale Engquist, who tragically died on 4 June 2017. His leadership in the formative years of the Indiana Dunes National Lakeshore was instrumental in the strong emphasis on research, resource management, and conservation for this significant urban national park. This report is further dedicated to the memory of Emma Bickham Pitcher, a preeminent birder and botanist in the Indiana Dunes from the early 1970s to 1987. Bickie was a dear friend to Pavlovic and Plampin. We also dedicate this report to David Hamilla, who passed away on 31 August 2018. David was truly a renaissance man who had passions for the sciences (paleontology, botany, geology), the arts, and fine cooking. We were greatly saddened by the untimely passing of Keith Board on 12 January 2019. Keith was an enthusiastic botanist and important contributor to the flora of northwest Indiana.

Dr. Noel Pavlovic dedicates this to his family—Sarah, Nathan, and Emily—who endured his preoccupation for hours while working on this project, and to his childhood friend, Peter Albrink, who passed away in 2003 from many years of illness. He and Noel spent many hours as children exploring the outdoors in Morgantown, West Virginia.

Pavlovic has taken the following liberties in revising this document. He has eliminated redundancies such as listing of geographic affinities within each chapter and has retained sources by including them in Table 1. He reorganized the introduction so that it flows in a smoother fashion and reordered the plant community descriptions to reflect successional or ecological relationships rather than an alphabetic order. He has greatly altered much of the text especially when he disagreed with Wilhelm's previous statements or where the weight of ecological literature does not support Wilhelm's scientific opinions. Where Wilhelm and the Pavlovic have significant disagreements, we retained some of Wilhelm's views and included Pavlovic's. We have eliminated certain previous idiosyncrasies such as bolding species scientific names and plant community names, and underlining subunit letters. Editorial comments by Pavlovic within quotations are in square brackets [ ].

Thanks to Indiana Dunes National Park and the Great Lakes Inventory and Monitoring Network for supporting the final stages of this project. Special thanks to G. Wagner and T. Gostomski. R. White of the USGS greatly contributed to consistency and clarity of this report.

Pavlovic takes full responsibility for any errors in this report.

Acronyms and Botanical Terms

Achene: A dry, indehiscent (*see definition below*) fruit that often has only one seed.

Actinomorphic: Flowers that show radial symmetry.

Anastomosing: Structures that are interconnected as in veins or bark ridges.

Apetalous: A flower lacking petals.

Aril: A fleshy tissue attached to a seed that may act as an attractant to a dispersing organism.

BA: Bailly Unit

Berry: A fleshy single seeded fruit from a single ovary.

Bilabiate: A two-lipped flower corolla.

BONAP: The Biota of North America Program

Bract: A reduced leaf-like structure subtending a flower, inflorescence, or branch.

Bulb: A short underground shoot composed of multiple overlapping leaves (e.g., onion).

BUT: Butler University Herbarium

Caespitose, cespitose: Growing in tufts or dense clumps.

Calciphile: A plant that prefers alkaline/high pH soils.

Carpel: The fundamental unit of a female flower; a sac containing an ovule(s). A pistil can be composed of single or multiple carpels. Each carpel encloses one or many ovules, the sac that encloses the ovary of a plant.

CD: Cowles Dunes Unit

Chasmogamous: A flower that opens to allow cross pollination (*see* cleistogamous).

Cleistogamous: A flower that never opens and thus self pollinates, e.g. many violet plants.

CoC: Coefficient of Conservatism

Connate: Fused as in leaves fused together at their bases.

Corm: A short and thick underground stem without leaves.

Corolla: The unit made up of the petals in a flower.

CP: Calumet Prairie Unit

Crassulacean acid metabolism (CAM): A photosynthetic pathway that involves separation of the light reaction of photosynthesis (photons providing energy to power starch creation) from the dark reaction (uptake of CO_2 and loss of moisture). Overnight CO_2 is taken up and converted to the malate, a four carbon molecule that is acidic. This pathway was first discovered in *Crassula* species.

CSSSBR: Chicago South Shore and South Bend Railroad (now The South Shore Line)

Culm: The stem of a grass or sedge.

Cyathium: The inflorescence of spurges (*Euphorbia*) resembling a single flower but having a cup-shaped involucre of fused bracts enclosing several male flowers and one female flower.

Cyme: A flower cluster or inflorescence with the central stem bearing a single terminal flower that develops first. The other flowers in the cluster develop as terminal buds of lateral stems.

Cymule: Several flowers forming part of a compound cyme (e.g., three clustered florets in *Betula*).

Dioecious: A Greek word meaning "two houses." Plants having the male and female reproductive organs in separate individuals.

Drupe: A fleshy fruit with a seed enclosed in a hard endocarp producing a pit (stone).

DSP: Dunes State Park

EIU: Eastern Illinois University Herbarium

Elaiosome: An oily appendage on a seed that attracts ants to carry the seed away from the mother plant.

Extirpated: Extinct in part of the plant's range.

F: The Field Museum Herbarium

Filiform: Structures such as leaves that are needle-like in form.

FQI: Floristic Quality Index

FV: Furnessville Unit

Glume: A leaf-like bract that subtends grass spikelets (absent, one, or two).

Gynoecium: Referring to the female parts of the flower: ovary, style, and stigma.

Helicoid cyme: An inflorescence, or cyme, in which each flowering branch gives rise to one lateral branch that is coiled snail-like and then expanded. Typical of the Boraginaceae family.

Hemiparasite: Photosynthetic plant that germinates on the roots of a host plant.

HP: Hoosier Prairie

HPG: Hobart Prairie Grove

HR: Heron Rookery

HUH: Howard University Herbarium

Hydromesophytic: Refers to plants that inhabit communities that are between wet (hydric) and mesic (moist).

Hypanthium: The fused sepals and petals that surround the gynoecium in flowers with inferior ovaries.

ILLS: Illinois Natural History Survey Herbarium

IM: Inland Marsh Unit (now called Tolleston Dunes)

IND: Indiana University Herbarium (Deam Herbarium)

Indehiscent: A pod or fruit that does not split open to release the seeds when ripe.

IN DNP: Indiana Division of Nature Preserves

INDU: Indiana Dunes National Park

Inferior: Perianth where the ovaries are below the calyx (sepals) and corolla (petals).

Inflorescence: The flower cluster including pedicels, bracts, and flowers.

Involucre: The bracts at the base of a unit (head of flowers or umbel) in a compound inflorescence.

ITIS: Integrated Taxonomic Information System (https://www.itis.gov/).

KE: Keiser Unit

KKH: Kathryn Kalmbach Herbarium, Denver Botanic Garden

Lemma: The larger bract that encloses the ovule in a grass floret.

Ligule: The hairs or appendage in a graminoid at the base of the leaf blade at the top of the sheath.

Locule: The chamber in a single ovule or carpel. Multi-carpellate pistils can have one to many locules.

Mericarp: One of the units that a multiple fruit splits into (i.e., the schizocarp seeds).

MICH : University of Michigan Herbarium

MIN: University of Minnesota Herbarium

MO: Missouri Botanical Garden Herbarium

Monoecious: A Greek word meaning "one house." Plants that have male and female reproductive organs in individual flowers or separate flowers on the same plant.

MOR: Morton Arboretum Herbarium

MU: Marshall University Herbarium

Mucilaginous: Plant tissue or secretion that is moist and sticky, as in stems of spiderwort.

MW: Miller Woods Unit

Myrmecochorous: A plant whose seeds are dispersed by ants.

Nectary: A nectar-secreting gland.

NEI: Neiuwland Herbarium of University of Notre Dame

NHMU: Natural History Museum of Utah Herbarium

NICTD: Northern Indiana Commuter Transportation District

NIPSCO: Northern Indiana Public Service Company

NMC: New Mexico State University Herbarium

Node: The point on a stem where leaves or branches arise.

Ocrea: The tubular sheathing stipule in the Polygonaceae family.

Palea: The smaller and upper bract that encloses the ovule in the grass floret. It is opposite the lemma and often hidden by the lemma.

Palmate: A compound leaf that has more than three leaflets originating from the same point, like fingers on a hand.

Panicle: An inflorescence in which the pedicels arise from a branched axis rather than from a simple central axis.

PB: Pinhook Bog Unit

Pectinate: Very deeply pinnatifid leaf or stipule.

Perfect: Flower that has both male (stamens) and female (pistils) parts.

Perianth: Refers to the combination of calyx (collective sepals) and corolla (collective petals).

Perigynia: The sac-like case around the female sedge flower.

Petal: The often brightly colored modified leaves in a flower that often function to attract pollinators to the flower. The petals are interior to the sepals.

Petiole: The stem of a leaf.

Phyllary: A single, leafy bract of the involucre of a composite flower. Phyllaries surround and enclose the flower head of a plant in the Asteraceae.

Phyllode: An expanded petiole that resembles a leaf.

Pinnately compound: A compound leaf that is feather-like in having many opposite leaflets.

Pistil: The female unit of the flower composed of the ovary, style, and stigma.

Pistillate: Referring to a female flower.

Pollen: A fine powdery substance of grains that contain the male reproductive cells (sperm) in seed plants.

Polygamous: Plants that bear male, female, and/or bisexual flowers on the same or different plants.

Recalcitrant: A seed that is difficult to germinate, often due to a lack of understanding of required germination conditions.

Rhizome: Modified, horizontal, underground stem that can store carbohydrates and help in vegetative reproduction.

Rudimentary: Minimal in structure or basic form.

Saprophyte: A plant that lacks chlorophyll so receives nutrition from dead or decaying plant material, usually through a fungal intermediary connecting to its roots.

Scape: The shoot or stem that bears flowers.

Schizocarp: A fruit that splits at maturity into two or more independent and indehiscent parts.

Sepal: Modified, often green, leaves that subtend the petals and that serve as the flower bud cover. Sepals are collectively called the calyx.

Silicle: A mustard fruit that is wider than it is long.

Silique: A mustard fruit that is long and thin and always longer than wide.

Spadix: The compact floral spike in the Acoraceae and Araceae that contains clusters of reduced female or male (or both) flowers.

Spathe: The bract that subtends the floral unit of species in the Acoraceae and Araceae families.

Spikelet: The cluster of flowers in a grass or sedge.

Stamen: The male, or pollen-producing, structure in flowering plants that are composed of filaments and anthers.

Staminate: Referring to a male flower.

Stellate: Star-shaped, usually referring to hairs on a plant.

Stipule: A leaf-like bract, in pairs, at the base of a leaf petiole.

Superior: Perianth where the ovaries are above the calyx (sepals) and corolla (petals).

SW4: Swink and Wilhelm (1994), *The Flora of the Chicago Region*, 4th edition.

Syconium: A type of inflorescence borne by figs (genus *Ficus*) that is formed by an enlarged, fleshy, hollow receptacle with multiple ovaries.

TA: Tamarack Unit

TD: Tolleston Dunes Unit (excluding Inland Marsh)

Tepal: Refers to sepals and petals when they have the same shape and color.

Trifoliate: A compound leaf that has three leaflets.

Tufted: Culms of a grass or sedge that are clustered into groups or clumps.

Turion: The vegetative reproductive unit of aquatic plants such as bladderworts.

Two-ranked: Refers to leaves or bracts that are opposite each other but in two planes 90 degrees from each other.

Umbel: A floral unit in the carrot family (Apiaceae), where the cluster of flowers originates from a single point.

USDA Plants: U.S. Department of Agriculture Plants database (https://plants.usda.gov/home).

UTC: Intermountain Herbarium, Utah State University

Waif: A plant that appears randomly in a new location.

WB: West Beach Unit

Whorled: The arrangement of leaves, branches, or flowers where more than two have the same point of attachment and arise at the same node.

W&R: Wilhelm and Rericha (2017) *Flora of the Chicago Region*.

Zygomorphic: Flowers that lack radial symmetry but are bilaterally symmetrical.

Introduction

In the heart of the Middle Western prairie country, on the threshold of one of the world's largest cities, lies a wild and fascinating treasure land of plant life. —Donald Culross Peattie (1930)

For over 140 years, the Indiana Dunes region of Northwest Indiana has been the focus of botanical and ecological investigations. The dunes provide a varied landscape different from much of the glacially flattened Midwest. Thus, botanists have been attracted to the juxtaposition of this landscape to Lake Michigan, the varied views of the shoreline, and the enthusiasm of finding a valley, glen, or open savanna slope replete with floral interest. Despite this long history of botanical exploration, dedicated and observant botanists have described many previously unreported plants since 1990. The Indiana Dunes contains two of the most imperiled ecosystems in the world: prairies and savannas (Hoekstra et al. 2005, Dinerstein et al. 2017). The Indiana Dunes is at the southern tip of Lake Michigan in the Great Lakes basin and is 35 miles southeast of Chicago, Illinois.

This report is the third in a series that documents the existence and status of special flora of Indiana Dunes National Park and adjacent areas in the Indiana Dunes. Until 15 February 2019, when Congress changed the park's name, the national park was known as Indiana Dunes National Lakeshore. Indiana Dunes National Park is the 61st national park in the National Park System. This report is an updated and expanded version based on the second edition of *Report on the Special Vegetation of the Indiana Dunes National Lakeshore* (Wilhelm 1990). The purpose of this revision is to document the flora of the Indiana Dunes on a unit and subunit basis, to document floral discoveries made in the last 30 years (since 1990), to develop a better understanding of the processes that are influencing the flora, and to provide a benchmark for future floristics and ecosystem management on the threshold of expected climatic changes. The latter focus is quite relevant as climate warming accelerates, brought about by increasing atmospheric CO_2 from human combustion of fossil fuels.

The geographic scope of this report covers the protected lands of Indiana Dunes National Park, Indiana Dunes State Park, Indiana Division of Nature Preserves, and the Shirley Heinze Land Trust (SHLT). The term "Indiana Dunes" is used to refer to this general protected region. We will use the official National Park Service (NPS) acronym INDU when referring to the lands of Indiana Dunes National Park rather than "Lakeshore" that Wilhelm (1990) used (see Appendix A for a list of all people mentioned in this report). The Indiana Dunes is still a lakeshore of Lake Michigan, but it is no longer labeled as a "Lakeshore" in referring to the protected lands.

We have divided the Indiana Dunes into 15 geographic units (hereafter called units) (Figures 1 and 2) and used these units to document the distribution of special flora. Most units are consistent with Wilhelm (1990), but we have split the West Beach Unit into a north and south unit that are respectively called West Beach and Inland Marsh. The NPS renamed Inland Marsh as Tolleston Dunes, which is confusing since two units have the same name; thus, we have chosen to retain the older name of Inland Marsh. We have added two new units: Calumet Prairie south of Tolleston Dunes, and Hobart Prairie Grove, that covers the lands of the new unit west of Hobart, Indiana. Two units have been renamed: Dune Acres to Cowles Dunes Unit and Visitor Center to Furnessville Unit (Figure 2). The majority of units are comprised mostly of national park lands except for Calumet Prairie, Dunes State Park, and Hoosier Prairie. Most units are

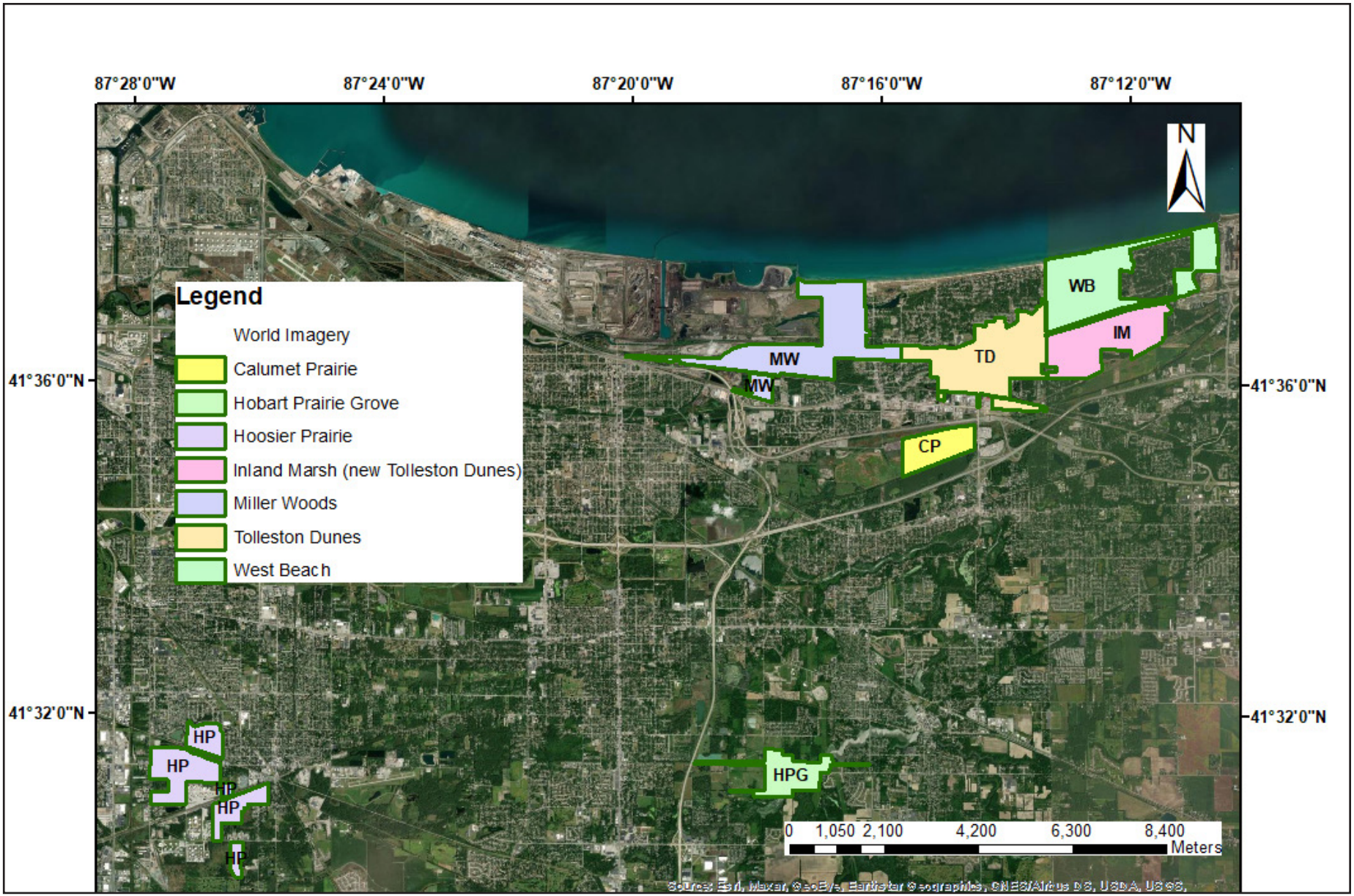


Figure 1. Survey units of the Indiana Dunes National Park, West Unit.
CP=Calumet Prairie, HP=Hoosier Prairie, HPG=Hobart Prairie Grove, IM=Inland Marsh, MW=Miller Woods, TD=Tolleston Dunes, WB=West Beach.

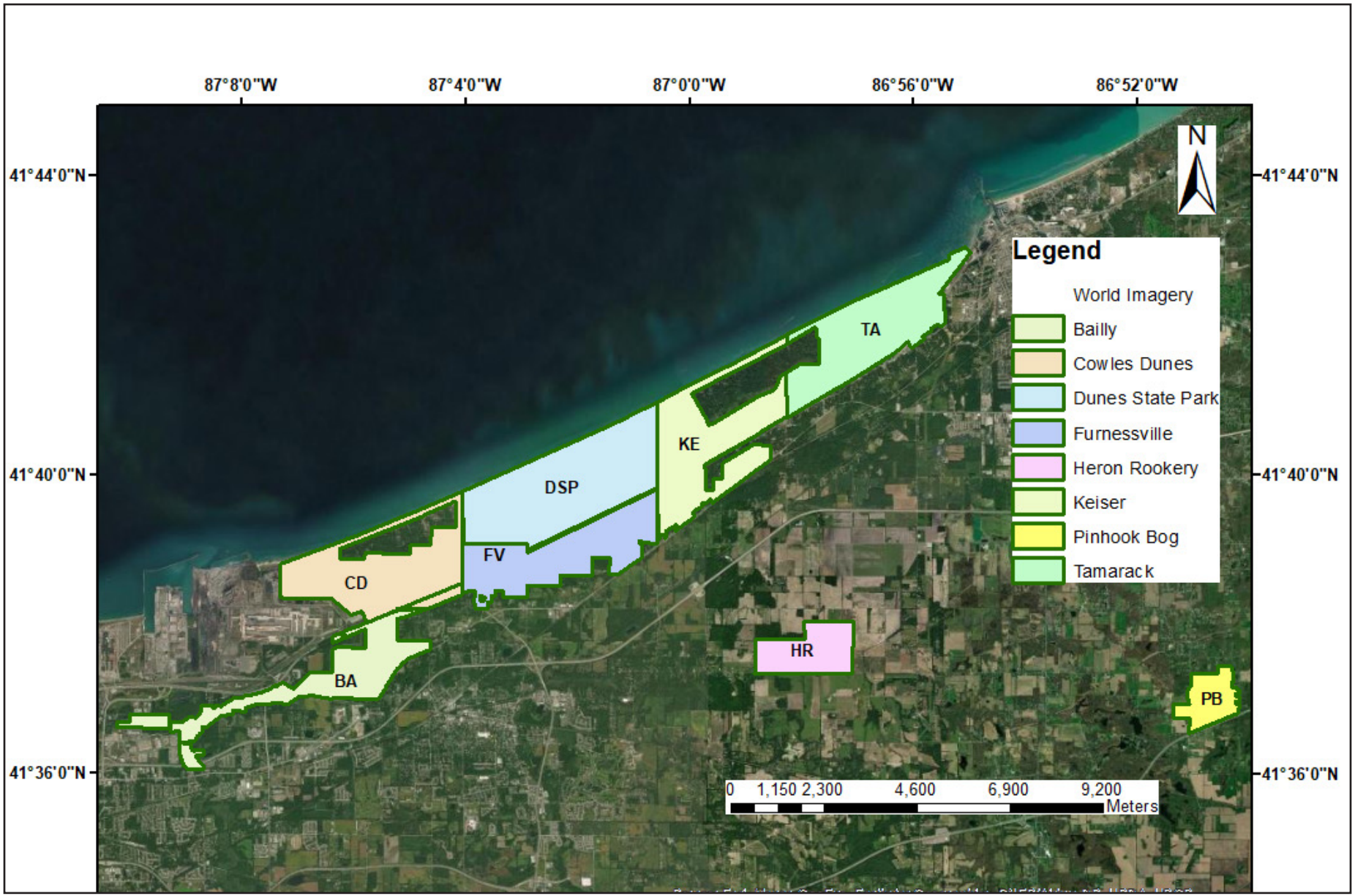


Figure 2. Survey units of the Indiana Dunes National Park, East Unit.
BA=Bailly, CD=Cowles Dunes, DSP=Dunes State Park, FV=Furnessville, HR=Heron Rookery, KE=Keiser, PB=Pinhook Bog, TA=Tamarack.

also subdivided into subunits, primarily based on portions that are separated by roads, but also based on ownership and on distinct ecological habitats. Within each unit, subunits are designated by alphabetic letters starting with the letter A. We have added subunits including Green Heron Pond to Miller Woods H, Coulter Prairie and Yellow Birch Fen to Inland Marsh B, MacAllister Prairie to Keiser H, Great Marsh to Keiser G, and Hiawatha, Drexwood, and Montana to Tamarack E. These are all properties owned by the Shirley Heinze Land Trust that are adjacent to INDU. We have added the Peddicord property, acquired by Save The Dunes, to Hobart Prairie Grove. The term "west unit," as used by the NPS, includes Miller Woods, Tolleston, Calumet Prairie, West Beach and Inland Marsh units. The "east unit" includes Bailly, Cowles Dunes, Dunes State Park, Furnessville, Keiser, and Tamarack units.

When "Lakeshore" is used in quoted material from Wilhelm (1990), this refers to INDU and the Dunes State Park. The units of INDU and the Dunes State Park define the areas of floristic analysis but include lands of the state of Indiana outside the state park (Calumet Prairie) and lands of Shirley Heinze Land Trust as listed in the previous paragraph. We refer to these collectively as the "Indiana Dunes." In this report, we define special flora as "locally rare, exemplary, relict, watch list, threatened, endangered, or extirpated native vascular plant species" (Wilhelm 1980). Exemplary was not defined but we can presume this means species that have unusual and attractive features that warrant their consideration. Relict in this context specifically refers to species left behind as climate changed, as in boreal relicts and species at extremes of their ranges such as Atlantic coastal plain disjunct species. Wilhelm (1980, 1990) also developed the concept of "special vegetation," which refers to vascular plants that could be given special attention with regard to their distribution and floristic status within the Indiana Dunes. We have retained this concept but use the term "special flora" for those species that we have singled out to highlight. We reserve the term "vegetation" specifically for the context of plant communities, for which it is usually employed, recognizing that the degree of human disturbance and the continuance of natural ecosystem processes will influence the presence of special flora within the indigenous and modified plant communities. "Special vegetation," in the vernacular, suggests some special component of vegetation in general, such as the Earth's green mantle, but is too vague in the context of restoring and managing a diverse dunal or any other ecosystem. Wilhelm (1990) identified many of the natural areas within INDU that still preserved a substantial degree of presettlement integrity and were, therefore, the areas most likely to provide habitats for special flora species.

Like previous versions, this report includes documentation of the flora of the Indiana Dunes including special flora, species accounts for special flora, and community and floristic summaries of the units of the Indiana Dunes. We characterize the presettlement vegetation and identify areas with few or no native vegetation associations that would benefit from restoration and management towards native plant communities. We identify singular parcels of native vegetation by park unit. Previously, an annotated flora of the special flora was included in the discussion of each park unit (formerly 13 units, now 15) (Wilhelm 1990). Instead, in this report, we discuss the entire annotated special flora in a single chapter placed ahead of the unit chapters. This structure permits a comprehensive discussion of each special flora species rather than repeated discussion in each section. In each unit chapter, we present a list of flora and special flora, a floristic quality assessment, and a natural area inventory. In the floristic summary for each unit chapter, we highlight special flora using bold genus and species names. The unit chapters are followed by a summary chapter that includes discussion of ongoing and future trends and a catalogue of the flora of the entire Indiana Dunes region (excluding the towns of Miller, Ogden Dunes, Dune Acres, and Beverly Shores).

The nomenclature in this report follows the Flora of North America (FNA 2022)

for families completed to date. For families that are not yet summarized by FNA, we are using the Integrated Taxonomic Information System (ITIS 2022). Nomenclatural authorities are included in the annotated lists, the flora, and the table of special flora, and are excluded from the text, except when the common name is first used. Family names are based on the latest information from the Angiosperm Phylogeny Group (2009, 2016) and Tony Reznicek's Michigan Flora Online (2019) (nomenclature from FNA or ITIS is provided in the final floral list in Appendix B). Pavlovic scoured Wilhelm and Rericha (2017) for new records and species to include in this treatment and cross-referenced new species and new nomenclature against FNA, ITIS, U.S. Department of Agriculture (USDA) Plants database, and the Michigan Flora. When species nomenclatural changes have occurred based on recent published reports and monographs, we have chosen the new names. Examples include *Opuntia cespitosa* rather than *O. humifusa* (Majure et al. 2017) and *Crocanthemum canadense* rather than *Helianthemum canadense* (Kubitzki and Chase 2003, Obae et al. 2013).

We discuss post-settlement human disturbances and changes in ecological conditions that have altered the presettlement vegetation pattern through time. Large areas of Indiana Dunes' vegetation have been greatly altered by human disturbance, the extinction or extirpation of species such as the passenger pigeon (*Ectopistes migratorius* L.) (Ellsworth and McComb 2003), bison (*Bison bison* L.) (Kaiser 1998, Trager et al. 2004, Martin and Wilsey 2006), elk (*Cervus canadensis* Erxleben), and bobcat (*Lynx rufus* Schreber) (Whitaker et al. 1994), and the introduction of non-indigenous plant and animal species. In this context, we discuss methods of maintaining, rehabilitating, and encouraging the development of healthy native plant communities. We note recent and continuing restoration efforts by Dr. Daniel Mason (NPS botanist at INDU) and others.

Wilhelm's (1980) concept of special flora, as discussed in the second *Special Vegetation of the Indiana Dunes National Lakeshore*, is largely based on political designations. As mentioned above, Wilhelm wrote that special flora, "as applied to vascular plants of the Indiana Dunes National Lakeshore, encompasses species that are locally important and are recognized in being described as 'unique', 'exemplary', 'relict', 'threatened', or 'endangered', and 'locally rare'." These conceptual terms span species characterization from geopolitical rankings based on artificial legal boundaries (e.g., state and counties) to geographic parameters. While there are no known vascular plant species that are unique or endemic to the Indiana Dunes, the region is the most botanically rich region in the Laurentian Great Lakes and the upper Midwest of the United States.

Relevant to any discussion of special flora is the concept of ecological rarity. Rabinowitz (1981) defined rarity based on three important ecological factors: the abundance or population size of the species in the habitat where it occurs, the range of habitats in which it occurs, and the geographic range of the species. For instance, dominance diversity curves and frequency distributions demonstrate that most species are rare and only a small subset may be common (Daubenmire 1974). Some species are habitat restricted, while others occur across a broad range of habitats. Setting low and high levels to these three factors, Rabinowitz defined eight categories of rarity (Rabinowitz 1981). For example, a species of large population size, wide habitat specificity, and large range is defined as a common species (Table 1).

The distribution of species among these rarity categories is scale-dependent, highlighting the importance of geographic range and fidelity that Wilhelm (1990) highlighted in his concept of special vegetation. On this planet Earth, highly impacted by humans, it is often difficult to evaluate population size as a criteria for ranking species, especially for species that have attained high population levels due to novel human disturbance (Pavlovic 1994). As a result, remnants retaining native vegetation composition and structure provide the only benchmark that we have for determining relative population size.

Table 1. Rabinowitz's three vectors of ecological scale that describe species distribution using population size (large or small), geographic range (large or small), and habitat specificity (wide or narrow).

	Large Range		*Small Range*	
Population Size	*Wide Specificity*	*Narrow Specificity*	*Wide Specificity*	*Narrow Specificity*
Large	Common	Predictable	Regionally common	Endemic
Small	Generalist	Specialist	Nonexistent?	Rare

Within plant communities, most species are rare, and it is probably from the rare species that we might select special floristic species. Wilhelm (1990) placed importance on the fidelity of a species to a particular habitat, so that habitat specialists can be considered rare relative to generalists. The fallacy of this argument is that all native species occurred in native communities whether they were stable or ephemeral. Just because they might occur today in human disturbed habitats does not demean their importance or existence. However, it does alter their relative abundance compared to, say, the landscape before the arrival of Europeans. Nevertheless, in our limited view of species abundance and distribution prior to European settlement, existing habitat restriction is a good criterion for selecting special floristic elements.

While the relative proportions of habitats in general have changed greatly because of habitat loss and human land use, we can only approximate the relative proportion or distribution of habitats based on maps of presettlement vegetation derived from Government Land Survey Office records (Bowles et al. 1998, Bowles et al. 2015a). However, pollen cores, other paleoecological methods, and genomics analyses can also provide some insight (Futyma 1985, Lytle 2005, Gonzales et al. 2008). Nevertheless, basing the selection of special flora on proportional representation of presettlement habitats could be criticized because it does not represent the current condition of the species in terms of where it occurs and its demographic condition. In Illinois, where much of the state was prairie, we would be in error to not be concerned about rare prairie plants, since there is now less than 0.01% of the presettlement prairie remaining (White and Madany 1978). In addition, we would not be able to determine from presettlement vegetation maps whether the habitat specificity of a species was different in presettlement conditions.

Presently, we can only focus our concern for species based on their current habitat distribution, population, and geographic range. Therefore, in this report, we focus on special species that have a limited geographic distribution (based on political boundaries), have narrow or limited range (state-listed), habitat specificity, and low population size. We have added a few species to the special flora that are declining even though they are widely reported, such as American bittersweet (*Celastrus scandens*) and American ash (*Fraxinus americana*).

Methods

A person interested in botany, and living in easy reaching distance of this area [dunes region], *could render a valuable aid to science by preparing a special paper, based on a number of years of observation on the variations, habitat and insect visitors of the different species of plants growing on the sand covered area along the south shore of Lake Michigan.*
—Willis S. Blatchley (1898)

Compilation of Plant Taxa

The plant species that comprise the special flora (locally rare, exemplary, relict, watch list, threatened, endangered, or extirpated native vascular plant species) of the Indiana Dunes are extracted from four principal sources:

1. The plants listed by Swink and Wilhelm (1979) and Wilhelm (1990) as rare in the 22-county Chicago Region (i.e., those plants formerly having conservatism rating coefficients of 15 or 20 [see next paragraph] (Swink and Wilhelm 1979));
2. The endangered and threatened plants of Indiana (Bacone and Hedge 1979; Aldrich et al. 1986, 2003) and subsequently modified every few years (www.in.gov/dnr/nature-preserves/files/np-etrplants.pdf; Indiana Division of Nature Preserves 2016, 2018, 2022; Indiana Department of Natural Resources 2020);
3. Boreal relict and coastal plain disjunct species (Deam 1940; Friesner 1937; Hoober 1934; McLaughlin 1932; Parker 1936; Peattie 1922, 1930; Reznicek 1994; Swink and Wilhelm 1994; Trefz 1935; Welch 1935); and
4. Plants that are locally rare.

The Indiana endangered and threatened plant list was greatly modified in 2020 and in 2022. There are now only three categories instead of five (extirpated, endangered, and threatened), with the elimination of "state rare" and "watch list." When Wilhelm called his system the Natural Areas Quality Index, he assigned species a coefficient of conservatism (CoC) ranging from 0 to 20, with rarer species getting values of 15 or 20 (Swink and Wilhelm 1979, Wilhelm 1990). These CoC of 15 to 20 were criticized for over-emphasizing rare species in the index calculation, so Wilhelm subsequently changed the scale to 0 to 10 only (Swink and Wilhelm 1994). Plants originally included by Wilhelm (1980, 1990) that had a conservatism score of 15 or 20 are retained if they have a new score of 10, even if they are no longer listed as endangered or threatened plants in Indiana. The rescaled conservatism scores are found in Swink and Wilhelm (1994), and they were again updated in Wilhelm and Rericha (2017).

We added the new category "locally rare plants" to include special flora that occur in only one subunit of the park because they might disappear without our notice, depending on the cause for their rarity. Wilhelm and Rericha (2017) reevaluated the conservatism coefficients from Swink and Wilhelm (1994) (Appendix C). New taxa in the flora with a conservatism score of 10 are not included in the special flora. We leave it to future botanists to add them to the special flora.

We have eliminated species from the special flora including *Asimina triloba* (L.) Dunal, and *Smilax rotundifolia* L. because both are neither locally rare nor considered of special concern. Other species have been eliminated because they or their varieties are no longer recognized taxonomically at the species level by the Flora of North America or the Integrated Taxonomic Information System (ITIS): *Aster vimineus* Lam. (*Symphyotrichum racemosum* (Elliott) G.L. Nesom), *Carex annectens* var. *xanthocarpa* (E.P. Bicknell) Wiegand (C. *annectans* (E.P. Bicknell) E.P. Bicknell) (Hipp 2008), *Cornus stolonifera* Michx. var. *baileyi* (Coult. & Evans) Drescher

(now *C. sericea* Linnaeus), and *Vaccinium attrococum* (subsumed into *V. corymbosum* but retained as *V. fuscatum* Aiton in USDA Plants (2022). In addition, *Carex debilis* Michx., *C. debilis* var. *rudgei* L.H. Bailey, *C. rugosperma* (Fernald) E.P. Bicknell (*C. tonsa* var. *rugosperma* (Mackenzie) Crins), *C. tonsa* (Fernald) E.P. Bicknell, and *C.* × *subimpressa* (*C. lacustris* Willd.) are listed while recognizing that additional taxonomic research needs to be done on these species. Bald cypress (*Taxodium distichum*) is listed as threatened in Indiana, but populations in the Indiana Dunes were planted and thus are considered adventive, so this species is not included in the special flora. The same is true for *Wisteria macrostachya* (*Wisteria frutescens* (L.) Poir.), that is listed as state rare and was located only in disturbed former homesites. *Rubus odoratus* was listed by Wilhelm (1990) as a special floristic species, but this species was introduced to the Dunes State Park by Norman Bergendahl some time between 1950 and 1970. Norman also introduced bee balm (*Monarda didyma* L.) to the Dunes State Park. We list this species as adventive. Red bud (*Cercis canadensis*) is uncommon in the Indiana Dunes, but is considered adventive since it has been planted. We do not include this species when calculating native species statistics. We have added *Celastrus scandens* as a special flora species because it is declining due to successional advancement and due to hybridization with Asiatic bittersweet (*C. orbiculatus*) (Leicht-Young et al. 2010a, Zaya et al. 2015, Pavlovic et al. 2016, Zaya et al. 2017). *Amelanchier humilis* is no longer in the Dunes flora due to taxonomic revisions. In this context, *Amelanchier spicata* is now recognized, formerly part of *A. sanguinea* and *A. stolonifera*.

One species listed in 1990 as a special flora, *Galium brevipes*, has been eliminated from the flora since we believe it was never in the Indiana Dunes (Table 2). Oddly, Wilhelm (1990) listed *Potamogeton richardsonii* in the flora of the Lakeshore, but nowhere did he list where it was reported. We do not include this in the flora. We have not included *Hypericum sphaerocarpon* in the flora because its report is doubtful. Wilhelm reported it in a 25 July 1998 survey near the Dunewood Campground (Keiser Unit), but he did not mention it in the summary. He does not mention it in the narrative, so it is probably an error (Wilhelm and Rericha 2016). No specimen of this species has been collected within the Indiana Dunes, and Wilhelm and Rericha (2017) do not list it in Porter County.

Many groups of species are undergoing taxonomic revision by application of modern genetic tools that better examine biological variation within and among species, genera, and families (Table 2). The genus of *Viola* has also been revised, necessitating additional field work in the dunes. The distribution of the Viola species in INDU should be considered provisional until further reidentification is completed. We have retained the species of *Rubus* maintained in Swink and Wilhelm (1994) and the Flora of North America, although Wilhelm and Rericha (2017) have revised this group into species recognized by L.H. Bailey (Gleason and Cronquist 1991). As a result, a total of 13 new *Rubus* species could be identified. Wilhelm and Rericha (2017) have made extensive collections of *Rubus* since 2000. Wilhelm and Rericha (2017) provide county distribution maps of their new species of *Rubus*, but additional sleuthing is necessary to determine which of these new species occur in the Indiana Dunes, if that is important for managers.

In a few cases, splitting of species has occurred that is not recognized by FNA, but is consistently recognized by Midwestern herbaria based on new information. For instance, the recognition of *Juncus pylaei* as separate from *J. effusus* means that additional searches are required to understand their relative distributions in the Dunes. Additional similar new taxa include *Schizachyrium littorale* segregated from *Schizachyrium scoparium*.

More detailed information about the contemporary and phytogeographic floristic status of the special flora is provided in the Results section.

Table 2. Taxa from Wilhelm (1990) that have changed nomenclature so that the species is subsumed in another or has been split from another. Those that were special flora are retained in the unit flora lists but are not included in the park floral statistics since they are subsumed into higher level species based on FNA (2022) and ITIS (2022).

Taxa from Wilhelm (1990)	Treatment In This Report	Explanation
Acnida altissima Riddell	*Amaranthus tuberculatus* (Moq.) J.D. Sauer	Water hemp is currently locally rare, only being found in Furnessville Unit. Due to its low FQI, commonness elsewhere and disturbance dependent ecology, it is not considered a special flora species.
Andropogon scoparius Michx.	*Schizachyrium littorale* (Nash) E.P. Bicknell	FNA (2022), USDA Plants (2022), and Wilhelm and Rericha (2017) recognize this species as separate from *S. scoparium* (Michx.) Nash. We have not extensively surveyed for this new species, but presume it is present from Miller A, West Beach A and D, Cowles Dunes A and B, Dunes State Park A, Keiser B and Tamarack C. Surveys in 2020 can confirm this inference. Wilhelm and Rericha (2017) only list it from Lake and Porter Counties. Peattie (1922) considers this species a coastal plain disjunct. Consequently, we have added it to the special flora.
Apocynum sibiricum Jacq.	*Apocynum cannabinum* L.	ITIS (2022), USDA Plants (2022), BONAP (2021) agree that the former is just variation in *A. cannabinum*. Wilhelm and Rericha (2017) retain *A. sibiricum*. We are keeping these separate in the unit tables.
Boehmeria cylindrica (L.) Sw. var. *drummondiana* Wedd.	*Boehmeria cylindrica* (L.) Sw.	FNA (2022) points out that experimental and genetic studies are needed to discern the biological significance of this variety. For now it is not recognized except for in Wilhelm and Rericha (2017). We have retained both in the tables.
Bromus pubescens Spreng.	*Bromus nottowayanus* Fernald	FNA (2022), ITIS (2022), and USDA Plants (2022) all now distinguish this species from *B. pubescens*. Wilhelm and Rericha (2017) recognize this species and consider it more common than *B. pubescens*.
Carex annectens E.P. Bicknell var. *xanthocarpa* (E.P. Bicknell) Wiegand	*Carex annectens* (E.P. Bicknell) E.P. Bicknell	The variation in traits that distinguish this variety from var. *annectans* covary independently, so further consideration of this variation will be elucidated by additional study and evidence. We retain both the species and the variety in the unit flora tables. Wilhelm and Rericha (2017) include the variety in their flora.
Carex scirpoides Schkuhr	*Carex interior* L.H. Bailey	*Carex scirpoides* is now subsumed under the more common *C. interior*.
Carex subimpressa Clokey	*Carex* × *subimpressa* Clokey [*C. hyalinolepis* × *C. pellita*]	Dritz's specimen was identified by him as *C. trichocarpa*. Wilhelm identified it as *C. subimpressa* in 1985, a hybrid between *C. hyalinolepis* and *C. lasiocarpa*. In 1990, he identified it as *C. lacustris* × *C. lanuginosa*. In vPlants (www.vplants.org), Andrew Hipp determined it to be a hybrid between *C. lacustris* and *C. pellita*. But in 2012, Tony Reznicek suggests it is a hybrid between *C. lacustris* and *C. lasiocarpa*. While new to the Indiana Dunes, this confusing entity is being recognized as a variety of *C. lacustris*.
Carya ovalis (Wang.) Sarg.	*Carya glabra* (Mill.) Sweet	*C. ovalis* is now considered a form of the very polymorphic *C. glabra* (Flora of North America Editorial Committee 1997). Wilhelm and Rericha (2017) still accept this species.
Cornus stolonifera var. *baileyi*	*Cornus sericea* L. ssp. *sericea*	The variety is now considered a subspecies of *C. sericea* inconsistent with Wilhelm and Rericha (2017). They call it *C. baileyi* J. M. Coulter & W. H. Evans.

Table 2 (continued). Taxa from Wilhelm (1990) that have changed nomenclature so that the species is subsumed in another or has been split from another. Those that were special flora are retained in the unit flora lists but are not included in the park floral statistics since they are subsumed into higher level species based on FNA (2022) and ITIS (2022).

Taxa from Wilhelm (1990)	Treatment In This Report	Explanation
Crataegus succulenta Schrad. ex Link	*Crataegus succulenta* Schrad. ex Link var. *succulenta*	We have no evidence at present that *Crataegus succulenta* var. *succulenta*, state threatened, occurs in the Dunes. The specimen collected by Rericha and Wilhelm from the Hobart Prairie Grove needs to be examined to determine if it is var. *succulenta*. No specimens have been collected from Bailly and Heron Rookery.
Eleocharis smallii Britton	*Eleocharis palustris* (L.) Roem. & Schult.	According to Wilhelm and Rericha (2017) plants that occur in moist prairies and remnant pond margins are referable to *E. smallii*; however, they, too, lump this into *E. palustris*. We retain *E. smallii* in the unit flora tables for future reference, but do not include this species in the summary statistics.
Euthamia graminifolia var. *nuttallii*	*Euthamia graminifolia* (L.) Nutt.	The variety is now considered a portion of the broad variation of this goldenrod. Wilhelm and Rericha (2017) elevate this variety to species level: *E. nuttallii* Greene.
Fraxinus americana L. var. *biltmoreana* (Beadle) Fernald	*Fraxinus americana* L.	Generally, Biltmore ash is not recognized as a separate taxon. Wilhelm (1990) recorded this variety from Keiser C, Heron Rookery, and Hobart Prairie Grove. Wilhelm and Rericha (2017) have elevated this to a separate species, *F. biltmoreana* Beadle, based on the paper by Nesom (2010).
Fraxinus pennsylvanica Marshall var. *subintegerrima* (Vahl.) Fernald	*Fraxinus pennsylvanica* Marshall	While there is considerable variation in *F. pennsylvanica*, the separation of green ash and red ash has been rejected. Wilhelm reported this variety, green ash, from Tolleston Dunes B; West Beach C; Inland Marsh B; all of Bailly except A; Cowles Dunes B and D; Dunes State Park; Furnessville D, F, and G; Keiser B to F; Tamarack A and D; Hobart Prairie Grove; Heron Rookery A; and Pinhook Bog A. He reported red ash from Bailly B and D; Dunes State Park; Furnessville A, C, and F; Keiser B, C, E, and F; and Heron Rookery A. Wilhelm and Rericha (2017) further complicate matters by separating green (*F. lanceolata* Borkh.), red (*F. pennsylvanica* Marshall), and a new species, *F. smallii* Britton. More discussion about this issue can be found in Nesom (2010) and Campbell (2017).
Galium brevipes L.	*Galium labradoricum* (Wiegand) Wiegand	Iltis (1957) incorrectly attributed this specimen collected by E. J. Hill in 1879 to Porter County. Wilhelm (1990) considered it collected in the Dunes State Park. In fact, it was collected by E. J. Hill in Lake County, Indiana. Wilhelm and Rericha (2017) attribute the specimen to *G. labradoricum* Wieg., a species that has never been reported from the Dunes State Park and is known only from Cowles Bog. It is more likely to have been reported from Lake County as Hill attested.
Hydrangea arborescens L.	*Hydrangea arborescens* var. *sterilis* Torr. & A. Gray	Rediscovered by Nathanael Pilla in 2017. This species was originally found by Manke in 1998 while sampling for Pavlovic's exotic plant study (1998–2000). We use the name not accepted by most authorities, except for Wilhelm and Rericha (2017), to make clear that this is the cultivar and not the native species. The dunes region is just north of the range of the native species. See Wilhelm and Rericha (2017) for a discussion of this variant.
Juncus tenuis Willd. In part	*Juncus anthelatus* (Wiegand) R. E. Brooks	See Brooks and Whittemore (1999)

Table 2 (continued). Taxa from Wilhelm (1990) that have changed nomenclature so that the species is subsumed in another or has been split from another. Those that were special flora are retained in the unit flora lists but are not included in the park floral statistics since they are subsumed into higher level species based on FNA (2022) and ITIS (2022).

Taxa from Wilhelm (1990)	Treatment In This Report	Explanation
Juncus effusus L.	*Juncus pylaei* Laharpe	This species has been separated from *Juncus effusus* var. *pylaei*.
Lathyrus palustris L. var. *myrtifolius* (Willd.) A. Gray	*Lathyrus palustris* L.	Variety is not recognized by ITIS (2022) but is still recognized by Wilhelm and Rericha (2017). We retain both the species and the variety in the unit flora tables.
Lindernia anagallidea (Michx.) Pennell	*Lindernia dubia* (L.) Pennell	While Wilhelm and Rericha (2017) accept *L. anagallidea* at the species level, Lewis (2000), whom they cite, is clear that this variety does not warrant species status based on all morphological characters studied. Nevertheless, we retain *L. anagallidea* in the unit flora tables.
Maianthemum canadense Desf. var. *interius*	*Maianthemum canadense* Desf.	While the variety is not recognized in FNA (2022), we have retained it in the flora tables to distinguish it from the hairless variety that is considered having boreal affinities. The variety is not included in the floristic statistics except when calculating variety statistics.
Polygonum opelousanum var. *adenocalyx* Stanford	*Persicaria hydropiperoides* (Michx.) Small	The variety is still included in the special flora because it is considered a coastal plain species and is still listed as threatened by the state of Indiana.
Rubus enslenii Tratt.	*Rubus flagellaris* Willd.	While still listed by Indiana Division of Nature Preserves as endangered, this species is now considered a form of *R. flagellaris*. It was listed from Miller Woods G and H, Inland Marsh B and D, Furnessville F and G, and Keiser F. Wilhelm and Rericha (2017) call this species *R. baileyanus* Britton. We have retained *R. enslenii* in the special flora because of its state listing, but are clear that most consider it a part of *R. flagellaris*.
Rubus setosus Bigelow	*Rubus setosus* Bigelow	Wilhelm and Rericha (2017) divide this species into five taxa: *R. schneideri*, *R. semisetosus*, *R. wisconsinensis*, *R. missouricus*, and *R. wheeleri*. The latter two occur in the dunes.
Selaginella apoda (L.) Fernald	*Selaginella eclipes* W.R. Buck.	We have chosen to retain *S. eclipes* even though it is no longer on the Indiana list as of 2022.
Vaccinium atrococcum (A. Gray) A. Heller	*Vaccinium corymbosum* L.	*V. atrococcum* is considered a variety of *V. corymbosum* that has more pubescence (Swink and Wilhelm 1979, 1994).
Vernonia altissima Nutt. var. *taeniotricha* S.F. Blake	*Vernonia gigantea* (Walter) Trel. ex Branner & Coville	We retain the species and variety in the unit tables.

Floristic Survey Methods

Several different techniques were employed to update and expand the listing of special flora. As in previous versions, we relied on four tasks, namely literature review, herbarium searches, field surveys, and floristic assessments with mapping. The diversity and floristic quality assessment of Indiana Dunes was made to understand how various areas preserved their presettlement integrity. Maps of each survey unit were prepared to indicate presettlement vegetation, with disturbed areas being identified by diagonal hatch lines. Of the four tasks identified, this revision is largely based on herbarium searches, field surveys, and floristic assessment and mapping, and less so on literature review.

Literature review

A review of the botanical literature was conducted to compile a flora from which the special flora could be selected, and to identify specific localities within the Dunes where wild populations were known to occur. In previous editions, Wilhelm

(1980, 1990) examined numerous books, articles, reports, and studies that dealt, from one standpoint or another, with the contemporary vascular plants of the dune area of northwestern Indiana. Some of the more significant research efforts include those by Bacone et al. (1980), Brennan (1923), Buhl (1935), Coulter (1879), Cowles (1899b, 1901), Daniel (1977), Deam (1940), Downing (1922), Fuller (1925, 1934), Hill (1896), Hull (1937), Kologiski and Kantrud (1978), Krekeler (1977), Laughlin (1953), Lindsey et al. (1969), Lyon (1927, 1930), National Park Service (1979), Peattie (1922, 1926, 1930), Pepoon (1927), Reshkin et al. (1981), Swink and Wilhelm (1979, 1994), and Tryon (1936). Two generally reliable and classic sources, Lyon (1927, 1930) and Peattie (1930), have dealt specifically with the vascular flora of the Indiana Dunes.

Two sources, Deam (1940) and Swink and Wilhelm (1994), were used to test the likelihood or validity of species presence reports, and to provide consistent species concepts and nomenclature. For this third edition, we used data from reports, scientific literature, and personal observations to compile an updated flora list for the Dunes (Appendix B). The results from the 2009 BioBlitz (a twenty-four hour survey of all organisms conducted by scientists as well as the public) at the Indiana Dunes were examined for new records. As in Wilhelm (1980, 1990), we worked to establish a clear understanding of the meaning and locations of the historic place names that were used by previous botanists.

Herbarium searches

The herbarium search was undertaken to identify the specific localities within the Indiana Dunes where special flora have been known to grow as wild populations. The search was limited to several local herbaria known to house the plant collections of botanists most responsible for collecting in the Indiana Dunes, thus, it was not possible or necessary to visit all herbaria in the U.S.

In the 1980 and 1990 editions, Wilhelm surveyed the herbaria of Butler University, Indianapolis, Indiana (BUT); the Field Museum of Natural History, Chicago, Illinois (F); Indiana University, Bloomington, Indiana (IND); the Morton Arboretum, Lisle, Illinois (MOR); and the herbarium at INDU. For this third edition, we used vPlants: A Virtual Herbarium of the Chicago Region (www.vplants.org) and the Morton Arboretum Plant Records Database (https://mortonarb.org/science/center-for-tree-science/herbarium/) to examine digital specimens from the Morton Arboretum (MOR), the Field Museum of Natural History (F), Howard University Herbarium (HUH), Illinois Natural History Survey herbarium (ILLS), Marshall University (MU), Missouri Botanic Garden (MO), New Mexico State University Herbarium (NMC), Kathryn Kalmbach Herbarium at the Denver Botanic Garden (KKH), Natural History Museum of Utah (NHMU), Neiuwland Herbarium at the University of Notre Dame (NEI), Purdue North West, and University of Michigan (MICH). We also examined all specimens in the INDU Herbarium housed at park headquarters.

Historical Sites

When examining literature and herbarium specimens for species locations, the researcher must be aware of the specific names of collecting sites used by earlier collectors and writers. In the dunes, collectors described their localities either in terms of the old whistle stops and stations along the Chicago South Shore and South Bend Traction Rail Line, or in relation to nearby towns or villages. Historic train stations are shown in Figures 3–5 based on the 1920 Rand McNally map of the dunes (Goodman 1920). The locations of all these areas are known; however, several of these areas are no longer extant as natural areas and some of them are not specifically within the Indiana Dunes boundaries (Table 3).

Although the famous bog and swamp forest east of the Town of Miller was destroyed, such phrases as "sandy plains west of Miller" could probably be interpreted as including the black oak savannas in Miller Woods. It might also be possible that some of the west end of Long Lake of Tolleston Dunes B may have been included in the Miller references. In some cases, references to the dune area east of the Town of Miller (now called Miller

Beach or the Miller Beach Community, a neighborhood of the City of Gary) may include part of what is now within the western half of West Beach and northern portions of the Tolleston Dunes (see Appendix D for maps of towns and roads).

Another term that has caused some confusion is Pine. Pine, rather than referring to what is now a town in northeastern Porter County known as the Town of Pines (or simply The Pines), or another locality in La Porte County known as "Pine," is instead an area along Lake Michigan in Lake County at the north end of Clark Road, directly north of the old town of Clarke, which is now incorporated into Gary. This location should not be confused with Clarke Junction, which is about a mile or so west of Clark Road, both on the west side of the city of Gary. (Note that Clarke is spelled with an "e" in both Clarke and Clarke Junction and that Clark Road, at the north end of which was the Pine Station, is spelled without an "e.") The Indiana Nature Preserve south of Pine, on the west side of Clark Road, far west of INDU, that was formerly called Clarke and Pine Nature preserve is now properly called Pine Station Nature Preserve. The Pinery is an old growth white pine stand southeast of Big Blowout in the DSP along Trail 10.

The old Tamarack Station, another conifer name, was at the western edge of what is now the Town of Pines in the Tamarack Unit in Porter County (Goodman 1920) (Figure 5). While the location of the Tamarack Station is well known, the location of the Tamarack Bog has been a matter of contention. Recent geographic mapping of the Government Land Office plat maps and witness trees suggests the bog was immediately north of the Tamarack Station, but another bog was indicated just south of Beverly Drive to the northeast (Bowles et al. 2015a).

Lyon (1930) mentions that Coffee Creek, Dune Creek, and Fort Creek are all names for the same creek, but Cook and Jackson (1978) point out that Coffee Creek and Dune Creek are in entirely different watersheds (see Appendix D for maps of hydrological features in the dunes). Coffee Creek is part of the Little Calumet drainage in the town of Chesterton. Dune Creek/Fort Creek is the Dunes Creek drainage that starts on the Lake Border Moraine, now called Munson Ditch along its most developed central branch, and traverses the Great Marsh on its east and northward flow to Lake Michigan in the Dunes State Park.

At the Dunes State Park, Lyon (1930) says that "Furnessville Blowout is frequently spoken of as Drury's Blowout, and Big Blowout as Furnessville Blowout." In our experience Furnessville Blowout is the narrow blowout to the west of Big Blowout and is labeled as such in the 1920 map (Goodman 1920).

Goose Lake, a famous site for botanical collecting, was referred to as Mud Lake by Peattie (1930) and as Walker Lake by Deam (1940) and others (Swink and Wilhelm 1994: p. 356 under *Fuirena pumila*). A small remnant of Goose Lake is in the NIPSCO (Northern Indiana Public Service Company) Greenbelt, southwest of Blag Slough (also spelled Blagge). Goose Lake, known for its water fluctuations, was on the east side of Dune Park. Dune Park, an area well known to the earlier collectors, naturalists, and ecologists, was not, as one might assume, a part of what is now Indiana Dunes State Park, or the modern Chicago and South Bend South Shore Railroad station called Dune Park Train Station. Dune Park, now destroyed, included the Baillytown sag and dune area north of the Chicago South Shore and South Bend Railroad (CSSSBR) traction line in the vicinity of the old Wilson Station (Figures 3 and 4). The Wilson Station was located south of the old Dune Park Station and west of the Baillytown Station, which was closer to the Cleveland Cliffs Burns Harbor steel mill (formerly the ArcelorMittal Steel complex and the Bethlehem Steel complex).

Wickliffe Station was west of Dune Park, approximately where Burns Ditch is today. Much of the land surrounding this station was sand mined in the late 1880s or 1890s (Schoon 2015).

Most other points of reference, particularly those along the CSSSBR, were quite specific



Figure 3. Locations of Chicago South Shore and South Bend Railroad stations in the 1920s, western area from Miller Station to Wilson Station. Based on the Rand McNally map (Goodman 1920) and overlaid on USGS topographic maps.



Figure 4. Locations of Chicago South Shore and South Bend Railroad stations in the 1920s, Dune Park Station to Tremont Station. Based on the Rand McNally map (Goodman 1920) and overlaid on USGS topographic maps.

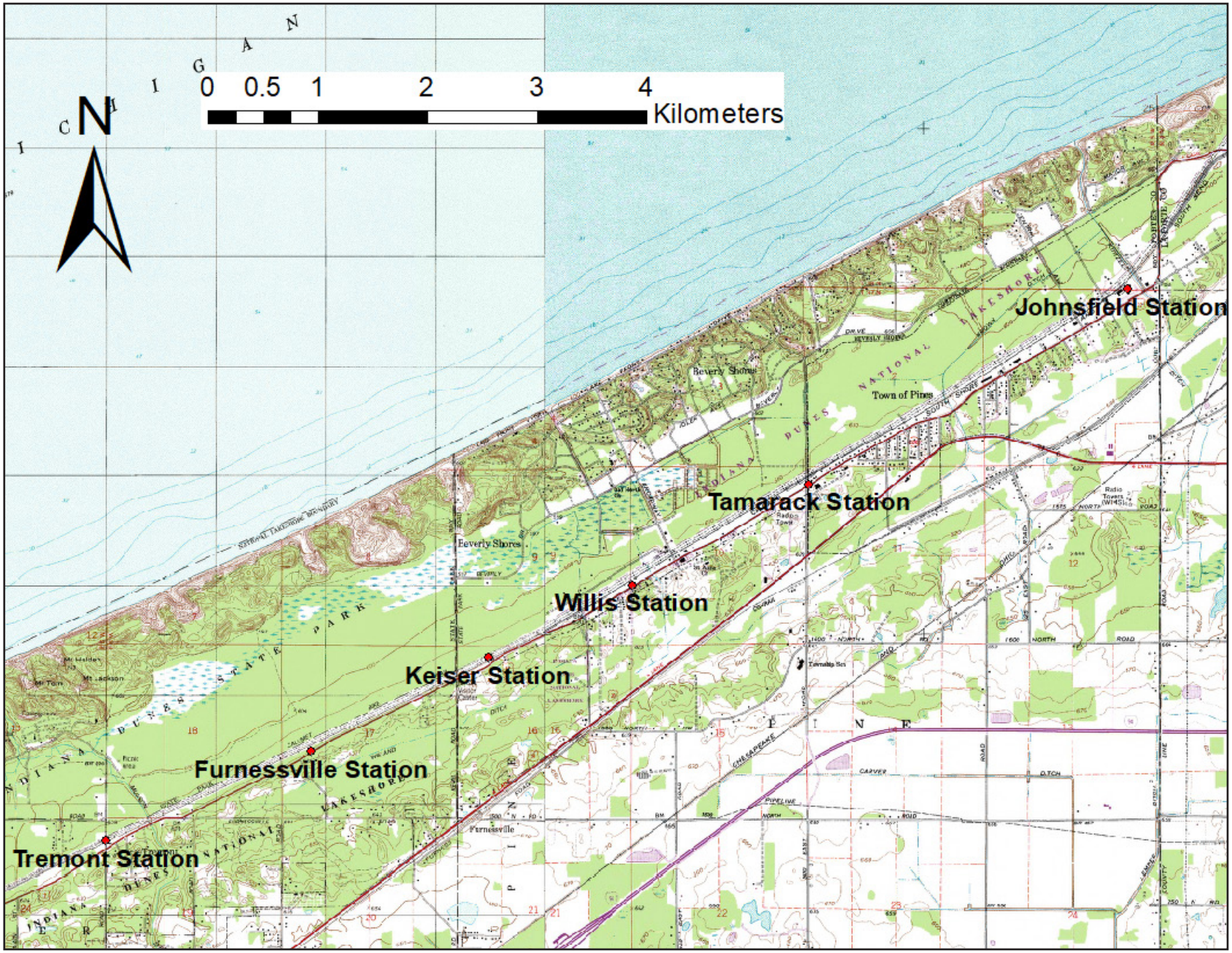


Figure 5. Locations of Chicago South Shore and South Bend Railroad stations in the 1920s, Tremont Station to Johnsfield Station. Based on the Rand McNally map (Goodman 1920) and overlaid on USGS topographic maps.

Table 3. Locations of historical plant collection sites and synonyms for those site names and other points of interest.

Locations in Northwest Indiana	Unit	Comments
Baillytown	Between Bailly and Cowles Dunes	Destroyed by steel mill construction.
Blag Slough	Cowles Dunes	Northeast of Goose Lake and west of Little Lake
Bog 6–7 mi west of La Porte	Pinhook	= Pinhook Bog
Chesterton	n/a	Natural areas destroyed, south of the Dunes
Clarke	n/a	Partly extant, but is not in the geography of this report.
Clarke Junction	n/a	Extant, in part, but not in the geography of this report.
Clarke & Pine	n/a	The former name of the nature preserve in northwest Gary that is now called Pine Station Nature Preserve. This site is not included in this report.
Coffee Creek	n/a	Is not the same as Dune Creek since it is to the south in the Little Calumet River watershed.
Cowles Bog	Cowles Dunes	Extant, in part
Cowles Tamarack Swamp	Cowles Dunes	= Cowles Bog
Crisman	n/a	Obliterated
Dune(s) Creek	East Unit excluding Keiser and Tamarack	Dunes Creek has three branches. The first originates in the Cowles Bog Wetland Complex and just south of U.S. 12 by Wagner Road. The second and central main branch has headwaters in Munson Ditch, east of Waverly Road, south of U.S. 20. The northern reaches are more natural once they enter INDU. The third branch includes the Great Marsh in the Dunes State Park.
Dune Park	Between East and West Units	This site was destroyed for Port of Indiana and steel mills; it was also a train stop to the west of the current train station of the same name (Figures 3 and 4). Henry Chandler Cowles took his classes there.
Fadell Dune	North of U.S. 20 and west of County Line Road (Lake County)	High dune that is part of the Tolleston Dunes Unit of the Indiana Dunes. It has been damaged by chronic off-road vehicle activity. While in the boundaries of the park, it is still in private ownership.
Forsythe	Furnessville. Relevant regarding *Galium brevipes* collected by E. J. Hill in 1879.	There were apparently two or more locations called Forsyth(e). The location in Porter County appears only in the 1948 Rand McNally map of northwest Indiana. It was a siding along the Chicago South Shore and South Bend Railroad (Swink and Wilhelm 1994). The other location was in the Gary area prior to 1890, possibly named for the Forsyth family that settled there (American Revolution Bicentennial Committee of Porter County 1976).
Fort Creek	East Unit excluding Keiser and Tamarack	This name is an alternative to Dunes Creek. Alongside this creek in the Dunes State Park was Fort Petit.
Furnessville	Furnessville	Largely extant; refers to the area in proximity to the former train stop (Figure 5).
Goose Lake Mud Lake Walker Lake	Cowles Dunes, but mostly under steel and canning mills	This popular wetland, a commonly frequented plant collecting spot, was obliterated except for small portion west of Blag Slough.
Indiana Dunes State Park	Dunes State Park	Now includes two nature preserves: Dunes Prairie and Dunes Nature Preserves.
Jackman's Bog	Pinhook Bog	Jackman's wife owned the property prior to its purchase by the National Park Service.

Table 3 (continued). Locations of historical plant collection sites and synonyms for those site names and other points of interest.

Locations in Northwest Indiana	Unit	Comments
Keiser	Tamarack and Keiser	Originally referred to the Keiser stop on the Chicago South Shore and South Bend Railroad (Figure 5).
Little Lake	Cowles Dunes	Extant, but disturbed. Michael Stewart called the diked lake south of Cowles Bog "Little Lake," thus adding some confusion.
Long Lake	Tolleston and West Beach	Largely extant, although the wetland is filling up with organic matter and becoming shallower. Beaver have recently invaded Long Lake.
Miller(s)	n/a	The town is extant, but the natural areas were mostly destroyed, except for Miller Woods, an area that was preserved by U.S. Steel Corporation prior to the federal government acquiring the property.
Mineral Springs	Cowles Dunes	Partly obliterated. Refers to the area near the former Mineral Springs train stop (Figure 4). Mineral Springs can also refer to the springs and seeps along the south side of the Little Calumet River, south of U.S. 20 and east of the road.
Oak Hill	Bailly and Cowles Dunes	Obliterated. Station was north of the intersection of U.S. 12 and Oak Hill Road (Figure 4).
Pageant Dune	Cowles Dunes and Dunes State Park	The portion of INDU and Dunes State Park east of Porter Beach. The 1916 pageant was at the boundary of the two units in a blowout facing Lake Michigan.
Pine	n/a	Partly extant as Clarke and Pine Nature Preserve that is not part of this report.
Port Chester	Cowles Dunes and Dunes State Park	Area north of station at Waverly Rd. (Figure 4).
Porter	Cowles Dunes	Obliterated, in part
Red Path Dune	Tamarack	Mount Baldy
Schererville Prairie	Hoosier Prairie	Hoosier Prairie is west of Griffith, Indiana, but also to the north of Schererville.
Tamarack	Tamarack	The bog is now destroyed, but the specific location of the bog is debated (Figure 5). This often refers to the locations near the former train stop.
Tolleston	The former town distinct from the park units of that name.	The town of this name no longer is recognized since it is part of Gary (Schoon 2003, 2006). It was to the west of the present Tolleston Dunes Unit of INDU.
Tremont	Furnessville	The intersection of U.S. 12 and Tremont Road that was formerly the main entrance to Dunes State Park before IN 49 was built. Thus, when Lyon mentions "dunes at Tremont," the implication is that this was in the Dunes State Park north of the north terminus of Tremont Road at Wilson Shelter.
Waverly Beach	Cowles Dunes and Dunes State Park	This is named for the road that provides access to the Porter Beach.
The Wicliffe (Wickliffe)	West Beach	Mostly obliterated.
Wilson	n/a	Station obliterated. Was south of Dune Park railroad station and south of the central dunes called Dune Park.
Wolf Lake	n/a	This site is in Lake County, west of the Indiana Dunes.

and lay in the dune, sag, and Great Marsh areas north of the traction line. When mentioned, the direction relative to those areas was inevitably northward, even though the direction often was not specifically stated. The town of Tolleston, where there was a post office, has been destroyed and has no relationship to the Tolleston Dunes Unit of INDU except for sharing the same name and the same dune system (Schoon 2006).

Plant taxa that were cited in the literature and from herbarium specimens by historical reference points from areas outside of the contemporary boundaries of INDU have been omitted from this report. All these areas, except for portions of Clarke Junction, Pine, and Wolf Lake, have since been destroyed or greatly altered.

Field surveys

During many growing seasons, field surveys of INDU were conducted to locate extant populations of the special flora. Wilhelm conducted field surveys at INDU during the growing seasons (May through September) of 1979, 1987, 1988, 1989, 1990, 1991, 1993, 1994, 1997, 1998, and 1999. In addition, the authors and others have conducted surveys through many years up to the date of publication of this third edition (surveys after 31 August 2020 are not included). To assist in the surveys, the Indiana Dunes was divided into convenient units (see Figures 1 and 2). Each unit was surveyed by a series of "walk-throughs," during which the presence of all encountered plants was recorded.

The discovery and rediscovery of special flora in the Indiana Dunes from the late 1970s to the present illustrate the fact that biological surveys approach a complete assessment of organisms present in an area but are never entirely complete. In this context, we can assign a probability of completion to inventories based on the asymptotic time to survey and the species accumulation curve (Sugden 1984, Hall 1989). Species may be cryptic, have specific phenologies, appear above ground only infrequently, have not been seen yet, or are newly arrived from outside the area of interest. Fundamental limiting factors in any floristic survey include the size of a survey site combined with its physiographic diversity; the amount of time available; the year and time of year during which the survey is conducted; the botanical field acumen of the surveyor, along with his or her specific familiarity with the survey site; and the survey season's weather patterns, including moisture and temperature with regard to phenological optima—and even as such factors affect the surveyor. We have not accounted for these factors in this report. Thus, the NPS Integrated Resource Management Applications (IRMA) program (which includes NPSpecies) has adopted a probability of completeness in biological inventories (Wotawa 2003). In addition, the NPS has examined the flora in proximity to INDU and identified species that are known from within the boundaries and those that are probably in the boundaries but have not been seen. We have expanded that assessment (Appendix B). We do not profess to have a complete understanding of the flora of the Indiana Dunes, but this third edition goes far towards that goal because much of the more recent survey work has been conducted by local individuals, canvassing a broader range of the growing season and greater coverage of the park than Wilhelm could do traveling infrequently from Chicago (Wilhelm 1980, 1990). If previous and contemporary surveyors had recorded the duration of a survey in the field with the number of species attained, we could assess the completeness of a survey in a probabilistic manner. We have documented new observations since 1990 in the flora list for each unit, and footnoted the observers and date for each new species seen.

Previous editions of the "Special Vegetation" have relied on floristic quality assessments for assessing the relative quality of units and subunits. These floristic quality assessments assess an area's ecological integrity based on plant species composition through the use of coefficients of conservatism (CoC) to calculate a floristic quality index (FQI). Combined with field observation of vegetation, CoC values are assigned to species to reflect assessments were used to map vegetation characteristics of presettlement habitats as distinct from vegetation altered after European

settlement (Wilhelm 1990). We include a floristic quality assessment for each unit in deference to Wilhelm but caution that these assessments are subject to the complexities of assigning coefficients of conservatism (discussed below). While we report results of floristic quality assessments, we believe that measures of species density, diversity, and dominance are more direct and useful components of assessment, but enumeration for the latter two measures requires quantitative vegetation sampling. Since floristic quality assessments, at the minimum, only require a species list in application of CoCs and calculation of floristic quality indices, floristic quality assessments have become popular.

Floristic diversity and quality assessment

The methodology used in assessing the degree to which an area preserves its presettlement integrity is described and demonstrated by Wilhelm (1977, 1978), modified by Swink and Wilhelm (1979), elaborated upon by Wilhelm and Ladd (1988), and further modified by Swink and Wilhelm (1994). Each native floristic element (plant taxon) has been assigned a "coefficient of conservatism" (CoC), which reflects a plant's observed fidelity to stable native plant communities in the Chicago Region (22-county area extending about 75 miles in radius from Chicago; includes three counties in Wisconsin, eleven in Illinois, seven in Indiana, and one in southwest Michigan). The Chicago Region is mentioned in Wilhelm and Ladd (1988) but is not defined so we presume they used the definition from Swink and Wilhelm (1980). Each species is assigned a score between 0 and 10, with species that are only found in presettlement plant communities given a 10, while those that are found in highly disturbed plant assemblages are given a value of 0. In the original formulation, exotic species were not included in the system, but this practice has been criticized because the species density of exotic species indicates a degree of habitat degradation just as the density of native species indicates a degree of habitat integrity, thus complementing each other in quality assessment (Miller and Wardrop 2006).

For each discrete survey site, the CoCs for each recorded plant are summed and an arithmetic mean derived. The mean provides a relative idea of the overall floristic "quality" of the site by condensing the constellation of coefficients into a single coefficient. An area (particularly a small one) in the dune region can be said to exhibit significantly high floristic quality if the derived mean CoC is about 5.5 to 6 or higher (Wilhelm 1990).

In conjunction with the field surveys, species lists were compiled for calculation of species density (species richness) and plant species floristic quality of the lands of the Indiana Dunes. The determination of Indiana Dunes' lands that preserve remnant natural areas supporting native vegetation is important for locating special flora, identifying important natural remnants to preserve, and identifying ecological templates for disturbed land restoration. Since many disturbance-dependent special flora are often confined to anthropogenically disturbed habitats rather than high quality remnant natural areas (Bowles et al. 1990), special flora are not only associated with presettlement remnants with high species diversity. Nevertheless, remnants of high plant species diversity will provide habitats and ecosystem processes important for special flora. The confinement of disturbance-dependent species to anthropogenically disturbed habitats provides an impetus to determine the processes that favor their persistence and discovery of how these processes may have been eliminated from natural vegetation communities (Pavlovic 1994).

To arrive at a site's relative floristic quality within the Chicago Region, the area of the site is brought into perspective by regressing the species richness and multiplying the product by the mean CoC. The product thus obtained can be viewed as a floristic quality index (FQI). An area with a mean CoC >5 and an FQI >45 is considered a natural area, and greater values mean areas with higher representation of conservative plants (CoC >5) (Swink and Wilhelm 1994). The FQI values for units and subunits at INDU range from 16 (Keiser G) to 188 (Cowles Dunes). The philosophy around which the two factors (the mean CoC and the species

richness regression) are derived is discussed by Swink and Wilhelm (1979, 1994) and Wilhelm and Ladd (1988). Researchers have found, however, that the mean coefficient of conservatism and species richness are confounded so that the resulting FQI is meaningless compared to analysis of the two components separately (Francis et al. 2000). For example, at the subunit scale, species richness is highly positively correlated with species area with a convex relationship (6A). If we take the log of area, a concave relationship is obtained (6B). Taking the log of both species richness and area yields a significant linear relationship (6C). Mean CoC is also positively correlated with area and log of area (Figures 6D and 6E). But FQI is positively correlated with area and log area even though the calculation of FQI supposedly removes the effect of area on "quality" (Figures 6F and 6G). According to Wilhelm (1990), in the Chicago Region, if the FQI of a given area is 40 to 50 or higher, one can be relatively certain that there is enough native character to be of significant environmental importance in terms of a regional floristic quality. Areas that rate in the 60s and higher can be considered of paramount importance within a similar context; such areas are extremely rare from a regional standpoint, probably occupying less than 0.02% of the total land area in the Chicago Region. For this report, we have used the CoC values from Swink and Wilhelm (1994) so that we can compare FQI statistics from those calculated by Wilhelm in 1990. We could have used the Indiana FQI or the new values from Wilhelm and Rericha (2017). The authors examined the changes in CoC values from Swink and Wilhelm (1994)

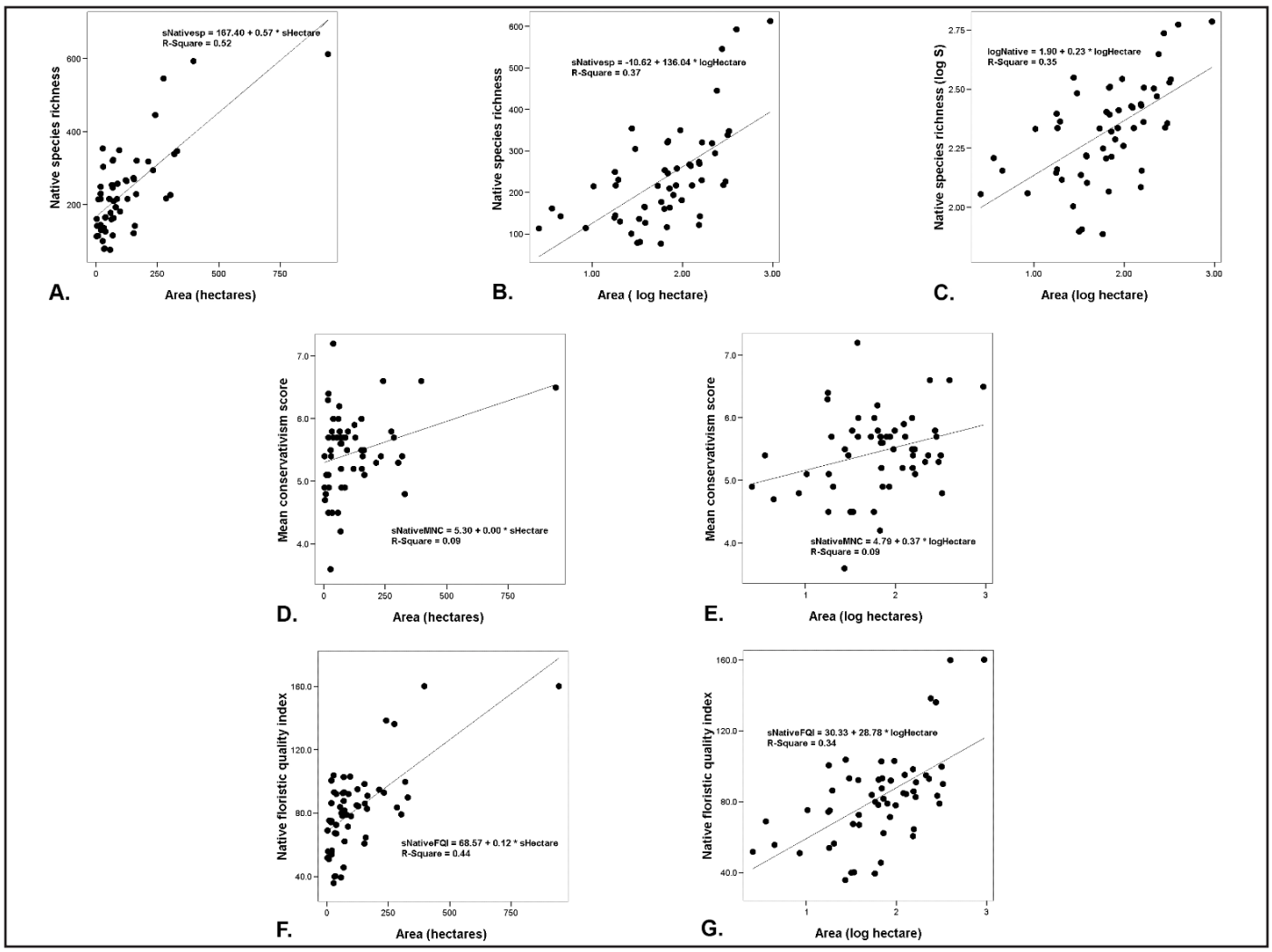


Figure 6. Relationships between area and species richness: A) area vs. native richness (nr), B) log area vs. nr, C) log area vs. log nr, D) area vs. mean conservative score (mcs), E) log area vs. mcs, F) area vs. FQI, and G) log area vs. FQI.

to Wilhelm and Rericha (2017) and found that 66 species had been elevated to a CoC value of 10 from a lower value. These species are not included as special flora in this report but should be considered in future floristic studies. We modified the calculation of FQI by calculating an FQI that is discounted due to the presence of adventive and invasive species. Adventive species are given a CoC of –0.5 and invasive species are given a CoC of –1. These discounts are incorporated into the sum of CoC, mean CoC and FQI statistics.

All floristic statistics for this report were calculated from a Microsoft Excel master flora spreadsheet created and maintained by Pavlovic and has been provided to the Resource Management Division of INDU.

Vegetation mapping

Each of the 15 units of Indiana Dunes has been mapped to indicate which areas can be viewed as significant remnant vegetation types and current vegetation types. The maps included within each unit chapter of this report were drawn from Geographic Information System (GIS) maps of the vegetation and boundaries of INDU and associated properties, as mapped in the mid-1980s by the Denver Service Center (provided by Lou Brenan formerly of NPS and now deceased), edited by Pavlovic, and overlaid on digital format USGS 7.5 Minute Series topographic maps. Maps used are specifically the Chesterton (1986), Dune Acres (1980), Gary (1986), Highland (1986), La Porte (1969), Michigan City West (1980), Portage (1986), and Westville (1962) quadrangles. Digital orthophotos of INDU and Dunes State Park were used as a base to ensure the boundary layers and vegetation layers were drawn as accurately as possible. For new units in the national park, including Calumet Prairie, Hobart Prairie Grove, Fadell Dune, and the Gary Enterprise Zone (Miller F), the digital orthophotos were used to create initial vegetation maps based on the structure of the vegetation, topography, visible hydrological features, and Pavlovic's knowledge of regional vegetation.

The vegetation is mapped to reflect the general plant communities present in each unit. The community concepts are those outlined and depicted by Bacone et al. (1979) but augmented by Pavlovic's 36+ years of field experience in the dunes (see natural presettlement vegetation section below). If Bacone et al. (1979, 1980) produced mylar maps of presettlement vegetation, they appear to be lost, so the only maps available are those in their report that lack geographic reference points. The original GIS vegetation base map was created by the Denver Service Center of the NPS based on photo interpretation of 1983 false color infrared aerial photographs. The vegetation types are color-coded in the park unit maps that appear at the beginning of each unit chapter: aquatic, bog, bottomland, dune complex, foredune complex, marsh complex, mesophytic forest, mesophytic prairie, panne, savanna complex, and swamp complex. Each of the 11 general plant community types is a complex of intergrading plant associations, each of which has synoptic relationships with plant associations in other general plant community types. These maps represent generalizations of the scale and extent of these vegetation types on the landscape. However, we illustrate the relative relationships of associations within and among the general community types in relation to the dominant gradients of moisture and light (Figure 7).

The portions mapped as natural area should not be interpreted as being in presettlement condition or pristine since there has been severe disturbance here and there over the last 150 years. The unit map is intended to alert the Indiana Dunes land-use planners that the land areas mapped as natural area sufficiently reflect presettlement conditions to the point that great care should be exercised regarding potential physical impacts. Such impacts might include trails, recreation areas, water level alterations, development, construction, and other factors that might have a deleterious effect on the natural vegetation and its special flora. Conversely, Indiana Dunes lands mapped as disturbed (crosshatched areas on maps) should not be construed as lacking ecological and botanical significance. Nevertheless, the areas classified as highly disturbed are far less likely than those

classified as natural area to contain the specific floristic elements, except for the presence or abundance of Indiana-listed disturbance-dependent species (Bowles et al. 1990, Pavlovic 1994). These areas could be focal points for restoration of native ecosystems to consolidate the vegetation matrix of the park.

Chapter Organization

The annotated list of the special flora for each unit has been combined into one chapter. Species are listed phylogenetically at the higher classification levels: clubmosses, ferns, conifers, monocots, and eudicots. Within each taxonomic level, families, genera, and species are listed alphabetically. The annotations comment on the historical and contemporary floristic status of each species, including an indication of whether representative plants of that species were recorded from contemporary populations. Herbarium specimens, where they exist, are listed after each annotation, along with pertinent comments by other writers. Ecological notes are included where relevant to population dynamics or when they illustrate interesting life history characteristics.

Each unit is examined in a separate chapter. Each chapter consists of six parts: a survey unit map, an introduction to the unit, a special flora summary, a floristic summary, a flora list, and a discussion of the conservation issues. The discussion section provides a perspective on the degree to which that particular unit, relative to the other units, provides habitats for the individual floristic elements, and it gives some indication of the degree to which special flora are represented by extant populations today. Almost one-third (29%) of the total individual floristic elements of the Indiana Dunes are known from only one unit and thus are designated as locally rare. For each unit, the flora is discussed in three categories: native to the Indiana

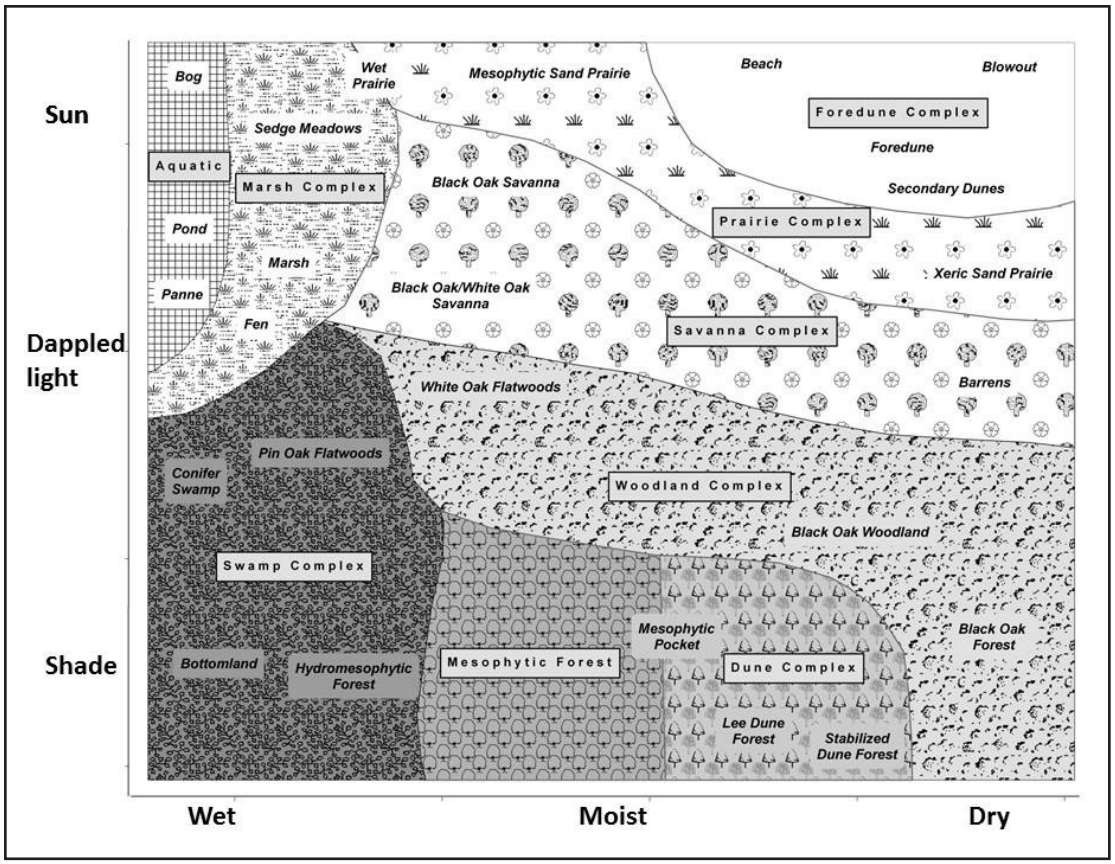


Figure 7. Relationships within and among the general and specific community types found in Indiana Dunes National Park. The X and Y axes are, respectively, the moisture-topographic gradient and the canopy-shade gradient. General community types are identified by differing patterns.

Dunes, adventive from other parts of North America, and exotic.

For this report, we define adventive species as those that have been intentionally or inadvertently introduced to the dunes and are considered native to North America. We define exotic species as those that have been introduced intentionally or inadvertently from other continents since European settlement.

Results

The region at the head of Lake Michigan is a meeting-place for plants from many directions; and, in consequence, furnishes a remarkedly varied and interesting flora. —E. J. Hill (1883)

The literature review and herbarium search, combined with the field survey, floristic quality assessment and vegetation mapping, have together resulted in information that has been organized to put the floristic elements of the special vegetation into a functional context:

1. A summary of the special flora taxa (Table 4),
2. A description of the presettlement vegetation and native plant communities,
3. An annotated list of special flora,
4. The unit floras, and
5. A list of the flora of INDU.

The last three items are given their own chapters within this section.

Special Flora Summary

Since the 1990 publication of the "Special Vegetation" report, INDU has acquired an additional 405 hectares (1,000 acres) and much floristic work has been performed. Since 1990, Hobart Prairie Grove has been added to the park. In the 1990s, Calumet Prairie was to be added to the park in exchange for the NPS giving Hoosier Prairie lands to the Indiana Division of Nature Preserves, but this never came to pass. Nevertheless, we have retained Calumet Prairie State Nature Preserve in the list of units. We have split West Beach into West Beach and Inland Marsh (now officially and confusingly named Tolleston Dunes). We retain the name Inland Marsh for the unit south of U.S. 12. We have included the Shirley Heinze Land Trust Coulter Prairie and Yellow Birch Woods with Inland Marsh since they are adjacent to NPS lands, and because they contain significant Indiana Dunes flora. All these factors have likely played some role in the results reported here, but the influence of additional years and personnel involved in plant surveys cannot be overlooked.

In 1980, 238 special flora taxa were known from INDU. In 1990, we knew of 297, an increase of 25%. As of 2020, we have a total 437 special flora taxa (Table 4), an increase of 47% over 1990 and 84% over 1980. In 1990, 26 taxa had a conservatism score (CoC) of 20, 113 had a CoC of 15 (15 and 20 are no longer used), 59 were Indiana endangered (SE), 48 were Indiana threatened (ST), 33 were Indiana rare (SR), one was Indiana special concern (SSC), five were Indiana watch list (SWL), and 11 were extirpated from Indiana (SX). In 2020, 68 were SE, 94 were ST, none were SR (this category is no longer used to describe plant species in Indiana), none were SSC (this category is no longer used to describe plant species in Indiana), 62 were SWL, and 12 were SX. In 2020, there were 195 species with conservatism scores of 10, with 47 having a score ≤9. These 47 species formerly had a CoC of 15 or 20 (Wilhelm 1990).

Of the special flora, 17 are aquatic, 39 from bogs, 51 from the dune complex, 12 from the foredune complex, 100 from the marsh complex, 51 from the mesophytic forest, 41 from the mesophytic prairie, 18 from pannes, seven from bottomland forest, two from disturbed vegetation, 50 from the savanna complex, and 54 from the swamp complex. Locally rare species are those that are restricted to only one subunit in the Indiana Dunes. This is a new category for special flora. Locally rare species total 204, but some of these are already listed as special flora because they are coastal plain disjunct, boreal relicts, or federally or state-listed. There are 67 species that have only the locally rare designation in the special flora.

Table 4. Special flora of the Indiana Dunes. Nomenclature follows *Flora of North America* (FNA 2022) and Integrated Taxonomic Information System (ITIS 2022). **Units**: mw = Miller Woods, td = Tolleston Dunes, cp = Calumet Prairie, wb = West Beach, im = Inland Marsh, ba = Bailly, cd = Cowles Dunes, sp = Dunes State Park, fv = Furnessville, ke = Keiser, ta = Tamarack, hr = Heron Rookery, hg = Hobart Prairie Grove, hp = Hoosier Prairie, and pb = Pinhook Bog. **Values in Unit cells**: X = known to occur, N = new locality, 0 = presence based on old record or herbarium specimen, R = reported from the subunit, ad = adventive as in planted and E = currently thought to be extirpated.

Special Flora	Habitat[1]	Status[2]	Geographic Affinity[3] (Source[4])	Units														
				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Acmispon americanus (Nutt.) Rydb.	sa	–	lr	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–
Acorus americanus (Raf.) Raf.	bo	SWL	lr	–	–	X	–	–	N	–	0	–	–	–	–	X	–	–
Actaea rubra (Aiton) Willd.	mf	ST	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	X
Adiantum pedatum L.	mf	10	–	–	–	–	X	–	N	X	X	X	X	N	–	X	–	–
Agalinis auriculata (Michx.) S.F. Blake [*Tomanthera auriculata* (Michx.) Raf.]	mp	ST	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	N	–
Agalinis skinneriana (Alph. Wood) Britton	mp	ST	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	N	–
Agastache nepetoides (L.) Kuntze	sa	–	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Aletris farinosa L.	mp	10	–	X	–	–	–	X	–	X	X	X	X	–	–	–	X	–
Allium cernuum Roth	mp	–	lr	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alnus incana (L.) Moench ssp. *rugosa* (Du Roi) Clausen [*Alnus rugosa* (Du Roi) Spreng.]	sw	SWL	bo(2) cp(6,10)	X	–	X	X	–	–	X	X	X	X	X	–	–	–	–
Alnus serrulata (Aiton) Willd.	sw	–	lr	–	–	–	–	–	–	–	–	–	0	–	–	–	–	–
Ammophila breviligulata Fernald	fd	SWL	cp(3,5,7)	X	–	–	X	–	–	X	X	–	X	X	–	–	–	–
Andromeda polifolia L. var. *latifolia* Aiton [*Andromeda glaucophylla* Link]	bo	ST 10	lr bo(11)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp [*Hierchloe odorata* (L.) P. Beauv.]	mp	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Aplectrum hyemale (Muhl. ex Willd.) Torr.	mf	10	lr	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–
Aralia hispida Vent.	dc	SE 10	–	–	E	–	–	E	–	0	–	–	–	–	–	–	–	–
Aralia racemosa L.	mf	10	–	–	–	–	–	X	X	–	X	–	X	X	–	X	–	–
Arctostaphylos uva-ursi (L.) Spreng. [*Arctostaphylos uva-ursi* var. *coactilis* Fernald & J.F. Macbr.]	dc	ST	bo(5)	X	X	–	X	X	–	X	X	X	X	X	–	–	–	–
Aristida longespica Poir. var. *geniculata* (Raf.) Fernald [*Aristida intermedia* Scribn. & Ball]	sa	SWL	–	X	X	–	X	X	–	–	–	–	X	–	–	–	–	–
Aristida tuberculosa Nutt.	sa	ST	cp(3,4,6,8)	–	X	–	X	X	–	–	X	X	X	–	–	–	–	–
Aristolochia serpentaria L.	mf	10	–	–	–	–	–	–	X	–	–	–	–	–	–	X	–	X
Arnoglossum plantagineum Raf. [*Cacalia plantaginea* (Raf.) Shinners]	ma	10	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Asclepias purpurascens L.	mp	–	–	–	–	X	–	–	–	X	R	R	–	–	–	X	–	–
Asclepias sullivantii Engelm. ex A. Gray	lr	–	lr	–	–	–	–	–	0	–	–	–	–	–	–	–	–	–
Asclepias viridiflora Raf.	mp	10	–	X	–	–	X	–	–	X	0	–	–	–	–	–	–	–

[1] Habitat types: aq = aquatic, bo = bog, ma = marsh complex, pa = panne, bf = bottomland forest, dc = dune complex, ds = disturbed, fd = foredune complex, mf = mesophytic forest, mp = mesophytic prairie, sa = savanna complex, and sw = swamp complex.

[2] Status codes: SE = endangered, SX = extirpated, SR = rare, SP = special concern, ST = threatened, SWL = watch list, and 10 or 9 = conservatism score (CoC, highest floristic quality).

[3] Geographic affinity codes: bo = boreal, cp = coastal plain, lr = locally rare.

[4] Literature sources for geographic affinity: 1. Deam (1940). 2. Friesner (1937). 3. Hoober (1934). 4. McLaughlin (1932). 5. Parker (1936). 6. Peattie (1922). 7. Peattie (1930). 8. Reznicek (1994). 9. Swink and Wilhelm (1994). 10. Trefz (1935). 11. Welch (1935).

Table 4 (continued). Special flora of the Indiana Dunes. Nomenclature follows *Flora of North America* (FNA 2022) and Integrated Taxonomic Information System (ITIS 2022). **Units**: mw = Miller Woods, td = Tolleston Dunes, cp = Calumet Prairie, wb = West Beach, im = Inland Marsh, ba = Bailly, cd = Cowles Dunes, sp = Dunes State Park, fv = Furnessville, ke = Keiser, ta = Tamarack, hr = Heron Rookery, hg = Hobart Prairie Grove, hp = Hoosier Prairie, and pb = Pinhook Bog. **Values in Unit cells**: X = known to occur, N = new locality, 0 = presence based on old record or herbarium specimen, R = reported from the subunit, ad = adventive as in planted and E = currently thought to be extirpated.

Special Flora	Habitat[1]	Status[2]	Geographic Affinity[3] (Source[4])	Units													
				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Baptisia tinctoria (L.) R. Br. [*Baptisia tinctoria* var. *crebra* Fernald]	mp	SWL 10	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Bartonia virginica (L.) Britton, Sterns & Poggenburg	sw	10	cp(5)	–	–	–	–	–	–	X	N	X	X	X	–	–	N	X
Betula alleghaniensis Britton	sw	10	lr bo(11)	–	–	–	–	X	–	X	–	–	–	–	–	–	–	–
Betula papyrifera Marshall	sw	ST 10	bo(1)	–	N	–	–	–	–	X	0	N	X	N	–	–	X	–
Betula populifolia Marshall	sw	SWL	bo(2)	?	–	–	–	–	–	?	?	–	–	–	–	–	–	?
Betula pumila L.	bo	10	bo(5,10)	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Bidens aristosa (Michx.) Britton	ma	–	lr	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–
Bidens discoidea (Torr. & A. Gray) Britton	sw	–	cp(3,6)	–	–	–	–	–	–	–	X	X	X	–	–	–	–	X
Bidens vulgata Greene	ma	–	lr	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–
Botrychium matricariifolium (Retz.) A. Braun ex W.D.J. Koch	dc	ST	–	–	X	–	–	–	–	X	X	–	N	N	–	–	–	–
Botrychium simplex E. Hitchc.	ma	SE	lr	–	X	–	–	–	–	–	–	–	–	–	–	–	–	–
Bouteloua curtipendula (Michx.) Torr. var. *curtipendula*	mp	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–
Brachyelytrum aristosum (Michx.) P. Beauv. ex Branner & Coville	mf	SE 10	–	–	–	–	–	–	–	–	N	–	N	–	–	–	–	–
Brachyelytrum erectum (Schreb.) P. Beauv.	mf	10	–	–	–	–	–	–	N	X	X	X	X	–	X	–	–	–
Brasenia schreberi J.F. Gmel.	aq	10	–	–	N	–	X	–	–	X	–	–	–	0	–	–	–	X
Bromus kalmii A. Gray	mp	10	–	–	–	–	–	–	–	X	0	–	–	–	–	–	–	–
Bromus nottowayanus Fernald	bo	5	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Buchnera americana L.	mp	SE 10	lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Cakile edentula (Bigelow) Hook. ssp. *edentula* var. *lacustris* Fernald	fd	SWL 9	cp(3,6)	X	–	–	X	–	–	X	X	–	–	X	–	–	–	–
Calla palustris L.	bo	SE	bo(5,11)	–	–	–	–	–	–	–	–	–	–	0	–	–	–	X
Callitriche heterophylla Pursh	ma	9	–	–	–	–	–	–	–	X	N	N	–	–	–	–	X	–
Calopogon tuberosus (L.) Britton, Sterns & Poggenburg	bo	10	–	–	–	–	–	–	–	0	–	–	–	0	–	–	X	X
Calystegia spithamaea (L.) Pursh	sa	10	lr	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–
Campanula rotundifolia L.	sa	10	bo(5)	–	X	–	X	X	–	X	X	–	X	X	–	–	–	–
Cardamine parviflora L. [*Cardamine parviflora* var. *arenicola* (Britton) O.E. Schulz]	ma	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–

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Special Flora	Habitat[1]	Status[2]	Geographic Affinity[3] (Source[4])	Units													
				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Carex aggregata Mack.	mf	–	lr	–	–	–	–	–	N	–	–	–	–	–	–	–	–	–
Carex alata Torr.	sa	SWL 10	cp(3,6)	X	X	X	X	X	–	X	X	X	X	X	–	–	–	–
Carex atherodes Spreng.	ma	SE	–	–	–	–	–	–	–	X	–	–	X	–	–	–	–	X
Carex atlantica L.H. Bailey ssp. *capillacea* (L.H. Bailey) Reznicek	sw	SE	lr	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Carex aurea Nutt.	pa	ST	–	X	–	–	X	–	–	–	–	–	–	N	–	–	–	–
Carex bebbii (L.H. Bailey) Olney ex Fernald	mp	ST	–	–	–	–	–	X	N	X	X	X	X	X	–	–	X	N
Carex bromoides Schkuhr. ex Willd.	sw	10	–	–	–	–	–	–	–	X	X	X	X	0	X	–	–	–
Carex bushii Mack.	ds	ST	lr	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–
Carex canescens L.	bo	10	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–	X
Carex careyana Torr. ex Dewey	mf	10	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Carex castanea Wahlenb.	mf	10	Lr bo	–	–	–	–	–	–	–	N	–	–	–	–	–	–	–
Carex chordorrhiza L.f.	bo	SE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Carex communis L.H. Bailey	mf	–	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Carex conoidea Schkuhr. ex Willd.	ma	ST	–	–	–	–	–	–	–	X	–	–	–	–	–	–	X	–
Carex crawei Dewey ex Torr.	mp	ST 10	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	N	–
Carex cryptolepis Mack.	ma	–	lr	–	–	–	–	–	–	–	0	–	X	–	–	–	–	–
Carex crus-corvi Kunze	mf	10	lr	–	–	–	–	–	–	–	–	–	–	–	–	N	–	–
Carex debilis Michx. var. *rudgei* L.H. Bailey	sw	SWL	–	–	–	–	–	–	–	X	X	X	X	X	–	–	–	–
Carex digitalis Willd.	mf	10	–	–	–	–	–	–	N	–	X	X	–	–	X	–	–	X
Carex eburnea Boott	dc	ST	bo(11)	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–
Carex echinodes (Fernald) P. Rothrock, A. Reznicek, and Hipp	mf	10	lr	–	–	–	–	–	–	–	N	–	–	–	–	–	–	–
Carex folliculata L.	mf	ST	–	–	–	–	–	–	–	X	X	X	X	X	–	–	–	–
Carex garberi Fernald	pa	SE	–	X	–	–	X	–	–	–	X	–	–	–	–	–	–	–
Carex hitchcockiana Dewey	mf	10	–	–	–	–	–	–	–	–	–	–	–	–	X	X	–	–
Carex hyalinolepis Steud.	mf	–	lr	–	–	–	–	–	–	–	–	–	–	–	N	–	–	–

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				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Carex interior L.H. Bailey [*C. scirpoides* Schkuhr]	bo	–	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Carex intumescens Rudge	sw	10	–	–	–	–	–	–	–	X	X	X	X	X	X	–	–	X
Carex lacustris Willd., unnamed hybrid [*C. lacustris* Willd. × *C. lasiocarpa americana* (Fernald) Hulten, formerly *Carex* × *subimpressa*]	ma	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Carex laevivaginata (Kük.) Mack.	ma	8	–	–	–	–	–	–	–	–	–	–	–	X	–	–	X	–
Carex laxiculmis Schwein.	mf	10	–	–	–	–	–	–	–	X	X	X	–	–	–	–	–	–
Carex leptalea Wahlenb.	bo	SWL 10	–	–	–	–	–	–	–	X	–	–	–	0	–	–	–	–
Carex leptonervia (Fernald) Fernald	mf	SE	–	–	–	–	–	–	–	X	N	X	X	–	X	–	–	X
Carex limosa L.	bo	SE	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–	X
Carex muskingumensis Schwein.	sw	–	lr	–	–	–	–	–	–	–	–	–	–	–	X	N	–	–
Carex oligocarpa Schkuhr ex. Willd.	mf	–	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Carex oligosperma Michx.	bo	10	–	–	X	–	–	X	–	–	–	–	–	–	–	–	–	X
Carex pauciflora Lightf.	bo	SEX 10	lr	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Carex pedunculata Muhl. ex Willd.	mf	SWL 10	–	–	–	–	–	–	–	–	X	–	–	–	X	–	–	–
Carex prairea Dewey	ma	–	lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Carex prasina Walenb.	mf	10	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Carex seorsa Howe	sw	ST	cp(3)	–	–	–	–	–	–	X	X	X	X	–	–	–	–	X
Carex shortiana Dewey	sa	10	lr	–	–	–	–	–	–	–	–	–	–	–	–	N	–	–
Carex siccata Dewey	sa	10	–	X	–	–	X	–	–	X	–	–	–	–	–	–	X	–
Carex stipata Muhl. ex Willd. var. *maxima* Chapm. ex Boott	sa	10	lr	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Carex tonsa (Fernald) E.P. Bicknell	sa	7	–	X	X	–	X	X	–	X	X	X	X	X	–	X	–	–
Carex trichocarpa Muhl. ex Willd.	ma	SWL	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Carex trisperma Dewey	bo	SWL 10	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–	X
Carex woodii Dewey	mf	SWL	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Carya glabra (Mill.) Sweet	sa	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X

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				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Carya laciniosa (Michx.) Loud.	bf	10	–	–	–	–	–	–	X	–	–	–	–	–	X	–	–	–
Castilleja coccinea (L.) Spreng.	mp	10	–	X	–	X	–	–	–	X	–	–	–	–	–	–	X	–
Celastrus scandens L.	fd	–	In decline	X	X	–	X	X	X	X	X	X	X	X	–	X	–	X
Celtis tenuifolia Nutt.	dc	10	–	N	–	–	X	–	–	X	N	–	–	N	–	–	–	–
Ceratophyllum echinatum A. Gray	aq	SWL	lr	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–
Chamaecrista nictitans (L.) Moench [*Cassia nictitans* L.]	sa	SWL	lr	X	–	–	–	–	–	–	–	–	X	–	–	–	–	–
Chamaedaphne calyculata (L.) Moench var. *angustifolia* (Aiton) Rehder	bo	10	bo(11)	–	–	–	–	–	–	X	X	–	0	0	–	–	–	X
Chamerion angustifolium (L.) Holub [*Epilobium angustifolium* L.]	ma	SE 10	–	–	N	–	–	–	–	–	–	–	N	–	–	–	X	–
Chimaphila maculata (L.) Pursh	dc sw	SWL 10	–	–	–	–	0	–	–	X	X	X	N	N	–	–	–	–
Chimaphila umbellata (L.) W.P.C. Barton ssp. *umbellata* [*Chimaphila umbellata* (L.) Nutt. var. *cisatlantica* S.F. Blake]	dc	SE 10	–	–	–	–	0	–	–	0	X	–	–	N	–	–	–	–
Chrysosplenium americanum Schwein.	sw	ST	–	–	–	–	–	–	–	X	X	X	X	X	–	–	–	–
Circaea alpina L.	sw	SEX	lr bo(11)	–	–	–	–	–	–	–	–	–	–	0	–	–	–	–
Cirsium pitcheri (Torr. ex Eaton) Torr. & A. Gray	fd	SE	–	X	–	–	X	–	–	X	X	–	X	0	–	–	–	–
Cladium mariscoides (Muhl.) Torr.	pa	10	cp(4)	X	X	–	X	X	–	X	X	–	X	N	–	–	–	–
Clinopodium arkansanum (Nutt.) House [*Satureja arkansana* (Nutt.) Briq.]	pa	ST	–	X	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Clinopodium vulgare L. [*Satureja vulgaris* (L.) Fritsch var. *neogaea* Fernald]	ma	SWL 6	–	–	–	–	–	–	–	–	–	–	X	–	–	–	?	–
Clintonia borealis (Aiton) Raf.	sw	SE	–	–	–	–	–	X	–	–	N	–	–	–	–	–	–	–
Collinsia verna Nutt.	bf	–	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Comarum palustre L. [*Potentilla palustris* (L.) Scop.]	bo ma	10	–	X	X	X	X	–	–	X	0	–	–	0	–	–	–	X
Comptonia peregrina (L.) J.M. Coult.	sa	SWL 9	bo(5,10,11)	–	–	–	–	–	–	–	–	–	X	–	–	–	X	–
Conopholis americana (L.) Wallr.	sw	10	–	–	–	–	–	–	–	N	X	X	X	–	–	–	–	X
Coptis trifolia (L.) Salisb.	sw	ST 10	bo(11)	–	–	–	–	–	–	X	N	–	N	N	–	–	–	–
Corallorhiza maculata Raf.	dc	10	–	N	–	–	–	–	–	X	X	X	X	N	–	–	–	–
Corallorhiza odontorhiza (Willd.) Poir.	sw dc	10	–	–	N	–	N	N	–	X	X	X	X	X	–	–	X	–

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Cornus canadensis L.	sw	SE	–	–	–	–	0	–	–	X	–	–	–	–	–	–	–	–
Cornus rugosa Lam.	dc	ST	bo (2,10,11)	X	–	–	X	–	–	X	X	–	–	N	–	–	–	–
Corydalis sempervirens (L.) Pers.	mp	SE	bo(5) lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Crataegus chrysocarpa Ashe	sa	SE	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Crataegus succulenta Schrader ex Link	sa	ST	–	–	–	–	–	–	X	–	–	–	–	–	N	N	–	–
Crocanthemum bicknellii (Fernald) Janch. [*Helianthemum bicknellii* Fernald]	sa	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Crotalaria sagittalis L.	mp	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Cuscuta pentagona Engelm.	mp	10	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Cuscuta polygonorum Engelm.	sw	–	lr	?	X	–	–	–	–	–	–	–	–	–	–	–	–	–
Cyperus diandrus Torr.	ma	10	cp (4) lr	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–
Cyperus houghtonii Torr.	sa	SE	–	X	X	–	–	X	–	X	X	X	–	X	–	–	–	–
Cyperus odoratus L. [*Cyperus engelmanii* Steud.]	ma	–	–	–	–	–	X	–	–	X	–	–	–	–	–	–	–	X
Cypripedium acaule Aiton	bo	SE 10	–	0	–	–	–	–	–	X	0	–	–	0	–	–	–	X
Cypripedium candidum Muhl.	mp	ST	–	–	–	–	–	–	–	X	0	–	–	–	–	–	X	–
Cypripedium parviflorum Salisb. var. *makasin* (Farw.) Sheviak [*Cypripedium calceolus* L. var. *parviflorum* (Salisb.) Fernald]	ma	ST 10	–	–	–	–	–	–	–	0	X	–	–	–	–	–	–	–
Cypripedium parviflorum Salisb. var. *pubescens* (Willd.) O.W. Knight [*Cypripedium calceolus* L. var. *pubescens* (Willd.) Correll]	sw	SWL 10	–	N	–	–	–	–	–	X	X	0	–	–	–	–	X	–
Cypripedium reginae Walter	sw	ST 10	lr bo(2,5,11)	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Cystopteris tenuis (Michx.) Desv.	mf	10	–	–	–	–	–	–	–	–	–	–	N	–	–	N	–	–
Dactylorhiza viridis (L.) R.M. Bateman, Pridgeon & M.W. Chase [*Coeloglossum viride* (L.) Hartm.; *Habenaria viridis* (L.) R. Br. var. *bracteata* (Muhl ex. Willd.) A. Gray]	dc	SE 10	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Dalea candida Willd. [*Petalostemon candidus* (Willd.) Michx.]	mp	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–
Danthonia compressa Austin	sa	10	lr bo	–	–	–	–	–	–	–	N	–	–	–	–	–	–	–

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Special Flora	Habitat[1]	Status[2]	Geographic Affinity[3] (Source[4])	Units														
				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Dasiphora fruticosa (L.) Rydb. [*Potentilla fruticosa* L.]	pa	10	lr bo(5,11)	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dendrolycopodium dendroideum (Michx.) A. Haines [*Lycopodium obscurum* L.]	sw	SE	–	–	–	–	–	–	–	–	0	N	N	N	–	–	–	–
Dendrolycopodium hickeyi (W.H. Wagner, Beitel & R.C. Moran) A. Haines	–	ST 10	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Deparia acrostichoides (Sw.) M. Kato [*Athyrium thelypterioides* (Michx.) Desv.]	sw	10	–	–	–	–	–	–	–	–	N	–	N	–	N	–	–	–
Desmodium canescens (L.) DC.	sa	–	lr	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–
Desmodium ciliare (Muhl.) DC.	sa	10	–	–	–	–	–	–	–	0	–	X	N	–	–	–	X	–
Desmodium cuspidatum (Muhl. ex Willd.) DC. ex G. Don	sa	10	lr	–	–	–	–	–	–	0	–	–	–	–	–	X	–	–
Desmodium perplexum B.G. Schub.	sa	–	lr	–	–	–	–	–	–	–	0	–	0	N	–	–	–	–
Desmodium rotundifolium DC.	sa	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Dichanthelium boreale (Nash) Freckmann [*Panicum boreale* Nash]	mp sa	ST 10	–	X	–	X	X	X	–	–	X	–	–	–	–	–	X	–
Dichanthelium dichotomum (L.) Gould ssp. *dichotomum* [*Panicum dichotomum* L.]	sa	10	–	–	–	–	–	–	–	X	0	X	X	–	–	–	–	X
Dichanthelium dichotomum (L.) Gould ssp. *lucidum* (Ashe) Freckmann & Lelong [*Panicum lucidum* Ashe]	ma	SE 10	cp(6)	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Dichanthelium linearifolium (Scribn.) Gould [*Panicum linearifolium* Scribn.]	sa	10	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *oligosanthes* [*Panicum oligosanthes* Schultes]	sa	–	cp(3,6)	X	X	–	–	N	–	–	0	–	–	–	–	–	N	–
Dichanthelium perlongum (Nash) Freckmann [*Panicum perlongum* Nash]	sa	10	–	X	–	–	X	–	–	–	0	–	–	–	–	–	–	–
Diervilla lonicera Mill.	sa	SWL 10	bo(2,11)	X	X	X	X	X	–	X	X	X	X	X	–	–	X	–
Diphasiastrum tristachyum (Pursh) Holub [*Lycopodium tristachyum* Pursh]	dc	ST	–	–	–	–	–	–	–	X	–	X	–	N	–	–	–	–
Draba reptans (Lam.) Fernald	sa	–	lr	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Drosera intermedia Hayne	bo	ST 10	cp(3,6)	0	–	–	–	0	–	X	–	–	X	–	–	–	X	X
Drosera rotundifolia L.	bo	SWL 10	cp(4)	–	–	–	–	–	–	X	X	–	X	0	–	–	–	X
Drymocallis arguta (Pursh) Rydb. [*Potentilla arguta* Pursh]	sa	SWL	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Dryopteris clintoniana (D.C. Eaton) Dowell	bo	SE	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Dryopteris goldiana (Hook.) A. Gray	mf	10	lr	–	–	–	–	–	–	–	–	–	–	–	N	–	–	–
Eleocharis atropurpurea (Retz) J. Presl & C. Presl	ma	10	lr	–	–	–	–	N	–	–	–	–	–	–	–	–	–	–

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Special Flora	Habitat[1]	Status[2]	Geographic Affinity[3] (Source[4])	Units														
				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Eleocharis geniculata (L.) Roem. & Shult.	pa	ST	cp(6,7)	X	–	–	X	–	–	–	–	–	–	0	–	–	–	–
Eleocharis melanocarpa Torr.	mp	ST	cp(3,6,8)	–	–	–	–	–	–	X	–	N	–	–	–	–	–	–
Eleocharis microcarpa Torr. var. *filiculmis* Torr.	ma	SE	cp (8) lr	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–
Eleocharis quadrangulata (Michx.) Roem. & Schult.	ma	10	cp(6) lr	–	–	–	–	–	–	N	–	–	–	–	–	–	–	–
Eleocharis quinqueflora (Hartmann) O. Schwartz [*Eleocharis pauciflora* (Lightf.) Link var. *fernaldii* Svenson]	ma	SWL 9	–	X	–	–	X	–	–	–	–	–	–	–	–	–	N	–
Eleocharis rostellata (Torr.) Torr.	ma	10	lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Eleocharis tenuis (Willd.) Schult. var. *verrucosa* (Svenson) Svenson	ma	10	–	–	–	–	–	–	–	N	–	–	–	X	–	–	X	–
Eleocharis wolfii (A. Gray) A. Gray	ma	ST	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Epigaea repens L.	dc	ST 10	bo(2)	–	–	–	–	–	–	X	X	X	–	X	–	–	–	–
Epilobium ciliatum Raf.	ma	–	–	X	–	–	–	–	–	X	–	–	–	–	–	–	X	–
Epilobium strictum Muhl.	ma	SWL10	–	–	–	–	–	–	–	X	–	–	–	–	–	–	X	–
Equisetum variegatum Schleich. ex F. Weber & D. Mohr	pa	SE	–	X	–	–	N	–	–	–	–	–	–	–	–	–	–	–
Equisetum × *nelsonii* (A.A. Eaton) J.H. Schaffn.	fd	10	–	N	–	–	N	–	–	–	–	–	–	–	–	–	–	–
Erigeron pulchellus Michx.	mp	10	–	–	–	–	N	–	–	X	0	–	–	–	–	X	–	–
Eriocaulon aquaticum (Hill) Druce [*Eriocaulon septangulare* With.]	sw	SE	lr cp(4,6)	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Eriophorum angustifolium Honckeny	ma	ST	–	–	–	–	–	–	–	0	–	–	–	–	–	–	X	–
Eriophorum tenellum Nutt.	bo	10	lr bo	–	–	–	–	–	–	–	–	–	–	–	–	–	–	N
Eriophorum vaginatum L. [*Eriophorum spissum* Fernald]	bo	SEX 10	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0
Eriophorum virginicum L.	bo	10	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Eupatorium sessilifolium L. var. *brittonianum* Porter	dc	10	–	–	–	–	–	–	–	X	X	–	–	–	–	–	–	–
Euphorbia polygonifolia L.	fd	ST 10	cp(3,4,6)	X	X	–	X	–	–	X	X	–	X	X	–	–	–	–
Eurybia furcata (E.S. Burgess) G.L. Nesom [*Aster furcatus* E.S. Burgess]	dc	ST	–	–	–	–	–	–	–	–	X	X	–	–	–	–	–	–
Eurybia schreberi (Nees) Nees	dc	SE 10	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Euthamia caroliniana (L.) Greene ex Porter & Britton [*Solidago tenuifolia* Pursh]	ma	SWL 10	–	X	X	–	–	X	–	N	0	–	–	–	–	–	N	–

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				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Fimbristylis puberula (Michx.) Vahl.	mp	SE	lr cp(3,4)	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Frasera caroliniensis Walter [*Swertia caroliniensis* (Walter) Kuntze]	sw mf	–	lr	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–
Fraxinus americana L.	mf	–	–	X	–	–	X	–	X	X	X	X	X	X	–	X	–	X
Fraxinus americana L. var. *biltmoreana* (Beadle) J.W. Wright ex Fernald	mf	9	–	–	–	–	–	–	–	–	–	–	X	–	X	–	–	–
Fraxinus nigra Marshall	sw	9	–	–	–	–	–	–	X	X	X	X	X	X	X	X	–	X
Fraxinus pennsylvanica Marshall	bf	4	–	–	X	–	X	X	X	X	X	X	X	X	X	X	X	X
Fuirena pumila (Torr.) Spreng.	ma	ST	lr cp(3,6,8)	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Galearis spectabilis (L.) Raf. [*Orchis spectabilis* L.]	mf	10	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Galium labradoricum (Wiegand) Wiegand	ma	ST 10	lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Galium lanceolatum (Torr.) Torr.	mf	10	–	–	–	–	–	–	X	–	X	X	–	–	–	–	–	X
Galium trifidum L.	ma	10	–	–	–	–	–	–	–	X	–	–	–	–	–	–	N	–
Gentiana alba Muhl. ex Nutt. [*Gentiana flavida* A. Gray]	dc	ST	–	–	–	–	–	–	–	0	0	–	–	–	–	–	–	–
Gentiana puberulenta J.S. Pringle	mp	SE	–	–	–	–	X	–	–	–	–	–	–	–	–	X	X	–
Gentiana saponaria L.	mp sa	8	–	–	X	–	–	X	–	X	–	X	X	X	–	–	X	–
Gentianopsis virgata (Raf.) Holub ssp. *virgata* [*Gentiana procera* Holm]	ma	–	bo(11)lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Geranium bicknellii Britton	mp	SE	–	–	–	–	–	–	–	X	–	–	–	–	–	–	X	–
Glyceria borealis (Nash) Batchelder	ma	SE 10	bo(5)	X	–	–	–	–	–	–	–	–	–	0	–	–	–	–
Glyceria grandis S. Watson	ma	SE 10	lr	–	–	–	–	N	–	–	–	–	–	–	–	–	–	–
Goodyera pubescens (Willd.) R.Br.	dc	9	–	–	–	–	–	–	–	–	N	X	X	N	–	–	–	N
Gymnocladus dioicus (L.) K. Koch	bf dc	–	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Hasteola suaveolens (L.) Pojark. [*Cacalia suaveolens* L.]	mp	–	lr	–	–	–	–	–	N	–	–	–	–	–	–	–	–	–
Helianthus hirsutus Raf.	sa	–	–	–	N	N	–	–	–	N	–	N	–	–	–	–	–	–
Heteranthera dubia (Jacq.) MacMill.	aq	–	lr	–	–	–	X	–	–	X	–	–	–	–	–	–	–	–
Hudsonia tomentosa Nutt.	dc	ST	cp(4,10)	–	X	–	X	X	–	E	–	N	–	–	–	–	–	–

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Huperzia lucidula (Michx.) Trevisan [*Lycopodium lucidulum* Michx.]	sw	SWL 10	–	–	–	–	X	–	–	X	X	X	X	N	X	–	–	X
Hydrocotyle umbellata L.	ma bo	10	cp(3,5,6,8)	–	0	–	0	–	–	–	–	–	N	N	–	–	–	–
Hypericum boreale (Britton) E.P. Bicknell	ma bo	SWL	–	–	X	–	–	X	–	X	–	X	X	X	–	–	–	–
Hypericum canadense L.	ma	SWL 10	–	X	X	–	X	X	–	X	–	X	X	–	–	–	X	X
Hypericum kalmianum L.	pa	SWL 10	–	X	X	X	X	X	–	X	X	X	X	X	–	–	–	–
Hypopitys monotropa Crantz [*Monotropa hypopitys* L.]	dc	SWL 10	–	–	–	–	–	–	N	X	X	X	X	N	–	–	X	–
Ipomoea pandurata (L.) G. Mey.	bf	–	–	–	–	–	–	–	N	N	–	–	–	–	–	–	–	–
Isotria verticillata (Muhl. ex Willd.) Raf.	bo	SWL 10	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Ilex mucronata (L.) M. Powell, V. Savolainen, S. Andrews [*Nemopanthus mucronatus* (L.) Trel.]	bo	ST 10	bo(11)	–	–	–	–	–	–	X	–	–	X	–	–	–	–	X
Juglans cinerea L.	mf	ST	–	–	–	–	–	–	X	–	X	X	X	X	X	X	–	–
Juncus arcticus Willd. var. *balticus* (Willd.) Trautvetter [*Juncus balticus* Willd. var. *littoralis* Engelm.]	pa	SWL	cp(3,6)	X	–	–	X	X	–	X	X	–	–	X	–	–	–	X
Juncus articulatus L.	ma	SE	cp(6)	–	–	–	–	–	–	X	–	–	–	X	–	–	–	–
Juncus diffusissimus Buckley	ma	10	lr	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Juncus militaris Bigelow	ma	SE 10	cp (8) lr	–	–	–	–	–	–	N	–	–	–	–	–	–	–	–
Juncus pelocarpus E. Mey.	ma	SE	cp(3,4,6)	X	–	–	X	–	–	X	–	–	–	–	–	–	–	–
Juncus scirpoides Lam.	ma pa	ST	cp(3,6,7,8)	X	X	–	N	X	X	X	0	X	N	–	–	–	–	–
Juniperus communis L.	fd	ST	bo(11)	N	–	–	X	–	–	X	X	N	X	X	–	–	–	–
Lactuca floridana (L.) Gaertn.	dc	–	lr	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–
Lactuca hirsuta Muhl.	dc	ST 10	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Larix laricina (Du Roi) K. Koch	bo	ST	bo(5)	–	–	–	–	–	–	X	ad	–	X	X	–	–	–	X
Lathyrus japonicus Willd. var. *maritimus* (L.) Kartesz & Gandhi [*Lathyrus japonicus* var. *glaber* (Ser.) Fernald]	fd	SE	cp(3,4,6)	X	–	–	X	–	–	–	X	–	X	N	–	–	–	–
Lathyrus ochroleucus Hook.	dc	SE	–	X	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Lathyrus venosus Muhl.	sa	SE	–	–	–	–	–	–	X	–	–	–	–	–	–	X	–	X
Lechea stricta Leggett ex Britton	sa	SEX	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	0	–

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				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Lemna turionifera Landolt	aq	–	lr	–	–	–	–	–	–	–	–	–	–	N	–	–	–	–
Liatris scariosa (L.) Willd. var. *nieuwlandii* (Lunell) E.G. Voss	sa	–	lr	–	N	–	–	N	–	–	–	–	–	–	–	–	–	–
Lilium philadelphicum L. [*Lilium philadelphicum* L. var. *andinum* (Nutt.) Ker Gawl.]	mp	SWL10	–	X	–	–	–	–	–	X	–	–	–	–	–	–	X	–
Linnaea borealis L. var. *longiflora* Torr. [*Linnaea borealis* var. *americana* (J. Forbes) Redher]	sw	SEX	bo(11)	–	–	–	0	–	–	0	–	–	–	–	–	–	–	–
Linum striatum Walter	sa	SWL 10	cp(5,6,8)	N	–	–	X	–	–	X	X	–	–	–	–	–	–	–
Linum virginianum L.	sa	10	–	–	–	–	–	–	–	X	–	X	–	N	–	–	–	–
Liparis loeselii (L.) Richard	pa	SWL	–	X	X	X	X	–	–	X	X	–	X	N	–	–	X	X
Lipocarpha drummondii (Nees) G.C. Tucker [*Hemicarpha drummondii* Nees]	ma	SE	lr	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–
Lonicera dioica L.	sa	10	–	X	X	–	X	–	X	X	X	X	X	X	–	–	–	X
Ludwigia sphaerocarpa Elliott [*Ludwigia sphaerocarpa* var. *deamii* Fernald & Griscom]	ma	SE	cp(3,6,8)	X	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Lycopodiella inundata (L.) Holub [*Lycopodium inundatum* L.]	sw	ST	cp(4)	–	–	–	–	–	–	X	0	–	X	N	–	–	X	–
Lycopodiella subapressa J.G. Bruce, W.H. Wagner, & Beitel	bg	SE	lr	–	–	–	–	–	–	–	–	–	–	N	–	–	–	X
Lycopodium clavatum L.	sw	SWL 10	–	–	–	–	–	–	–	X	–	X	N	–	–	–	–	X
Maianthemum canadense Desf. (smooth form)	sw	10	bo (2,5,11)	–	–	–	0	N	–	–	X	X	X	–	X	–	N	X
Malaxis unifolia Michx.	sw bg	SE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X	X
Matteuccia struthiopteris (L.) Todaro var. *pensylvanica* (Willd.) C.V. Morton	bf	ST	lr	–	–	–	–	–	–	–	–	–	–	N	X	–	–	–
Melampyrum lineare Desr.	dc	SE	–	X	–	–	–	–	–	X	X	–	–	X	–	–	–	–
Menyanthes trifoliata L. [*Menyanthes trifoliata* var. *minor* Fernald]	bo	SWL 10	–	N	–	–	0	–	–	0	–	–	–	0	–	–	–	X
Milium effusum L. ssp. *cisatlanticum* (Fernald) A. Haines	sw mf	ST	–	–	–	–	–	–	–	–	X	–	X	–	X	–	–	–
Mimulus alatus Aiton	ma	7	–	–	–	–	–	–	–	X	X	–	–	–	X	X	N	–
Minuartia michauxii (Fenzl) Farw. [*Arenaria stricta* Michx.]	sa	ST	–	X	–	–	0	–	–	–	X	–	–	0	–	–	–	–
Mitchella repens L.	mf	10	–	–	–	–	–	–	–	X	X	X	X	X	X	–	–	X
Monotropa uniflora L.	dc	10	–	X	X	–	N	–	–	X	X	–	X	X	N	N	–	–
Morus rubra L.	mf	10	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Muhlenbergia tenuiflora (Willd.) Britton, Sterns & Poggenburg	mf	–	lr	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–

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Special Flora	Habitat[1]	Status[2]	Geographic Affinity[3] (Source[4])	Units														
				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Myosotis laxa Lehm.	ma sw	ST	bo(11)	X	–	X	–	–	X	X	X	–	–	X	–	–	–	–
Myosotis verna Nutt.	mp	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Myriophyllum verticillatum L. [*Myriophyllum verticillatum* var. *pectinatum* Wallr.]	aq	ST	lr	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Najas guadalupensis (Spreng.) Magnus	aq	–	lr	–	–	–	N	–	–	–	–	–	–	–	–	–	–	–
Oenothera fruticosa L. ssp. *tetragona* (Roth) W.L. Wagner [*Oenothera tetragona* Roth var. *longistipata* (Pennell) Munz]	mp	9	–	–	–	–	–	–	–	X	–	–	N	–	–	–	–	–
Oenothera gaura W.L. Wagner & Hoch [*Gaura biennis* L.]	sa	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–
Oenothera oakesiana (A. Gray) J.W. Robbins ex S. Watson & J.M. Coult.	sa	–	lr	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Oenothera perennis L.	sa	ST	lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Ophioglossum pusillum Raf. [*Ophioglossum vulgatum* var. *pseudopodum* (S.F. Blake) Farw.]	ma	ST 10	–	X	X	–	–	–	–	X	0	–	X	N	–	–	X	–
Orobanche fasciculata Nutt.	dc	SE 10	lr	X	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Orobanche uniflora L.	dc	10	–	X	–	–	–	–	–	X	X	–	–	–	–	–	N	–
Orthilia secunda (L.) House [*Pyrola secunda* L.]	dc	SEX	–	0	–	–	0	–	–	0	–	–	–	–	–	–	–	–
Oryzopsis asperifolia Michx.	dc	SE 10	–	–	–	–	–	–	–	–	X	–	–	E	–	–	–	–
Oxalis violacea L.	mp	9	–	–	–	–	–	–	N	–	–	–	N	–	–	X	X	–
Panax quinquefolius L.	mf	SWL	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Panax trifolius L.	sw	SWL 10	bo(11)	–	–	–	–	–	–	X	X	X	X	X	X	–	–	–
Panicum verrucosum Muhl.	ma	ST	cp(6,8 lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Patis racemosa (Sm.) Romasch., P.M. Peterson & Soreng [*Piptatherum racemosum* (Sm.) Eaton; *Oryzopsis racemosa* ((Sm.) Ricker)]	dc	ST 10	lr	–	–	–	X	–	–	X	–	–	–	–	–	–	–	–
Peltandra virginica (L.) Schott	ma	10	cp(3,5,6)	–	–	–	–	–	–	X	X	–	N	–	–	–	–	–
Penstemon tubaeflorus Nutt.	mp	SE	lr	–	N	–	–	–	–	–	–	–	–	–	–	–	–	–
Persicaria arifolia (L.) Haroldson [*Polygonum arifolium* L. var. *pubescens* (R. Keller) Fernald]	ma	9	–	–	–	–	–	X	–	X	X	X	X	X	–	–	–	X
Persicaria careyi (Olney) Greene [*Polygonum careyi* Olney]	ma	ST	–	–	–	–	–	–	–	–	X	–	X	–	–	–	X	–

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				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Persicaria hydropiperoides (Michx.) Small [*Polygonum opelousanum* Riddell var. *adenocalyx* Stanford]	ma	ST 9	cp(9)	–	–	–	–	X	–	X	–	–	–	–	–	–	–	–
Persicaria robustior (Small) E.P. Bicknell	–	SE 10	lr	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Phegopteris hexagonoptera (Michx.) Fee [*Dryopteris hexagonoptera* (Michx.) C. Chr.]	mf	10	–	–	–	–	–	–	–	X	X	X	X	–	X	–	–	X
Phemeranthus rugospermus (Holz.) Kiger [*Talinum rugospermum* Holzinger]	sa	SE	–	X	X	–	–	X	–	–	–	–	–	–	–	–	–	–
Phyla lanceolata (Michx.) Greene [*Lippia lanceolata* Michx.]	aq	31	lr	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–
Physostegia virginiana (L.) Benth. ssp. *praemorsa* (Shinners) P.D. Cantino [*P. virginiana* var. *arenaria* Shimek]	mp	10	–	–	–	–	–	–	–	–	–	–	–	N	–	–	X	–
Pinus banksiana Lamb.	dc	ST	bo(5,7,11)	X	X	–	X	X	X	X	X	X	–	–	–	–	–	–
Pinus strobus L.	sw dc	ST	bo(2,11)	X	–	–	X	–	X	X	X	N	X	N	–	–	–	X
Piptatheropsis pungens (Spreng.) Romasch., P.M. Peterson & Soreng [*Piptatherum pungens* (Torr.) Dorn; *Oryzopsis pungens* ((Torr.) Hitchc.]	dc	SEX 10	lr	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–
Piptochaetium avenaceum (L.) Parodi [*Stipa avenacea* L.]	dc	ST	–	–	–	?	–	–	–	–	X	–	–	X	–	–	–	–
Plantago virginica L.	ds	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Platanthera aquilonis Sheviak [*Habenaria hyperborea* (L.) R. Br. var. *huronensis* (Nutt.) Farw.]	ma	ST	bo(11)	X	–	–	N	–	–	0	–	–	–	–	–	–	–	–
Platanthera ciliaris (L.) Lindl. [*Habenaria ciliaris* (L.) R. Br.]	bo	SE	–	0	–	–	–	–	–	0	0	–	–	–	–	–	–	X
Platanthera clavellata (Michx.) Luer [*Habenaria clavellata* (Michx.) Spreng.]	sw	SWL 10	bo(2) cp(4)	0	N	–	–	–	–	X	X	X	X	0	–	–	X	–
Platanthera flava (L.) Lindl. var. *herbiola* (R. Br.) Luer [*Habenaria flava* (L.) R. Br. var. *herbiola* (R. Br.) Ames & Correll]	ma	SWL 10	–	N	N	–	–	N	–	–	X	–	X	X	–	–	X	–
Platanthera hookeri (Torr. ex A. Gray) Lindl. [*Habenaria hookeri* Torr.]	dc	SEX	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Platanthera lacera (Michx.) G. Don [*Habenaria lacera* (Michx.) R.Br.]	mp	SWL 10	–	–	X	X	–	X	–	X	X	–	X	X	–	–	X	X
Platanthera psycodes (L.) Lindl. [*Habenaria psycodes* (L.) Spreng.]	sw	ST	–	X	–	X	N	–	–	–	X	–	X	0	–	–	–	–
Poa alsodes A. Gray	mf	ST	–	–	–	–	–	–	–	X	X	–	–	–	X	–	–	–
Poa paludigena Fernald & Wiegand	sw	ST	bo(5,11)	–	–	–	–	–	–	X	X	–	–	–	–	–	–	–
Poa saltuensis Fernald & Wiegand ssp. *languida* (Hitchc.) A. Haines [*Poa languida* Hitchc.]	dc	10	–	–	–	–	–	–	–	X	X	X	–	–	–	–	–	–

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Pogonia ophioglossoides (L.) Ker Gawl.	bo pa	ST 10	–	X	–	–	N	–	–	–	–	–	–	–	–	–	X	X
Polygala paucifolia Willd.	dc	SE	lr bo(11)	–	–	–	–	–	–	–	X	–	–	–	–	–	–	–
Polygonum articulatum L [*Polygonella articulata* (L.) Meisn.]	dc	ST	cp(3,6)	X	X	–	X	R	–	X	X	–	–	X	–	–	–	–
Polypodium virginianum L.	dc	10	–	–	–	–	–	–	–	0	X	–	–	0	X	–	–	–
Polytaenia nuttallii DC.	sa	SE	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Populus balsamifera L.	dc	SE	lr	0	–	–	–	–	–	–	0	–	X	–	–	–	–	–
Potamogeton bicupulatus Fernald	aq	SE	cp(8) lr	–	–	–	–	–	–	0	0	–	–	–	–	–	–	–
Potamogeton diversifolius Raf.	aq	9	–	–	–	–	X	–	–	X	–	N	–	–	–	–	–	–
Potamogeton pulcher Tuck.	aq	ST	cp(3,6,8)	X	–	–	–	–	–	X	N	–	–	–	–	–	–	–
Potamogeton pusilius L.	aq	SWL	–	X	–	–	X	–	–	X	–	–	–	–	–	–	–	–
Potamogeton robbinsii Oakes	aq	ST	lr	X	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Potamogeton strictifolius A. Benn.	aq	ST 10	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Potamogeton zosteriformis Fernald	aq	–	lr	–	–	–	X	–	–	–	–	–	–	–	–	–	–	–
Potentilla anserina L.	pa	ST	–	–	–	–	X	–	–	–	X	–	–	X	–	–	–	–
Prenanthes aspera Michx.	mp	ST	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Prenanthes crepidinea Michx.	bf	SWL	lr	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Prunus pensylvanica L. f.	dc	ST	–	X	X	X	X	X	–	X	X	X	X	X	–	–	–	X
Pyrola americana Sweet [*Pyrola rotundifolia* (L.) var. *americana* (Sweet) Fernald]	dc	ST	bo(2,5)	–	–	–	X	–	–	X	X	X	N	–	–	–	–	–
Pyrola elliptica Nutt.	dc	SWL 10	bo(2,5)	–	–	–	–	–	–	X	X	X	N	X	–	–	–	–
Rhamnus alnifolia L'Her.	ma	ST 10	lr bo(5)	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Rhexia mariana L. var. *mariana*	ma	ST	Cp8 lr	–	–	–	–	–	–	–	–	–	N	–	–	–	–	–
Rhexia virginica L.	ma	10	cp(5,8)	X	–	–	–	X	–	X	X	X	X	X	–	–	X	–
Rhus aromatica Aiton var. *arenaria* (Greene) Fernald	fd	ST	–	X	X	–	X	–	N	X	X	X	–	X	–	–	–	–
Rhynchospora alba (L.) Vahl	bo	10	cp(4)	–	–	–	–	–	–	–	–	–	N	–	–	–	–	X

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				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Rhynchospora macrostachya Torr. ex A. Gray	ma	ST 10	cp(3,6,8)	0	–	–	–	X	–	X	–	–	N	0	–	–	–	–
Rhynchospora nitens (Vahl) A. Gray [*Psilocarya nitens* (Vahl) Alph. Wood]	ma	SE 10	cp(6,8) lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Rhynchospora recognita (Gale) Kral [*Rhynchospora globularis* (Chapm.) Small var. *recognita* Gale]	ma	SE 10	cp(3,6)	–	–	–	–	–	–	X	–	–	–	0	–	–	X	–
Rhynchospora scirpoides (Torr.) Griseb. [*Psilocarya scirpoides* Torr.]	ma	ST	cp(3,6,8)	–	–	–	–	X	–	X	–	–	N	0	–	–	–	–
Ribes hirtellum Michx.	sw	SWL 10	–	–	–	–	–	–	–	X	–	X	–	–	–	–	–	–
Rorippa sessiliflora (Nutt.) Hitchc.	ma	–	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Rubus flagellaris Willd. [*Rubus enslenii* Tratt.]	sa	10	–	N	–	–	–	N	–	–	N	N	N	N	–	–	–	–
Rubus pubescens Raf.	sw	10	–	–	–	X	–	–	–	X	X	X	X	0	–	–	–	X
Rubus setosus Bigelow	sw	SE 10	–	–	–	–	–	N	–	N	–	–	–	–	–	–	N	–
Rudbeckia subtomentosa Pursh	sa	–	lr	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
Ruellia humilis Nutt.	sa	–	lr	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Sabatia angularis (L.) Pursh	pa	10	–	X	X	–	X	–	–	X	X	X	–	–	–	X	–	–
Sagittaria brevirostra Mack. & Bush	ma	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Sagittaria rigida Pursh	ma	10	–	–	–	–	0	–	–	X	–	–	–	–	–	–	–	–
Salix candida Flüeggé ex. Willd.	ma	10	bo(5)	–	–	X	–	–	–	X	0	–	–	–	–	–	–	–
Salix cordata Michx. [*Salix syrticola* Fernald]	fd	SE 10	bo(10)	X	–	–	X	–	–	–	X	–	–	–	–	–	–	–
Salix lucida Muhl.	ma	10	–	N	–	X	–	–	–	–	X	–	–	X	–	–	–	N
Salix pedicellaris Pursh [*Salix pedicellaris* var. *hypoglauca* Fernald]	bo	10	–	X	–	–	–	–	–	0	–	–	–	0	–	–	–	X
Salix sericea Marshall	ma	10	–	–	–	–	–	X	–	X	0	X	N	X	–	–	–	X
Sanicula trifoliata E.P. Bicknell	mf	10	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–	X
Sarracenia purpurea L.	bo	ST 10	cp(4)	–	–	–	–	–	–	X	–	–	–	–	–	–	–	X
*Sceptridium dissectum (*Spreng.) Lyon [*Botrychium dissectum* Spreng.]	mf	–	–	–	–	–	–	–	X	X	X	X	X	0	X	–	–	X
Sceptridium multifidum (S.G. Gmel.) M. Nishida [*Botrychium multifidum* (S.G. Gmel.) Rupr.; *B. multifidum* var. *intermedium* (D.C. Eaton) Farw.]	dc	SEX10	–	–	–	–	–	–	–	X	O	X	X	–	–	–	–	–
Sceptridium oneidense (Gilbert) Holub [*Botrychium oneidense* (Gilbert) House]	dc	SWL 8	–	–	–	–	–	–	–	X	X	X	X	X	X	–	–	–

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Special Flora	Habitat[1]	Status[2]	Geographic Affinity[3] (Source[4])	Units														
				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Sceptridium rugulosum (W.H. Wagner) Skoda & Holub [*Botrychium rugulosum* W.H. Wagner]	?	SEX	lr	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Scheuchzeria palustris L.	bo	SE	–		–	–	–	–	–	–	–	–	–	0	–	–	–	0
Schoenoplectiella hallii (A. Gray) Lye [*Schoenoplectus hallii* (A. Gray) S.G. Sm; *Scirpus hallii* A. Gray]	ma	SE 10	–	–	X	–	–	X	–	N	–	X	–	–	–	–	–	–
Schoenoplectiella purshiana (Fernald) Lye [*Schoenoplectus purshianus* (Fernald) M.T. Strong; *Scirpus purshianus* Fernald]	ma	ST	cp(3,6)	–	–	–	X	–	–	X	–	X	X	0	–	–	–	–
Schoenoplectiella smithii (A. Gray) Hayas. [*Schoenoplectus smithii* (A. Gray) Sojak; *Scirpus smithii* A. Gray]	ma	ST	cp(4,6)	N	–	–	X	–	–	X	–	–	–	–	–	–	–	–
Schoenoplectus subterminalis (Torr.) SojA.k [*Scirpus subterminalis* Torr.]	ma	ST 10	lr	–	–	–	0	–	–	–	–	–	–	–	–	–	–	–
Schizachyrium littorale (Nash) E.P. Bicknell	fd	10	cp(6)	N	–	–	N	–	–	N	N	–	N	N	–	–	–	–
Scirpus expansus Fernald	ma	SE 9	–	–	–	–	–	–	–	–	X	–	X	–	–	–	–	–
Scirpus georgianus R.M. Harper	ma	5	–	–	–	–	–	–	–	N	–	–	X	N	–	–	–	–
Scirpus hattorianus Makino	ma	–	lr	–	–	–	–	–	–	N	N	–	–	–	–	–	–	–
Scirpus polyphyllus Vahl	ma	10	lr	–	–	–	–	–	–	N	–	–	–	–	–	–	–	–
Scleria muehlenbergii Steud. [*Scleria reticularis* Michx. var. *pubescens* Britton]	ma	SE 10	cp(8) lr	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Scleria pauciflora Muhl. ex. Willd. var. *caroliniana* Alph. Wood	ma	SWL 10	–	0	–	–	–	X	–	–	–	N	–	X	–	–	–	–
Scleria reticularis Michx.	ma	ST	cp(3,6,8)	–	–	–	–	X	–	X	–	–	N	–	–	–	–	–
Scleria verticillata Muhl.	pa	10	–	X	–	–	X	–	–	–	–	N	–	–	–	–	–	–
Scutellaria parvula Michx. var. *missouriensis* (Torr.) Goodman & C.A. Lawson	sa	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Sedum ternatum Michx.	mf	10	lr	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–
Selaginella eclipes W.R. Buck [*Selaginella apoda* (L.) Fernald]	aq	SWL	lr	–	–	–	–	–	–	–	–	–	N	–	–	–	–	–
Selaginella rupestris (L.) Spring	dc	SE	–	–	X	–	–	X	–	–	X	–	–	–	–	–	–	–
Sinapis arvensis L.	ds	–	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Silene virginica L.	mf	–	lr	–	–	–	–	–	X	–	–	–	–	–	–	–	–	–
Sisyrinchium angustifolium Mill.	mp	10	cp(6)	–	–	–	–	X	–	X	0	N	X	–	–	–	X	–

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				mw	*td*	*cp*	*wb*	*im*	*ba*	*cd*	*sp*	*fv*	*ke*	*ta*	*hr*	*hg*	*hp*	*pb*
Sisyrinchium atlanticum E.P. Bicknell	mp	10	cp(3,5,6,8)	–	–	–	–	X	–	X	0	0	–	–	–	–	–	–
Solidago ptarmicoides (Torr. & A. Gray) B. Boivin [*Aster ptarmicoides* Torr. & A. Gray; *Oligoneuron album* (Nutt.) G.L. Nesom]	pa	ST	–	X	–	–	X	–	–	–	–	–	–	–	–	–	X	–
Solidago simplex Kunth var. *gillmanii* (A. Gray) G.S. Ringius [*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald]	fd	ST	–	X	–	–	X	–	–	X	X	–	X	X	–	–	–	–
Solidago speciosa Nuttall	sa	ST	–	X	X	X	X	X	X	X	X	X	X	X	–	X	X	–
Sparganium americanum Nutt.	ma	10	–	X	–	–	–	–	–	X	X	–	X	–	–	–	X	–
Sparganium androcladum (Engelm.) Morong	ma	ST	lr	–	0	–	–	–	–	X	–	–	–	–	–	–	–	–
Sphenopholis nitida (Biehler) Scribn.	me	10	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–	0
Sphenopholis obtusata (Michx.) Scribn.	mp	–	lr	–	–	–	–	X	–	–	–	–	–	–	–	–	–	–
Spiranthes lacera (Raf.) Raf.	mp	10	lr	–	–	–	–	N	–	X	–	–	–	–	–	–	–	–
Spiranthes lucida (H.H. Eaton) Ames	sw	ST 10	bo(1)	–	–	–	–	–	–	X	–	–	N	–	–	–	–	–
Spiranthes magnicamporum Sheviak	mp	SE	–	N	–	–	–	X	–	N	–	–	–	–	–	X	–	–
Spiranthes ovalis Lindl. var. *erostellata* Catling	mf	–	–	–	–	–	–	N	N	–	–	–	–	–	–	–	–	N
Spirodela polyrhiza (L.) Schleid.	aq	–	–	–	–	–	–	–	–	N	X	–	N	–	–	N	–	–
Stachys aspera Michx.	ma	10	lr	–	–	–	–	–	–	–	N	–	–	–	–	–	–	–
Stachys hyssopifolia Michx.	sa	–	cp(3,6,8)	–	–	–	–	X	–	X	–	X	–	–	–	–	–	–
Strophostyles leiosperma (Torr. & A. Gray) Piper	mp	SWL	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Symphyotrichum boreale (Torr. & A. Gray) A. Löve & D. Löve [*Aster borealis* Prov.]	pa	ST	–	X	X	–	X	X	–	X	0	–	0	0	–	–	–	–
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *interior* (Wiegand) G.L. Nesom [*Aster simplex* Willd. var. *interior* (Wiegand) Cronquist]	ma	–	lr	–	–	–	X	–	–	X	–	–	–	–	–	–	X	–
Symphyotrichum ontarionis (Wiegand) G.L. Nesom [*Aster ontarionis* Wiegand]	bf	–	lr	–	–	–	–	–	–	–	–	–	–	N	–	–	–	–
Symphyotrichum sericeum (Vent.) G.L. Nesom [*Aster sericeus* Vent.]	sa	ST	–	–	X	–	X	N	N	0	–	–	–	–	–	–	–	–
Thelypteris noveboracensis (L.) Nieuwl. [*Dryopteris noveboracensis* (L.) A. Gray]	sw	10	–	N	–	–	–	–	–	X	X	X	X	X	X	–	–	–
Thuja occidentalis L.	sw	SE	bo(5,11)	–	–	–	–	–	–	X	–	–	–	0	–	–	–	–
Torreyochloa pallida (Torr.) G.L. Church var. *pallida* [*Glyceria pallida* (Torr.) Trin.]	sw	10	–	–	–	–	–	–	–	–	0	X	N	–	–	–	–	–

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Toxicodendron rydbergii (Small ex Rydb.) Greene	fd	–	–	–	–	–	–	–	–	N	N	–	N	–	–	–	–	–
Toxicodendron vernix (L.) Kuntze [*Rhus vernix* L.]	bo sw	10	–	–	–	X	–	–	–	X	X	X	X	X	–	–	X	X
Tradescantia subaspera Ker Gawl.	sa	10	lr	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Trichostema dichotomum L.	sa	SWL	–	–	X	–	–	X	–	–	–	N	–	–	–	–	–	–
Trientalis borealis Raf.	sw	10	bo(11)	–	–	–	–	X	–	X	X	X	X	N	–	–	–	–
Trillium cernuum L. [*Trillium cernuum* var. *macranthum* Eamse & Wiegand]	mf	SE	lr	–	–	–	–	–	–	–	–	–	X	–	–	–	–	–
Trillium erectum L.	mf	–	lr	–	–	–	–	–	–	–	–	X	–	–	–	–	–	–
Triphora trianthophoros (Sw.) Rydb.	sw	10	lr	–	–	–	–	–	–	–	0	–	–	–	–	–	–	–
Turritis glabra L. [*Arabis glabra* (L.) Bernh.]	sa	SWL	–	–	–	–	–	–	–	0	–	N	–	X	–	–	–	–
Utricularia cornuta Michx.	pa	SE 10	cp(4)	X	–	–	X	–	–	N	–	–	–	–	–	–	–	N
Utricularia geminiscapa Benj.	bo	SE 10	cp(8) lr	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Utricularia gibba L.	ma	10	cp(3,5,6,7)	X	N	–	X	N	–	X	–	–	–	0	–	–	X	–
Utricularia intermedia Hayne	ma	SWL 10	–	N	–	–	–	–	–	X0	–	–	–	–	–	–	–	–
Utricularia minor L.	ma	ST 10	–	X	–	–	–	–	–	0	–	–	N	N	–	–	–	–
Utricularia purpurea Walter	ma	ST 10	cp(6)	–	N	–	0	X	–	X	–	–	–	0	–	–	–	–
Utricularia subulata L.	pa	ST	cp(8)	–	–	–	X	–	–	0	–	–	–	–	–	–	X	–
Uvularia sessilifolia L.	mf	10	lr	–	–	–	–	–	–	–	–	–	–	X	–	–	–	–
Vaccinium macrocarpon Aiton	bo	SWL 10	cp(10)	–	–	–	0	–	–	0	0	–	0	0	–	–	–	X
Vaccinium myrtilloides Michx.	sa	SE	lr	–	–	–	–	–	–	–	–	–	–	–	–	–	X	–
Vaccinium oxycoccos L.	bo	ST 10	lr bo(5)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Valerianella chenopodiifolia (Pursh) DC.	mf	SWL	–	–	–	–	–	–	–	–	–	X	–	–	X	–	–	–
Verbena simplex Lehm.	sa	–	lr	–	–	–	–	–	–	–	–	0	–	–	–	–	X	–
Veronica americana Schwein. ex Benth.	ma	SEX 10	lr	–	–	–	–	–	–	0	–	–	–	–	–	–	–	–
Veronica catenata Pennell [*Veronica comosa* Richter]	ma	10	–	–	–	–	–	–	–	X	0	X	–	–	–	–	–	–
Viburnum trilobum Marshall [*Viburnum opulus* var. *americanum* Aiton]	mf	SE	lr	–	–	–	–	–	–	–	–	–	–	0	0	–	–	0

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Vicia caroliniana Walter	sa	–	lr	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–
Viola blanda Willd. [*Viola incognita* Brainerd var. *forbesii* Brainerd]	sw mf	SWL 10	–	–	–	–	–	–	–	X	X	X	N	0	–	–	–	N
Viola canadensis L.	dc	9	–	–	–	–	–	–	–	–	X	–	–	–	X	–	–	–
Viola macloskeyi F.E. Lloyd (Banks ex Ging) M.S. Baker [*V. pallens* (DC.) Brainerd; *V. palustris* L. ssp. *palustris*]	sw	10	–	–	–	–	–	–	–	X	X	X	X	0	–	–	–	X
Viola rostrata Pursh	mf	10	–	–	–	–	–	–	–	–	–	–	–	–	X	–	–	–
Viola sagittata Aiton var. *ovata* (Nutt.) Torr. & A. Gray [*Viola fimbriatula* Sm.]	sa	6	–	X	–	–	–	–	–	–	–	X	–	X	–	–	X	–
Viola primulifolia L.	ma	ST	lr cp(5)	–	–	–	–	–	–	–	N	–	N	0	–	–	–	–
Vitis labrusca L.	dc	9	bo(5)	X	N	–	X	X	–	X	X	X	X	X	–	–	–	–
Wolffia columbiana H. Karst.	aq	–	lr	–	–	–	–	–	–	–	X	–	N	–	–	–	–	–
Woodwardia areolata (L.) T. Moore	sw	ST 10	cp(5,6)	–	–	–	–	–	–	E	–	–	–	–	–	–	–	–
Woodwardia virginica (L.) Sm.	bo	10	–	–	–	–	–	X	–	X	–	–	N	–	–	–	–	X
Xyris difformis Chapm.	ma bg	ST 10	lr cp(6)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	X
Xyris torta Sm.	ma	10	cp(4,5,6)	–	N	–	X	X	–	X	X	–	X	0	–	–	X	–
Zizania aquatica L.	ma	4	cp(3)	X	–	–	0	–	–	0	–	–	N	–	–	–	–	–
Zizania palustris L.	ma	SWL 10	–	X	0	–	0	–	–	–	–	–	–	–	–	–	–	–

[1] Habitat types: aq = aquatic, bo = bog, ma = marsh complex, pa = panne, bf = bottomland forest, dc = dune complex, ds = disturbed, fd = foredune complex, mf = mesophytic forest, mp = mesophytic prairie, sa = savanna complex, and sw = swamp complex.

[2] Status codes: SE = endangered, SX = extirpated, SR = rare, SP = special concern, ST = threatened, SWL = watch list, and 10 or 9 = conservatism score (CoC, highest floristic quality).

[3] Geographic affinity codes: bo = boreal, cp = coastal plain, lr = locally rare.

[4] Literature sources for geographic affinity: 1. Deam (1940). 2. Friesner (1937). 3. Hoober (1934). 4. McLaughlin (1932). 5. Parker (1936). 6. Peattie (1922). 7. Peattie (1930). 8. Reznicek (1994). 9. Swink and Wilhelm (1994). 10. Trefz (1935). 11. Welch (1935).

The Presettlement Vegetation and Native Plant Communities

The botanical features of the dunes may be considered under two heads; first, the dunes as a common meeting ground of trees and wild flowers from all directions; and second, the dunes as a picturesque battle ground between plant life and the elements. Botanically the Indiana dunes are a marvelous cosmopolitan preserve, a veritable floral melting pot.

—Henry Chandler Cowles' testimony at the National Park Service hearing to establish a Dunes National Park in Indiana (Mather 1917)

It is to Henry Chandler Cowles that we owe, not indeed the first recognition or even the first study of succession, but certainly the first thorough working out of a strikingly complete and beautiful successional series (1899), which together with later more comprehensive studies ('01, '11) brought before the minds of ecologists the reality and the universality of the process in so vivid a manner as to stimulate everywhere—at least in the English-speaking world—that interest and enthusiasm for the subject which has led and is leading to such great results. During the first decade of this century indeed Cowles did far more than any one else to create and to increase our knowledge of succession and to deduce its general laws. By acute and thorough observation and by lucid exposition he became the great pioneer in the subject. It is therefore natural and fitting that my contribution to a volume intended to express the honour and affection in which Cowles is held by his fellow botanists should deal with this subject.

—Arthur Tansley (1935)

The Indiana Dunes region provides conditions for three principal but intergrading situations on which vegetation is partly determined: 1) substrate type (dune sand, wetland muck, and clay moraines), 2) moisture availability (xeric, mesic, and hydric), and 3) light availability (photosynthetic active radiation, or PAR) at or near the ground level. Wilhelm (1990) identified moisture and arborescent development as defining the principal axes of the vegetation complex at the Indiana Dunes. While the presence of trees has important ecological implications, the density of trees determines light availability at the ground surface, which, in turn, determines the groundlayer vegetation (i.e., light is the proximate factor determining groundlayer composition). Since most of the species richness is in the groundlayer, we decided to use light availability as one of the principal gradients. Thus, forest, woodland, savanna, and unforested communities form the principal gradient along the variation in photosynthetically active radiation (see Figure 7).

Comprehensively, at least seven major factors had a role in forming and maintaining the principal vegetation types at the Indiana Dunes:

1. The geographic position of northwestern Indiana at the southern tip of Lake Michigan (Visher 1935).
2. The variety of substrates occupying the area north of the Valparaiso Moraine: (the glacial moraine that encircles the coastal region of southern Lake Michigan) sand, muck, peat, and morainal silt loams and clays (Persinger 1972, Furr 1981), and their modification by vegetation over time to create soils differing in

moisture, organic matter, and nutrient content.

3. The effects of Native American-set fires in this region where abundant rainfall precludes many lightning set fires. Lightning-set fires might have occurred in drought years (Hill 1896, Curtis 1959, Cook and Jackson 1978, Vankat 1979, Lewis 1980).
4. The physiographic position of northwestern Indiana and southern Lake Michigan within the eastern portions of the Prairie Province (Transeau 1935, Braun 1950, Kuchler 1964) and the western limit of the Eastern Temperate Deciduous Forest, as well as the postglacial northward migrations of boreal and subboreal forests.
5. The level of the water table and its variability.
6. Succession and disturbance regimes such as blowing sand, fires, treefalls from storms and intensity of elk and bison activity (Cowles 1899b, Olson 1958d, Bowles et al. 1990, Pavlovic and Bowles 1996).
7. The intensity of sunlight available.

Within the region of the Indiana Dunes, treeless or partially treeless communities dominated the landscape during the presettlement times, especially in the western portions and probably in the dune complex. A 1922 aerial photograph of the Mt. Baldy area indicates that the far eastern portions of the Indiana Dunes were savanna/woodland complex rather than the present forest created by fire suppression. Fires, moving eastward under the influence of the prevailing westerlies (Hill 1896), were very influential in maintaining the openness of these communities, especially in the western portion of the Lake Michigan watershed in Indiana.

Fires had a diminishing influence as they moved east because of the moisture-laden winds coming off Lake Michigan in both summer and winter under particular meteorological conditions. The increasing topographic heterogeneity of the dunes, and the presence of north to south fire breaks such as the Grand Calumet River, Dunes Creek, and Trail Creek (Henderson 1987), and Fish Lake amplified this diminishing effect (Plampin and Hamilla 2011, 2014). Consequently, mesophytic forest communities were remotely interspersed along the dune complex as far west as the Miller area, but were best developed in the eastern sectors, with principal outliers along the Little Calumet River as far west as the Bailly area. Swamp complex communities, for the most part, were scattered where favorable edaphic and hydrologic conditions prevailed and where fires had little or no regular influence. These were mostly in the eastern portions of the Indiana Dunes, especially along the 600-foot contour seepage zone.

Whether the contemporary vegetation associations in the Indiana Dunes compare compositionally and structurally to the presettlement vegetation is inversely proportional to the modification by Europeans that began in the early 1800s (Cook and Jackson 1978). European colonization has had a direct and profound influence on five of the seven transformative factors influencing vegetation including the fire regime (frequency, intensity, and scale), the water table, and succession and disturbance regimes (as described below).

Europeans not only brought intensive logging practices, but also useful or familiar plants from the Old World flora (Cook and Jackson 1978, McClain and Elzinga 1994). The introduced flora had been evolving in the disturbed agricultural and urban soils of Europe, the Mediterranean region, and Asia independently of the New World flora, even though these northern hemisphere floras shared some genetic, generic, and species similarities (White 1983). Six ecological factors, agriculture, animal husbandry, fire suppression, drainage, logging, and the introduction of Old World flora and fauna, had detrimental effects on the natural communities of the Indiana Dunes. Yet the infertility of the sands and wetland barriers helped preserve some of the natural dunes ecosystems from total obliteration. More recently, atmospheric nitrogen deposition has probably contributed to species loss

(Bird and Choi 2017).

The concept of succession, developed in the Indiana Dunes by Cowles (1899a) and refined by Olson (1958d), described the process of successive vegetation development on sand dunes. This application was concerned with what is now called primary succession, because it commences from a pure geologic substrate devoid of plants and animals. Over time plants and animals inhabit and modify the conditions. The vegetation development from beach to oak or beech-maple forest progresses through a variable network of vegetation associations and results in a community with high biomass and low light levels (Olson 1958d). While succession is typically viewed as a process where each successional stage prepares the way for the next, this facilitation concept is not the rule, since any stage can potentially inhibit progression to the next stage or tolerate change, neither facilitating nor inhibiting it (Connell and Slatyer 1977). For example, the dense sward of the native marram grass (*Ammophila breviligulata*) on a foredune facilitates the buildup of soil organic matter that will permit other species to invade. However, if stable for a while, a thick thatch and dense culms build up and create low light conditions that inhibit invasion and germination of seed of new plant species. Factors that kill the marram grass or remove the thatch create conditions for invasion of the secondary dune vegetation (Poulson 1990, 1993a, 1993b, 1995, 1999; Poulson and McClung 1993, 1999). Thus, marram grass can facilitate or inhibit succession.

In contrast, secondary succession occurs when a disturbance destroys or stresses the vegetation, but does not completely sterilize the substrate (Egler 1954, White 1979). Some disturbances—fire or farming for example—damage the vegetation, which initiates a new vegetation succession influenced by any plants or seed that remain, as well as by incoming propagules dispersing from afar (Egler 1954). Vegetation development in succession can be arrested, sometimes at an intermediate state. Henderson (1982, 1987), for example, observed the failure of black oak savanna to succeed locally into a beech-maple mesophytic forest because of the droughty soils, hot summer microclimate, and prevalence of fire. Although primary vegetation change can be slower than secondary succession (Futyma 1985; Cole 1986, 2001; Cole et al. 1992), this is not always true.

Wilhelm (1990) distinguished natural and secondary succession based on natural and anthropogenic processes and their relative rates of change. He emphasized that the former was slow, and the latter was fast. This perspective is biased. For example, the human plowing of a meadow can be just as rapid as a tornado blowing down a forest. Thus, we emphasize the concepts of vegetation development and disturbance regimes rather than the rates of successional change.

A more relevant issue is whether successional and disturbance processes favor native versus non-native species. That much of the landscape was formerly indigenous vegetation and is now dominated by human-caused disturbance and non-native flora is not insignificant because it represents the context in which land managers attempt to preserve the remnants of the indigenous vegetation, of which Indiana Dunes is an outstanding example. Many disturbances in today's context create conditions favorable to the invasion of non-native plants and, as far as invasive species are concerned, change fundamentally the direction and outcome of succession. Even minor disturbances such as light selective logging, light grazing, or slight water drawdowns, can result in the drastic alteration of a plant community. In addition, invasive species can leave legacy impacts on the soil structure, chemistry, and biota that affect the ability to conduct restoration (Elgersma et al. 2011, Pyšek et al. 2012, Morriën and van der Putten 2013).

In addition, national parks are not refugia from human impacts because humans have and are changing conditions that fundamentally influence the scale, intensity, and frequency of successional and disturbance processes. In the central and eastern U.S., presettlement vegetation are islands surrounded by anthropogenically

changed vegetation that does not serve as a source for native species (called novel ecosystems); thus, the native vegetation islands are remote from the areas that at one time served as sources for native species recolonization by dispersal of propagules. Indeed, native plant communities today are surrounded by a completely rearranged post-settlement environment. The Indiana Dunes has experienced and is experiencing a barrage of human impacts including nitrogen deposition that is enriching nitrogen-limited vegetation and modifying successional rates, former overexploitation in resources resulting in the decline of some species, fire suppression that has converted a rich oak-savanna ecosystem into a depauperate oak forest system, and ditching and drainage that have converted wetlands into species-poor red maple and ash forests. In addition, invasive species such as the emerald ash borer (*Agrilus planipennis*) have killed ash trees throughout the dunes (Hausman et al. 2010). As human-caused climate change progresses, the increasing CO_2 in the atmosphere will alter plant competition relationships, warm the climate, and alter drought and rainfall patterns, all of which will significantly and ultimately change the vegetation of the Indiana Dunes.

Presettlement Vegetation Descriptions

Because of the importance of succession to the pattern and composition of the dunes vegetation, we present the following presettlement descriptions in relation to the principal controlling factors, hydrology, light, and successional status. Thus, we first present wetlands that are not forested, then forested wetlands, and finally, terrestrial communities, with associations arranged in simplified successional order from treeless to forested associations. Approximately a dozen plants have been selected to characterize each association type.

The major plant communities are illustrated in the natural area vegetation maps at the beginning of each unit chapter. They are based upon a concept of the vegetation as it is presumed to have existed in the late Holocene, prior to European settlement (Bacone et al. 1980). The maps, produced by Bacone et al. (1980), exist in paper form but are not georeferenced, and mylars of the maps have been lost. More recently, Marlin Bowles, Jenny McBride, Samniqueka Halsey, Tammy Patterson, and Pavlovic created a digitized GIS map of the presettlement vegetation as the Public Land Survey surveyors saw it in the early 1830s (Figure 8) (Bowles et al. 2015b). Since the maps in this report were created from a mid-1980s vegetation survey, the reader is cautioned about taking the maps too literally. For example, there are many areas of the park that were formerly savanna or marsh complex but are now forested, as they have been invaded by trees due to fire suppression and dewatering from ditching.

Maintenance, enhancement, and restoration of these indigenous plant communities will best preserve healthy populations of special flora. Less evident from the description and maps are the complex gradients in abiotic and biotic factors that determine the vegetation pattern and the degree of transition or ecotone between the communities. Many species are often found in these transitional areas. Gradients are steep in much of the Indiana Dunes, so transitions are abrupt and narrow (e.g., the narrow willow zones between mesic dunes and hydric marshes and ponds). At Hoosier Prairie these transitions are broad because the topographic gradients are slight, changing over tens of meters. Consequently, at Hoosier Prairie, these ecotonal willow lands are broad enough to be mapped. In the dunes closer to Lake Michigan, these transitions are narrow to nonexistent due to rapid topographic change between dunes and wetlands. Much of the discussion of the native plant communities is taken from Bacone et al. (1980) and Wilhelm (1990), but augmented from our extensive experience.

Wetland Communities

The wetlands described here are non-forested and intergrade into each other, often as concentric zones around a depression. Topographic depressions and sloughs filled with water in the late winter and spring can become bone-dry in the summer months or during droughts (Doss 1991) as a result of

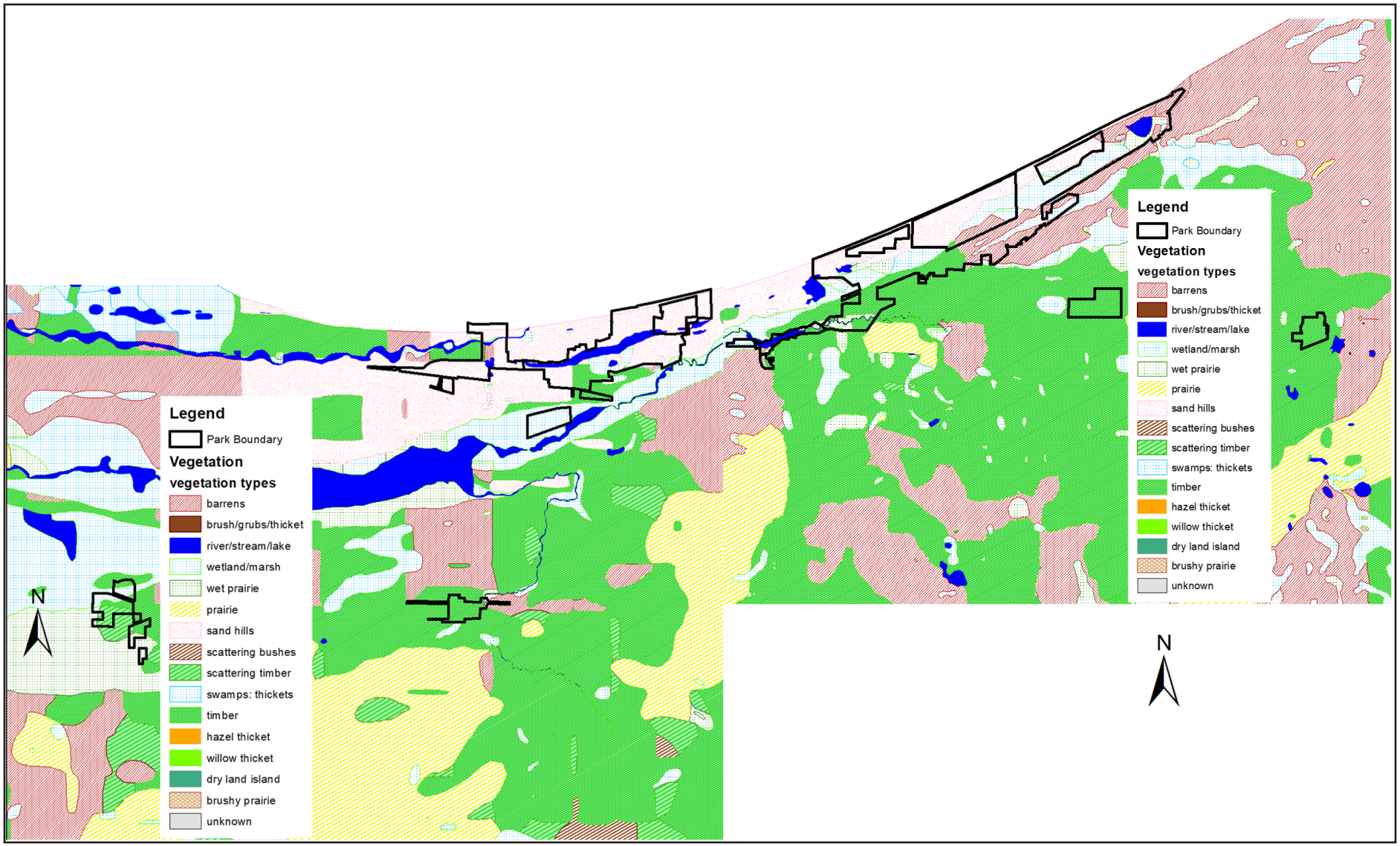


Figure 8. Presettlement vegetation of the Indiana Dunes, as characterized by the Public Land Survey Office in the early 1830s.

natural seasonal fluctuations in precipitation and evaporation. Extreme rain events from August to November can flood these systems within hours. The ephemeral nature of many of the wetland communities as a result of water level fluctuations complicates mapping the aquatic vascular plant communities.

Aquatic

The aquatic, or pond, plant community is comprised of species that complete their life cycle on or beneath the water's surface. Thus, there are submersed plants (e.g., *Ceratophyllum demersum*, *Elodea nuttallii*, and *Utricularia minor*) that rarely appear above the water's surface, floating plants (e.g. *Brasenia schreberi*), and emergent aquatic plants that grow up above the water's surface (the remaining species listed below). Aquatic vegetation grades into the marsh complex where water depth declines gradually or where invasive marsh plants have invaded. Plant species that typify the aquatic vascular plant community in the Indiana Dunes include *Brasenia schreberi*, *Pontederia cordata*, *Ceratophyllum demersum*, *Potamogeton gramineus*, *Elodea nuttallii*, *Potamogeton illinoensis*, *Nuphar advena*, *Potamogeton pusillus*, *Nymphaea odorata* ssp. *tuberosa*, *Sagittaria latifolia*, *Persicaria amphibia*, and *Utricularia minor*.

Bog

The word bog, in the vernacular, signifies any place where there is a quagmire or wet, mucky, hummocky ground. Hence, to be "bogged down" describes the difficulty one experiences when progress is retarded by such ground where the legs get stuck in the substrate. Ecologists, on the other hand, tend to restrict the term "bog" to acidic wetlands that are fed by precipitation and usually have organic substrates (i.e., peat) that have a characteristic flora. These are often associated with glacial kettle valleys. This is in contrast to the alkaline groundwater or artesian-fed wetlands called fens, although this is a simplification because fens vary in degree of mineral richness (Swinehart et al. 2001).

In the past, controversy flared over the use of the terms bog and fen for Cowles Bog (Cowles Dunes Unit) (Hendrickson and Wilcox 1979). The controversy focused on the fact that the traditional name for the wetland is in fact a misnomer (Apfelbaum et al. 1983, Cohen and Shedlock 1986, Shedlock et al. 1993). Wilhelm (1990) wrote, "Importantly, however, while the terms bog and fen are conceptually each at opposite ends of a community spectrum, they are nevertheless profoundly and complexly related to each other within the spectrum—not to mention the affinities both communities have to certain phases of the forested peatlands and the swamp complex." Although the concept is often applied to wetlands in the entirety, the application of the concepts of bogs or fens is complicated by the frequent mosaic nature of these types, and the evidence for rapid conversion of fen communities to bogs by the invasion of *Sphagnum* moss (Swinehart et al. 2001). In addition, this pH distinction is confounded by the often floristic similarity of the two types (Cain and Slater 1948, Mandossian 1965, Swinehart et al. 2001). For instance, that fens and bogs share species such as white pine or tamarack has confused people about the terms for these wetlands. Swinehart et al. (2001) identified four types of peatlands in northern Indiana: mineral rich fens, leatherleaf bogs (e.g., Pinhook Bog), tall shrub bogs, and forested peatlands. Paleoecological studies suggest that both bogs and fens eventually undergo succession to red maple swamp (Swinehart and Parker 2000).

This confusion is in part explained, as Heinselman (1970) points out, by the fact that portions of a peatland may undergo transformations from one kind to another, and that the ratio of organic matter to minerals in fen and bog peats have profound chemical consequences. In less organic soils, most of the exchange capacity is saturated by metallic cations from soil minerals, but exchangeable metallic cations damp off as organic content rises and hydrogen ions become dominant. Subsequent research has indicated that much of the groundwater reaching the mound portion of Cowles Bog is circumneutral (pH 7), of ancient origin based on relative proportions of O_2 isotopes, and minerotrophic—all indications of a groundwater source characteristic of fens

(Shedlock et al. 1993, 1994). But higher hummocks, especially with sphagnum, may be acidic within the larger fen. In addition, any given substrate may have several ionic states within a short distance (Potzger 1937), with these manifestations sometimes superimposed over other circumstances. For instance, mounds within a fen system may have a lower soil pH than the waters surrounding it. The former white pine swamp north of Cowles Bog is illustrative in this regard because the white pines grew on hummocks that were more acidic than the swamp muck between them. All these factors, coupled with the fundamental nature of the original parent community, elevate a conceptually linear plant community spectrum into one that is more spatially complex.

Typical plants of bogs in the Indiana Dunes include *Andromeda polifolia* var. *latifolia*, *Menyanthes trifoliata*, *Carex canescens*, *Ilex mucronata*, *Carex oligosperma*, *Pogonia ophioglossoides*, *Carex trisperma*, *Rhynchospora alba*, *Chamaedaphne calyculata*, and *Vaccinium oxycoccos*.

Marsh Complex

"Marsh," like "bog," is not a scientific word that brings immediately to mind a discrete plant community, but rather it is a more colloquial expression that denotes a place where one is sure to get his or her feet wet, or perhaps a place waterfowl like to frequent. The term "marsh" is used here only for lack of a better word to describe the intricate complex of wet, open, non-forested plant associations that have had to be mapped together. In the Indiana Dunes, the marsh complex includes several specific community types, all of which intergrade floristically with each other, as well as with some of the other general community types: fen, marsh (in a restricted sense), and a wet prairie/sedge meadow complex. According to Swinehart et al. (2001), marshes are distinguished from bogs and fens by having surficial water for some portion of the year, while the latter are moss-covered.

Fen

As discussed under the bog association, fens represent a variety of plant associations that have a basic to circumneutral substrate that is saturated by minerotrophic (mineral rich) groundwater that is high in calcium and magnesium, with continuous flowing water throughout the growing season. The substrate can range in character from exposed marl to deep peat. Fens are found along the bluff bases in the Little Calumet River floodplain. Interestingly enough, fen conditions here are present in portions of the floating mat area south of Dune Acres known as "Cowles Bog" (Kurz 1928). Within the Chicago region, Cowles Bog remains unique perhaps because of the mosaic of bog, fen, and swamp associations near each other.

At Cowles Bog, the open portion of the fen, which occupies a small area north of the former large cattail marsh area, is typified by *Bidens trichosperma*, *Pedicularis lanceolata*, *Campanula aparinoides*, *Comarum palustre*, *Thelypteris palustris* var. *pubescens*, *Rhamnus alnifolia*, *Eleocharis rostellata*, *Salix myricoides*, *Galium obtusum*, *Schoenoplectus acutus* var. *acutus*, and *Muhlenbergia glomerata*.

Marsh

The marsh community is saturated by water for all or most of the growing season. This condition provides habitat for a wide range of intergrading plant associations; their composition depends upon the nature of the soil, the soil alkalinity, the stability of the water levels, the frequency of fire, the disturbance history, and other factors. From the standpoint of the marsh vegetation, it is important to note that *Typha* spp. (cattail) dominate many of the Indiana Dunes marsh communities today. More often than not, this is *Typha* × *glauca*, a hybrid between the indigenous *T. latifolia* and nonindigenous *T. angustifolia* (Peattie 1926, Boers et al. 2007, Olson et al. 2009, Travis et al. 2010). *Typha* was virtually unmentioned by the original land surveyors. Such a conspicuous, easily identifiable plant was bound to have attracted attention had it been an important plant in the marsh community during presettlement times, although surveyors were interested only in timber and soil type as indicative of places suitable for agriculture. The widespread

growth of cattail today suggests that, where it grows in abundance and often to the near exclusion of other plants, reflects a profound degree of habitat perturbation and hybrid vigor. Evidence suggests that three of the most significant factors in cattail success over other wetland plants are unstable water levels, a prolonged lack of fire, and hybrid vigor (Wilcox et al. 1984, Kuehn et al. 1999, Farrer and Goldberg 2009). In addition, cattail is among the few plants that can successfully re-inhabit wetlands, on which attempts have been made to farm or heavy amounts of haying have occurred, as occurred at Cowles Bog (Cook and Jackson 1978).

Plants that serve as fuel for the regular fires of late summer or fall in the marsh community are primarily members of the sedge family (Cyperaceae), including such perennials as *Carex aquatilis* var. *substricta*, *Carex lasiocarpa* ssp. *americana*, *Carex comosa*, *Carex sartwellii*, *Carex haydenii*, *Carex stricta*, *Carex lacustris*, *Schoenoplectus acutus* var. *acutus*, and *Schoenoplectus tabernaemontani*.

Other plants typical of healthy marsh communities are numerous and include *Symphyotrichum firmum*, *Comarum palustre*, *Carex tribuloides*, *Proserpinaca palustris*, *Decodon verticillatus*, *Rumex britannica*, *Lysimachia thyrsiflora*, *Scutellaria galericulata*, *Persicaria hydropiperoides*, and *Sium suave*.

Panne (Dune Slack)

The term "panne", as generally used in the Chicago Region, refers quite specifically to the calcareous (Kurz 1923), wet, interdunal depressions that form near the water table on the lee sides of the first or second line of foredunes along Lake Michigan. The high quality panne community (internationally called dune slacks; see Smith et al. (2008)) at INDU is confined largely to the Miller Woods, West Beach, and Tamarack (Crescent Dune) units. Pannes occur throughout the Great Lakes where there are alkaline wetlands along the shoreline. There is a western variant of the panne community at Clarke and Pine Nature Preserve in the "ridge and swale" region of northwestern Lake County, Indiana. Additional pannes and ponds occurred to the west of Miller Dunes (section of Miller Woods north of the Grand Calumet River lagoons) but were destroyed by the construction of the U.S. Steel Corporation complex and the landfills. Pannes are found adjacent to the town of Ogden Dunes on both the west and east, were occasional where Burns Ditch occurs today, and are found to the east across the Indiana Harbor and industrial complex, formerly Dune Park. There is a small panne-like depression at Portage Lakefront Park (West Beach D) and a small one to the west near the jack pines (*Pinus banksiana*) just east of Ogden Dunes. There is also a panne-like community below Crescent Dune and there are several in the Indiana Dunes State Park.

Wilhelm (1990) wrote:

> ***The panne communities are distinguished by their soil, water chemistry, and their floristic composition. They contain certain plant species which now grow nowhere else in either the Chicago Region or the state of Indiana. Many of the panne plant species are also conservative members of the marly fens—communities which are not represented in the Lakeshore—but the water flow from the landward dunes towards Lake Michigan is not unlike that of fens (Doss 1991). The obvious floristic relationship between the fen and the panne, however, has inspired light use of the term "fenne" among some local ecologists. "Fenne" is a term which, while perhaps a little perverse linguistically, captures rather well the integration of the two community concepts: "panne" as used by Raunkiaer (1934) and Daubenmire (1968); and "fen" as perceived locally.***

The second use of the word panne refers to a seepage or depression on the beach that becomes vegetated, but only briefly, since lake level fluctuations can destroy it or it becomes incorporated into a new foredune. Like the species-rich panne, the beach panne has calcareous water from the lake and from the water seepage from the inland dunes. The term "panne" was perhaps first applied locally by Downing

(1922), when he described the panne as an initial dune formation (probably in the sense of Cowles (1899b)), as ephemeral seeps on the middle beach, where cottonwoods can germinate in wet years (Pavlovic, pers. obs., and Thomas Poulson, formerly University of Illinois at Chicago, pers. comm. with Pavlovic). Thomas Poulson, Jerry Olson (deceased, formerly Oak Ridge National Laboratory), and Pavlovic have observed the phenomenon that Downing refers to at the Miller Dunes, and the feature referred to here should not be confused with the more floristically rich pannes located behind the foredunes.

Downing (1922) wrote:

> *A dune, therefore, usually starts on some low-lying area near the shore where the land is sufficiently moist to allow many cottonwood seeds to germinate, yet far enough from the storm beach so the seedlings are not uprooted by the heavy waves. Such a low, moist germination bed is known as a panne. That cottonwoods are the predominant growth in such a locality is due to the fact that these poplars are the commonest trees in the neighborhood...and also because their seeds are small, tufted with silky pappus that insures their ready transportation by the wind.*

Cottonwood (*Populus deltoides*), in addition, is rarely if ever the "predominant growth" in pannes that are usually adjacent to jack pine stands (*Pinus banksiana*) behind the foredunes. Plants that typify the interdunal panne community in the Indiana Dunes include *Agalinis purpurea*, *Lobelia kalmii*, *Solidago ptarmicoides*, *Rhynchospora capillacea*, *Carex aurea*, *Sabatia angularis*, *Carex viridula* ssp. *viridula*, *Scleria verticillata*, *Cladium mariscoides*, *Triglochin maritima*, *Gentianopsis crinita*, *Utricularia cornuta*, *Juncus arcticus* var. *balticus*, *Utricularia subulata*, and *Liparis loeselii*.

Sedge Meadow/Wet Prairie Complex

The sedge meadow/wet prairie complex is the conceptual and floristic intergrade between the marsh community and the mesophytic prairie complex. On the wetter end of the moisture gradient is the sedge meadow where sedges common to the marsh community provide the fuel for regular fires. Common sedges include *Carex stricta*, *C. aquatilis*, and *C. lacustris*. At the dryer end of the gradient, the wet prairie has grasses such as *Andropogon gerardii*, *Calamagrostis canadensis*, *Calamagrostis stricta* ssp. *inexpansa*, *Panicum virgatum*, and *Spartina pectinata* that provide fuel for fires. Forbs that typify the sedge meadow include *Symphyotrichum boreale*, *Triadenum fraseri*, *Bidens tripartita*, *Lycopus uniflorus*, *Thelypteris palustris* var. *pubescens*, *Mentha arvensis*, *Eupatorium perfoliatum*, *Persicaria punctata*, *Galium obtusum*, and *Persicaria sagittata*.

Forested Wetlands

Bottomland

Bottomland is a term that applies to plant communities that developed in the floodplains of streams and rivers, particularly those with gentle gradients. In the Indiana Dunes these communities are generally characterized by trees, under which an herbaceous flora is adapted to the regular, or at least frequent, deposition of silt during the spring floods and to the dry conditions often encountered during the summer and early fall months.

There can be a tendency on the part of some to confuse the swamp complex with bottomland, but these two forested wetland types are distinguished by the processes that produce the flooding. Both experience seasonal flooding, but in the case of bottomlands, the source of water is fluvial rather than coming from groundwater seepage or rainfall flowing into isolated basins. The bottomland community in the Indiana Dunes, though it likely has changed profoundly since settlement, is presently confined to the floodplain of the Little Calumet River, where typical or characteristic plant species include *Acer saccharinum*, *Fraxinus pennsylvanica* (now largely killed), *Cardamine bulbosa*, *Populus deltoides*, *Carex grisea*, *Rudbeckia laciniata*, *Carya laciniosa*, *Salix nigra*, *Chaerophyllum procumbens*, *Viola striata*, and *Floerkea proserpinacoides*.

Swamp Complex
The term "swamp" applies to wooded wetlands in which a non-floating substrate is kept moist by groundwater or rain for all or nearly all the growing season. The distinction here between swamp complex and bottomland is quite clear, but the distinction between swamp complex and the bog/fen complex can be far less than absolute. Generally speaking, the bog, as well as certain phases of the fen, is developed locally on a floating mat of peat, the vascular vegetation of which is often herbaceous or shrubby, and/or with scattered conifers, principally tamarack (*Larix laricina*) and eastern northern white cedar (*Thuja occidentalis*). See herein the earlier discussions under bog and marsh complex, those by Curtis (1959), and those by Dansereau and Segadas-Vianna (1952), with regard to the successional relationships between bog and swamp. In the Indiana Dunes, the swamp complex potentially includes three essential, though often intergrading phases: the hydromesophytic forest, the conifer swamp, and the pin oak (*Quercus palustris*) flatwoods.

The wooded portion of the fen at Cowles Bog is north of the fen proper and southeast of the hydromesophytic forest. Characteristic plants of the wooded fen include *Caltha palustris*, *Pedicularis lanceolata*, *Chelone glabra*, *Toxicodendron vernix*, *Cicuta maculata*, *Solidago patula*, *Fraxinus nigra*, *Symplocarpus foetidus*, *Juglans cinerea*, *Thuja occidentalis*, and *Larix laricina*.

Hydromesophytic Forest
The hydromesophytic forest is characterized by a mix of mesophytic forest species, some of the species common to both the bogs and the fens, several of the more shade-tolerant marsh community species, and some species typical of swamps, as well as a few species which are more conservative to the boreal forests of northern Wisconsin and Michigan. Within the Indiana Dunes, the hydromesophytic forests are found principally along the subdunal margins of the Great Marsh and Bailleytown Sag areas. This diversity of tree species is the result of the mosaic of seep zones and hummocks on the northward tilted plain south of the Great Marsh. Species that are more typical of the hydromesophytic forest, but are also important in the mesophytic forest, include *Actaea pachypoda*, *Cornus alternifolia*, *Allium tricoccum*, *Phegopteris hexagonoptera*, *Eurybia macrophylla*, *Fagus grandifolia*, *Brachyelytrum erectum*, *Quercus rubra*, *Conopholis americana*, and *Viburnum acerifolium*.

Hydromesophytic forest species also typical of the boreal forest, though not necessarily relict, include *Acer rubrum*, *Thelypteris noveboracensis*, *Betula alleghaniensis*, *Platanthera clavellata*, *Carex crinita* var. *crinita*, *Maianthemum canadense*, *Carex intumescens*, *Panax trifolius*, *Chrysosplenium americanum*, *Trientalis borealis*, and *Coptis trifolia*.

Hydromesophytic forest community species that are also shade-tolerant marsh community species include *Bidens cernua*, *Platanthera lacera*, *Cardamine bulbosa*, *Onoclea sensibilis*, *Cicuta maculata*, *Persicaria hydropiperoides*, *Thelypteris palustris* var. *pubescens*, *Packera aurea*, *Eutrochium fistulosum*, and *Sium suave*.

Some of the species that typically inhabit fen conditions in the Chicago Region, but which are also important members of the hydromesophytic forest community in the Indiana Dunes, include *Doellingeria umbellata* var. *umbellata*, *Persicaria arifolia*, *Caltha palustris*, *Micranthes pensylvanica*, *Chelone glabra*, *Solidago patula*, *Cicuta bulbifera*, *Symplocarpus foetidus*, *Fraxinus nigra*, and *Viola macloskeyi*.

Conifer Swamp
As the name suggests, conifer swamps are dominated by evergreen trees. Species characterizing this phase of the swamp complex locally include *Acer rubrum*, *Pinus strobus*, *Betula alleghaniensis*, *Toxicodendron vernix*, *Glyceria canadensis*, *Saururus cernuus*, *Ilex verticillata*, *Vaccinium corymbosum*, *Osmunda regalis* var. *spectabilis*, and *Viola macloskeyi*.

The conifer swamp is poorly developed in the Indiana Dunes today, probably having been nearly obliterated locally by logging

and draining years ago. The best example is the former pine swamp north of Cowles Bog proper. Plants that are usually found in wet areas where white pines (*Pinus strobus*) are important include *Acer rubrum*, *Ilex mucronata*, *Betula alleghaniensis*, *Osmunda regalis* var. *spectabilis*, *Chamaedaphne calyculata*, *Toxicodendron vernix*, *Cornus canadensis* (probably extirpated), *Sarracenia purpurea*, *Drosera rotundifolia*, *Trientalis borealis*, *Larix laricina*, and *Vaccinium macrocarpon*.

Pin Oak Flatwoods

Another phase of the swamp complex is the pin oak flatwoods, which seem to be as much related to the hydromesophytic forest as to certain phases of the savanna complex, though they do not appear intermediate between the two, either conceptually or floristically. Nevertheless, the floristic composition, while today not very rich, is largely derived from species that are also members of either the more mesophytic phases of the savanna complex, the marsh complex, or of certain phases of the hydromesophytic forest.

The pin oak flatwoods community usually develops in sandy depressions, often amidst savanna and white oak flatwoods. These depressions are either low enough topographically to allow the substrate to be kept moist by groundwater brought to the surface by capillary action, or are kept moist by rain water which, unable to drain away through an impervious subsoil, lingers in the substrate. When the flatwoods are intermediate in elevation, a pond or marsh can occur in the lowest elevations and pin oak flatwoods can grade into the adjacent upland savanna on higher ground.

The character of subsoil and the degree of organic matter accumulation in part determine the substrate saturation time. However, in most cases, the pin oak flat becomes dry during summer months due to combining factors that include drainage, evaporation, and transpiration. The pin oak flatwoods have groundlayer vegetation that is relatively depauperate. Some diversity is found on fallen logs and buttresses, and among the hummocks formed by buttonbush (*Cephalanthus occidentalis*) colonies.

Plants that typify the pin oak flatwoods in the Indiana Dunes include *Bidens discoidea*, *Nyssa sylvatica*, *Carex virescens*, *Osmundastrum cinnamomeum*, *Cephalanthus occidentalis*, *Quercus palustris*, *Lindera benzoin*, *Spiraea alba* and *S. tomentosa*, *Lycopus uniflorus*, and *Vaccinium corymbosum*.

Terrestrial Communities

The terrestrial plant communities can be grouped according to the presence or absence of trees. Here, we have arranged these communities in relative successional order, from early to late successional stages and from more open and drier habitats to more closed and mesic communities.

Foredune Complex

The foredune is typically the first linear dune inland from the shoreline. However, the vegetation association that characterizes the foredune complex can occur throughout the open, non-forested dunes depending on rates of sand accretion and deflation, controlled by the direct and indirect influence of surface winds off Lake Michigan (Olson 1958a, 1958d). Within the foredune complex, at least three specific plant community types can be described: the beach, the foredune, and the secondary dunes with blowouts.

Beach

The beach community is restricted to a narrow strip adjacent to the littoral zone of Lake Michigan. During presettlement times, the beaches ran the length of Indiana's border with Lake Michigan, interrupted only by the Grand Calumet River, Dunes Creek (Fort Creek), and Trail Creek. The species belonging to this community are few, often consisting mostly of *Cakile edentula* and *Populus deltoides* but with occasional vagrant species such as *Salix* spp. and *Polygonum* spp. For example, Pitcher's thistle (*Cirsium pitcheri*) occurred frequently on the beach and foredunes as well as in blowouts during presettlement times (Peattie 1930). However, dune erosion and human activity have largely confined this species to blowouts except at the town of Dune Acres. Since

1991, we have seen the establishment of this species on secondary dunes in the Dunes State Park east of Big Blowout and hope it will establish on the new foredunes. Until recent reintroduction, beach pea (*Lathyrus japonicus* var. *maritimus*) had been lost from the beach and foredune communities, restricted to two, then one blowout in the Dunes State Park.

Foredune
The foredune community, intergrading at its lower edge with the beach community, occupies the windward exposure of the first line of dunes next to Lake Michigan (Cowles 1899b). Its size and floristic development are a function of the diversity and proximity of landward flora and the length of time it has been established. Increasing Lake Michigan levels and storms can erode the foredunes, producing temporary bluffs and truncated foredunes as happened in 1986–1987 and 2019–2020. The foredunes are followed by secondary dunes, but wherever sand disturbance becomes frequent, *Ammophila breviligulata* is often present.

Characteristic plants of the foredune community include *Ammophila breviligulata*, *Cornus sericea*, *Cakile edentula*, *Euphorbia polygonifolia*, *Calamovilfa longifolia*, *Lathyrus japonicus* var. *maritimus*, *Cirsium pitcheri* (formerly common), and *Populus deltoides*.

Secondary Dunes
The secondary dunes often occur behind the foredune or several dune ridges behind a broad corrugated plane of foredune ridges such as occur at Miller Woods A. This community is found in more stabilized dunes where disturbance or other factors have eclipsed the dominance of *Ammophila breviligulata* and where soil nutrients have increased. The secondary dunes are characterized by mixtures of annuals, biennials, and long-lived perennials, many of which are also members of the foredune and prairie communities; these include *Arabidopsis lyrata*, *Juniperus communis*, *Arctostaphylos uva-ursi*, *Populus deltoides*, *Artemisia campestris* ssp. *caudata*, *Prunus pumila*, *Asclepias syriaca*, *Salix cordata*, *Cirsium pitcheri*, *Schizachyrium scoparium*, *Celastrus scandens*, *Solidago nemoralis*, *Cornus sericea*, *Solidago simplex* var. *gillmanii*, *Elymus canadensis*, *Toxicodendron radicans*, *Euphorbia corollata*, *Vitis riparia*, and *Euphorbia polygonifolia*.

As succession proceeds, secondary dunes are invaded by a variety of shrubs and trees, but can take many different paths (Olson 1958d). Thus, secondary dunes can become jack pine or oak woodlands, the former occurring on both mesic and xeric sites and the latter occurring on xeric sites only. Secondary dune vegetation can also grade into common juniper and red cedar stands and a basswood fringe at the edge of the blowout and the dune complex.

Blowout Community
The blowout community occurred in presettlement times when the lake level dropped from a high stand and strong prevailing winds drove abundant sand inland (Arbogast and Loope 1999). The landward march of the sand buried or undermined forests of the dune complex. These buried forests were sometimes later reexposed as standing dead ghost trees. Blowouts can also be caused by human disturbance. Blowouts extend often for hundreds of yards inland. They include mosaics of foredune, secondary dune, and blowout communities depending upon the recent disturbance regime.

The original land surveyors made little or no reference to blowouts (Bacone et al. 1980, Wilhelm 1990), but they were required to report only on timber and soil conditions relevant to timber extraction and farming of the land (Bourdo 1956, Hutchinson 1988, Wang and Larsen 2006). While the creation of blowouts from human disturbance, as exemplified by the formerly unprotected portion of West Beach west of the bathhouse road and Mt. Baldy (popular southward migrating dune area in east Tamarack), does occur, these features also naturally occurred inland from pannes and in secondary dunes as well. The chronic human disturbance either eliminates stabilizing *Ammophila breviligulata* stands or destroys the distinctive *Schizachyrium scoparium* bunchgrass mosaic of the secondary dunes

and destabilizes the sand. All photographs from the late 1800s and early 20th century present a less vegetated landscape than exists today (Cowles 1899b, Pepoon 1927, Cressey 1928). This point is corroborated by Jerry Olson's observation that the large blowouts are more vegetated now than they were when he studied them in the 1940s and 1950s (pers. comm. with Pavlovic). The only blowout mentioned by the original land surveyors, although their section lines traversed several contemporary ones, was aged by Olson as in excess of 200 years; all the other blowouts aged by Olson are interpreted as less than 200 years of age. In addition, radiocarbon dates from ghost trees at Indiana Dunes all date as being recent, probably buried by the massive volumes of sand that migrated inland after the 1850 high stand of Lake Michigan (Kenneth Cole, INDU plant ecologist from 1984 to 1991, now retired from USGS, pers. comm. with Pavlovic; Arbogast and Loope 1999). Less vegetation in the past could reflect the closer proximity to the human disturbance that created the blowouts. However, information from buried soil radiocarbon dates has demonstrated that the development of high dunes, of which blowout creation is a prerequisite, has historically occurred just after Lake Michigan water levels began to decline from a high stand (Arbogast and Loope 1999). These recent changes in dune condition correlate well with the approximately 150-year cycles in lake level, intervals that Baedke and Thompson (2000) have documented. The last major high stand of Lake Michigan was around 1850, twenty years after the land survey was conducted. Prior to that time, most of the dunes were forested; consequently, the land surveyors did not find any blowouts in 1832. Nevertheless, some blowouts may date from the 1850s, a result of anthropogenic disturbance when white pine was lumbered from the dunes (Cook and Jackson 1978). The mosaic of foredune and secondary dune vegetation in the blowouts is not the result of their origin, but of the chronic and episodic disturbance from winter storms. This dynamism is in contrast to the often more stable secondary dune community just behind the foredunes, where species reflecting habitat stability are found. Nevertheless, succession will eventually turn blowouts into oak savanna and forest. Species typifying the seral nature of the blowout community include *Ammophila breviligulata*, *Corispermum americanum*, *Schizachyrium scoparium*, *Euphorbia polygonifolia*, *Arabidopsis lyrata*, *Triplasis purpurea*, *Calamovilfa longifolia*, *Vulpia octoflora*, and *Cirsium pitcheri*.

Prairie Complex

The term "prairie" can apply to any treeless or nearly treeless terrestrial vascular plant community that is species-rich, dominated by grasses, and maintained by fire. The term prairie, derived from the French word for grassland, conjures up images of vast and rolling open landscapes with scattered bison (Anderson 2006). The Indiana Dunes is biogeographically placed in the prairie peninsula between the prairie and eastern deciduous forests (Transeau 1935). Much of the prairie in the Indiana Dunes has been called prairie openings or oak openings because of the small patches of grassland interspersed among the marsh and savanna complexes (Shimek 1910, Abella et al. 2001, Brewer and Vankat 2004, Pavlovic et al. 2006). The specific floristic composition of prairie changes from one of physiographic moisture, soil texture, and topographic conditions, ranging in character from wet to dry, on sandy, loamy, peaty, or clayey soils (Curtis and McIntosh 1951, Rohr and Potzger 1951, Weaver 1954, Curtis 1959). Most prairies in the dunes are sand prairies; however, in the Bailly Unit a highly degraded silt-loam prairie occurs on the Lake Border Moraine (Baily D). This prairie, now called Mnoke Prairie, is being restored. The largest sand prairie remnant is Lois Howes Prairie, largely a mesophytic prairie (Cowles Dunes B). Small mesophytic prairie openings occur in Inland Marsh, Tolleston Dunes, and Miller Woods. Dry sand prairies are scattered throughout the dunes area in barrens or small areas without trees, and intergrade with the oak savanna complex and the secondary dunes.

Plants that typify the xeric sand prairie include *Schizachyrium scoparium*, *Krigia virginica*, *Arabidopsis lyrata*, *Nuttallanthus canadensis*, *Asclepias amplexicaulis*, *Opuntia*

cespitosa, *Carex muehlenbergii*, *Polygonum tenue*, *Coreopsis lanceolata*, *Solidago nemoralis*, *Koeleria macrantha*, and *Viola pedata*.

Plants that are typical of the mesic sand prairie include *Aletris farinosa*, *Krigia biflora*, *Andropogon gerardii*, *Lechea minor*, *Baptisia lactea*, *Liatris spicata*, *Bromus kalmii*, *Oenothera fruticosa* ssp. *tetragona*, *Coreopsis tripteris*, *Sorghastrum nutans*, *Eryngium yuccifolium*, and *Viola sagittata* var. *sagittata*.

Plant species in the Indiana Dunes that typify mesophytic sand prairie conditions include *Andropogon gerardii*, *Liatris spicata*, *Baptisia lactea*, *Oenothera fruticosa* ssp. *tetragona*, *Bromus kalmii*, *Drymocallis arguta*, *Arnoglossum atriplicifolium*, *Pycnanthemum virginianum*, *Eryngium yuccifolium*, and *Sorghastrum nutans*.

Plant species that typify the mesophytic to wet mesic silt-loam prairie in the Indiana Dunes include *Andropogon gerardii*, *Liatris spicata*, *Apocynum cannabinum*, *Parthenium integrifolium*, *Symphyotrichum sericeum*, *Silphium terebinthinaceum*, *Hasteola suaveolens*, *Sporobolus heterolepis*, *Carex bebbii*, *Solidago rigida*, and *Carex scoparia*.

The rarest prairie type is the hill prairie, which, to our knowledge, occurs only in in a small remnant at the Hobart Prairie Grove Unit. Species typical of the hill prairie include *Amorpha canescens*, *Oxalis violacea*, *Asclepias purpurascens*, *Taenidia integerrima*, *Bouteloua curtipendula* var. *curtipendula*, *Triosteum aurantiacum*, *Dalea candida*, *Vicia caroliniana*, *Houstonia caerulea*, and *Lathyrus venosus*.

Wet prairie is dominated by prairie cordgrass (*Spartina pectinata*). It is also quite rare in the dunes, and is currently represented by degraded and depauperate communities. In the Indiana Dunes, forbs and graminoids typical of wet prairie are more likely to include *Aletris farinosa*, *Ludwigia alternifolia*, *Cladium mariscoides*, *Oxypolis rigidior*, *Eleocharis melanocarpa*, *Rubus hispidus*, *Gentianopsis crinita*, *Sisyrinchium atlanticum*, *Juncus canadensis*, and *Spiranthes cernua*.

Savanna Complex

The savanna complex, as a general community type, includes all prairie phases in which trees are conspicuous elements even though prairie is generally conceived of having canopy cover from 0%–20%, savanna from 20%–50%, and woodland from 50%–75% (Dyksterhuis 1957, Leach and Ross 1995). We now know that canopy cover and soil texture distinguish prairie groundlayer with an abundance of C4 grasses from savanna forblands that are equally rich in flora, but lack C4 grasses (Anderson and Bowles 1999, Leach and Givnish 1999, Will-Wolf and Stearns 1999, Pavlovic et al. 2006). Since the prairies in the dunes are mostly "oak openings," it makes sense to associate them within the savanna complex. The sand savannas are dominated by black oak (*Quercus velutina*), whereas on the richer moraine soils, they are dominated by white oak (*Quercus alba*) and shagbark hickory (*Carya ovata*), often with inclusions of pin oak flatwoods. The black oak phase intergrades with the open marsh complex and mesophytic prairie, particularly in the western portions of INDU, but as one proceeds eastward, it intergrades with white oak flatwoods and sometimes with red oak (*Quercus rubra*). In the east unit, the black oak savanna complex intergrades with the dune complex (lee side dune forest) and the fire suppressed black oak forest that was formerly part of the complex. The savanna complex is best developed in the Tolleston phase dunes and the south-facing slopes of the dune complex (more recent dunes) and in the corrugated dune plain in Miller Woods.

In xeric areas, where black oak cover is from 20% to 50%, the following species are likely to be quite apparent: *Symphyotrichum sericeum*, *Lupinus perennis* var. *occidentalis*, *Carex pensylvanica*, *Maianthemum canadense*, *Euphorbia corollata*, *Solidago nemoralis*, *Crocanthemum canadense*, *Sorghastrum nutans*, *Lespedeza capitata*, *Tephrosia virginiana*, *Liatris aspera*, and *Vaccinium pallidum*.

Where black oak canopy cover is greater than 50%, but less than 90%, the following species become more important (Pavlovic

et al. 2006): *Aquilegia canadensis*, *Helianthus divaricatus*, *Aralia nudicaulis*, *Ionactis linariifolia*, *Ceanothus americanus*, *Maianthemum stellatum*, *Diervilla lonicera*, *Solidago speciosa*, *Fragaria virginiana*, and *Vaccinium angustifolium*.

As black oak begins to give way, the following species often co-increase in importance with white oak: *Apocynum androsaemifolium*, *Galium pilosum*, *Aureolaria flava*, *Lespedeza hirta*, *Aureolaria pedicularia*, *Monotropa uniflora*, *Corallorhiza odontorhiza*, *Prenanthes alba*, *Danthonia spicata*, and *Sassafras albidum*.

In areas on moraine or silt-loam soils, white oak and shagbark hickory together become the principal trees, and the savanna complex begins to provide habitat for more mesophytic ground layer species such as *Anemone quinquefolia*, *Phlox divaricata*, *Thalictrum thalictroides*, *Polemonium reptans*, *Carex rosea*, *Polygonatum biflorum*, *Claytonia virginica*, *Smilax tamnoides*, *Galium concinnum*, and *Trillium recurvatum*. Examples of this deep soil savanna occur south of the Little Calumet River in Bailly and at the Hobart Prairie Grove.

Dune Complex

The dune complex is a narrow, east to west-tending band of a principally wooded plant community that includes the transitional, young, open woodlands adjacent to the foredune complex, the savanna complex, some small pockets of mesophytic forest, stabilized dune forest, and lee side dune forest communities. Thus, many of these communities are transitional between the savanna complex and the mesophytic forest. The prevalence of mesic conditions increases in the dune complex towards the east, but small and isolated mesophytic pockets occur as far west as Miller Woods. These habitats are primarily found on the lakeward side of the high dunes that are less than 2,000 years before present (ybp) and thus are younger than the Tolleston-aged dunes (3,000–4,000 ybp, see Argyilan et al. 2018).

The communities of the dune complex are represented by subtle floristic differences for which indicator species are not always present. Nevertheless, they can be distinguished by landscape position and physiognomy as well as flora. The central community around which the dune complex is conceived is the forest that has developed leeward of the foredune complex as well as on the wooded dunes north of the Great Marsh and Baillytown Sag area. Species that characterize the dune complex (but are hardly confined to these associations in the stabilized dune forest) include *Acer rubrum*, *Anemone acutiloba*, *Aquilegia canadensis*, *Pinus strobus*, *Asplenium platyneuron*, *Polygonatum pubescens*, *Campanula rotundifolia*, *Ptelea trifoliata* ssp. *trifoliata* var. *mollis*, *Cornus florida*, *Quercus rubra*, *Cornus rugosa*, and *Smilax rotundifolia*.

The lee side dune forests are similar, though as a rule not quite as mesic. While it is difficult to draw differences between the stabilized dune forest and the lee side dune forest, the latter is perhaps more typically represented by *Amelanchier arborea*, *Monotropa uniflora*, *Corallorhiza odontorhiza*, *Prenanthes altissima*, *Fraxinus americana*, *Quercus alba*, *Galium pilosum*, *Solidago speciosa*, *Gaultheria procumbens*, *Trillium grandiflorum* (now rare), and *Aureolaria flava*.

A mesophytic extreme of these two dune forests is the mesophytic pocket (Cowles 1899a, Olson 1958d). Mesophytic pockets are characterized by the presence of one or more mesophytic tree species that are fire intolerant such as sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), tulip tree (*Liriodendron tulipifera*), basswood (*Tilia americana*), white ash (*Fraxinus americana*), black cherry (*Prunus serotina*), and rarely hop hornbeam (*Ostrya virginiana*). Mesophytic pockets are confined to the deep valleys in the high dunes where fire was infrequent because of the steep northerly slopes, humid conditions near Lake Michigan, and daily offshore winds. Plants typical of the mesophytic pocket include *Acer saccharum*, *Quercus rubra*, *Carex eburnea* (rare), *Solidago caesia*, *Fraxinus americana*, *Tilia americana*, *Hamamelis virginiana*, *Viburnum acerifolium*, and *Ostrya virginiana*.

Mesophytic Forest

Mesophytic forests are weakly represented at the Indiana Dunes due to the dryness of the sand dunes, frequent fires, and geographic location in the prairie peninsula. These conditions exclude mesophytic forests because the dominant trees—sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), and basswood (*Tilia americana*)—are fire and drought intolerant. In areas protected from fire by local hydrology and dune physiognomy (e.g., Dunes State Park south of the Great Marsh, Keiser Woods, and remnants to the east), and located on the moraines where soil types are finer in texture, mesophytic forests developed. In addition, increasing winter precipitation as a result of the lake effect towards the east have also facilitated the persistence of mesophytic forests (Henne et al. 2007). The multilayered forests of high canopy cover moderate the microclimatic temperature so that the groundlayer develops in deep cool shade. The exception to the microclimatic moderation occurs when a canopy tree falls and initiates canopy gap phase succession.

Norman Henderson (NPS scientist at INDU who was first to study fire history in the dunes and moved to Capital Reef National Park in September of 1983) showed Pavlovic a beech tree seedling and saplings growing on the dune in the area of the Dune Ridge Trail (in Keiser A, June 1983), which subsequent wildfires and prescribed burns killed. In the late 1990s, Jerry Olson also showed Pavlovic some beech saplings on a low dune north of the Great Marsh in the same general area, but these too would have been killed by recent prescribed burns. Presumably, the seed source for these plants was and continues to be the beech trees north of the Calumet Dune at Keiser Woods and the nearby beech-maple stand to the east. Dispersal likely comes from blue jays (*Cyanocitta cristata*) (Meiners et al. 2002).

Where creeks and steep north slopes facing Lake Michigan have excluded fire, the mesophytic forest as a rich plant community developed and thrived during presettlement times in the eastern portions of the prairie peninsula. Physiographic conditions suitable to a phase of mesophytic forest community prevailed in the Indiana Dunes upon steep slopes (particularly those facing northeast), deep ravines, and other topographically extreme conditions. The suppression of fire during the post-settlement period has encouraged the development of woody species of the mesophytic forest in areas that were formerly oak savanna or woodland. Species such as red maple, ash, and black cherry have invaded these fire suppressed stands but do not represent at the present time a succession towards the climax community because the ground layer is depauperate savanna flora rather than the rich mesophytic forest groundlayer. The deep shade and deep duff layer that develops with fire suppression resulted in the loss of savanna complex herbs. Without sufficient seed sources and time, these depauperate forests will never succeed to an herb-rich beech-maple forest groundlayer.

Characteristic plants of the Indiana Dunes mesophytic forest community include *Acer saccharum*, *Enemion biternatum*, *Brachyelytrum erectum*, *Mitella diphylla*, *Carpinus caroliniana* ssp. *virginiana*, *Polystichum acrostichoides*, *Phegopteris hexagonoptera*, *Solidago flexicaulis*, *Fagus grandifolia*, and *Trillium flexipes*.

Typical plants of more dry-mesophytic conditions include *Acer rubrum*, *Anemone acutiloba*, *Arisaema triphyllum*, *Quercus rubra*, *Symphyotrichum shortii*, *Sanguinaria canadensis*, *Caulophyllum thalictroides*, *Trillium recurvatum*, *Festuca subverticillata*, and *Viola pubescens*.

Annotated List of Special Flora

In studying the flora of a restricted region, no matter how carefully it seems to have been explored, one is frequently surprised by finding new things. It almost seems as if such plants ought to be classed with those which are known to be introduced, like many migrants along the railways or escapes from gardens. But they are really old residents that had failed to be detected. No region can be regarded as thoroughly explored till every acre of its wild areas at least has been examined. Then some plants are so rare or local or grow under such peculiar conditions that a few square rods or even feet may comprise their range. —E. J. Hill (1899)

Unlike previous editions of the *Report on the Special Vegetation*, this new edition consolidates the special species narratives into one chapter. In addition, the species accounts are organized by plant class and families; lycophytes and ferns first, gymnosperms second, and lastly angiosperms, the flowering plants. In the last 20 years, phylogenetic research, spurred by new advances in genetic techniques and their application to vascular plants, have greatly modified our understanding of plant evolutionary relationships (Bell et al. 2010). In addition, the relationships between, and binomial names in, certain domains, kingdoms, phyla, classes, orders, families, genera, and species have changed greatly. For example, it is now understood that flowering plants consist of eight groups of Angiosperm classes rather than the original two classes: monocots and dicots. The eight groups are the genus *Arborella* (confined to New Caledonia in the South Pacific), Nymphaeales (water lilies), Austrobaileyales, Chloranthales, Magnoliids, Monocots, *Ceratophyllum*, and Eudicots (Stevens 2001 and onwards, Angiosperm Phylogeny Group 2009, Reveal and Chase 2011). Much of the generic and species nomenclature used in Swink and Wilhelm (1994) was considered obsolete when it was published. The newer Wilhelm and Rericha (2017) has a more updated nomenclature.

Nomenclature used in this report follows the Flora of North America (FNA) except for families and genera that have not yet been treated by taxonomists in the FNA nor updated. In the latter case, we followed the Integrated Taxonomic Information System (www.itis.gov/index.html). Families are in alphabetical order within each class and species accounts appear alphabetically within families. This permits a discussion of family-specific ecological information that is relevant for conservation. The family descriptions include information about the morphology of plants in that family, about human uses for plants in the family, and information about the ecology of the species from the scientific literature. Family characteristic descriptions were gleaned from Fernald (1970), Lawrence (1951), Radford et al. (1974), Smith, Jr. (1977), Angiosperm Phylogeny Group (2009), and Elpel (2013).

Combining all species narratives from each park unit chapter from Wilhelm (1990) allows park-wide discussion of population trends and conservation in one location. Consolidation also allows greater economy in presentation. For instance, all discussion concerning species biogeographical affinities has been eliminated because this information is presented in Table 4. We hope these changes make for a stronger and more user-friendly document.

The special flora abstracts begin with the scientific name of the species; synonyms are given in square brackets if relevant. The narrative of each special flora abstract includes edited and revised versions of Wilhelm's (1990) text with more recent findings or documentation since 1990. Thus, the species information provided is taken from Wilhelm (1990), cited reports, herbarium specimens, and documents more recent than 1990, and from communications

with the authors. Sources of new plant finds since 1990 are documented in each unit chapter by name of person who found it, the date found, and the species found. If documented by herbarium specimens, these are listed by the finder's name, collection number, date of collection, county of collection and reference to herbaria where the species is housed. Not all specimens that are relevant to the Indiana Dunes region are listed, just a selected few to document the species occurrence by county (Lake, Porter, or LaPorte). Lists of associated species are taken from Wilhelm (1990), other reports, or herbarium specimen labels.

Herbaria are referenced in the annotated species accounts by acronym. See page xxi for definitions for acronyms and botanical terms. Herbarium citations do not include specific location information so that special plants may be protected.

Wilhelm (1990) used a variety of terms to characterize the relative abundance of plants in the landscape, which is a concept that is related to rarity and includes terms such as common, frequent, rare, and occasional. These semi-quantitative terms provide descriptive estimations of approximate concentrations and can be useful in characterizing a general abundance of species (Daubenmire 1968, Morris 1995). These terms are related, but not absolutely, with other quantitative abundance scales such as the logarithmic used by Olson (1958d) based on quadrat counts. We have not attempted to equate the semi-quantitative to quantitative scales in Table 5. Wilhelm (1990) does not define his abundance scale. In Table 5, the semi-quantitative categories are listed from high to low abundance.

In addition, these terms often connote not only the numerical abundance of species but also their patchiness or dispersion across the vegetation type. "High" abundance might indicate a large patch with many stems or individuals, or many plants scattered throughout an area. "Prevalent" may be a synonym for common or frequent. These terms are semiquantitative and provide descriptive estimations rather than quantitative results showing exact concentrations. The semi-quantitative terms are the tradeoff between establishing plots of a certain size and counting individuals or stems versus assigning a less precise but quickly obtained semi-quantitative value of relative abundance.

Table 5. Examples of semi-quantitative and quantitative abundance scales used in plant ecology.

Semi-quantitative abundance (Wilhelm 1980, 1990)	Quantitative abundance (Olson 1958)
–	6 = 1,000,000 stems per ha
–	5 = 100,000 stems per ha
A = abundant	4 = 10,000 stems per ha
C = common	3 = 1000 stems per ha
F = frequent	2 = 100 stems per ha
O = occasional	1 = 10 stems per ha
R = rare	+ = <10 stems per ha

LYCOPODIOPSIDA: The Lycophytes

LYCOPODIACEAE — Clubmoss Family

There was a time when clubmosses dominated the Earth's vegetation and produced the world's largest coal beds. Evidence suggests that coal deposits occurred because brown fungi that decomposed wood (cellulose) had not yet evolved (Hittinger 2012). Clubmosses are characterized by microphylls (leaves that are extensions of stems) and by having spore-producing structures on the upper surfaces of leaves. Historically, the modern clubmosses in the dunes were over collected for use in Christmas wreaths and the spores for use in flash powder (Lellinger 1985). The remaining populations have declined due to shading from canopy closure, burial from litter buildup, and possibly from the prescribed burning of tiny remnant patches (Pavlovic, pers. obs., 1983–2021). Many of these species are boreal in distribution, and climate change could eliminate them from the Indiana Dunes. Only *Diphasiastrum digitatum*, *Diphasiastrum tristachyum*, *Huperzia lucidula*, *Lycopodiella inundata*, and *Lycopodium clavatum* appear to be holding their own. Formerly, all clubmosses were in the genus *Lycopodium*; however, we use the new nomenclature with the genus divided into *Dendrolycopodium*, *Diphasiatrum*, *Huperzia*, *Lycopodiella*, and *Lycopodium* (Xiang et al. 2015). Once part of the fern allies, clubmosses are now recognized as a separate lineage that we call lycopods.

Dendrolycopodium dendroideum (Michx.) A. Haines [*Lycopodium dendroideum* Michx. and *Lycopodium obscurum* L.]

Tree ground pine is reported from DSP, Furnessville, Keiser, and Tamarack. It was known from the DSP only based on the following statement by Lyon (1927): "subdunal woods, Tremont, rare." However, this may be the location found by Susan Bagby in 1992 in Furnessville D just east of Teale Road. This population was last observed by Dan Mason, Gerlack, and Plampin in 1999. Pavlovic saw the patch after Susan reported it, but repeated searches since then have been fruitless in relocating the population. Gerould Wilhelm found a population in Keiser Woods C in 1991 (see specimen cited below) growing with *Ilex verticillata*, *Lindera benzoin*, *Liriodendron tulipifera*, *Mitchella repens*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Platanthera clavellata*, *Prunus virginiana*, *Quercus rubra*, and *Smilax rotundifolia*, but efforts to relocate the patch have failed. Myrna Newgent (Plampin and Newgent 1992) found a new location for this rare clubmoss on 24 August 1992 in Tamarack C that was verified by Pavlovic. Plampin, Myrna Newgent, and Lydia Miramontes reported its loss in 2003. This boreal species may no longer be extant at the Indiana Dunes.

Voucher Specimens:

Wilhelm #19990, 12 October 1991, Porter Co. (MOR)

Dendrolycopodium hickeyi (W.H. Wagner, Beitel & R.C. Moran) A. Haines

Orpurt collected *Lycopodium obscurum* from the DSP, a specimen that Paul Rothrock reidentified as this species. Where this species was collected and whether it still exists is unknown. Records of this species are found more consistently in the Kankakee River valley to the southeast and to the east.

Voucher Specimens:

Orpurt s.n., 20 September. 1953, Porter Co. (IND)

Diphasiastrum tristachyum (Pursh) Holub [*Lycopodium tristachyum* Pursh]

We thought that ground cedar was probably extirpated from the Indiana Dunes until its discovery at the Crescent Dune area of Tamarack C on 18 October 2002. Finding this species in the Crescent Dune area is an example of how long-distance spore dispersal aids these species. It was growing with *Aster* spp., *Fragaria virginiana*, *Juncus arcticus* var. *balticus*, *Lycopodiella inundata*, *Pseudognaphalium obtusifolium*, *Salix* spp., and *Spiranthes cernua*. Hamilla and Plampin found ground cedar at Crescent Dune in 2010 but it did not appear healthy. They could not find these again in 2014. Competition from shrubs may have caused

the demise of this population. On 20 August 2015, Hamilla and Tonkovich searched in vain for this clubmoss at Crescent Dune. The area looked to be scorched by herbicide and the only plants starting to regrow in the area were *Polytrichum* moss.

In 1971, Lois Howes led Gerould Wilhelm to a small colony of ground cedar on a ridge top in Cowles Dunes A (Swink and Wilhelm 1979), where it was growing with *Gaultheria procumbens*, *Phlox bifida*, *Quercus rubra*, *Quercus velutina*, *Sassafras albidum*, *Vaccinium angustifolium*, and *Viola pedata*. Indiana Dunes National Park staff monitored this population (Bowles et al. 1985), but the single plant was later collected by an unknown botanist. Marlin Bowles and Gerould Wilhelm tried unsuccessfully to relocate this population in both 1987 (Bowles 1988) and in 1988, as did Hamilla. In 1988, Pavlovic located the permanent monitoring plot, but the clubmoss was not present. The specimen has since been identified as *D. digitatum* × *D. tristachyum*, also called *D.* × *habereri* (House) Holub (see Dritz specimen below and Palmer (2018)).

The Furnessville population was monitored in 1985 and sought unsuccessfully by Plampin and Hamilla on 10 October 2007. Bowles (1988) recorded seven live ramets in 1987, but these also appear to have been extirpated from the unit. A spring 2013 search by INDU biological technicians and Plampin also did not locate this plant. This single, small plant may have been killed by the prescribed fire in 1991, since it was not relocated by Pam Benjamin, Myrna Newgent, and Plampin in 1992. Over-collection in the past, increasing canopy cover, and increasing litter deposition contributed to its decline and created conditions where fire would be the proximate cause for its demise. This species has only been found in early successional communities in France, suggesting that successional management may be required for its persistence (Muller et al. 2003). The *Diphasiastrum* genus also includes *D. digitatum* (formerly *Lycopodium complanatum*); both species have small leaves adnate to the stem that barely overlap. Wilhelm and Rericha (2017) include the putative hybrid between *D. digitatum* and *D. tristachyum*, *D.* × *habereri* (House) Holub as occurring in Lake, Porter, and La Porte counties. We have not included this taxon in the flora of INDU since we currently have no evidence that this hybrid occurs in the dunes.

Voucher Specimens:

Dritz #44, 20 April 1980, Porter Co. (MOR) as Diphasiastrum × habereri *(House) Holub*
Bowles and DeMauro s.n., 15 July 1985, Porter Co. (INDU)
Plampin and Miramontes s.n., 18 October 2002, La Porte Co. (INDU)

Huperzia lucidula (Michx.) Trevisan [*Lycopodium lucidulum* Michx.]

Shining clubmoss never seems to be abundant where it occurs in the dunes, which raises concerns about its status. In addition, clumps consist of only a few stems. Shining clubmoss is known from West Beach, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Heron Rookery, and Pinhook Bog. A very small population was found at West Beach A by Diana Horton in 1988. Pavlovic (pers. obs., 1989) reported it growing there with *Amelanchier* sp., *Asplenium platyneuron*, *Carex pensylvanica*, *Hamamelis virginiana*, *Lonicera dioica*, *Pedicularis canadensis*, *Prenanthes alba*, *Quercus alba*, *Q. velutina*, *Q. rubra*, *Vaccinium pallidum*, and carpets of moss. This clubmoss is extant in the swamp complex region of Cowles Dunes B south of the Dune Acres tennis courts. Emma Bickie Pitcher showed Pavlovic a small clump on a steep, north-facing slope south of the Dune Acres soccer field in 1987; it may have been trampled later by over-abundant deer. Shining clubmoss was found by Lydia Miramontes in 2002 or 2003 south of the Cowles Bog Trail, just east of the *Botrychium matricariifolium* found by Hamilla in 2006. Though this population disappeared when the area south of the Cowles Bog Trail was rehabilitated, this clubmoss grows in two places south of the Cowles Bog boardwalk, as seen by Plampin in 2002 and by Molly Hacker (pers. comm with Plampin, 2013). The 2017 renovation of the boardwalk in Cowles Dunes A may have destroyed these plants.

Wilhelm (1990) wrote,

> *Shining clubmoss was once known in the Dunes State Park from a report by Pepoon in which he states: "On the bluffs of Fort Creek near Mt. Tom," where Plampin has seen it. Plampin saw another population at the east end of the Park, where it "grows on a steep, north-facing slope [along] the north loop of Trail 10." According to Plampin, there was a large clump south of the beech mound in the Dunes State Park west of Kemil Road.*

Douglas Botka has seen 25 small colonies of this plant in the DSP since 2013. This little clubmoss is occasional in the Swamp Complex portions of Furnessville B and D; it has also been reported from Furnessville F. Reported from Keiser by Lyon (1927), it appears in Keiser A, where it was found by Myrna Newgent on 9 July 1992. Shining clubmoss is evidently very rare but extant in the swamp complex of Keiser C. In 2002, Plampin reported three stands of shining clubmoss growing in Keiser E in the abandoned road that became the Dunewood Trace Trail. At least one stand survived conversion from road to trail. Plampin and Newgent (1992) reported this clubmoss from Tamarack C, but in April 2008, Hamilla found a healthy population (14 plants and 39 stems) in Tamarack C on the west bluff along Kintzele Ditch north of Beverly Drive. His photographs document that this clump has some of the healthiest specimens of this clubmoss seen in the dunes. Of concern is that the population will be destroyed by erosion from the Kintzele Ditch. Four small clumps were found by Lydia Miramontes and Plampin at Crescent Dune, Tamarack C on 18 October 2002. No plants have been found in or around the Crescent Dune panne since.

Shining clubmoss is known from Heron Rookery A based on a specimen collected by Ron Hiebert. This species grows in somewhat more mesophytic woods just a little east of *L. clavatum*, and in the hydromesophytic swamp forest in the northwest portion of the Pinhook Bog. Tonkovich found shining clubmoss in Pinhook Bog on 22 December 2015 north of where the NPS had completed shrub thinning. Has increasing canopy cover resulting from fire suppression caused this species to decline in vigor, as suggested by the patches found along Kintzele Ditch where light levels are higher? This could be tested experimentally.

Voucher Specimens:

Pavlovic and Kjellmark #179, 7 July 1988, Porter Co. (INDU)
Hess and Bowles #5897, 8 May 1984, Porter Co. (MOR)
Wilhelm #6587, 19 May 1979, Porter Co. (MOR)
Hiebert #507, 28 April 1987, Porter Co. (MOR)

Lycopodiella inundata (L.) Holub [*Lycopodium inundatum* L.]

Bog clubmoss is known from Cowles Dunes, DSP, Keiser, Tamarack, and Hoosier Prairie. Many of the populations of *Lycopodiella inundata* are likely *Lycopodiella subappressa* or the hybrid of *L. subappressa* with *L. margueritae*, thus requiring visitation of these populations. Bog clubmoss is known specifically from Cowles Dunes B from the report by Lyon (1927), in which he states that it grew in an "interdunal meadow at Mineral Springs." Lyon (1927) also mentions that it grew in a "ditch by railroad, Port Chester, rare." This latter location is probably in the Cowles Dunes E, wherein Ken Dritz found a population on 9 August 1981 875 feet west of Waverly Road (see also the association list under *Dichanthelium dichotomum* ssp. *lucidum*). Bowles et al. (1985) recorded probably the same population along the NIPSCO right-of-way just west of Waverly Road, where it grew among *Sphagnum* mosses with *Acer rubrum*, *Aletris farinosa*, *Drosera rotundifolia*, *Liatris spicata*, *Platanthera clavellata*, *Rubus flagellaris*, *Spiraea tomentosa* var. *rosea*, and *Thelypteris palustris* var. *pubescens*.

From personal observation by Pavlovic, this species seems to spread horizontally into suitable adjacent habitat as succession occurs in its former location. The degradation of the NIPSCO right-of-way habitat by exotic species invasion, use of herbicide on woody plants (Plampin and Hamilla 2008b), and use of large equipment to arrest woody invasion may have

led to the disappearance of this clubmoss by 1999. Hamilla and Plampin searched extensively for this population without success in 2007 and 2008 (Plampin and Hamilla 2008b).

Bog clubmoss was known from the DSP based on the report by Lyon (1927), in which he stated that it grew in a subdunal meadow at Furnessville, which might have instead been the Furnessville Unit. Myrna Newgent and Plampin found separate patches (a new record for this clubmoss) in a wetland southwest of the Dunewood Campground in Keiser F. These patches were quite large and had expanded since the drainage ditch was plugged. These patches may have expanded into suitable adjacent habitat, but after the hydrology was altered by the wetland restoration project in the ditch south of the campground, the species appears to have disappeared. Bog clubmoss was also not reported from Hoosier Prairie A until it was found in association with *Utricularia subulata*. This clubmoss is rare at Pinhook Bog B, where it was most recently seen on 11 August 2008 by Dan Mason, Hamilla, and Myrna Newgent (see *Lycopodiella subapressa*, as the Pinhook specimens are probably this species and not *L. inundata*).

Voucher Specimens:
Rowlatt & Dritz #1281, 13 August 1983, Porter Co. (MOR)

Lycopodiella subappressa J. G. Bruce, W. H. Wagner & Beitel
Northern appressed clubmoss was listed in Swink and Wilhelm (1994) under *Lycopodium inundatum* (now called *Lycopodiella inundata* (L.) Holub) but is now segregated from the older species based on a new treatment by Bruce et al. (1991). In February 2011, the specimens from Pinhook Bog were ascribed to this species by Gerould Wilhelm (annotated in the herbarium specimen label).

Hamilla believed, and Tonkovich concurs, that the Crescent Dune population of *L. inundata* found by Plampin and Lydia Miramontes on 18 October 2002 is *L. subappressa*. This population thrives in wet years and consists of at least 19 patches (Plampin and Hamilla 2008b). Further floristic work is needed to identify if other populations of *Lycopodiella inundata* here and elsewhere in the Dunes should be retained or listed as *L. subappressa*. Northern appressed clubmoss is listed as endangered in Indiana.

Voucher Specimens:
Klick #2756, 31 July 1987, La Porte Co. (INDU)

Lycopodium clavatum L.
Running clubmoss is known only from the Cowles Dunes, Furnessville, Keiser, and Pinhook Bog units. Bowles et al. (1985) found running club moss in Cowles Dunes B in an ecotone between a "dry-mesic dune forest" and a sand prairie, growing among *Polytrichum* mosses with *Aronia* × *prunifolia*, *Comandra umbellata*, *Quercus alba*, *Q. velutina*, *Sassafras albidum*, and *Vaccinium corymbosum*. *Vaccinium myrtilloides* (see abstract below) is also listed as an associate, a report which is uncertain due to the rarity of this species in Indiana. By 1988, no running clubmoss plants were apparent. Fire suppression allowed considerable accumulation of white oak leaf litter, which buried the existing plants, and what remnants remained may have been killed (if not already dead) by the intense heat when fire was reintroduced into Lupine Lane Prairie in 1986. Unlike many other clubmosses, the runners of this species are on top of the soil surface rather than being buried; this characteristic leads to its fire sensitivity (Tom Post, Indiana Division of Nature Preserves, pers. comm. with Pavlovic). Plampin (1989) reported four plants south of Lupine Lane associating with *Gaultheria procumbens*, *Quercus velutina*, and *Sassafras albidum*, and growing on a north slope in 1984, but these are now also gone. Plampin also reports that there is a small clump of running clubmoss between the Lois Howes Prairie (hereafter Howes Prairie [Cowles Dunes B]) and the Cowles Bog Wetland Complex. This clump could be trampled by hikers walking the old stagecoach road trail. Bowles (1988) mapped and described the Furnessville A population, which is now believed to be extirpated because of the patch's small extent and

fire damage. Plampin noted that Myrna Newgent spotted running clubmoss on 7 July 1992 growing with *Acer* sp., *Aronia* × *prunifolia*, *Hamamelis virginiana*, *Diphasiastrum digitatum*, *Dendrolycopodium dendroideum*, *Medeola virginiana*, *Nyssa sylvatica*, *Pteridium aquilinum* var. *latisculum*, and *Quercus velutina* east of Teale Road in Furnessville D. Plampin found another small patch near the old Calumet Dunes Interpretive Center on 31 October 1996. Plampin et al. (2003) has also found several patches in Keiser B and E while botanizing with Charlotte Wolf and Nicole Kalkbrenner. There is a small colony of running clubmoss near the base of the south-facing bluff along the north edge of Pinhook Bog A; it is growing in a dry-mesic savanna with *Carex laxiflora*, *Corylus americana*, *Danthonia spicata*, *Osmorhiza claytonii*, *Vaccinium pallidum*, and *Viola sororia*.

Voucher Specimens:

Howes s.n., 13 March 1971, Porter Co. (MOR)
Bowles & DeMauro s.n., 15 July 1985, Porter Co. (INDU)

SELAGINELLACEAE — Spikemoss Family

Spikemosses are also called "small clubmosses." *Selaginella eclipse* is typically found in wetlands, whereas *Selaginella rupestris* grows in dry habitats and is similar to the resurrection ferns that grow in deserts of the southwestern United States and Mexico. These resurrection ferns can become dormant and dry up during drought but are able to reinitiate photosynthesis upon rewetting!

Selaginella eclipes W.R. Buck [*Selaginella apoda* (L.) Fernald]

Plampin found marsh clubmoss in Keiser D on 5 and 12 October 1999. It was growing with *Aster* spp., *Carex cryptolepis*, *Carex* spp., *Eutrochium fistulosum*, *Eupatorium perfoliatum*, *Euthamia graminifolia*, *Juncus canadensis*, *Liriodendron tulipifera*, *Spiranthes cernua*, *Thelypteris palustris* var. *pubescens*, *Typha angustifolia*, and *Vitis labrusca*. Plants grew south of the Calumet Bike Trail. Plants were not visible in 2002 or during the drought of 2007. The site is now very overgrown, and the hydrology has changed since the Calumet Bike Trail was rehabilitated.

Voucher Specimens:

Plampin s.n., 13 October 1999, Porter Co. (INDU)

Selaginella rupestris (L.) Spring

The sand clubmoss is one of our region's rarest plants (Wilhelm 1990). Sand clubmoss is known from Tolleston Dunes, Inland Marsh, and DSP. Plampin found sand clubmoss in Tolleston Dunes A in 1989, according to Wilhelm (1990). It grew just upslope from *Gentiana saponaria*, with *Cyperus lupulinus* ssp. *lupulinus*, *Crocanthemum canadense*, *Opuntia cespitosa*, *Schizachyrium scoparium*, *Sorghastrum nutans*, and *Viola pedata*. Hamilla and Plampin failed to relocate this population in 2009. We have seen it in Tolleston Dunes C in bare sand near the baseball park. Ken Dritz found it in Inland Marsh A in 1986 growing with *Arabidopsis lyrata*, *Artemisia campestris* ssp. *caudata*, *Asclepias tuberosa*, *Bromus tectorum*, *Campanula rotundifolia*, *Coreopsis palmata*, *Cyperus lupulinus*, *Dichanthelium depauperatum*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Dichanthelium ovale* ssp. *pseudopubescens*, *Erigeron strigosus*, *Euphorbia corollata*, *Fragaria virginiana*, *Helianthus decapetalus*, *Hesperostipa spartea*, *Koeleria macrantha*, *Krigia virginica*, *Lepidium virginicum*, *Liatris aspera*, *Lupinus perennis* var. *occidentalis*, *Monarda punctata*, *Oenothera rhombipetala*, *Opuntia cespitosa*, *Phlox pilosa*, *Poa compressa*, *Quercus rubra*, *Q. velutina*, *Rhus copallinum* var. *copallinum*, *Rosa carolina*, *Rumex acetosella*, *Solidago speciosa*, *Sporobolus cryptandrus*, *Tephrosia virginiana*, *Toxicodendron radicans*, *Tradescantia ohiensis*, *Viola pedata*, and *Vulpia octoflora* var. *tenella*.

While Bowles (1988) documented this species's location and habitat, by 1989, the plants appeared to be reduced in size and fewer in number (Bowles 1989). Pavlovic saw multiple

plants at several locations during a lupine demography research study in Inland Marsh in 1994 and 1995. Hamilla, Molly Hacker, and Plampin were unable to relocate the populations along Stagecoach Road in 2010, a site that experiences a lot of trampling from human activity associated with the popular, but unofficial, dune climb.

In 1988, Pavlovic reported the rare sand clubmoss from the dry sand prairie off Trail 3 in the DSP; he pointed out that it was found by Cynthia Keck during a bryophyte survey. It is "found at the base of the northwest facing dune amongst black oak and Scotch pines. It occurs in at least half a dozen clumps in small openings with mosses and lichens." Michael Homoya, Roger Hedge, Derek Nimitz, and others relocated this population in 2015. In 1988, Gerould Wilhelm and Noel Pavlovic visited this area and noted that among the numerous species of terricolous lichens was *Cladonia robbinsii*, a very rare species in the Chicago Region. The diminutive sand club moss can be easily overlooked and may be more abundant than these records suggest, although the populations may not be stable. Nitrogen deposition may be contributing to the decline of this "resurrection fern." In the Chicago Region, sand clubmoss is only known from Lake and Porter counties, Indiana (Wilhelm and Rericha 2017).

Voucher Specimens:
Dritz #480, 19 June 1986, Porter Co. (MOR)

POLYPODIOPSIDA: The Ferns

The ferns are generally characterized by having specialized clusters of sporangia (spore-bearing structures) called sori that are located generally on the lower surface of the leaves. Some ferns produce two types of leaves: sterile leaves and sori-bearing fertile leaves.

OPHIOGLOSSACEAE — Adder's Tongue Family

Members of the Ophioglossaceae differ from the other ferns in having bivalved sporangia and erect venation. The genus name *Botrychium* means "like a bunch (of grapes)," referring to the fertile fronds. The genus name *Ophioglossum* means snake (*ophis*) tongue (*glossa*) in Greek. The genus *Botrychium* is now split into two genera locally: *Botrypus* and *Sceptridium*. We have chosen to further distinguish the two forms of *Sceptridium dissectum*: *dissectum* and *obliquum*. The former third form, *oneidense* is now a separate species, *S. oneidense*.

Botrychium matricariifolium (Retz.) A. Braun ex W.D.J. Koch

Daisy leaf grape fern is known from Tolleston Dunes, Cowles Dunes, DSP, Keiser, and Tamarack. Myrna Newgent found this grape fern in Tolleston Dunes B in June of 1985. This small fern was later found by K. and G. Yatskieyvich in 1999 in Cowles Dunes A. A large colony on both sides of the Cowles Bog trail near the boardwalk was found by Hamilla on 22 May 2005.

Grape fern was found by Armstrong and Schwarz at DSP in 1965. It was found again along Trail 2 when Bowles et al. (1985) sampled the population and recorded the following associates: *Acer saccharum*, *Allium tricoccum*, *Cornus alternifolia*, *Cryptotaenia canadensis*, *Galium aparine*, *Lactuca* sp., *Lindera benzoin*, *Maianthemum stellatum*, *Osmorhiza longistylis*, *Prunus serotina*, *Sanicula* sp., and *Persicaria virginiana*. Bowles (1985) noted a second colony near the one he sampled in 1984. No daisy leaf grape ferns were found in these sites in 2008, where *Sassafras albidum* had invaded (Plampin and Hamilla 2008a). Since this species tends to prefer more open sites, Plampin and Hamilla (2008a) suggested sassafras control may be helpful in bringing back this population. This diminutive grape fern was reported from Keiser E by Plampin and Sandy Whisler in 1992 and was seen again by Plampin and Myrna Newgent in 1994. Pam Benjamin and others found this fern in Keiser F on 29 June 1995.

Plampin and Hamilla relocated the fern in the same area on 1 May 2012. Lydia Miramontes found one plant with a fertile frond in Tamarack C on 29 July 2004. On 22 July 2009, Stacy Dove found this fern amid fallen black oak trees where Herman Road turns north into Tamarack C.

Voucher Specimens:

Armstrong & Schwarz s.n., 23 May 1965, Porter Co. (MOR)
Hamilla 2621, 9 May 2010, Porter Co. (INDU)

Botrychium simplex E. Hitchc.

Dwarf grape fern (also called least moonwort) is rare in wet-mesic marsh edges in Tolleston Dunes B, as found by Myrna Newgent and Plampin on 30 May 1990, with verification by Pavlovic. It has not been seen here more recently (Plampin and Hamilla 2008a). Buckthorn and Asiatic bush honeysuckle have invaded the site where this species was found. Abandonment of the former ski trail to the north and west after the Marquette Bike Trail was constructed may have contributed to its decline by no longer creating open habitat conditions. This species is cryptic due to its small size and also may be ephemeral. Great morphological variation in dwarf grape fern is supposedly due to variation in environmental conditions where it is found (Wagner and Wagner 1994).

Voucher Specimens:

Board 1990: Slide taken by Keith Board from near Miller along north edge of a large marsh, north of Highway 12. (MOR)

Ophioglossum pusillum Raf. [*Ophioglossum vulgatum* L. var. *pseudopodum* (S.F. Blake) Farw.]

Northern adder's tongue fern is known from Miller Woods, Tolleston Dunes, Cowles Dunes, DSP, Keiser, Tamarack, and Hoosier Prairie units. It is possibly known from Miller Woods, as reported by Peattie (1930): "to Miller Springs [*sic*];" however, it could be an error meaning "Mineral Springs" or springs south of Miller Woods. Nathanael Pilla and Terry Troche found northern adder's tongue growing in Miller Woods on 20 May 2016. This fern is also rare in Tolleston Dunes C, where it was found by Plampin. Wilhelm (1990) wrote, "Pitcher (1988a) cited the following note from Lois Howes: 'Just outside N. Park & Lupine, 1950s,' which Emma Bickie Pitcher indicated is in Cowles Dunes B. Plampin (1989b) reported it from two more places in Howes Prairie" after it was relocated by Ken Klick, Eric Kjellmark, and Julie Stumpf. In Howes Prairie (Cowles Dunes B), northern adder's tongue was growing with *Calamagrostis canadensis*, *Eryngium yuccifolium*, *Krigia* sp., *Liatris aspera*, *Lithospermum caroliniense* var. *croceum*, *Lupinus perennis* var. *occidentalis*, *Populus tremuloides*, and *Rudbeckia hirta*. Plampin found a third population consisting of over 100 plants in Howes Prairie south of the *Chimaphila maculata* stand. None of these populations were apparent in 2008 (Plampin and Hamilla 2008a, 2008b). A specimen at The Field Museum of Chicago (F) (Tryon #912) from 1934 was collected at DSP in a damp meadow.

Northern adder's tongue fern is found in the wetland south of the Dunewood Campground in Keiser F. Wilhelm (1990) noted this fern is "quite frequent in the southern third of Hoosier Prairie A and B," based on a report by John Bacone (former Director of Indiana Division of Nature Preserves, pers. comm. with Pavlovic, 1988). According to Wilhelm (1990), Ken Dritz recorded it at the south end of the prairie on 23 June 1985, where it had been relocated by Ken Klick. Northern adder's tongue fern may be a plant that spends more years underground than growing above ground and so comes and goes interannually. Hamilla and Molly Hacker found 12 healthy plants growing in Crescent Dune on 31 July 2014 on a *Sphagnum capillaceum* mound with *Fragaria virginiana* and *Scirpus* sp.

Voucher Specimens:

Tryon #912, 15 June 1934, Porter Co. (F)
Kjellmark #175, 1 June 1989, Porter Co. (INDU)

Sceptridium dissectum (Spreng.) Lyon [*Botrychium dissectum* Spreng.]
Cut-leaved grape fern is known from all units of the eastern portion of the park, including the Heron Rookery and Pinhook Bog. Three forms of this species (*dissectum*, *obliquum*, and *oneidense*) have been recognized as separate species in the past, but the former two are now subsumed into this species and the last is a separate species (see *Sceptridium oneidense*). We separate the two forms in the discussion for clarity of variation in distribution and to retain former information despite the lumping of the two forms into *S. dissectum*.

The typical form is "occasional in the mesophytic forest portion of Bailly B, and probably elsewhere" (Wilhelm 1990). It is still rare to occasional in Cowles Dunes A and B. In the DSP, this fern (f. *obliquum* and f. *dissectum*) is extant along Trail 2, and Pepoon (1927) cited it from Mt. Tom. There are specimens of *B. dissectum* f. *obliquum* at the Field Museum of Chicago (F) collected in the DSP by Tryon (25 September 1932) from "damp woods." *B. dissectum* f. *obliquum* is occasional in the savanna complex portions of Furnessville A, C, D, E, F, and G, with *B. dissectum* f. *dissectum* less numerous. Cut-leaved grape fern is extant, though rare, in the wooded swamps of Keiser B, C, E, and F. Reported by Lyon (1927) from the "rich subdunal woods" at Tamarack, this species survived the habitat degradation that has occurred there. Plampin and Myrna Newgent found it in Tamarack C in the summers of 2002 and 2003 as well as earlier in 1992. They also report this form from Tamarack B and D (Plampin and Newgent 1992). Both forms are occasional in the cut-over forest south and north of the Little Calumet River in the Heron Rookery. Both forms (*obliquum* and *dissectum*) are occasional on the south-facing slope along the north edge of Pinhook Bog.

Voucher Specimens:
Bennett #7173, 1 October 1960, Porter Co. (F); forma obliquum
Hiebert #105, 31 August 1981, Porter Co. (INDU). One plant of this variety [f. dissectum*]; however, specimens of* B. dissectum *f.* obliquum *are numerous.*

Sceptridium multifidum (S.G. Gmel.) M. Nishida [*Botrychium multifidum* (S.G. Gmel.) Rupr.; *Botrychium multifidum* var. *intermedium* (D.C. Eaton) Farw.]
Leathery grape fern is known from Cowles Dunes, DSP, Furnessville, and Keiser units. Wilhelm (1990) wrote,

> *This rare fern is known from Cowles Dunes B based on the report by Pitcher (1988a): 'S. of INDTR. E. of Lupine Ln. Tr.' According to Plampin (1987c), INDTR is a designation for Indian Trail' used by Lois Howes.*

This rare fern has been seen in the DSP (see Tryon below). Plampin pointed out two plants in Furnessville A on 23 August 2007; however, she questioned the accuracy of her determination and sought the advice of professional botanists regarding this taxon. The ferns at Furnessville were studied by Hamilla and Plampin (Plampin and Hamilla 2008a, 2008b). The ferns here may be a southern variant of *S. multifidum* according to D. R. Farrar, Iowa State University, or possibly a hybrid *S. dissectum* × *S. multifidum* or *S. dissectum* × *S. oneidense*. There has also been some speculation they might be *S. rugulosum* (W.H. Wagner Skoda & Holub. Until a definitive determination is made, we refer to this as *S. multifidum*. The Furnessville plants grow with *Acer rubrum*, *S. dissectum* (f. *dissectum*), *S. dissectum* (f. *obliquum*), *S. oneidense*, *Carex swanii*, *Dichanthelium acuminatum* ssp. *lindheimeri*, *Populus tremuloides*, *Quercus palustris*, *Rubus strigosus*, *Rubus hispidus*, and *Sassafras albidum*. According to Gerould Wilhelm and Plampin, this rare fern was frequent in Keiser C on 28 September 1989, particularly near the north edge of the old growth trees. One plant was seen there by Hamilla on 23 September 2007.

Voucher Specimens:
Tryon #870, 20 March 1932, Porter Co. (F)
Wilhelm et al. s.n., 28 September 1989, Porter Co. (MOR)

Sceptridium oneidense (Gilbert) Holub [*Botrychium oneidense* (Gilbert) House]
Blunt-lobed grape fern was formerly considered a form of *S. dissectum*. It is known from the Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Heron Rookery units. Hamilla noted *B. oneidense* growing in association with *Asplenium platyneuron* in Cowles Dunes A on the west slope of a large dune west of the trail to Little Lake on 11 November 2007. In the DSP, this fern is extant along Trail 2, and Pepoon (1927) cited it from Mt. Tom. At the Field Museum (F), there is a specimen of *B. dissectum* f. *oneidense* collected by Tryon (#744, 24 September 1932) from "damp woods." Bowles et al. (1985) found blunt-lobed grape fern along Trail 2 in what they describe as "mid- successional mesic sand forest." They listed it as growing with *Acer saccharum*, *Allium tricoccum*, *Cornus alternifolia*, *Cryptotaenia canadensis*, *Fraxinus americana*, *Galium aparine*, *Lindera benzoin*, *Maianthemum stellatum*, *Osmorhiza longistylis*, *Polygonum virginiana*, *Prunus serotina*, *Quercus alba*, *Q. rubra*, and *Sanicula* sp.

Plampin found this fern in Furnessville A on 23 August 2007, in Keiser C with Hamilla on 23 September 2007, in Keiser E on 1 October 2007, and in the southeastern portion of the DSP west of Kemil Road on 2 October 2007 (Plampin and Hamilla 2008a). Plampin and Newgent (1994) found this plant in the Tamarack Unit. They also located a single individual growing in Tamarack B just east of C.R. 375 on 1 May 2012. Hamilla recalls Gerould Wilhelm and Laura Rericha finding this fern in the Heron Rookery in April of 2009.

Voucher Specimens:
Deam #21224, 25 August 1916, Porter Co. (IND)

Sceptridium rugulosum (W.H. Wagner) Skoda & Holub [*Botrychium rugulosum* W.H. Wagner]
St. Lawrence grape fern was collected from "Millers" by E.S. Bastin in 1878 (Wagner and Wagner 1994). In 1982, W.H. Wagner determined that this specimen, originally labeled *Botrychium lunarioides* var. *obliquum* Schwartz, was *Sceptridium rugulosum*. Whether this grape fern is extant in Miller Woods A is not known.

Voucher Specimens:
Bastin s.n., 5 July 1878, Lake Co. (F)

EQUISETACEAE — Horsetail Family

Horsetails are also called scouring rushes because the stems, containing silica, were used to clean pipes by Native Americans and pots and pans by the pioneers (Geniusz 2015). Horsetails often grow in disturbed or early successional habitats and can be clonal. They also generally reproduce by spores. Horsetails were previously considered fern allies, but based on recent analysis of nuclear and chloroplast DNA, they are now known to be ferns (Palmer 2018). They have small leaves similar to the lycophytes, but are similar due to convergent evolution (i.e., reduction of fern leaves).

Equisetum × *nelsonii* (A.A. Eaton) J.H. Schaffner [*E. laevigatum* A. Braun × *E. variegatum* Schleich. ex F. Weber & D. Mohr]
This hybrid is known from Miller Woods A and West Beach A. Swink and Wilhelm (1994) note that scouring rush grows in marly fens, tufa flats, spring runs, pannes, and interdunal swales often associated with *E. laevigatum*. This species occurs in Porter and Lake counties and within the Chicago Region to the northwest (Wilhelm and Rericha 2017).

Voucher Specimens:
Simonin #7, 23 July 1982, Porter Co. (MOR)
Dritz #79, 26 May 1980, Lake Co. (MOR)

Equisetum variegatum Schleich. ex F. Weber & D. Mohr

Bowles et al. (1985) recorded variegated scouring rush from "early successional disturbed panne" in Miller Woods A. There it grows with its hybrid *E.* × *nelsonii* and *Eupatorium perfoliatum*, *Fragaria virginiana*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, *Lythrum alatum*, *Packera paupercula*, *Panicum virgatum*, and *Schoenoplectus pungens*. It is also reported from the West Beach Unit.

Voucher Specimens:

Swink s.n., 9 September 1947, Lake Co. (MOR)
Swink #699, 15 September 1951, Lake Co. (F)

PTERIDACEAE — Maidenhair Fern Family

This and several other families named here (Blechnaceae and Woodsiaceae, based on Flora of North America Editorial Committee (1993)) are somewhat controversial. *Adiantum* is a well-defined genus distinguished by the "sporangia borne on the abaxial surface of the false indusium." The genus name is derived from Greek, meaning "unwetted," referring to the observation that the leaves shed water.

Adiantum pedatum L.

Maidenhair fern is known from West Beach, Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Hobart Prairie Grove. This delicate fern grows on north-facing dune slopes in the high dunes of the western portion of West Beach A, where it is frequent. Tonkovich found maidenhair fern growing in Bailly A, northwest of the INDU headquarters, in 2011 and 2014. It also is found growing in one of the more mesophytic phases of the savanna in Cowles Dunes B just southwest of Howes Prairie. A single clump grows or grew in Cowles Dunes B, but a fallen log appears to have covered it in 2007. According to Wilhelm (1990), "Pitcher (1988a) reported it from Dune Acres proper at 'WRD' which was probably Lois Howes' designation for West Road." L. Olsen showed Plampin ten plants growing with *Pinus strobus* in Cowles Dunes A in the early 1990s. Maidenhair fern is extant on shaded slopes within the DSP dune complex, and Wilhelm noted that "Plampin (1987d) reported seeing it on 28 May 1991." Plampin and Hamilla saw several clumps west of Kemil Road in the DSP near the more northerly beech mound on 2 October 2007. Maidenhair fern is extant along the edge of the swamp complex in Furnessville C. Reported by Lyon (1927), the maidenhair fern is extant in Keiser C. It is also reported from Tamarack C by Plampin et al. (2003) in a population of over 100 plants in a hardwood cove in association with *Anemone acutiloba*, *Aquilegia canadensis*, *Aralia nudicaulis*, *Carpinus caroliniana* ssp. *virginiana*, *Corallorhiza maculata*, *Hamamelis virginiana*, *Pinus strobus*, *Maianthemum stellatum*, and *Smilax* spp.

Voucher Specimens:

Otto #23, 11 June 1982, Porter Co. (INDU)

BLECHNACEAE — Chain Fern Family

Chain ferns are terrestrial, have sori on veins that are parallel to the midrib of the frond, and have indusia.

Woodwardia areolata (L.) T. Moore

In regard to netted chain fern, Wilhelm (1990) wrote:

> *Imagine my shock when I first received the phlegmatic missive from Michael Homoya that he had seen the netted chain fern on a casual visit to the Dunes in the spring of 1988. There is only one other record from the Midwest north of the January −4.5°C isotherm (Cranfill 1983); it was collected by Liberty Hyde Bailey, Van Buren County, in 1880 in southwestern Michigan (Billington 1952). After receiving the location information provided by Homoya (1988), Marlin Bowles and I searched for the fern and lucked upon it. Bowles (1989)*

details the location and recorded the following associates: Acer rubrum, Betula lutea [*B. alleghaniensis*], Bidens connata, Boehmeria cylindrica, Carex seorsa, Dryopteris thelypteris *var.* pubescens [*Thelypteris palustris var. pubescens*], Glyceria striata, Ilex verticillata, Impatiens capensis, Lindera benzoin, Maianthemum canadense *var.* interius, Nyssa sylvatica, Onoclea sensibilis, Osmunda cinnamomea [*Osmundastrum cinnamomeum*], Parthenocissus quinquefolia, Quercus rubra, Rubus pensylvanicus, Sassafras albidum, Symplocarpus foetidus, Ulmus americana, *and* Vaccinium corymbosum. *According to Cranfill (1983)* "*No stations are known in the limestone regions of the Interior Low Plateaus or in the calcareous Black Belt region of Alabama and Mississippi.*" *Absence of the species from glaciated areas in southern Illinois and southeastern Ohio can be ascribed to the predominance of calcareous glacial drift in these areas. He goes on to say that* [acidic] *seep and bog habitat are necessary for the species. Some have suggested that this fern is adventive here, but I think it is autochthonous. It is growing with conservative species in a top-quality natural area. Billington considered the Michigan population to be native. The Indiana Dunes National Lakeshore is a virtual repository of coastal plain disjuncts, and the clump that Marlin and I monitored appears to be long-established: 14 genets, 114 ramets.*

This netted chain fern reported by Wilhelm (1990) seems to have disappeared, possibly killed by a fallen tree. Hamilla searched diligently for it in 2007. However, Eric Kjellmark and Michael Homoya only saw a single plant, rather than a clump, so it is possible that there are two patches. This single plant was growing with *Osmundastrum cinnamomeum*, *Symplocarpus foetidus*, *Festuca subverticillata*, *Acer rubrum*, *Betula alleghaniensis*, *Toxicodendron vernix*, and *Ulmus rubra*. Recent hydrological changes from reengineering the Cowles Bog boardwalk and beaver activity have ensured habitat for this species no longer exists. This species has been shown to have the ability to uptake uranium and thorium, thus making it a candidate for phytoremediation of contaminated sites (Knox et al. 2008).

Voucher Specimens:

Kjellmark & Homoya #100, 8 June 1988, Porter Co. (IND)

Woodwardia virginica (L.) Sm.

Virginia chain fern is known from Inland Marsh, Cowles Dunes, Keiser, and Pinhook Bog units. Virginia chain fern is reported by Ken Dritz from Inland Marsh B (Wilhelm 1990). It has been plentiful here according to Plampin, based on observations from 2000 to 2010. In Cowles Dunes, Virginia chain fern is very rare, growing as a small colony at the edge of a shrubby swale in the marsh complex portion of Cowles Dunes A, and from another small colony in Cowles Dunes B, east of Mineral Springs Road and north of the guard house (technically, this population is on Dune Acres park land). Virginia chain fern is frequent in Pinhook Bog on both sides of Wozniak Road. Plampin found Virginia chain fern at MacAllister Prairie (a SHLT property adjacent to the north of Keiser C) on 13 September 2003.

Voucher Specimens:

Kjellmark, Klick, Cole #152, 5 August 1988, La Porte Co. (INDU)

WOODSIACEAE — Wood Fern Family

Wood ferns are perennial and are mostly terrestrial. Characteristics include scaly stems and petiole bases, abaxial sori, absence of needlelike hairs, and a basal chromosome number of 40 or 41. Fronds range from simple to one- to two-pinnate or more divided.

Cystopteris tenuis (Michx.) Desv.

Slender fragile fern is known from Keiser and Hobart Prairie Grove. Susan von Oettingen

collected this fern in Keiser C on 30 September 1982. Nathanael Pilla and Hamilla found this fern growing at Hobart Prairie Grove A and B on 3 June 2017.

Voucher Specimens:
Oettingen #403, 30 September 1982, Porter Co. (MOR)

Deparia acrostichoides (Sw.) M. Kato [*Athyrium thelypterioides* (Michx.) Desv.]
Silvery spleenwort is known from the DSP, Keiser, and the Heron Rookery. According to Wilhelm (1990), Ken Dritz noted silvery spleenwort along Trail 2 in the DSP on 13 July 1980. Hamilla noted this species west of Kemil Road in the DSP on 11 September 2007. There it was in the swamp forest near *Adiantum pedatum*, *Arisaema triphyllum*, *Athyrium filix-femina* var. *angustum*, *Botrychium* spp., and *Phegopteris hexagonoptera*.

Silvery spleenwort grows in Keiser C, where it was found by Hamilla on 23 September 2007. Hamilla also found the plant on 8 October 2006 north of the Little Calumet River in the Heron Rookery near *Dryopteris goldiana*. Plampin and Naida Lehmann found a stand of nine plants there on 18 October 2006.

Voucher Specimens:
Deam #49707, 14 September 1930, Porter Co. (IND)

Dryopteris clintoniana (D.C. Eaton) Dowell
Clinton's wood fern is one of our rarest ferns that is only known from the DSP by Tryon (1936) as *D. cristata* var. *clintoniana*. It is at the western limit of its range (Swink and Wilhelm 1994). According to Sessa et al. (2012), this allohexaploid species is derived from a cross between *D. goldiana* and *D. cristata*. This species is currently considered extirpated from the Indiana Dunes.

Voucher Specimens:
Tryon #447, 25 July 1934, Porter Co. (F)
Tryon #2208, 28 August 1935, Porter Co. (F)

Dryopteris goldiana (Hook. ex Goldie) A. Gray
Goldie fern was found by Hamilla at the Heron Rookery on 8 October 2006. This is the first contemporary record of this fern from INDU. It was growing with *Deparia acrostichoides*. Hamilla found an additional site in 2007 while relocating the original site (Plampin and Hamilla 2008a). This population of six plants is just north of the Little Calumet River and could be vulnerable to riverbank erosion. Associates of this goldie fern included *Acer rubrum*, *Allium tricoccum*, *Asarum canadense*, *Asimina triloba*, *Carpinus caroliniana* var. *virginiana*, *Cystopteris protrusa*, *Fraxinus americana*, *Hydrophyllum virginianum*, *Laportea canadensis*, *Lindera benzoin*, *Osmorhiza longistylis*, *Platanus occidentalis*, and *Sanicula odorata*. Both populations were extant in 2008. This species prefers mesophytic woods such as beech-maple or maple-basswood forests (Swink and Wilhelm 1994) and rich calcareous woods (Fernald 1970).

Phegopteris hexagonoptera (Michx.) Fee [*Dryopteris hexagonoptera* (Michx.) C. Chr.]
Broad beech fern is reported from Cowles Dunes, DSP, Furnessville, Keiser, Heron Rookery, and Pinhook Bog units. Plampin reported this species west of Waverly Road and east of Howes Prairie in Cowles Dunes B. In DSP, the broad beech fern is rare, but extant in the hydromesophytic swamp west of Kemil Road (seen 2 October 2007 by Hamilla and Plampin). It was associated with *Liriodendron tulipifera*, *Polystichum acrostichoides*, *Sanicula odorata*, and *Thelypteris noveboracensis*. Broad beech fern is "rare to occasional in the swamp complex" portions of Furnessville C (Wilhelm 1990). Reported from the Keiser area by Lyon (1927), broad beech fern is extant in the hydromesophytic forest of the swamp complex in Keiser C. At the Heron Rookery A, this fern is known only from a small colony along the northern edge of an old oxbow, south of the Little Calumet River. It is rare in the mesophytic forest south of Pinhook Bog in subunit A, east of Wozniak Road.

Voucher Specimens:

Board #923, September 1990, Porter Co. (MOR)

Matteuccia struthiopteris (L.) Todaro var. *pensylvanica* (Willd.) C.V. Morton

Ostrich fern was found by Gerould Wilhelm and Ken Dritz on 26 June 1997 at Heron Rookery B. No specimen was collected. Sarah and Noel Pavlovic found ostrich fern growing in Furnessville E on 25 May 2014. This fern has also been reported from Furnessville F and G. This is one of the most common species to be cultivated, and it rapidly spreads by rhizomes (Moran 2004). Swink and Wilhelm (1994) note that it is rare in natural areas in the Chicago Region. The fiddle heads of ostrich fern are edible.

Thelypteris noveboracensis (L.) Nieuwl. [*Dryopteris noveboracensis* (L.) A. Gray]

New York fern has been found in Miller Woods, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and the Heron Rookery. New York fern occurs in Miller Woods A. There are a few populations of this fern in the swampy woods of Cowles Dunes D. There is at least one extensive population in Cowles Dunes E, seen by Plampin on 25 June 2000. This fern is extant and even frequent in portions of the swamp complex of the DSP. New York fern is frequent in the swamp complex portions of Furnessville C, D, E, and G, where there is a very large population. Wilhelm (1990) found this fern on 12 September 1979 in Keiser B growing with *Acer rubrum*, *Betula papyrifera*, *Carex debilis* var. *rudgei*, *C. folliculata*, *C. intumescens*, *C. seorsa*, *C. virescens*, *Ilex verticillata*, *Lindera benzoin*, *Maianthemum canadense*, *Mitchella repens*, *Nyssa sylvatica*, *Osmunda regalis* var. *spectabilis*, *Osmundastrum cinnamomeum*, *Platanthera clavellata*, *Quercus rubra*, *Rubus hispidus*, and *Saururus cernuus*.

In addition, New York fern is still frequent in the swamp complex portion of Keiser B and in subdunal woods remnants of Keiser C. It has survived the degradation of Tamarack A, persisting in the wet woods just north of the CSSSBR (Wilhelm 1990). New York fern is found in the wetter portions of the beech/maple forest on both sides of the Little Calumet River at the Heron Rookery. In northern hardwood forests, this is one of three species of ferns that foresters prefer to remove because of inhibition of tree regeneration (Engelman and Nyland 2006).

Voucher Specimens:

Wilhelm #6953, 12 September 1979, Porter Co. (MOR)

Wilhelm #6862, 20 June 1979, Porter Co. (MOR)

POLYPODIACEAE — Polypody Family

All ferns were formerly included in this family, but it now is limited to seven genera in North America, with *Polypodium* being the largest. These terrestrial, perennial ferns have simple pinnatifid blades that are entire or nearly so. The sori lack indusia, and the spores are bilateral, colorless or yellowish, and often transparent.

Polypodium virginianum L.

Polypody is known from Cowles Dunes, DSP, Tamarack, and the Heron Rookery. Polypody was known from the dunes based on the statement by Peattie (1930): "Rare and local, as in woods at Mineral Springs." This location would be Cowles A. Polypody was unknown from the DSP until it was noted on Mt. Jackson by D. Arvin in 1981. Mt. Jackson (176 feet above Lake Michigan) is the shortest of the three high dunes in the DSP, the other two being Mt. Tom (192 feet) and Mt. Holden (184 feet). Wilhelm (1990) wrote, "According to Keith Board, this population is very near the Mt. Jackson population of *Polygala paucifolia*." *Polypodium virginianum* is known from Tamarack A as reported by Peattie (1930): "Rare and local, as in woods at Mineral Springs, at Tamarack Sta., acc. to Nieuwland." This fern also grows in Heron Rookery B. This evergreen fern has been of great interest in regard to photosynthetic activity in variable light regimes and droughty habitats (Gildner and Larson 1992a, 1992b;

Matthes-Sears et al. 1993). Polypody rapidly increases photosynthesis when sun flecks occur on the leaves.

Voucher Specimens:
Arvin s.n., 17 May 1981, Porter Co. (MOR)

PINOPSIDA: The Conifers

The conifers and other higher plants are distinguished by producing seeds and the first development of woody growth forms. Conifers have naked (*gymno*) seeds (*sperma*). Although many conifers are considered evergreen, a few such as bald cypress (*Taxodium distichum* (L.) Rich.) and tamarack (*Larix laricina* (Du Roi) K. Koch) drop their leaves after the growing season. Conifers dominated the world from about 300 to 150 million years ago (Condamine et al. 2020). Today they are confined to localized dry or stressful habitats except where they dominate in the northern boreal regions (Ridsdale et al. 2005). The conifers are divided into four groups: the Cycadales (cycads), Ginkoales (ginko), Pinales (conifers and pines), and Gnetales (*Ephedra* and *Welwitschia*). Only the Pinales occur at the Indiana Dunes. Asian ginko (*Ginko biloba* L.) trees that were planted are common in urban areas of northwest Indiana.

CUPRESSACEAE — Cypress and Redwood Family

Containing only four genera in eastern North America, the Indiana Dunes region has representatives from just two genera: *Juniperus* and *Thuja* (*Taxodium* and *Chamaecyparis* are absent as native species). Members of this family have single scale-like or needle-like leaves, while some species have dimorphic leaves where the type changes with age (e.g., *Juniperus virginiana*). These trees bear very few male cones, with the small female cones being either woody with winged seeds (*Thuja*) or berry-like with wingless seeds (*Juniperus*) (Lawrence 1951). The wood of redwood (*Sequoia sempervirens* (D. Don) Endlicher) and of juniper is known for resistance to rot and insects. Juniper berries are used in making gin (Lawrence 1951). Wood of *Thuja* is used to make cedar shingles. Bald cypress has been planted at the NIPSCO dike (Cowles A) and in Beverly Shores (Keiser C).

Juniperus communis L. [includes *Juniperus communis* L. var. *depressa* Pursh]
Common juniper, unlike many other conifers, produces male and female individuals, a breeding strategy called dioecy meaning "two houses." Swink and Wilhelm (1979) pointed out that Deam (1940) excluded Indiana from the geographic range of the typical variety but acknowledged that "specimens of tree proportions have been reported from Porter County in Indiana." Common juniper is known from Miller Woods, West Beach, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. Common juniper is occasional on the dunes north of the Grand Calumet River in Miller Woods A. This shrub also is rare in West Beach E, especially in the eastern sand mine. It is extant in Cowles Dunes A, particularly in the foredune and dune complex regions. Common juniper is still occasional to frequent in the foredune complex of the DSP. According to Wilhelm (1990),

> *Peattie (1930) reported a specimen of erect habit, which he identified as typical* J. communis*, from Mt. Tom, at which location he said that it grew with* Opuntia rafinesquii [*O. cespitosa*] *on open dunes. Laughlin (1953) also reported the typical variety in the DSP, stating that it had a trunk 3 inches in diameter, and going a bit further to mention that it was "the largest native tree of its kind in the United States."*

Bowles et al. (1986) listed the following associates for the var. *depressa* in the DSP: *Arabidopsis lyrata*, *Artemisia campestris* ssp. *caudata*, *Calamovilfa longifolia*, *Corispermum americanum*, *Euphorbia polygonifolia*, *Lithospermum caroliniense* var. *croceum*, *Pinus banksiana*, *Populus deltoides*, *Prunus pumila*, *Quercus velutina*, *Schizachyrium scoparium*, and *Solidago simplex* var. *gillman*ii.

Common juniper is occasional in the sand blows of Furnessville A. This shrub is still present but infrequent in the dune complex portion of Keiser D and F. Apparently this species is restricted in Tamarack C to a few populations along the edge of the foredunes west of Mt. Baldy. Two forms of this species are recognized in the dunes region: a multi-stemmed form (var. *depressa* Pursh) and the typical single-stemmed form. This species is susceptible to cedar apple rust.

Voucher Specimens:
Wilhelm #6627, 21 May 1979, Porter Co. (MOR)
Wilhelm #15255, 25 August 1987, La Porte Co. (MOR)

Thuja occidentalis L.
Northern white cedar is extant among the tamaracks in the swamp complex portion of Cowles Dunes A; this is the only living native population in the state of Indiana. This tree is generally called American arbor vitae. The population today is at least as extensive as the one described by Deam (1932):

> *In Porter County it is known only in a large tamarack bog north of the Mineral Springs stop on the Traction line, and about a mile from Lake Michigan. Here about 100 trees are scattered over an area of less than two acres. The largest specimen measured 70 cm in circumference. This species is doomed to early extinction in our area. No doubt it already has vanished from Lake County, and it is probable that the colony north of Mineral Springs is the last of the species in Indiana.*

According to Wilhelm (1990),

> *Bowles et al. (1985) estimate that most of the arbor vitae regeneration is vegetative from the branches of fallen older trees. In a detailed sampling on 19 May 1987, Bowles (1988) recorded 135 genets, in a 0.92 ha area, with an average of 2 ramets per genet; he found more than half over 1 dm (dbh) and 4 ramets in excess of 3 dm. According to Wilcox et al. (1986), these trees are restricted to the most well-drained portion of the peat mound.*

In recent years deer have eliminated all reproduction and removed green growth to create a browse line. To alleviate the problem, INDU constructed a deer exclosure in consultation with the Indiana Division of Nature Preserves to protect this state-endangered species. Since 2000, it has been propagated from cuttings to increase the local population, and Paul Labus had 100 seedlings to plant, sown from seed collected on site (D. Mason, INDU botanist, pers. comm. with Pavlovic, 2005). Cuttings from plants on the mound have also been planted south of the Cowles Bog Trail in Cowles Dunes, north of Cowles Bog. This tree species was known from the Tamarack Unit based on the following report by Lyon (1927): "two or three trees, subdunal woods at Tamarack." This population is now most likely extirpated since the Tamarack bog was partly destroyed by the construction of the South Shore Line and traversed by Lake Shore County Road (Brown Road).

Voucher Specimens:
Hiebert #187, 22 October 1981, Porter Co. (INDU)

PINACEAE — Pine Family

Pines are recognized by their bundles of needles called fascicles. Pines are important sources of wood and chemicals. According to E. Gibbons (1966), you could even eat a pine tree! More often you can eat the seeds, called pine nuts, from species such as pinyon pine (*Pinus edulis* Engelmann) from the southwest U.S. and stone pine (*P. pinea* L.) of Europe.

Larix laricina (Du Roi) K. Koch
Tamarack is restricted in the Dunes and is found only in Cowles Dunes, Keiser, Tamarack, and Pinhook Bog. This species is most common at Pinhook Bog, with the next largest

population at Cowles Bog (Cowles Dunes A). Few if any specimens still survive in Keiser and Tamarack. Since the Tamarack Bog west of the town of Pines straddled the Keiser and Tamarack units, it probably grew in Keiser. Bergendahl's site in Tamarack A was north in the pine swamp north of the Tamarack Station on the South Shore Line. A lone tamarack tree was found north of the Calumet Bike Trail at the covered bridge by Plampin in December 2004, but the tree died. Known as a deciduous conifer that turns golden in the autumn prior to leaf fall, tamarack grows in both acidic and alkaline habitats (Weeks et al. 2005).

Voucher Specimens:

Deam #9629, 14 August 1911, Porter Co. (IND)
Hiebert #433, 14 June 1984, La Porte Co. (MOR)

Pinus banksiana Lamb.

Jack pine is known from Miller, Tolleston Dunes, West Beach, Inland Marsh, Bailly, Cowles Dunes, DSP, and Furnessville. Peattie (1930) pointed out that the Indiana Dunes populations of jack pine represent the southernmost extension of its natural range. Swink and Wilhelm (1979) write that in the Indiana Dunes area this species seldom occurs as a wild plant far from Lake Michigan. In Michigan, the coastal plant community where jack pine occurs is called the Great Lakes barrens (Cohen et al. 2015). In its most characteristic association, it occupies areas that have had a history of fire, growing with *Amelanchier arborea*, *Arctostaphylos uva-ursi*, and *Juniperus communis* var. *depressa*. Outliers of jack pine occur in the foredune association near the lake with *Schizachyrium scoparium*, *Arabidopsis lyrata*, *Artemisia campestris* ssp. *caudata*, *Calamovilfa longifolia*, *Lithospermum caroliniense* var. *croceum*, *Monarda punctata* var. *villicaulis*, *Panicum virgatum*, *Populus deltoides*, *Prunus pumila*, and *Solidago simplex* var. *gillmanii* (Wilhelm 1990). It also occurs in the shrub zone farther from the lake (and higher above the lake) with *Celastrus scandens*, *Cornus sericea*, *Juniperus virginiana* var. *virginiana*, *Prunus virginiana*, *Ptelea trifoliata* ssp. *trifoliata*, *Rhus aromatica*, *Toxicodendron radicans*, *Maianthemum stellatum*, and *Vitis riparia* (Wilhelm 1990). It is also found in the high dunes in the eastern unit of INDU, in the dry woodland that is dominated by *Quercus velutina*.

Pepoon (1927) felt that it was "rapidly becoming exterminated at its western border by smoke, cinders, dust of cement mills, and cutting off, as well as by frequent fires." This latter comment on fire is counter to information noted by Peattie (1930), who points out the cones rarely open fully unless charred by fire—though in this part of its range, jack pine cones are likely not to be serotinous as they are farther north. This non-serotinous condition may be characteristic of populations occurring in dune and swale lake plains on the shores of Lakes Michigan and Superior where fire was less prevalent (Gauthier et al. 1996). Jack pine is still a characteristic species of the interdunal pond borders north of the Grand Calumet River in Miller A. Old photographs suggest it was formerly more abundant in the back dunes at Miller, but Government Land Survey records from 1835 are ambiguous concerning the distribution of this species because the surveyors did not distinguish between jack and white pine (Bowles et al. 2015). At the Miller Dunes, new jack pines are beginning to invade between the dune ridges that formed in 1991 and 2000.

Armentano and Menges (1986) discussed the pollution effects of ozone (O_3) and sulfur dioxide (SO^2) on jack pine at Miller. According to Menges and Armentano (1985), the dune slopes around the pannes in Miller A have some of the oldest jack pines in the Indiana Dunes. There are a few young trees along the sand ridges in the western and northern portions of Tolleston Dunes A. One might question the nativity of these trees. Jack pine is known from West Beach A, B, D, and G, where it grows in and around the pannes. According to Menges and Armentano (1985), the oldest jack pine at Ogden Dunes was 64 years, but they speculate that most of the trees are much younger. A few jack pines are present in Inland Marsh B. This pine is adventive in Bailly A. Jack pine is extant in both Cowles Dunes A and B. In the latter area it occurs with *Calamovilfa longifolia* var. *magna*, *Galium*

pilosum, *Ionactis linariifolia*, *Liatris aspera*, *Lithospermum caroliniense* var. *croceum*, *Panicum virgatum*, *Quercus velutina*, *Sassafras albidum*, *Schizachyrium scoparium*, *Solidago speciosa*, *Symphyotrichum oolentangiense*, and *Tephrosia virginiana*.

Jack pine is still common in the dune and foredune complexes in the DSP. Wilhelm (1990) wrote, "Emma Pitcher found a young specimen of this rare tree in the eastern portion of the North Pitcher Prairie, Furnessville A; she also noted (Pitcher 1988b) that it grows in Furnessville F." Plampin noted jack pine growing in subunit D. Chun and Choi (2012) found that the establishment of jack pine seedlings was five times greater in moist sands around pannes than on dune ridges, suggesting the future regeneration will be constrained by the rate of panne formation in a coastal system that is greatly disrupted.

Voucher Specimens:

Wilhelm and Bacone #5180, 3 August 1978, Lake Co. (MOR)
Hiebert #37, 14 July 1981, Porter Co. (MOR)
Schulenberg, Howes, and Kropp #76-991, 9 October 1976, Porter Co. (MOR)
Tryon s.n., 3 August 1935, Porter Co. (F)

Pinus strobus L.

White pine is known from West Beach, Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Pinhook Bog, and Tamarack. About this species, Swink and Wilhelm (1979) write:

> *This species has a significant history in our area. At one time* [prior to 1850s]*, it was very common in the dune country in Lake, Porter, La Porte, and Berrien counties. Most of this timber was cut for lumber, and only a tiny remnant survives.* Quercus velutina *has occupied many of its former sites, and in some of these woodlands, especially in winter, one can still spot a few of the pines growing with the oaks. Local historical accounts provide interesting stories of the various lumber camps in the Indiana dunes set up in the 19th century to provide white pine timber.*

Wilhelm (1990) writes:

> *By the time Peattie wrote in 1930 there were no commercial stands of this species in the area. (See also Brennan (1923), page 211). According to Menges and Armentano (1985): "A complete age distribution for white pine is available from a mesic pocket site on the lake front* [Cowles Dunes A]*." This population includes the largest (75.1 cm dbh) and oldest (162 years) white pines sampled. The latter individual has a fire scar dating from about 1879, the approximate date that the five next largest pines were established. All other white pines* [here]*, with one exception, are 68–111 years old; the number present slowly declines in younger age classes. Only one living tree originated within the last 64 years—a 19-year-old tree established on an encroaching dune.*

White pine is still occasional in West Beach A and D, though it may have been more common at one time. A few individuals are known from the Bailly Unit, but they may have been planted. This species is extant in both Cowles Dunes A and B. White pine is extant in the DSP, though not nearly as common as it once was among the dunes in the foredune and dune complexes. There is a population of old trees at the eastern end of the park in an area known as the "Pinery" on park maps. Menges and Armentano (1985) believe there is evidence that white pine is competing successfully with oaks, but Haney (1986) cited evidence to suggest that even here the lack of small size classes is apparent.

White pine grows, probably adventively, in Furnessville E and F. This pine is still occasional in the more stable portions of the dune complex in Keiser A. Concerning this population, Menges and Armentano (1985) note:

> *The history of* [this population]*, the only other white pine population available for aging, was similar in history to* [those in Cowles Dunes surveys]*. The oldest tree was 132 years*

old; peak recruitment occurred between 80 and 110 years ago; and only two trees sampled were younger than 60 years. While seedlings exist in this population, poor recruitment of canopy trees since 1900 suggests that high seedling mortality has prevailed.

The white pines in Furnessville F were reportedly planted by Gus Olson in the 1950s (Norm Bergendahl, pers. comm. with Plampin). White pine grows in Keiser A, and there is a tree with a 31-inch bole at the far eastern edge of the swamp forest in Keiser B, just west of Lakeshore County Road (Wilhelm 1990). Plampin and Newgent (1992) note that white pine is rare in Tamarack C. There are also several specimens of this tree east of Wozniak Road at Pinhook Bog (Wilhelm 1990). Pollen records have shown that there has been a gradual decline in white pine throughout the Indiana Dunes with a concomitant increase in oak over the last 2,000 years (Futyma 1985, Cole 2001). In the spring of 2009, S. Leicht-Young and crew found clusters of white pine seedlings at West Beach A and D. This event occurred after record rainfalls the preceding fall and a cold and snowy winter in 2009. It is unlikely they survived because of their high density making them visible to browsing deer.

Voucher Specimens:

Wilcox #21, 12 May 1982, La Porte Co. (INDU)

MAGNOLIIDAE: The Flowering Plants—Class Liliopsida (Monocots)

The flowering plants at the Indiana Dunes are divided into two classes: the Liliopsida, or monocots, and the Magnoliopsida, or dicots. The monocots are presented first in this annotated list and the dicots second. The best known monocots are grasses, lilies, and orchids. The name refers to the seeds having only one seed leaf compared to the dicots that have two. The main characteristics of the monocots include parallel venation, alternate and entire leaves, and flower parts in threes or multiples of three. Monocots are now considered to be more advanced and derived from a dicot ancestor (Angiosperm Phylogeny Group 2009, 2016).

ACORACEAE — Sweet Flag Family

Sweet flags are perennial wetland herbs with horizontal creeping rhizomes. The leaves are not differentiated into a petiole and blade and are sword-shaped. The venation is parallel to the length of the leaf. While the inflorescence appears to be a spathe, it is derived from the distal portion of the encircling leaf (sympodial leaf) rather than a separate structure as in the Araceae. The true spathe is absent. The flowers are bisexual, with six tepals and stamens with one sessile ovary that lacks a style. The fruits are berries. There are three to six species worldwide in temperate parts of the Northern Hemisphere and in high elevation, tropical Asia.

Acorus americanus (Raf.) Raf.

Sweet flag was formerly called *A. calamus* L. but it is now known that the species of that name is of European origin and that *A. americanus* is the North American species. *Acorus americanus* is diploid and *A. calamus* is a sterile triploid that only reproduces vegetatively (Packer and Ringius 1984, Grayum 1987, Thompson 1995, Voss and Reznicek 2012). Sweet flag has been used medicinally by Native Americans, Europeans, and Hmong refugees (Corlett et al. 2002, Toupal 2006, Pai and McCarthy 2010). Both species are known from the Chicago Region, but *A. americanus* is more common.

Sweet flag was found to be abundant in a high-quality fen on the south side of the Little Calumet River within Bailly D when D. Beamer and Pavlovic explored it in 2003. T. Bonace found this unusual species to the northwest of the Mnoke Prairie parking lot (Bailly D) on 10 May 2004. After Plampin saw it on 25 September 2006, it was verified by Dan Mason based on the venation of the basal leaves. It is not clear which species has been planted in the restorations conducted by Dan Mason at the Cowles Bog Wetland Complex and the Great

Marsh Restoration at Keiser. Wilhelm (1990) reported *A. calamus* from Bailly, but in this instance, we assign it to *A. americanus*. Wilhelm (1990) states that *A. calamus* was reported from Calumet Prairie. The identity of this report needs to be determined. Lyon collected a specimen from the DSP (see below). *Acorus* is reported from Hobart Prairie Grove, but whether it is *americanus* or *calamus* needs confirmation.

Voucher Specimens:

Lyon s.n., 19 August 1923, Porter Co. (IND)

ALISMATACEAE — Water Plantain Family

Plants in this family are marsh or aquatic herbs that have three green sepals and three white petals. The flowers have zero, six, nine, or up to 30 stamens. The roots of our principal genus, *Sagittaria*, can be eaten, thus the common name "duck potato."

Sagittaria brevirostra Mack. & Bush

Short-beaked arrowhead is known only from a marsh at Hoosier Prairie A. Swink and Wilhelm (1994) note that it is found in shallow water and marshes. The ratio of male to female flowers in this perennial arrowhead was higher in dry situations compared to wet conditions, while across the moisture conditions male flowers outnumbered females (Kaul 1991).

Voucher Specimens:

Hiebert #485, 14 August 1986, Lake Co. (INDU)

Sagittaria rigida Pursh

Stiff arrowhead was reported from Long Lake (West Beach C) by Peattie (1930), but apparently no specimens were preserved to validate this report. Both Deam (1940) and Swink and Wilhelm (1979) excluded this species from Lake and Porter counties. According to Wilhelm (1990), "Dritz (1987) reported this species from Little Lake [Cowles Dunes A], where he noted it on September 19, 1984." Leaf width and length are reduced by submergence (flooding) and petiole length is increased (Wooten 1986).

ALLIACEAE — Onion Family

This family was formerly part of the Liliaceae (Lily) family. These perennial plants originate from a bulb and often have thin leaves that are flat or round in cross-section. The inflorescence is often a spherical head of flowers. The flowers have three sepals and petals (six tepals), with three stamens and one three-carpellate pistil.

Allium cernuum Roth

This native onion, nodding wild onion, is rare in wet-mesic meadows of Miller Woods C. Some believe that Chicago was named for this species and as a result this species is the branding symbol for the Chicago Wilderness Initiative, but other sources believe the word "striped skunk" refers to *Allium tricoccum* (Greenberg 2002, Grossman et al. 2004, Sullivan 1997).

Voucher Specimens:

Ciolac & Schulenberg s.n., 8 August 1970, Lake Co. (MOR)

ARACEAE — Arum Family

This plant family is known for its unusual inflorescence structure. The flowers are clustered on a vertical spike called a spadix that is subtended by a showy, sometimes brightly colored, spathe (bract). Cultivated species include *Calla*, *Caladium*, *Philodendron*, and *Diffenbachia* (dumb cane). Many species, such as the jack-in-the-pulpit (*Ariseama triphyllum*) and green dragon (*A. dracontium*), contain calcium oxalate crystals or enzymes

that make the raw plant inedible due to the acrid and peppery taste. If eaten, the calcium oxalate causes a painful reaction. *Acorus* (sweet flag) was assigned to this family despite its aberrant features, but has since been placed in its own family, Acoraceae.

Plants formerly of the duckweed family (formerly Lemnaceae) are now assigned to the Araceae family (Angiosperm Phylogeny Group 2016, University of Michigan Herbarium 2018). Those genera are monoecious floating aquatics. The simple, minute flowers are enclosed in a pouch or spathe and have only a single stamen and pistil; however, many species rarely flower. Wilhelm and Rericha (2017) retain these genera in the Lemnaceae.

Calla palustris L.
Water arum is known from Tamarack and Pinhook Bog. Though Peattie (1930) reported this species "In cold bogs, at Tamarack Sta. [Tamarack B] acc. to Nieuwland, rare," it is now locally extinct. At Pinhook Bog, water arum is common in the ditch off the west side of Wozniak Road (subunit A) and in the moats on the east side of the road (subunit B). Bowles et al. (1985) mapped and described the densities of a couple of populations of this species. Numerous large patches in the southern portions of the bog were seen by Pavlovic in 2002. Water arum is a boreal species that occurs here at the southern portion of its range.

Voucher Specimens:
Wilhelm #6852, 15 June 1979, La Porte Co. (MOR)

Lemna turionifera Landolt
Nathanael Pilla found red duckweed growing in Tamarack C in 2017. Earl Sherff collected a specimen on 27 May 1911 at Mineral Springs on a floating pond.

Peltandra virginica (L.) Schott
Arrow arum is known from Cowles Dunes, DSP, and Keiser. According to Wilhelm (1990), "Arrow arum was reported from Cowles Dunes A by Swink (1964)." Sandy O'Brien found this plant growing in the Great Marsh just east of Mineral Springs Road in Cowles Dunes B on 30 June 1995. This species is extant in the marsh and swamp complexes at the DSP as reported by Lyon (1927) and Wilhelm (1990). It was reported from Keiser B by Hamilla and Plampin on 28 August 2007. Arrow arum has been planted in Cowles Bog Wetland Complex and Keiser B as part of restoration work by Dan Mason.

Voucher Specimens:
Otto #15, 4 June 1982, Porter Co. (MOR)

Spirodela polyrhiza (L.) Schleid.
Giant duckweed is known from Cowles Dunes, DSP, Keiser, and Hobart Prairie Grove. Giant duckweed is known only from the DSP based on the report of Lyon (1927): "On September 6, 1926, great quantities of this duckweed were blown and washed ashore along the lake front for several miles near Tremont." This duckweed was more recently found growing in the diked wetland in Cowles Bog A west of the wet prairie restoration and along Beverly Drive in Keiser C. The former was found by Scott Namestnik on 18 July 2016, and the latter by Tony Troche on 31 August 2015. We lack an herbarium specimen of this species from the dunes. Giant duckweed is commonly used as a phytotoxic indicator for rare earth elements (Xu et al. 2017) and is the host of an unusual epiphytic green alga, *Koshicola spirodelophila* (Watanabe et al. 2016). Given the prevalence in the Chicago Region (Wilhelm and Rericha 2017), this species may be removed from the special flora if it is found in more park units.

Wolffia columbiana H. Karst.
American water meal is known from the DSP and Keiser. Plampin and Myrna Newgent found it growing with *Goodyera pubescens* (see that species in the Orchidaceae) on 25 February 1995. This species may be underreported. We have no specimen of this species from the Indiana Dunes. This species has been shown to create previously unknown substomatal waxy cavities that accumulate starch. They act as bathyscapes, to allow the plant

to descend to the water bottom when switching from the live floating stage to the dormant turion stage (Witty 2009).

COLCHICACEAE — Colchicum Family

The only native genus in our area represented in this family is *Uvularia*. This genus was formerly in the Liliaceae family. Plants in this family are perennial herbs with basal or alternate leaves that have parallel veins and entire margins. The flowers are either on stalks from the ground or are in loose umbels. The three sepals and petals are alike, forming a perianth of six tepals in two whorls. The flowers have six stamens and a one- to three-parted pistil. The fruit is a capsule. The non-native *Colchicum* spp., the autumn crocus, has been found in abandoned homesites where it was planted by the former homeowner.

Uvularia sessilifolia L.

Merrybells was found by Plampin in Tamarack A in 1993 north and south of the Calumet Bike Trail as only the second known population in the Chicago Region (Swink and Wilhelm 1994). This population was extant when inspected by Daniel Mason and Plampin on 9 May 2007. Plants grew north and south of the trail and into the woods to the north. Hamilla, Carie Satkoski, Molly Hacker, and Plampin collected seeds on 28 August 2008 for propagation in the greenhouse, but they did not germinate. No plants were found in the woods after 2007.

Voucher Specimens:

Plampin & Newgent #1-1993, Porter Co. (INDU)

COMMELINACEAE — Spiderwort Family

Plants in the Spiderwort family are perennial or annual species that have succulent and often swollen stems. Some species, such as spiderwort (*Tradescantia ohiensis* Raf.) have mucilaginous stems when broken. Many species are cultivated for their flowers. Cochrane and Iltis (2000) note that students can observe cytoplasmic motion of purple vacuoles (cyclosis) within the cells of the staminate filament hairs of *Tradescantia ohiensis*.

Tradescantia subaspera Ker Gawl.

According to Wilhelm (1990), "This distinctive spiderwort was first noted by E. Pitcher in August of 1982 on the east side of Hadenfeld Road at an 'old house site.'" Since this is the only known site for this species in the dunes, and it is otherwise only known from south of of the Kankakee River, we can surmise that it was planted by the homeowner. According to Deam (1940), it is more frequent in Indiana just south of our region. He indicated that it was never common and is almost always found on shaded slopes and in ravines. Pavlovic relocated about 100 stems at the site within a thicket of oriental bittersweet on 26 July 2017. It appeared to be blooming, though no flowers were apparent late in the day. The next morning, the blooms were conspicuously abundant. There is an old record from Newton County, Indiana, south of the Kankakee River and Lake County, Indiana (Swink and Wilhelm 1994). Apparently, the leaves turn pink when exposed to radioactivity (Nayar et al. 1970, Rechel and Campbell 1978, Cebulska-Wasilewska 1992, Mišík et al. 2016). This species has middle leaves greater than 2 cm wide that are quite hairy (Wilhelm and Rericha 2017).

Voucher Specimens:

Pitcher s.n., 8 September 1983, Porter Co. (MOR)

CONVALLARIACEAE — Mayflower Family

The genera comprising this family were formerly part of the Liliaceae family and are often included in the Asparagaceae family (Angiosperm Phylogeny Group 2009, 2016). All have alternate, strap-like leaves with parallel venation.

We depart from convention by putting *Clintonia* here as does University of Michigan Herbarium (2018).

Clintonia borealis (Aiton) Raf.

Bluebead is known from the DSP and from Yellow Birch Fen, a section of Coulter Prairie property south of the Inland Marsh owned by the Shirley Heinze Land Trust (Inland Marsh B). This latter site, found by Marlin Bowles in 1989, is probably the historical population reported by Swink in 1952 (Swink and Wilhelm 1994). Here, bluebead grows with *Acer rubrum*, *Aralia nudicaulis*, *Betula alleghaniensis*, *Maianthemum canadense*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Quercus alba*, *Sassafras albidum*, *Maianthemum racemosum*, *Solidago caesia*, and *Viburnum acerifolium*. Keith Board showed the state park plants to Plampin in 1990, who later showed them to Richard Johnson, a friend of the late Norman Bergendahl. When asked whether Norm had installed the plants in the DSP, Richard replied, "What do you think?" Richard's reply was a reference to Norman's tendency to plant species in the DSP if he thought they should grow there. The current status of the DSP population, considered introduced, is unknown.

Voucher Specimens:

Bowles #851, 12 September 1988, Porter Co. (MOR)

Maianthemum canadense Desf. [both the hairless and marginally ciliate var. *interius* are discussed]

Canada mayflower has two different "forms" (sometimes recognized at the varietal level), which occur in two distinct types of habitats. The Flora of North America does not recognize the pubescent variety, *Maianthemum canadense* var. *interius*, but if the forms/varieties are combined, this species would be more common throughout the area. Swink and Wilhelm (1994) and Wilhelm and Rericha (2017) recognize the two forms of the species.

The typical *M. canadense* (smooth Canada mayflower) is hairless, restricted to very mesophytic sites, and has boreal affinities. It is known historically from West Beach and from DSP, Furnessville, Keiser, Heron Rookery, Hoosier Prairie, and Pinhook Bog. This more rare variety is occasional on mesophytic hummocks in the swamp complex of Furnessville D, and occurs in Furnessville G, according to Plampin, who saw this plant on 4 July 1997. It is still occasional in the swamp complex of Keiser B and C. At the Heron Rookery A, this smooth variety of the Canada mayflower is the only one Wilhelm (1990) has seen, though the hairy variety (*interius*) is commonly found in woodlands dominated by oak. Smooth Canada mayflower grows at Hoosier Prairie A. It is common in the hydromesophytic swamp on both sides of Wozniak Road and in the beech forest along the north bluff of Pinhook Bog A and B.

The pubescent form (*M. canadense* var. *interius*) is more common and grows in areas where red and white oaks are dominant. It grows in all units except Bailly, Heron Rookery, and Hobart Prairie Grove. It was reported by Kurz (1923) from what is now West Beach A. Canada mayflower is rare in the hydromesophytic swamps west of Kemil Road (DSP A), where it grows with *Carex intumescens* and *C. pedunculata*. Canada mayflower is favored for browsing by deer, which when overabundant, can cause mayflower populations to decline (Balgooyen and Waller 1995; Rooney 1997, 2001; Kirschbaum and Anacker 2005).

Voucher Specimens:

Hiebert #431, 1 June 1984, Porter Co. (INDU)

CYPERACEAE — Sedge Family

The sedge family, with 178 species found in the dunes (one *Bulbostylis*, one *Bolboshoenus*, 109 *Carex*, one *Cladium*, 13 (plus one hybrid) *Cyperus*, one *Dulichium*, 18 *Eleocharis*, four *Eriophorum*, two *Fimbristylis*, one *Fuirena*, two *Lipocarpha*, seven *Rhynchospora*, three *Schoenoplectus*, three *Schoenoplectiella*, seven *Scirpus*, and five *Scleria*), makes up the

largest plant family represented here. Sedges are often characterized by their triangular cross sections and three ranked leaves, and in *Carex* by the enclosure of the female ovule in a sac called the perigynium. The style is two- or three-lobed. The largest genus is *Carex*. The genus *Scirpus* has been split into four genera: *Bolboshoenus*, *Schoenoplectus*, *Schoenoplectiella*, and *Scirpus* (Rothrock 2009). This family includes papyrus (*Cyperus papyrus* L.), chufa or groundnut (*Cyperus esculentus* L.), and a few ornamental plants. Besides their use for fibers and ornamental plants, only five species of sedge are used for fodder, beauty, health, chemical, flavoring, and human food according to Rothrock (2009).

Carex aggregata Mack.

Smooth clustered sedge was noted by Wilhelm (unpublished) growing along the valley of the Little Calumet River at Bailly G on 21 July 1997. It typically grows in partly shaded ground. Swink and Wilhelm (1994) report it as adventive in Michigan, but it may be native in Indiana. According to Hipp (2008), this species is best identified from intact sheaths that are yellow or brown in the inner band and that are thickened at the summit. This species is a member of the *Carex* section Phaestoglochin, a section that includes more common dunes species such as *C. muehlenbergii* and *C. sparganioides* (Smith 2018). If the leaf sheaths are damaged or absent on the specimen being examined, this species may be difficult to distinguish from *C. gravida*, a species that is absent from Jasper, Lake, La Porte, Porter, and Starke counties in Indiana (Wilhelm and Rericha 2017, Mather 2020). No specimen has been collected.

Carex alata Torr.

Winged sedge has been seen at Miller Woods, Tolleston Dunes, Calumet Prairie, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. This species is found in wet sand prairies and sedge meadows in the Dunes and eastern portions of the Kankakee River in the Chicago Region (Wilhelm and Rericha 2017). Winged sedge is a member of the large *Carex* section Ovales. It is occasional in wet sandy swales in Miller Woods C, E, F, and G. Winged sedge grows in Tolleston Dunes C and Calumet Prairie C. It is found in the marsh complex communities of Inland Marsh A, where it is not infrequent, and West Beach A, where it was growing with *Populus tremuloides*, *Calamagrostis canadensis*, *Juncus greenei*, *Spiraea alba*, *Helianthus* sp., and *Pycnanthemum virginianum*. Winged sedge is known from Cowles Bog A, where it was collected in 1976 by U. Rowlatt. A population was found by Ken Dritz and Gerould Wilhelm along the bike trail in Cowles Dunes E growing with *Acer rubrum*, *Agrostis gigantea*, *Arisaema triphyllum*, *Carex bromoides*, *C. crinita*, *C. stipata*, *C. swanii*, *C. tribuloides*, *Calamagrostis canadensis*, *Cornus obliqua*, *Dichanthelium clandestinum*, *Fraxinus pennsylvanica*, *Geum canadense*, *Helianthus strumosus*, *Iris virginica*, *Juncus effusus*, *Lycopus americanus*, *Phalaris arundinacea*, *Poa compressa*, *P. pratensis*, *Populus tremuloides*, *Quercus rubra*, *Rubus idaeus* ssp. *strigosus*, and *Thelypteris palustris* var. *pubescens*. This population was monitored by INDU staff along the NIPSCO right-of-way (Bowles et al. 1986). It also grows at the east end of Cowles Dunes B in the ecotone between the Great Marsh and Howes Prairie (Cowles Dunes B). This species is occasional at points along the bike trail in the eastern portion of the DSP. Winged sedge grows in Furnessville G. It was reported by Lyon (1927), who noted it from "moist open subdunal (ground)." While Wilhelm (1990) found it was frequent along the Calumet Bike Trail east of Kemil Road, Plampin and Hamilla (2008b) were unable to find it there in 2007. They attributed its absence or at least suppression from the invasion of *Phragmites*, hybrid cattail, and wild grape. Wilhelm (1990) found it growing with *Alisma subcordatum*, *Calamagrostis canadensis*, *Eleocharis obtusa*, *Eupatorium perfoliatum*, *Galium tinctorium*, *Glyceria canadensis*, *G. striata*, *Juncus canadensis*, *J. effusus*, *Mimulus ringens*, *Salix discolor*, *Solidago rugosa*, *Spiraea tomentosa* var. *rosea*, *Thelypteris palustris* var. *pubescens*, and *Typha latifolia*. Winged sedge occurs in the wetlands south of the Dunewood Campground in Keiser F. Winged sedge was recently found in Tamarack D. In studies of drought effects on wetland plants, this sedge was shown to have increased water-use efficiency after a drought when water levels returned to normal, and it tolerates droughts up to four weeks in duration (Touchette et al. 2007, 2008,

2010). This and the other species studied illustrated that the plants performed better under variable water level conditions than with static ones as long as dry periods were not too long.

Voucher Specimens:

Kjellmark #117, 7 July 1988, Porter Co. (MOR)
Dritz & Wilhelm #346, 24 June 1987, Porter Co. (MOR)
Wilhelm & Dritz #16360, 27 July 1988, Porter Co. (MOR)
Kjellmark #132, 18 July 1988, Porter Co. (MOR)
Rowlatt #s.n., 12 June 1976, Porter Co. (MOR)

Carex atherodes Spreng.

Hairy-leaved lake sedge is known from the Cowles Dunes, Keiser, and Pinhook Bog units and grows at Cowles Bog A with *Carex haydenii*, *Carex hystericina*, *Cornus sericea*, *Schoenoplectus acutus* var. *acutus*, *Toxicodendron vernix*, and *Typha latifolia*. This sedge was recently found in the Great Marsh restoration area in Keiser B. Hairy-leaved lake sedge grows with a relative, *Carex lacustris*, along the boardwalk in the minerotrophic moat at the western edge of Pinhook Bog B. *C. atherodes* is a member of the *Carex* section of the genus (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Kjellmark #118, 8 July 1988, Porter Co. (MOR)

Carex atlantica L.H. Bailey ssp. *capillacea* (L.H. Bailey) Reznicek [*Carex atlantica* var. *capillacea* (L.H. Bailey) Cronquist]

Hair star sedge, also formerly known as *Carex howei* Mack., is known from Cowles Dunes A. Deam (1940) stated that this species is known "in Indiana from a single collection by M.W. Lyon, Jr.: 'moist woods on dunes at Mineral Springs, Porter County, June 17 1923.'" Wilhelm (1990) wrote:

> *This little sedge is a member of the section Stellulatae, and closely related to* Carex interior*, a sedge which I determined as, albeit rare, among the tamaracks at Cowles Bog; thinking little of it at the time, I failed to preserve a specimen. I do not mean to suggest that I think Deam's report (which was recognized by Swink & Wilhelm, 1979) was based on a misidentified* Carex interior*, indeed he also recognized that the latter species was '. . . frequent to common, . . . in tamarack bogs and swamps and on springy banks.' I only mention it to point out that I have no specimen by which to confirm my earlier determination, so it is possible that I actually saw this rare species and did not realize it.*

Gerould Wilhelm confirmed the identification of the Lyon and Nieuwland collection in 2014 as *C. howei* (specimen listed below).

Hair star sedge occurs in hydromesophytic forests and swamps in the northeast portion of the Chicago Region (Wilhelm and Rericha 2017).

Voucher Specimens:

Lyon and Nieuwland s.n., 17 June 1923, Porter Co. (NEI)

Carex aurea Nutt.

Golden sedge is known only from the pannes at Miller Woods A, West Beach A, and Tamarack. At West Beach, golden sedge grows with *Carex garberi*, *C. viridula* ssp. *viridula*, *Fragaria virginiana*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, and *Populus deltoides*. In the fall of 2015, Tonkovich and Hamilla found this golden sedge growing in the seeps at Crescent Dune in the Tamarack Unit. Due to complexities in distinguishing characters, some botanists consider the sedge in the dunes as representative of *C. garberi*. Having seen this species further north in Michigan, Noel Pavlovic agrees with Tonkovich that both species are present at the Indiana Dunes. Here is what Tonkovich wrote to Pavlovic on 9 December 2015:

Regarding the never-ending issue with Carex aurea *and* C. garberi*, I noticed the current wording seems to be hesitant to claim* C. aurea *has been seen in the Park. I would definitely say yes, it is here. I have most certainly seen it in several of the pannes—and have some old photos. In addition, this fall while out with Dave Hamilla at the Crescent Dune panne, I saw a population. It is most definitely NOT* C. garberi*—and Dave has lots of photos he took of it last year. I took a look at the herbarium here to see what has been collected too. The few specimens in there marked as* C. garberi *do tend to fit that species description. So I am inclined to say both species are here and my guess is that the two species may even overlap within something that appears to be one population.*

Hipp (2008) states this is easily identified by its spherical perigynia with rounded tip and golden color. It has a smaller terminal inflorescence compared to *C. garberi* because most of the flowers therein are staminate (Smith 2018). *C. aurea* is a member of the Bicolores section of the *Carex* genus.

Voucher Specimens:

Dritz #81, 26 May 1980, Porter Co. (MOR)

Carex bebbii (L.H. Bailey) Olney ex Fernald

Bebb's oval sedge is known from Inland Marsh, Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Pinhook Bog, and Hoosier Prairie. It grows in damp depressions in Inland Marsh C, is restricted to Bailly D, and is occasional in Cowles Dunes A. Bebb's oval sedge is occasional along the NIPSCO right-of-way in the DSP B. It also is known from Furnessville G. In Keiser B, it was growing with *Acer rubrum*, *Apios americana*, *Carex stricta*, *Cicuta maculata*, *Cinna arundinacea*, *Eutrochium purpureum*, *Impatiens pallida*, *Leersia oryzoides*, *Onoclea sensibilis*, and *Pilea pumila*. This species was noted by Fox (1985) from several unusual wetlands south and west of the Dunewood Campground and east of 375E in Keiser F. Robin Scribailo and M. Stewart found Bebb's sedge growing in Tamarack B in 1995. Eric Kjellmark and Pam Benjamin collected a specimen from Pinhook Bog. It is known locally south of Main Street at Hoosier Prairie A. Wilhelm (1990) wrote:

The local conservatism of this species represents a paradox here in the Chicago Region. Aldrich et al. (1986) considered this species to be threatened in Indiana; however, in the silty loams of northern Illinois it is so frequent and resilient to disturbance as to have induced Swink & Wilhelm (1979) to give it a coefficient of conservatism of 3; in retrospect, though, it is now listed as 6.

This species has been investigated for its effectiveness in effluent treatment by assessing chemical oxygen demand removal (COD). COD removal by *C. bebbii* was greater than 90% (Taylor et al. 2009). According to Smith et al. (2008) Bebb's oval sedge typically grows where the substrate is not completely saturated throughout the year. This sedge is a member of the Ovales subsection. While most species of sedge are perennials, *C. bebbii* can produce seed in the first year (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Otto #59, 2 July 1982, Lake Co. (INDU)

Manke & Pavlovic #2063, 11 August 1998, Porter Co. (INDU)

Carex bromoides Schkuhr ex Willd.

Brome hummock sedge is known from Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Heron Rookery units. It is occasional in the swamp complex portion of Cowles Dunes A and D and may also occur in similar habitats in Cowles Dunes B. This species, a consistent associate of *Carex seorsa*, is frequent in the hydromesophytic swamp west of Kemil Road in the DSP. This often-overlooked species is frequent throughout the swamp complex portions of Furnessville B, C, D, and E. It is found in remnants of the subdunal woods in Keiser B, and usually grows near *C. seorsa* and *C. crinita* in the swales of the hydromesophytic forest

of Keiser C. Brome hummock sedge is reported from Tamarack A; it may still be found in degraded remnants of the swamp complex. This sedge is frequent in the wetter depressions in the cut-over forest south of the Little Calumet River and the wet woods north of the river in the Heron Rookery. Brome hummock sedge is a member of the Deweyanae section (Flora of North America Editorial Committee 2002).

Voucher Specimens:
Wilhelm & Dritz #6709, 26 May 1979, Porter Co. (MOR)
Hiebert #1444, 28 April 1987, Porter Co. (INDU)

Carex bushii Mackenzie
Long-scaled green sedge was collected from Bailly A by Eric Kjellmark adjacent to INDU headquarters, growing with *Carex glaucodea*. This species is adventive in the Chicago Region, typically growing further south. We have included it in the special flora because it is native to North America and it is rare in the Dunes. In the Chicago Region, it is found growing in dry-mesic to dry old fields (Wilhelm and Rericha 2017). Long-scaled green sedge is a member of the Porocystis section.

Voucher Specimens:
Kjellmark #106, 9 June 1988, Porter Co. (MOR)

Carex canescens L.
Gray bog sedge is found in Furnessville and Pinhook Bog. Gray bog sedge is rare in the high-quality swamp complex of Furnessville B. This species is common along the boardwalk at Pinhook Bog east of Wozniak Road. Our specimens are referable to the variety *subloliacea* (Wilhelm 1990), but according to Andrew Hipp (Hipp 2008, Maguilla et al. 2015), the variety *subloliacea* Laestad was incorrectly applied to North American material that is var. *disjuncta* Fernald instead. The Flora of North America (2002) lists two subspecies, *disjuncta* and *canescens*. Gray sedge is a member of the Glareosae section.

Voucher Specimens:
Wilhelm & Betz #14790, 13 May 1987, Porter Co. (MOR)
Wilhelm & Dritz #6906, 23 June 1979, La Porte Co. (MOR)

Carex careyana Torr. ex Dewey
Carey's wood sedge is characteristic in beech-maple forests, and "a healthy population" is found on a terrace at the base of the wooded slope along the north edge of Pinhook Bog A (Wilhelm 1990). This species has the largest perigynia of the section Careyana (Hipp 2008).

Voucher Specimens:
Wilhelm & Dritz #14754, 29 April 1987, La Porte Co. (MOR)

Carex castanea Wahlenberg
Chestnut sedge was unknown from Indiana until it was found in the DSP by Doug Botka in 2019. This is the first time it was recorded in the Chicago Region. Could it be a waif from the shores of the Upper Peninsula or the northern portions of the lower peninsula of Michigan? Or, as with *Carex eburnea*, did it persist due to the moderating microclimate adjacent to Lake Michigan? Within its range it forms hybrids with *C. arctata* called *C.* × *knieskernii* Dewey (Waterway 1994).

Carex chordorrhiza L.f.
Cordroot sedge is only known in the Dunes from Pinhook Bog. According to Wilhelm (1990):

Deam collected a specimen of cordroot sedge in Pinhook Bog years before he wrote his flora, but for some reason excluded it from La Porte County when he published his flora (Deam 1940). Apparently, the plant had not been seen in Pinhook Bog B since, until its remarkable rediscovery there by K. Dritz in 1979. It is frequent along the boardwalk, but it is inconspicuous when not in fruit. Cordroot sedge was growing with Acer rubrum,

Andromeda glaucophylla [*A. polifolia* var. *latifolia*], Aronia floribunda, Carex lasiocarpa, C. limosa, C. trisperma, Chamaedaphne calyculata, Drosera rotundifolia, Larix laricina, Menyanthes trifoliata, Sarracenia purpurea, Rhus vernix [*Toxicodendron vernix*], Vaccinium corymbosum, *and* V. oxycoccos. *Bowles et al. (1985) mapped a population of this species and noted the following associates:* Carex lasiocarpa, C. limosa, C. trisperma, Chamaedaphne calyculata, Drosera intermedia, D. rotundifolia, Larix laricina, Habenaria ciliaris [*Platanthera ciliaris*], Rhynchospora alba, Sarracenia purpurea, Rhus vernix [*Toxicodendron vernix*], Vaccinium corymbosum, V. macrocarpon, *and* V. oxycoccos.

A study of this species in Europe showed that its local abundance increases with light and nutrient availability, but the denser populations were found in specific communities in its peripheral range (Bloch-Orłowska and Meissner 2016). The elongate stolons of this species are diagnostic (Hipp 2008), and it is the only representative species in the section Chordorrhizae in North America (Flinn et al. 2008).

Voucher Specimens:

Dritz #57, 17 May 1979, La Porte Co. (MOR)

Carex communis L.H. Bailey

Common beech sedge is known from the beech-maple forest in Heron Rookery A, where it grows on hummocks under beech trees with *Coptis trifolia* and *Mitchella repens*. This species typically is found in rich dry to mesic forests (Rothrock 2021). This ant-dispersed sedge has broader microenvironmental preferences than other co-occurring sedges in Quebec and germinates poorly under leaf litter (Vellend et al. 2000a, 2000b). The densely caespitose habit and relatively wide leaf blades make this species easily recognizable (Hipp 2008). Common beech sedge is a member of the Acrocystis section of *Carex*.

Voucher Specimens:

Hiebert #514, 28 April 1987, Porter Co. (INDU)

Carex conoidea Schkuhr. ex Willd.

Prairie gray sedge is known from Cowles Dunes and Hoosier Prairie. Prairie gray sedge was first collected along the CSSSBR in a wet meadow by Bennett (Cowles Dunes A) in 1956. It was collected in the same spot by Ken Dritz, (first specimen listed below), where it was growing with *Carex buxbaumii*, *C. lanuginosa*, *Comandra umbellata*, *Eleocharis intermedia*, *Houstonia caerulea*, *Iris virginica*, *Luzula multiflora* ssp. *multiflora*, *Poa pratensis*, *Thelypteris palustris* var. *pubescens*, and *Viola sagittata* var. *sagittata*. Marlin Bowles installed a monitoring plot at INDU for this population (Bowles et al. 1986). Ken Dritz also found this sedge at Hoosier Prairie A (second specimen listed below), where it was growing in a sedge meadow with *Carex lanuginosa*, *C. meadii* (probably *C. tetanica*), *C. scoparia*, *C. suberecta*, *Eleocharis elliptica*, *E. wolfii*, *Erigeron philadelphicus*, *Eryngium yuccifolium*, *Galium obtusum*, *Houstonia caerulea*, *Hypoxis hirsuta*, *Ludwigia alternifolia*, *Mentha arvensis*, *Osmunda regalis* var. *spectabilis*, *Packera paupercula*, *Sisyrinchium albidum*, and *Thelypteris palustris* var. *pubescens*. Bowles et al. (1986) mapped the population and noted that it occurred throughout a 1,000-square-meter area; they listed local dominants as *Carex stricta*, *C. suberecta*, *C. lanuginosa*, and *Solidago altissima*. According to Wilhelm (1990), Klick pointed out that prairie gray sedge is found in moist prairie in other portions of Hoosier Prairie as well. Hipp (2008) advised to "learn to recognize the unique perigynium surface in prairie gray sedge—lustrous with impressed veins—and you will be unlikely to confuse it with anything else." Prairie gray sedge is a member of the Griseae section (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Dritz #61, 18 May 1980, Porter Co. (MOR)

Dritz #382, 18 May 1985, Lake Co. (MOR)

Carex crawei Dewey ex Torr.
Early fen sedge was not known from the Dunes until found by Paul Rothrock at Hoosier Prairie in 2008. This sedge is more common to the west in Illinois but restricted to fens, dolomite prairies, and wet prairies (Wilhelm and Rericha 2017). The distribution of this species in dynamic upper Midwest floodplains has been modeled relative to geomorphological state (Loheide and Booth 2011).

Voucher Specimens:
Rothrock #4733, 16 June 2008, Lake Co. (IND)

Carex cryptolepis Mack. [*Carex flava* var. *fertilis* Peck (misapplied)]
Yellow sedge is reported to grow in the DSP and Keiser. Lyon (1927) first noted small yellow sedge from a "subdunal ditch, Keiser." Peattie (1930) stated that Lyon (1927) reported this species from Tremont, DSP, but it is not reported by Lyon (1927). Perhaps Lyon's report was from Furnessville Unit, which included Tremont at the intersection of U.S. 12 and Tremont Road. It is known from just east of here in Keiser D along the Calumet Bike Trail, so it may show up along the same trail west of Kemil Road. Yellow sedge was growing in Keiser D with *Agrostis scabra*, *Calamagrostis canadensis*, *Carex folliculata*, *Eleocharis elliptica*, *Eupatorium perfoliatum*, *Fimbristylis autumnalis*, *Hypericum canadense*, *Juncus canadensis*, *J. marginatus*, *Lindernia dubia*, *Osmunda regalis* var. *spectabilis*, *Rhynchospora capitellata*, *Spiraea tomentosa* var. *rosea*, *Thelypteris palustris* var. *pubescens*, and *Viola lanceolata*. This species has low genetic diversity compared to *C. lutea*, possibly due to having experienced high post glacial climatic variation (Derieg et al. 2008). Despite this low diversity, it has high seed viability (Kettenring and Galatowitsch 2007). This species is also similar to *C. flava* and *C. viridula* (Hipp 2008). Hipp (2008) states "no other sedge in our flora has perigynia so beautifully recurved as those of section Ceratocystis." A closely related species *C. viritistellata* Derieg, Reznicek & Bruederle, celestial sedge, has been recognized, but so far is only reported in the Wabash River valley in Indiana (Derieg et al. 2013, Rothrock 2021).

Voucher Specimens:
Wilhelm & Dritz #16364, 27 July 1988, Porter Co. (MOR)

Carex crus-corvi Kunze
Crow-foot fox sedge is only known from Hobart Prairie Grove, Peddicord Property, that is owned by Save The Dunes. No specimen has been collected.

Carex debilis Michx. var. *rudgei* L.H. Bailey
Northern weak sedge grows in Cowles Dunes, possibly in DSP, Furnessville, Keiser, and Tamarack. Nathanael Pilla notes this species along the Cowles Bog boardwalk in the swamp forest. Northern weak sedge was noted by Wilhelm (1990) along the Calumet Bike Trail in Cowles Dunes E, and he wrote that Ken Dritz (1987) reported having seen this species in the hydromesophytic swamp of Cowles Dunes D on 8 August 1981. Wilhelm (1990) "did not see this rare sedge within the [Dunes State] Park," but "did see it on the east side of Kemil Road, its eastern border, in the swamp complex of Keiser C growing with paper birch and along the NIPSCO right-of-way in Keiser D." It was growing with *Acer rubrum*, *Betula papyrifera*, *Carex folliculata*, *C. intumescens*, *C. seorsa*, *C. virescens*, *Ilex verticillata*, *Lindera benzoin*, *Maianthemum canadense*, *Mitchella repens*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Osmunda regalis* var. *spectabilis*, *Platanthera clavellata*, *Quercus rubra*, *Rubus hispidus* var. *obovalis*, *Saururus cernuus*, and *Thelypteris noveboracensis*. Wilhelm felt it was likely that it still grows in the swamp complex of the DSP, where it was previously cited by Lyon (1927). Wilhelm recorded its presence in Keiser C and D. This species is occasional to frequent in the swamp complex portions of Furnessville D and E. According to Nathanael Pilla (Orbis Environmental Consulting, pers. comm. with Pavlovic, 2019), northern weak sedge grows in the wood lot east of the Dune Park train station. Northern weak sedge is extant in the acid swamps of Tamarack D and still may yet persist, though not yet found in the swamp complex

remnants of Tamarack A. Northern weak sedge is included in the Hymenochlaenae section of *Carex*.

Voucher Specimens:
Wilhelm & Dritz #6947, 9 September 1979, Porter Co. (MOR)

Carex digitalis Willd.
Narrow-leaved wood sedge is known from Bailly, DSP, Furnessville, Heron Rookery, and Pinhook Bog. It is characteristically found in mesic woods such as beech-maple forests. Kobal found *C. digitalis* growing in Bailly D (specimen below). According to Wilhelm (1990), "Dritz (1987) reported narrow-leaved wood sedge from along Trail 2 in the DSP; he noted it there on 20 May 1980." Wilhelm (1990) stated "Evidently rare, this species is known from a mesic hummock in the swamp complex of Furnessville D and G." It is a new species for the Heron Rookery B north of the Little Calumet River. This inconspicuous sedge is infrequent in the woods of north Pinhook Bog A. Narrow-leaved wood sedge is a member of the Careyanae section (Flora of North America Editorial Committee 2002) and occurs throughout eastern North America. Range-wide this species exhibits considerable morphological and genetic variation, but relationships are not yet understood (Ford et al. 2006).

Voucher Specimens:
Wilhelm & Dritz #6941, 6 July 1979, La Porte Co. (MOR)
Kobal #99-04, 4 June 1999, Porter Co. (MOR)

Carex eburnea Boott
Ivory sedge, perhaps one of Indiana's rarest plants, is known from the high dunes facing Lake Michigan and panne edges at West Beach. The proximity to the lake, where climate is moderated, especially in the summer, may allow this boreal species to persist here. In West Beach D, there are several large colonies and numerous smaller ones on a northeast-facing slope, where Bowles et al. (1985) recorded it as growing with *Acer saccharum*, *Aralia nudicaulis*, *Hamamelis virginiana*, *Maianthemum racemosum* ssp. *racemosum*, *Maianthemum stellatum*, *Pinus strobus*, *Prunus serotina*, *Quercus rubra*, *Solidago caesia*, *Tilia americana*, and *Toxicodendron radicans*. It occurs on the lake-facing slope with *Ostrya caroliniana*.

Ivory sedge was monitored by Bowles et al. (1985) growing on the border of a panne in West Beach A with *Arctostaphylos uva-ursi*, *Calamovilfa longifolia*, *Cornus obliqua*, *Equisetum arvense*, *Juniperus communis*, *Liatris cylindracea*, *Panicum virgatum*, *Pinus banksiana*, *Schizachyrium scoparium*, and *Solidago ptarmicoides*. On 19 August 2008, Plampin and Hamilla (2008a) found at least fifteen colonies upslope of a depression on the southwest side of a panne east of the bath house that is being invaded by *Berberis repens*.

Ivory sedge is a calciphile (Hipp 2008) and is distinguished by its wiry leaf blades, mat-forming habit, and white-tipped perigynia beaks. Ivory sedge is a member of the Ovales section of *Carex* (Flora of North America Editorial Committee 2002).

Voucher Specimens:
Wilhelm #6990, 30 September 1979, Porter Co. (MOR)

Carex echinodes (Fernald) P. Rothrock, Reznicek, & Hipp
Bristly oval sedge was collected decades ago in DSP near the Duneside Inn. In 2009, Rothrock, Reznicek, and Hipp determined that *C. tenera* Dewey var. *echinodes* (Fernald) Wiegand was genetically separate from *C. tenera* Dewey (Rothrock et al. 2009). Thus, this taxon now has species rank.

Voucher Specimens:
Bennett s.n., 30 May 1953 and 14 June 1953, Porter Co. (F).

Carex folliculata L.

Follicle sedge is known from Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. Wilhelm (1990) stated "There is still a large colony of this conspicuous sedge in the swamp complex region of Cowles Dunes B as well as along the CSSSBR in Cowles Dunes E." Bowles et al. (1985) listed the following associates from Cowles Dunes B: *Acer rubrum*, *Maianthemum canadense*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Osmunda regalis* var. *spectabilis*, *Physocarpus opulifolius*, *Pinus strobus*, *Solidago patula*, *Symplocarpus foetidus*, and *Toxicodendron vernix*. Plampin saw follicle sedge in Cowles Dunes D on 15 July 2006. This sedge is extant in the swamp complex not far from Kemil Road in the DSP. The associates listed by Bowles (1987) are typical of hydromesophytic swamp populations: *Acer rubrum*, *Carex seorsa*, *Carpinus caroliniana* ssp. *virginiana*, *Doellingeria umbellata* var. *umbellata*, *Fagus grandifolia*, *Hamamelis virginiana*, *Lindera benzoin*, *Liriodendron tulipifera*, *Osmundastrum cinnamomeum*, *Platanthera clavellata*, *Solidago patula*, and *Symplocarpus foetidus*. Follicle sedge is frequent in the swamp complex of Furnessville D, E, and G, as well as in places among the paper birches in Keiser C and D. Gerould Wilhelm and Ken Dritz in 1979 noted it was growing with *Acer rubrum*, *Betula papyrifera*, *Carex debilis* var. *rudgei*, *C. intumescens*, *C. seorsa*, *C. virescens*, *Ilex verticillata*, *Lindera benzoin*, *Maianthemum canadense*, *Mitchella repens*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Osmunda regalis* var. *spectabilis*, *Platanthera clavellata*, *Quercus rubra*, *Rubus hispidus*, *Saururus cernuus*, and *Thelypteris noveboracensis* (Wilhelm 1990). Bowles et al. (1985) mapped the population and recorded three plants per square meter, twelve culms per plant. Follicle sedge was seen on 7 August 1997 in Keiser E in a speckled alder swamp near the site of the *Platanthera clavellata* plants. While first reported from Tamarack A by Peattie (1930), follicle sedge can no longer be found there. It is extant, however, in the area south of the CSSSBR and east of U.S. 12 in Tamarack D, where it grew with *Eupatorium perfoliatum*, *Euthamia graminifolia*, *Juncus canadensis*, and *Thelypteris palustris* var. *pubescens*. Plampin and O'Brien (1999) report that it is locally abundant to intermittent along the Calumet Trail east of the Beverly Shores CSSSBR Station (Keiser B). It grows in Tamarack A in the disjunct old growth forest northeast of the Calumet Bike Trail (Plampin, pers. obs. on 19 July 2004 and earlier). Follicle sedge is the namesake for the former section Folliculatae that is now called Rostrales (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Swink s.n., 1983, Porter Co. (MOR)
Wilhelm & Dritz #6946, 9 September 1979, Porter Co. (MOR)
Bowles #665, 19 October 1986, La Porte Co. (MOR)

Carex garberi Fernald

False golden sedge is known from Miller Woods, West Beach, and DSP. This species is extant in the pannes in Miller Woods A and evidently in C as well. It is also found in the pannes of West Beach A and D. Bowles et al. (1986) listed the following associates from a panne border: *Eleocharis elliptica*, *Equisetum hyemale* ssp. *affine*, *Gentianopsis crinita*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, and *Salix myricoides*. According to Wilhelm (1990), "Dritz (1987) noted this species at the panne in Big Blowout of Dunes State Park on 20 June 1982." Some of the specimens from these local populations appear taxonomically intermediate between this species and the closely related *Carex aurea*. Hipp (2008) states that this species is distinguished from *C. aurea* by its whitish ascending perigynia, densely flowered spikes, and a typically gynecandrous terminal spike. See *C. aurea* for additional taxonomic discussion. *Carex garberi* is in the Bicolores section of the family.

Voucher Specimens:

O'Brien #36, 17 June 1985, Lake Co. (INDU)
Steyermark #65004, 14 September 1947, Lake Co. (F)

Carex hitchcockiana Dewey
Hairy gray sedge is known from the Heron Rookery and Hobart Prairie Grove. Often overlooked, hairy gray sedge is locally rare in the very mesophytic areas among the beech trees in Heron Rookery A. It is also occasional in the Hobart Prairie Grove. No specimen has been collected. Hairy gray sedge is a member of the section Griseae (Flora of North America Editorial Committee 2002).

Carex hyalinolepis Steud.
Southern lake sedge, or south lake sedge, is common to the south of our region in Indiana. Scott Namestnik found this species on private property along the Little Calumet River. On 11 May 2018, he and Nathanael Pilla found it growing in the Heron Rookery south of the Little Calumet River. Given these recent finds, it may be native to the Heron Rookery. No specimen has been documented for this species. Scott and Nathanael showed this species to Pavlovic on 5 May 2019. According to Wilhelm and Rericha (2017), southern lake sedge is often found in high abundance in disturbed ditches. Rothrock (2021) notes it is rare in northwest Indiana.

Carex interior L.H. Bailey
Prairie star sedge is known from Tamarack A. This species is typically known from bogs but is known locally from calcareous wet meadows. This species was formerly classified as *C. scirpoides* Schkuhr (Wilhelm and Rericha 2017). Thus, this record is being treated separately from the more common *Carex interior*.

Voucher Specimens:
Umbach #897, 11 June 1904, Lake Co. (MOR)

Carex intumescens Rudge
Shining bur sedge is known from the swamp complex in the Cowles Dunes (B and D), DSP, Keiser (B and C), Furnessville (C, D, and F), Tamarack, Heron Rookery, and Pinhook Bog. This conspicuous sedge, with its hemispheric inflorescences, is found in the swamp complex and the NIPSCO right-of-way in the DSP, where it grows with *Acer rubrum*, *Maianthemum canadense*, *Podophyllum peltatum*, *Quercus rubra*, and *Sassafras albidum*. Daniel Mason and Tonkovich found it in Keiser B in 2000. Shining bur sedge was also found in a Keiser F wetland south of the Dunewood Campground, where it was first noted by Pavlovic in 1992. This sedge may have been extirpated from Tamarack A, where it was reported by Peattie (1930), but it survives in Tamarack D, where it was growing with *Calamagrostis canadensis*, *Dichanthelium clandestinum*, *Osmundastrum cinnamomeum*, and *Sphagnum* spp. on 28 June 1988 (Wilhelm 1990). Shining bur sedge is frequent in the wetter portions of the forest south and north of the Little Calumet River at the Heron Rookery, and it is occasional in the hydromesophytic swamp forest off the west side of Wozniak Road at Pinhook Bog A. Shining bur sedge is a member of the Lupulinae section (Flora of North America Editorial Committee 2002).

Voucher Specimens:
Wilhelm & Dritz #17417, 31 July 1989, Porter Co. (MOR)
Otto #66, 19 July 1982, Porter Co. (MOR)
Wilhelm et al. #2392, 19 June 1976, Porter Co. (MOR)
Pavlovic #176, 28 June 1988, La Porte Co. (MOR)
Wilhelm & Dritz #6981, 16 September 1979, La Porte Co. (MOR)

Carex laevivaginata (Kük.) Mack.
Smooth-sheathed fox sedge is known in Tamarack and Hoosier Prairie. A rare relative of *Carex stipata*, the sedge is occasional in moist, partly shaded sands of Tamarack D. Wilhelm (1990) stated, "A report by Dritz (1987), who notes that it grows in 'prairie proper' south of Main Street" at Hoosier Prairie A. Smooth-sheathed fox sedge is a member of the section Vulpinae (Flora of North America Editorial Committee 2002). In the Vulpinae, this species

is distinguished by its yellow (sometimes white) and thickened sheath apex and papillose, epistomic, adaxial leaf surfaces.

Voucher Specimens:

Wilhelm & Shimp #14865, 21 May 1987, La Porte Co. (MOR)

Carex laxiculmis Schwein.

Blue wood sedge is known from Cowles Dunes, DSP, and Furnessville. It is a species of rich mesic woodlands (Wilhelm and Rericha 2017). Nathanael Pilla and Scott Namestnik independently found this sedge growing on the west side of Mineral Springs Road in the wet prairie restoration in 2015. Wilhelm (1990), "noted weak-stemmed wood sedge at Waverly Station on 9 May 1982." This location is probably Cowles Dunes D. Wilhelm (1990) states that "This easily overlooked sedge is extant in the swamp complex in the Dunes State Park, as reported by Lyon (1927); Dritz (1987) has reported it from along Trail 2 as well." This sedge appears in Furnessville E and G. Two varieties are recognized in this species, *laxiculmis* and *copulata* (Flora of North America Editorial Committee 2002). Specimens in the Dunes are more likely to be the latter variety (Rothrock 2021). Blue wood sedge is a member of the section Careyanae (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Wilhelm & Homoya #17057, 25 May 1989, Porter Co. (MOR)

Carex leptalea Wahlenberg

Slender sedge is known from Cowles Dunes and from Tamarack. Ken Klick collected slender sedge from Cowles Bog on 9 June 1988. Associates included *Toxicodendron vernix, Typha angustifolia*, *Parnassia glauca*, *Lysimachia thyrisflora*, *Cyprepidium candidum*, *Eleocharis rostellata*, *Sarracenia purpurea*, and *Carex sartwellii*.

Voucher Specimens:

Klick #2796, 9 June 1989, Porter Co. (MOR)

Carex leptonervia (Fernald) Fernald

Few-nerved wood sedge is known from Cowles Dunes, Furnessville, Keiser, Heron Rookery, DSP, and Pinhook Bog. Few-nerved wood sedge is rare in beech forests of northern Porter County but more common eastward. Ken Dritz found this species along the Calumet Bike Trail (Cowles Dunes C), south of the hydromesophytic swamp, in an area that was probably once this same swampland. In 2009, Scott Namestnik, Lindsay Namestnik, and Curtis collected this species in Howes Prairie (Cowles Dunes B). Along the bike trail, it was growing with *Carex grisea*, *C. crinita*, *Poa compressa*, *P. pratensis*, *Rubus idaeus* ssp. *strigosus*, *Thelypteris palustris* var. *pubescens*. *Carex leptonervia* was collected from the DSP by Pavlovic's exotic plant study crew on 26 June 1999. Few-nerved wood sedge is occasional on mesophytic hummocks in the swamp complex of Furnessville B and D. According to Wilhelm (1990), "It is occasional on mesophytic hummocks in the hydromesophytic swamp (Keiser E) just east of Kemil Road." This sedge is occasional on the beech hummocks south of the Little Calumet River in Heron Rookery A. Few-nerved wood sedge is rare in mesophytic forests along the north edge of Pinhook Bog A. This sedge in the Laxiflorae section, has a myrmecochorous (ant-dispersed) seed, with an ant-attracting elaiosome (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Dritz #460, 30 May 1986, Porter Co. (MOR)
Wilhelm & Betz #14789, 13 May 1987, Porter Co. (MOR)
Wilhelm & Dritz #6707, 26 May 1979, Porter Co. (MOR)
Namestnik, Namestnik and Curtis #710, 15 May 2009, Porter Co. (MOR)

Carex limosa L.

Muck sedge is known from Cowles Dunes A, B, and C, and Pinhook Bog B. At Cowles Bog, it was growing with *Eleocharis rostellata*, *Galium labradoricum*, and *Typha angustifolia*.

This sedge is frequent in the *Sphagnum* mat of the Pinhook Bog east of Wozniak Road. Bowles et al. (1986) mapped one of these populations and noted the following associates: *Chamaedaphne calyculata*, *Drosera rotundifolia*, *Larix laricina*, *Sarracenia purpurea*, *Sphagnum* spp., *Vaccinium macrocarpon*, and *V. oxycoccos*. Muck sedge is the namesake for the Limosae section of sedges (Flora of North America Editorial Committee 2002, Wilhelm and Rericha 2017).

Voucher Specimens:

Dritz #92, 15 June 1980, Porter Co. (MOR)
Swink s.n., 18 June 1979, La Porte Co. (MOR)

Carex muskingumensis Schwein.

Swamp oval sedge is known from Hobart Prairie Grove and Heron Rookery. Nathanael Pilla (Orbis Environmental Consulting, pers. comm. with Pavlovic) reported swamp oval sedge as common along the riparian area on the east side of Hobart Prairie Grove. Swamp oval sedge is usually found in floodplain forests, but also occurs in *Quercus bicolor* wetlands. It is more common in the Kankakee River Valley than in the Dunes (Swink and Wilhelm 1994). Swamp oval sedge occurs in the floodplain at Heron Rookery B. Swamp oval sedge is a member of the Ovales section (Flora of North America Editorial Committee 2002). No specimen has been collected.

Carex oligocarpa Schkuhr ex Willd.

Few-fruited gray sedge is typical of beech-maple forests and is known from Heron Rookery A. This species is similar to *C. hitchcockiana*, with both having impressed perigynium veins and tapering beaks (Hipp 2008). Similar to *C. leptonervia*, this sedge is myrmecochorous (Wilhelm and Rericha 2017). Few-fruited gray sedge is a member of the Griseae section (Flora of North America Editorial Committee 2002). This species is similar to *C. blanda* and *C. grisea* (Smith 2018). No specimen has been collected.

Carex oligosperma Michx.

Running bog sedge is known from Tolleston Dunes, Inland Marsh, and Pinhook Bog. It is abundant in the old Tolleston-aged panne near the west end of Tolleston Dunes A, where it was growing with *Carex buxbaumii* and *Persicaria amphibia*. This sedge is occasional in the old Tolleston-aged pannes of Inland Marsh A, where it grows with *Cladium mariscoides* and *Schoenoplectus acutus* var. *acutus*, and in Inland Marsh B (Coulter Prairie). Running bog sedge is common in the more open portions of Pinhook Bog B east of Wozniak Road. Hipp (2008) states that this species is easy to recognize by the few-flowered pistillate spike that is nestled in the intersection of the bract and the long-stiped staminate inflorescence. Running bog sedge is a member of the Visecariae section (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Dritz & Wilhelm #267, 20 June 1982, Lake Co. (MOR)
Wilhelm & Dritz #6908, 23 June 1979, La Porte Co. (MOR)
Umbach #1076, 23 June 1906, Dune Park, Porter Co. (MOR)

Carex pauciflora Lightf.

Few-flowered sedge was reported from Mineral Springs (Cowles Bog) based on a specimen collected by Nieuwland in 1918. Rothrock quotes Tony Reznicek, "you would think that if he found it as a new state record, Nieuwland would take better care of the collection." Wilhelm and Rericha (2017) report this specimen as the only occurrence in the Chicago Region.

Voucher Specimens:

Nieuwland (s.n.), 1918, Porter Co. (IND)

Carex pedunculata Muhl. ex Willd.

Long-stalked hummock sedge is known from DSP and the Heron Rookery. According to Wilhelm (1990), this species "is confined to a small beech hummock in the hydromesophytic

swamp west of Kemil Road in the Dunes State Park." There it grows in a high-quality community with *Actaea pachypoda*, *Allium tricoccum*, *Anemone americana*, *Brachyelytrum erectum*, *Cardamine douglassii*, *Caulophyllum thalictroides*, *Claytonia virginica*, *Euonymus obovatus*, *Fagus grandifolia*, *Hamamelis virginiana*, *Lindera benzoin*, *Maianthemum canadense*, *M. racemosum* ssp. *racemosum*, *Panax quinquefolius*, *P. trifolius*, *Podophyllum peltatum*, *Polystichum acrostichoides*, *Quercus rubra*, *Uvularia grandiflora*, and *Viburnum acerifolium*. At the Heron Rookery (A and B), this rare sedge is occasional on the raised hummocks at the bases of old-growth beech trees on both sides of the Little Calumet River. There it grows with *Acer rubrum*, *Asarum canadense*, *Fagus grandifolia*, *Panax trifolius*, and *Viola rostrata*. According to Hipp (2008), the elongate perigynium base serves as an elaiosome that attracts ants for seed dispersal. Smith (2018) finds it curious that this species presents basal inflorescences as well as culmed ones, with the former having long arching peduncles and no bracts. It is possible this presentation makes the seeds with elaiosomes accessible to ants. This species shows the eastern North America and eastern Asia disjunct distribution pattern (Flora of North America Editorial Committee 2002). This is one of the four species in the section Clandestinae (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Kjellmark #24, 29 April 1987, Porter Co. (MOR)
Klick #2778, 14 May 1988, Porter Co. (MOR)

Carex prairea Dewey

Typical of prairie fens, fen panicled sedge is known from Cowles Dunes A, specifically in Cowles Bog. It is occasional in bogs, but more often found in fens. Swink and Wilhelm (1994) note it is associated with *Larix laricina*. Andrew Hipp (2008) states this species is distinguished from *C. diandra* by its copper inner sheath. *Carex prairea* is a member of the Heleoglochin section of the *Carex* genus (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Deam #20043, 3 June 1916, Porter Co. (IND)

Carex prasina Wahlenb.

Leek sedge is occasional in the cut-over beech forest south of the Little Calumet River in the Heron Rookery A. It is known only from Porter, La Porte, St. Joseph, and Berrien counties in the Chicago Region (Wilhelm and Rericha 2017). Leek sedge is a member of the Hymnochlaenae section (Flora of North America Editorial Committee 2002). An ecological study of this sedge in Quebec showed that the conditions of optimal habitat for this species did not correspond to the habitats where it was commonly found (Flinn et al. 2010). The authors use the results of Finn et al. to caution readers about potential problems in thinking that the conditions where a species occurs represent its optimal habitat; instead, the abiotic and biotic environment needs to be considered (i.e., the potential and realized niche).

Voucher Specimens:

Wilhelm #6863, 20 June 1979, Porter Co. (MOR)

Carex seorsa Howe

Swamp star sedge is known from Cowles Dunes, DSP, Furnessville, Keiser, and Pinhook Bog. This inconspicuous member of the section Stellulatae is quite common in the swamp complex portions of Cowles Dunes A, B, and D. Bowles et al. (1985) give the following associates for it in Cowles Dunes A and B: *Acer rubrum*, *Alnus incana* ssp. *rugosa*, *Betula alleghaniensis*, *Hamamelis virginiana*, *Maianthemum canadense*, *Osmundastrum cinnamomeum*, *Osmunda regalis* var. *spectabilis*, *Quercus bicolor*, *Symplocarpus foetidus*, *Toxicodendron vernix*, and *Ulmus americana*. Locally, it is almost always associated with *Carex bromoides*. This easily overlooked sedge is still occasional to common in the swamp complex and along the NIPSCO right-of-way of the DSP. It is frequent in the swamp

complex portions of Furnessville B, C, D, F, and G. Swamp star sedge is quite common in the swamp complex portion of Keiser B, C, and D. Bowles et al. (1985) noted the following associates in the remnant subdunal woods of Keiser B: *Acer rubrum*, *Caltha palustris*, *Carex folliculata*, *Fraxinus americana*, *F. pennsylvanica*, *Lilium michiganense*, *Liriodendron tulipifera*, *Quercus alba*, *Q. rubra*, and *Symplocarpus foetidus*. This tufted sedge is common in the hydromesophytic swamp forest west of Wozniak Road at Pinhook Bog A.

Voucher Specimens:

Hiebert #295, 27 May 1982, Porter Co. (MOR)
Wilhelm #6593, 19 May 1979, Porter Co. (MOR)
Wilhelm & Dritz #6703, 26 May 1979, Porter Co. (MOR)
Wilhelm #6886, 23 June 1979, La Porte Co. (MOR)

Carex shortiana Dewey

Short's sedge is reported from Hobart Prairie Grove A by Sandy O'Brien on 14 June 2012. According to Rothrock (2021), this species is rare in northwest Indiana. Wilhelm and Rericha (2017) do not list this species from Lake County, but note it is found in mesic open woodlands and savannas of moraine bluffs. We will retain Short's sedge on the list but would like to see a specimen to confirm its identity.

Carex siccata Dewey [*C. foena* Willd. (misapplied)]

Running savanna sedge is known from Miller Woods, West Beach, Cowles Dunes, and Hoosier Prairie units. Wilhelm (1990) states, "This species is not as rare as we (Swink & Wilhelm, 1979) once thought. We now know it to occur occasionally in sandy Black Oak savanna in northwest Indiana generally." It is reported from Miller Woods C. It also occurs in West Beach D. Evidently rare, it was found at Howes Prairie (Cowles Dunes B) by Pavlovic in 1985. At Hoosier Prairie, according to Wilhelm (1990), "this rare rhizomatous species of dry savannas is known locally solely on the basis of a report by Dritz (1987), who notes it from the savanna north of Main Street," east of the NIPSCO substation at Hoosier Prairie A. The long creeping rhizomes and the unkempt appearance of the inflorescences distinguishes this species found in prairies and oak savannas (Hipp 2008). Running savanna sedge is a member of the Ammoglochin section of the *Carex* genus (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Wilhelm #6806, 10 June 1979, Lake Co. (MOR)
Pavlovic #140, 27 June 1985, Porter Co. (INDU)

Carex stipata Muhl. ex Willd. var. *maxima* Chapm. ex Boott

Great fox sedge is only known from Porter County in the Chicago Region based on two specimens collected by Levi Umbach in 1912. One of these specimens was collected in a ditch at Port Chester, designating the train stop that we attribute to Cowles Dunes B. It is possible this was collected on the east side of Waverly Road in Furnessville F. We consider this species to likely be extirpated. *Carex stipata* var. *maxima* is rarer in the Indiana Dunes and in Indiana compared to the more common variety, *Carex stipata* var. *stipata* (Rothrock 2021). The former variety is more common in the Atlantic coastal plain, the Gulf coast, and the Piedmont (Rothrock 2021).

Voucher Specimens:

Umbach #5459, 22 June 1912, Porter Co. (MOR)

Carex tonsa (Fernald) E.P. Bicknell

Smooth-fruited oak sedge is known from Miller Woods, Tolleston Dunes, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Hobart Prairie Grove. It is occasional in the black oak savannas and sand prairies of Miller Woods B, C, D, E, and G. This species is frequent in deep droughty sands along the old dune ridges in Tolleston Dunes A, B, and C, and in the dry sandy prairies of the black oak sand ridges in

Inland Marsh A, B, and C. It is known to occur in West Beach E. This early-fruiting sedge becomes inconspicuous by June, and even in May, the fruits are concealed in the dense tufts of harsh, stiff leaves, so it can be overlooked. According to Wilhelm (1990), Ken Dritz told him that a copse of young trees now stands on the site of the formerly barren sandpile in Inland Marsh B where this sedge had been collected in 1982.

This species is occasional in the xeric sands of the western portion of Cowles Dunes A and in droughty sands at the west end of the DSP in the vicinity of Pageant Blowout. It is confined to sandy woods in the savanna complex of Furnessville D. Smooth-fruited oak sedge is occasional in the deep droughty sands of blowout areas in Keiser E and F. This species is occasional in droughty sands of Tamarack D. It is also found in the rare openings of the Hobart Prairie Grove. Smith (2018) discusses how the species persists well because of its deep rhizomes.

Voucher Specimens:

Wilhelm #6793, 9 June 1979, Lake Co. (MOR)
Dritz & Rowlatt #261, 6 June 1982, Porter Co. (MOR)
Wilhelm & Bacone #6737, 27 May 1979, Porter Co. (MOR)

Carex trichocarpa Muhl. ex Willd.

Hairy-fruited lake sedge is known only from Hoosier Prairie A. This species is found in moist calcareous meadows and sloughs (Swink and Wilhelm 1994). The specimen from Cowles Dunes was originally labeled as this species but see *C.* × *subimpressa* in Table 4. No specimen of this species has been collected from Hoosier Prairie.

Carex trisperma Dewey

Three-seeded bog sedge was known from Cowles Dunes, and still grows at Pinhook Bog. According to Peattie (1930), three-seeded bog sedge grew at "Tamarack bog at Mineral Springs (Cowles Dunes A), and westward in swamps and woods to Pine." Levi Umbach collected this sedge in Dune Park in 1906. Wilhelm (1990) only saw this species at Pinhook Bog A, where it is common in the hydromesophytic swamp forest west of Wozniak Road. The bent inflorescence and beak of the perigynia are diagnostic for this species (Smith 2018). This sedge was found to be recalcitrant in bog restorations since it failed to establish in 57% of 22 restorations in Quebec and New Brunswick (Hugron et al. 2020). The authors attributed this failure to autecological considerations and in this case, restorations lacked shaded microhabitats where this species is often found. This explanation is consistent with *C. trisperma* preferring shaded habitats in bogs throughout Maine (Anderson et al. 1996). *Carex trisperma* is a member of the Glareosae section of *Carex* (Flora of North America Editorial Committee 2002).

Voucher Specimens:

Wilhelm #6893, 23 June 1979, La Porte Co. (MOR)
Umbach #1126, 19 July 1906, swamp, Dune Park, Porter Co. (MOR)

Carex woodii Dewey

Wood's stiff sedge occurs only in Heron Rookery B; it is often associated with beech-maple forests. Gerould Wilhelm (unpublished report) found it growing there on 26 June 1997. Though related to *C. meadii* and *C. tetanica*, these species do not occur in rich forests (Hipp 2008). Vegetative shoots of Wood's stiff sedge can be confused with *C. pennsylvanica*; however, the deeply purple-colored and non-fibrous leaf sheaths and the wider leaf blades distinguish it (Rothrock 2021). According to Rothrock (2021), self-incompatibility and low genetic exchange make vegetative clonal spread adaptive for this species. Wood's stiff sedge is a member of the Panicae section (Flora of North America Editorial Committee 2002). No specimen has been collected.

Carex × *subimpressa* Clokey

Dritz's specimen was identified by him as *C. trichocarpa*, collected at Cowles Dunes E. Wilhelm identified it as *C. subimpressa* in 1985, a hybrid between *C. hyalinolepis* and *C. pellita*. In 1990, he identified it as *C. lacustris* × *C. lanuginosa*. In vPlants (www.vplants.org), Andrew Hipp determined it to be a hybrid between *C. lacustris* and *C. pellita*. But in 2012, Tony Reznicek suggests it is a hybrid between *C. lacustris* and *C. lasiocarpa*. While new to the Indiana Dunes, we are recognizing this entity as a variant of *C. lacustris*.

Voucher Specimens:

Dritz #228, 27 June 1981, Porter Co. (MOR)

Cladium mariscoides (Muhl.) Torr.

Twig rush is known from Miller Woods, Tolleston Dunes, West Beach, Inland Marsh, Cowles Dunes, DSP, Keiser, and Tamarack. Twig rush is closely related to sawgrass (*C. jamaicense*), the dominant meadow plant of the Everglades National Park, Florida. Twig rush is found throughout Miller Woods in calcareous swales but is common in the pannes of Miller Woods A north of the Grand Calumet River lagoons. Wilcox and Simonin (1987) reported twig rush from Miller Woods C and E. Twig rush is common in the old Tolleston panne near the west end of Tolleston Dunes A but is occasional in sand mined flats to the east. At West Beach twig rush is common in the pannes of subunits A and D. In Inland Marsh, twig rush is occasional to common in the wet sands and old Tolleston-aged pannes of Inland Marsh A and B. According to Wilhelm (1990), Ken Dritz recorded it from Inland Marsh B (no date is given). Wilhelm (1990) also described that

> *Twig rush is not infrequent in wet calcareous depressions and swales in both Cowles Dunes A and B. A population in Cowles Dunes B was associated with* Agrostis gigantea, Calamagrostis canadensis, Populus tremuloides, Spiraea alba, S. tomentosa *var.* rosea, *and* Thelypteris palustris *var.* pubescens.

Twig rush was not known to occur east of Cowles Dunes until it was found in DSP in 1985 (Bowles et al. 1985). At DSP, it was an associate of *Potentilla anserina* at the panne at Beach House Blowout. Pavlovic found it growing in Keiser F in 1992, and Tonkovich and Hamilla found it in Tamarack C in the Crescent Dune panne in 2015. Associates in the Crescent Dune panne included *Fimbristylis autumnalis*, *Solidago rugosa*, and *Prunella vulgaris*. This panne may have been destroyed after it was overrun by sand during the 1986–1987 high levels of Lake Michigan. The Keiser F population was growing in the wetland southwest of the Dunewood Campground. The seeds of twig rush look like miniature toy tops. Though individual plants are perennial, Bernard et al. (1985, cited in Rothrock (2009)) demonstrated that the individual stems of this species have a biennial cycle lifespan.

Voucher Specimens:

Klick #2748, 2 July 1987, Porter Co. (INDU)
Wilhelm & Bacone #5205, 3 August 1978, Lake Co. (MOR)
Fox #76, 10 August 1984, Lake Co. (INDU)

Cyperus diandrus Torr.

Umbrella flat sedge is reported from West Beach C along the shore of Long Lake. This annual species (Rothrock 2009) may fluctuate from year to year depending on the variance in the hydrological cycle.

Voucher Specimens:

Dritz #165, 11 September 1980, Porter Co. (MOR)

Cyperus houghtonii Torr.

Houghton's sand sedge grows in Miller Woods, Tolleston Dunes, Inland Marsh, Cowles Dunes, DSP, Furnessville, and Tamarack. Listed as endangered in Indiana, this sedge is occasional in the savanna complex, especially around the edges of sand blows. It is quite

similar to the more common *C. schweinitzii*, but is distinguished by its smooth stems, more spreading bracts, and smaller floral scales and achenes. This species is named in honor of Douglass Houghton, a doctor, botanist, and the first geologist of the state of Michigan (Rothrock 2009).

Voucher Specimens:

Harrington #H48, 30 July 1943, Lake Co. (MOR)
Rericha & Wilhelm #3619, 12 August 2006, Porter Co. (MOR)

Cyperus odoratus L. [*Cyperus engelmannii* Steud.]

False rusty nut sedge is known from West Beach, Cowles Dunes, and Pinhook Bog. It is frequent along the north shore of Long Lake in West Beach C and in moist soil areas of West Beach F. It is documented from Cowles Dunes A, based on the specimen cited below. This rare *Cyperus* was unknown from Pinhook Bog B until it was found by D. Wilcox during his studies of highway salt impact on the bog, but it was originally misidentified as *C. ferruginescens*. Tucker (1984) discusses the merits of the distinctions between *C. engelmannii* and *C. odoratus* (see also Tucker and Gandhi (2019)). The Flora of North America (2002) treats them as one species, *C. odoratus*, whereas Wilhelm and Rericha (2017) and Smith (2018) separate them based on the former having scales that do not overlap on the same side of the spikelet, and the latter overlapping. Rothrock (2009) treats these species as varieties (var. *odoratus* and var. *engelmannii*) of *C. odoratus*. Mears and Libby (1995) treated *C. engelmannii* Steud as separate from *C. odoratus*. *Cyperus odoratus* has been widely studied as a filler in a synthetic polyethylene composite material (Faris et al. 2020).

Voucher Specimens:

Wilhelm & Dritz #12310, 19 September 1984, Porter Co. (MOR)
Buchholz #4, 22 August 1985, Porter Co. (INDU)
Wilcox #71, 7 September 1982, La Porte Co. (INDU)

Eleocharis atropurpurea (Retz) J. Presl & C. Presl

Purple spike rush was not known from the dunes, Chicago Region, or Indiana until 10 July 2020, when Nathanael Pilla found it at Coulter Prairie with Doug Botka and Brad Slaughter (who confirmed the identification). It was growing with *Lipocarpha drummondii* and *Eleocharis engelmannii*. On 16 July, Pilla found it growing in the Dunes Acres soccer field. According to Scott Namestnik, *E. atropurpurea* fruits earlier than *E. geniculata* at a time when local botanists may not be looking for that species or any other *Eleocharis*.

Voucher Specimens:

Pilla, N. s.n., 10 July 2020, Porter Co. (IND)

Eleocharis geniculata (L.) Roem. & Schult.

Knee spike rush grows in the pannes of Miller Woods and West Beach and was reported from Tamarack (see specimen record below). According to Bowles (1989), the Miller Woods A population had not changed from 1985 to 1989. At West Beach, Bowles et al. (1985) gave the following associates: *Carex viridula* ssp. *viridula*, *Cyperus bipartitus*, *Eleocharis elliptica*, *Euthamia graminifolia*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, *J. marginatus*, *Lobelia kalmii*, *Rhynchospora capillacea*, *Scleria verticillata*, *Triglochin maritima*, and *Utricularia subulata*. Knee spike rush was reported by Lyon (1927) as having grown along the ditch by the CSSSBR at Tamarack, from which it may have been extirpated.

Voucher Specimens:

Hess et al. #6012, 4 September 1984, Lake Co. (MOR)
Wilhelm #6989, 30 September 1979, Porter Co. (MOR)

Eleocharis melanocarpa Torr.

Black-fruited spike rush is known from Cowles Dunes and Furnessville. This rare spike rush is extant in the wet acid sands in at least ten locations within Howes Prairie (Cowles Dunes B) and in a wet swale in Lupine Lane in Cowles Dunes B. It also is known from the fly ash-

impacted swale area (Blag Slough) in Cowles Dunes A, where Bowles et al. (1985) recorded five small colonies in the eastern part of a lake basin (Pavlovic et al. 2009). It grows in Furnessville F. Roger Hedge, E. Stork, and Pavlovic located a large patch east of 50N in a flat, damp swale north of Olson's Pond on 26 July 2017. Plampin saw a population in Furnessville E on 26 August 1994 growing with *Agalinis purpurea*, *Juncus scirpoides*, *Linum medium* var. *texanum*, *Schoenoplectiella purshiana*, *Scleria verticillata*, and *Viola lanceolata*. Swink and Wilhelm (1979) pointed out that "Except for isolated areas in Indiana and Michigan, this species is found only in states bordering the Atlantic Ocean and the Gulf of Mexico." This species can make "wickets" similar to those of *E. rostellata* by rooting from the tips (Rothrock 2009).

Voucher Specimens:
Fox #2, 14 October 1983, Porter Co. (MOR)

Eleocharis microcarpa Torr. var. *filiculmis* Torr.
Hair spike rush is known from Inland Marsh B in Coulter Prairie, where it was first noted by K. Dritz on 7 August 1983. According to the label, associates include *Calamagrostis canadensis*, *Eleocharis obtusa*, *Juncus canadensis*, *Ludwigia alternifolia*, *Lysimachia terrestris*, *Scirpus cyperinus*, *Thelypteris palustris* var. *pubescens*, and *Viola lanceolata*. Associates from the 1986 collection include *Cephalanthus occidentalis*, *Dichanthelium acuminatum* ssp. *spretum*, *Fimbristylis autumnalis*, *Hypericum boreale*, *Persicaria punctata*, *Rhynchospora capitellata*, and *Rhynchospora scirpoides*. Wilhelm (1990) reported that K. Dritz observed that this species had spread into new areas of the marsh in response to the disturbance of a regularly mowed trail and was dominant in an exotic game pen that intrudes into the marsh. There, Dritz said, it grows in "prodigious quantities, where the soil is churned continuously by the hooves of penned quadrupeds, and where every other species has been obliterated by grazing" (Wilhelm 1990). With the absence of the penned herbivores and possible water withdrawal from wells of the adjacent homes, this species may only persist in the seed bank. Artificial disturbance may be warranted on a decadal scale to allow replenishment of the seed bank, if hydrologic drawdown and development of this species on mud flats no longer occurs. The only other known location for this species in the Chicago Region is the mowed fire lanes at the Jasper-Pulaski Wildlife Area near Tefft, Indiana. This INDU site represents the high density of a disturbance-dependent species in a novel disturbance regime (Pavlovic 1994). This overabundance does not imply that we should concentrate grazers to churn the soil but investigate the natural conditions or agents such as herbivores that favor this seed bank species (Pavlovic 1994). This species appears to flourish after fires as well as after soil disturbances. Hair spike rush appears to be allelopathic to algae (Rothrock 2009).

Voucher Specimens:
Dritz #501, 23 August 1986, Porter Co. (MOR)

Eleocharis quadrangulata (Michx.) Roem. & Schult.
Square-stemmed spike rush was thought to be extirpated from the Dunes until Nathanael Pilla found this species growing in the marsh restoration west of Mineral Springs Road (north of the Calumet bike trail parking lot) on 16 September 2019. Before that discovery, only a single specimen was known, as collected by I.B. Meyers in 1910 at Mud Lake (also known as Goose Lake), only a mile west of the 2019 sighting. It may still be extant in the wetlands within and around Little Lake and Blag Slough as well.

Voucher Specimens:
Meyers s.n., 20 September 1910, Porter Co. (F)

Eleocharis quinqueflora (Hartmann) O. Schwarz [*Eleocharis pauciflora* (Lightf.) Link var. *fernaldii* Svenson]
Matted spike rush is known from the pannes of Miller Woods A and West Beach A, and from Hoosier Prairie A. It grows in a sandy swale at Miller with *Carex viridula* ssp. *viridula*, *Carex garberi*, *Cornus sericea*, *Eleocharis compressa*, *Equisetum arvense*, *Erigeron philadelphicus*,

Eupatorium perfoliatum, *Fragaria virginiana*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, *Liparis loeselii*, *Lycopus americanus*, *Packera paupercula*, *Populus deltoides*, *Sabatia angularis*, *Salix amygdaloides*, *S. cordata*, *S. interior*, *S. rigida*, *Schoenoplectus pungens*, *Triglochin maritima*, and *Typha angustifolia*. At West Beach A, matted spike rush grows with *Carex viridula* ssp. *viridula*, *Juncus arcticus* var. *balticus*, and *Rhynchospora capillacea*. This species was recorded for Hoosier Prairie A in the unpublished Indiana DNR 24 October 1995 plant list (Wilhelm 1990).

Voucher Specimens:

Dritz #77, 26 May 1980, Lake Co. (MOR)
Dritz #80, 26 May 1980, Porter Co. (MOR)
Tonkovich #382, 31 August 2000, Porter Co. (F)

Eleocharis rostellata (Torr.) Torr.

Wicket spike rush, a species representative of fens lacking human disturbance, had not been recorded from the Indiana Dunes until it was found by Ken Dritz at Cowles Dunes A. It is still abundant in the "ellipse"—the graminoid fen northeast of the raised bog that was invaded by *Typha* × *glauca*. It grows with *Betula pumila*, *Carex limosa*, *C. seorsa*, *Cicuta bulbifera*, *Eupatorium perfoliatum*, *Galium labradoricum*, *Larix laricina*, *Parnassia glauca*, *Rosa palustris*, *Salix candida*, *Sarracenia purpurea*, *Schoenoplectus pungens*, *Thelypteris palustris* var. *pubescens*, *Toxicodendron vernix*, and *Typha angustifolia* (likely *T.* × *glauca*). How it responded to the 2002 cutting and use of herbide on the hybrid cattails in the "ellipse" is not yet known. According to Smith (2018), some culms produce rudimentary proliferous spikelets, the culms of which arch and bend to the ground. There the spikelets sprout in viviparous reproduction and so the wickets are formed.

Voucher Specimens:

Dritz #90, 15 June 1980, Porter Co. (MOR)

Eleocharis tenuis (Willd.) Schult. var. *verrucosa* (Svenson) Svenson

Slender spike rush is known from Hoosier Prairie A and Tamarack D. The Field Museum (F) has a specimen collected by H. R. Bennett from a sand interdunal flat in Dune Acres on 10 August 1958, but the location information is vague. This specimen was verified by Galen Smith in 2000. It could have been collected from sloughs like Little Lake in the now destroyed Dune Park, though another possibility is the Dune Acres soccer field. There is a specimen of *E. tenuis* var. *verrucosa* from Tamarack D collected by Pavlovic on 27 June 1988. Wilhelm and Rericha (2017) name this species *Eleocharis verrucosa* (Svenson) L. J. Harms.

Voucher Specimens:

Pavlovic #174, 27 June 1988, La Porte Co. (INDU)

Eleocharis wolfii (A. Gray) A. Gray

Wolf's spike rush is known in the Indiana Dunes only from Hoosier Prairie. Wilhelm (1990) related:

> *The discovery of Wolf's spike rush at Hoosier Prairie is another one of those incredible contributions by Ken Dritz. Who but Ken would take note of such an obscure species?* [...] *Klick (pers. comm.) relates that, in addition to the original substation location, there are populations on both sides of Main Street, and that it most often is found in seasonally flooded wet prairie in association with* Calamagrostis canadensis *and* Thelypteris palustris *var.* pubescens. *Bowles (1987) mapped a population in "mesic sand prairie cleared of Aspen," and noted the following associates:* Calamagrostis canadensis, Doellingeria umbellata *var.* umbellata, Galium obtusum, Houstonia caerulea, Lechea tenuifolia, Onoclea sensibilis, Panicum virgatum, Populus deltoides, Rubus flagellaris, Thelypteris palustris *var.* pubescens, *and* Verbena hastata.

In the spring of 1985, Wilhelm (1990) quoted Ken Dritz as noting the following associates:

Cyperus rivularis, *C. strigosus*, *Eleocharis obtusa*, *Erigeron philadelphicus*, *Hierochloë odorata*, *Houstonia caerulea*, *Hypericum mutilum*, *Hypoxis hirsuta*, *Juncus acuminatus*, *Juncus dudleyi*, *Panicum agrostoides*, *Poa pratensis*, *Polygala sanquinea*, *Rotala ramosior*, *Saxifraga pensylvanica*, and *Veronica peregrina*. In 1985, Bowles et al. (1986) recorded the following associates: *Agrostis gigantea*, *Eryngium yuccifolium*, *Fragaria virginiana*, *Juncus marginatus*, *J. tenuis*, *Lobelia spicata*, *Lycopus rubellus*, *Onoclea sensibilis*, *Panicum agrostoides*, and *Spartina pectinata*.

Voucher Specimens:
Dritz #355, 29 July 1984, Lake Co. (MOR)

Eriophorum angustifolium Honckeny
Narrow-leaved cotton-grass is known from Cowles Dunes and Hoosier Prairie. The Cowles Dunes population is known only from the report by Lyon (1927), in which he noted that it grew in the "subdunal marsh, Port Chester," now known as Cowles Dunes B. According to Wilhelm (1990), the only record for this species at Hoosier Prairie A is Bacone (1988, 1995).

Voucher Specimens:
Deam #20017, 3 June 1916, Porter Co. (IND)

Eriophorum tenellum Nuttall
On June 4, 2020, Scott Namestnik and Roger Hedge visited Pinhook Bog to look for *Eriophorum vaginatum*. Instead, they collected a specimen that turned out to be *E. tenellum*, a new species to the Dunes and to Indiana. They did not find *E. vaginatum*.

Voucher Specimens:
Namestnik #4358, 4 June 2020, LaPorte Co. (MOR)

Eriophorum vaginatum L. [*Eriophorum spissum* Fernald]
Dense cotton-grass is known only from Pinhook Bog B based on the specimen below, but it may be extirpated since it has not been seen since 1929. The cotton-grasses get their name for their fruiting heads, with silky cotton-like bristles subtending the achene. Successional management at Pinhook might permit this species to reappear, as Rothrock (2009) notes its long-term seed viability.

Voucher Specimens:
Deam #46663, 30 May 1929, La Porte Co. (IND)

Eriophorum virginicum L.
Rusty cotton-grass is frequent in the more open areas of Pinhook Bog B east of Wozniak Road. There are two specimens of this species in the Field Museum of Chicago (F) that were collected from Pinhook Bog by C. Buhl on 16 September 1934.

Voucher Specimens:
Wilhelm & Dritz #6982, 16 September 1979, La Porte Co. (MOR)

Fimbristylis puberula (Michx.) Vahl var. *puberula* [*F. drummondii* (Torr. & Hook.) Boeckeler]
Chestnut sedge is extant and occasional in the Howes Prairie region of Cowles Dunes B. Nathanael and Mateo Pilla found this species growing in Howes Prairie on 21 June 2020. It is commonly found in sandy grasslands near Lake Michigan (Wilhelm and Rericha 2017). Rothrock (2009) notes that this and *F. autumnalis* have the C4 photosynthetic physiology, a trait that reduces water loss relative to carbohydrate gained during photosynthesis. Nathanael Pilla found it growing in the Dunes Acres soccer field in August 2020 as well.

Voucher Specimens:
Swink s.n., 23 August 1952, Porter Co. (F)
Plampin #1-1991, 16 August 1991, Porter Co. (INDU)

Fuirena pumila (Torr.) Spreng.

Umbrella sedge was formerly known only from the now-destroyed Goose Lake (also known as Walker or Mud Lake) in Porter County. It was found by Ken Dritz with Marlin Bowles in the northeast corner of Blag Slough in Cowles Dunes A in 1991, and later found in St. Joseph Co. by Gerould Wilhelm. Umbrella sedge is associated with *Calamagrostis canadensis*, *Cephalanthus occidentalis*, *Conyza canadensis*, *Cyperus erythrorhizos*, *Dichanthelium acuminatum* ssp. *spretum*, *Dulichium arundinaceum*, *Eleocharis flavescens* var. *olivacea*, *Eupatorium serotinum*, *E. perfoliatum*, *Hypericum majus*, *H. canadense*, *Juncus brachycarpus*, *J. canadensis*, *J. effusus*, *J. scirpoides*, *Ludwigia palustris*, *Persicaria punctata*, *Phragmites australis*, *Pontederia cordata*, *Potamogeton* sp., *Rhus copallinum* var. *copallinum*, *Rhynchospora macrostachya*, *Rotala ramosior*, *Rubus pensylvanicus*, *Sagittaria graminea*, *Schoenoplectiella purshiana*, *Spiraea tomentosa* var. *rosea*, *Stachys hyssopifolia*, *Triadenum fraseri*, and *Typha angustifolia*. Carie Satkoski found 18 culms in Blag Slough near the Ken Dritz and Marlin Bowles site on 21 August 2007. In 2008, Plampin, Hamilla, and Carie Satkoski, found three distinct patches of this sedge on the north side of Blag Slough (Plampin and Hamilla 2008a).Umbrella sedge has been observed four times after years following major rain fall events and water level drawdowns: 1991, 2007, 2008, and 2012 (Pavlovic, pers. obs.). On 27 September 2012, Roger Hedge and Emily Stork located this species in Little Lake as well (Hedge and Stork 2014). This rare plant is an annual and may persist in the seed bank until there is a lake water drawdown.

Voucher Specimens:

Deam #21186, 25 August 1916, Porter Co. (IND)
Lamp #275, 18 August 1958, Goose Lake, Porter Co. (MOR)
Dritz & Bowles #949, 11 August 1991, Porter Co. (MOR)

Lipocarpha drummondii (Nees) G.C. Tucker [*Hemicarpha drummondii* Nees]

Drummond's half-chaff sedge is rare in Indiana, with most specimens collected in the first decade of the 20th century (Deam 1940). However, U. Rowlett collected this species on 13 August 1983 at Inland Marsh B in the sandpits along County Line Road (see specimen cited below). These sandpits are now protected in Coulter Prairie, owned by the Shirley Heinze Land Trust. Rowlett noted that Drummond's half-chaff sedge was first observed at that site by Ken Dritz. Nathanael Pilla, Doug Botka, and Brad Slaughter found this species at this same site on 10 July 2020. *Lipocarpha micrantha* is more common in the Chicago Region (Wolter et al. 2014).

Voucher Specimens:

Rowlett #1267, 13 August 1983, Porter Co. (F)

Rhynchospora alba (L.) Vahl

White beak rush grows at Keiser and Pinhook Bog. Christy Fox found it growing in Keiser F on 1 February 1985. This site would become the Dunewood Campground of INDU. White beak rush is common in Pinhook Bog B east of Wozniak Road, particularly around the wetlands and in the more open areas. The Field Museum of Chicago has a specimen collected by Julian A. Steyermark on 9 August 1941 that is confusingly labeled "La Porte Co,: Mineral Springs" in a "quaking open bog near tamarack." We attribute this to Pinhook Bog, since there are no other records of this species growing at Cowles Bog at Mineral Springs Road. This is the only sedge within Indiana Dunes with white spikelets (Rothrock 2009).

Voucher Specimens:

Wilhelm & Dritz #6973, 16 September 1979, La Porte Co. (MOR)

Rhynchospora macrostachya Torr. ex A. Gray

Horned beak rush is known historically from Miller Woods, West Beach, and Tamarack and contemporaneously from Inland Marsh and Cowles Dunes. Levi Umbach found it in swales and sloughs at "Millers" in 1897 (based on the specimen cited below), but Swink and Wilhelm (1979) write that they have never seen this species in Lake County, Indiana.

However, they thought it might yet occur somewhere in one of the Miller Woods marsh communities. Horned beak rush was collected by Rowlett at "West Beach sandpits [now Inland Marsh B] in sedge meadow" (see specimen cited below). Horned beak rush is known from Inland Marsh A and from the Coulter Prairie (Inland Marsh B). Associates at the former site included *Ludwigia palustris*, *Proserpinaca palustris*, *Schoenoplectus acutus* var. *acutus*, and *Utricularia purpurea*. E.J. Hill collected a specimen from Dune Park on 4 August 1898, and Agnes Chase collected two specimens there on 30 August and 8 September 1898. Deam collected a specimen of this rare sedge about two miles northwest of Porter, probably in the Goose Lake area where it was also collected by both Swink and by Bennett. Goose Lake was destroyed when the Bethlehem Steel Mill was constructed in 1963. Lyon collected this species in the early 1920s at Little Lake (Cowles Dunes A), where it was also collected by Ken Dritz in 1980 (specimen cited below). Ken Dritz recorded the following associates: *Bidens* sp., *Calamagrostis canadensis*, *Cephalanthus occidentalis*, *Cicuta bulbifera*, *Cladium mariscoides*, *Dulichium arundinaceum*, *Hypericum canadense*, *Lysimachia terrestris*, *Proserpinaca palustris* var. *crebra*, and *Spiraea tomentosa* var. *rosea*. There have been later collections of this species from the NIPSCO ponds (Blag Slough), and it was frequent at Little Lake along a transect set up by Marlin Bowles in 1988. In 1985, Bowles et al. (1986) recorded two populations and the following associates: *Hypericum boreale*, *Juncus canadensis*, *Juncus effusus*, *Rhynchospora scirpoides*, *Sagittaria graminea*, *Scirpus cyperinus*, and *Sparganium* spp. In October 2015, on two separate visits to Little Lake, Nathanael Pilla and Tonkovich found several populations of *R. macrostachya* while searching for species in Bowles' monitoring plots and *Potamogeton pulcher*.

Horned beak rush was reported from Tamarack B by Lyon (1927). What might be "the largest population in Indiana" was found by Gerould Wilhelm on 28 August 1992 (unpublished report) in the Shirley Heinze Land Trust's McAllister Prairie off an unused road in the town of Beverly Shores. This population is north of the Keiser B subunit. Horned beak rush has the largest seed of our native *Rhynchospora* species.

Voucher Specimens:

Umbach s.n., 4 September 1897, Lake Co. (F)
Rowlett #1260, 13 August 1983, Porter Co. (F)
Klick #2757, 11 August 1987, Porter Co. (MOR)
Dritz #105, 13 July 1980, Porter Co. (MOR)

Rhynchospora nitens (Vahl) A. Gray [*Psilocarya nitens* (Vahl) Alph. Wood]

Deam (1940) reported short-beaked bald rush from Dune Park based on a specimen collected by Umbach in 1899. Deam may not have realized The Field Museum of Chicago had three specimens collected by Agnes Chase (one) and E. J. Hill (two) from when they must have joined forces with Levi Umbach on 18 August 1898. Swink and Wilhelm (1994) thought this species was probably extirpated from the Chicago Region; however, R. Hedge and E. Stork found it on 27 September 2012 in a swale near Little Lake in Cowles Dunes A. Later (2 October 2012), Hedge, Stork, Dan Mason, and Pavlovic also located this species in Little Lake (Hedge and Stork 2014). It is not as prevalent as *R. scirpoides* but is visibly different in color. Seen from afar, the inflorescences of this species tend to have a browner color than the grayer *R. scirpoides*. This species might be found wherever *R. scirpoides* grows.

Voucher Specimens:

Hedge & Pavlovic #12-10-02-135, 2 October 2012, Porter Co. (MOR)

Rhynchospora recognita (Gale) Kral [*Rhynchospora globularis* (Chapm.) Small var. *recognita* Gale]

Grass beak rush is known from Cowles Dunes, Tamarack, and Hoosier Prairie. Swink found this rush in Howes Prairie (Cowles Dunes B). Klick also found this species in 1987 noting that it grew with *Aletris farinosa*, *Calamagrostis canadensis*, *Eleocharis melanocarpa*, *Juncus marginatus*, and *Panicum virgatum*. Grass beak rush was reported from Tamarack by Peattie

(1930). With the Great Marsh as suitable habitat for this species, it may occur between Cowles Dunes and Tamarack. Perhaps it will be found as the Great Marsh restoration proceeds. According to Wilhelm (1990), this sedge was found at Hoosier Prairie A "by K. Dritz on 29 July 1984, when he found *Carex conoidea*, *Eleocharis wolfii*, and *Lycopodiella inundata*." On that date, grass beak rush was growing with *Alisma subcordatum*, *A. triviale*, *Euphorbia corollata*, *Houstonia caerulea*, *Juncus marginatus*, *Ludwigia alternifolia*, *Lysimachia lanceolata*, *L. terrestris*, *Osmunda regalis* var. *spectabilis*, *Packera paupercula*, *Rotala ramosior*, *Rudbeckia hirta*, *Viola lanceolata*, and *Xyris torta*. Bowles et al. (1985) mapped this population and listed the following associates: *Cyperus bipartitus*, *Eupatorium perfoliatum*, *Juncus canadensis*, *J. interior*, *Leersia oryzoides*, *Osmunda regalis* var. *spectabilis*, *Spartina pectinata*, *Symphyotrichum ericoides*, and *Thelypteris palustris* var. *pubescens*. Even though only one of five stems were collected, the plant did not return the next year and has not been seen since. Much of this area has been managed through mowing by Division of Nature Preserves staff in the last few years, and disturbance might allow the reappearance of grass beak rush.

Voucher Specimens:

Swink #1607, 27 July 1952, Porter Co. (F)
Klick #2745, 21 July 1987, Porter Co. (INDU)
Dritz #356, 29 July 1984, Lake Co. (MOR)

Rhynchospora scirpoides (Torr.) Grisebach [*Psilocarya scirpoides* Torr.]

Long-beaked bald rush is known from Inland Marsh, Cowles Dunes, Keiser, and Tamarack. The Field Museum of Chicago has numerous specimens collected from Dune Park on or after 1897 by E.J. Hill, A. Chase, and Levi Umbach. This rare rush is known from the Coulter Prairie in Inland Marsh B and is frequent in the area of Little Lake and the NIPSCO ponds in Cowles Dunes A. Associates include *Calamagrostis canadensis*, *Eleocharis obtusa*, *Euthamia graminifolia*, *Fimbristylis autumnalis*, *Hypericum boreale*, *Juncus canadensis*, *Ludwigia alternifolia*, *Lycopus uniflorus*, *Rhynchospora capitellata*, *Spiraea tomentosa* var. *rosea*, *Triadenum virginicum*, and *Viola lanceolata*. The population at Little Lake has been monitored by INDU (Bowles et al. 1986) and is associated with *Calamagrostis canadensis*, *Cephalanthus occidentalis*, *Dulichium arundinaceum*, *Fimbristylis autumnalis*, *Hypericum canadense*, *H. boreale*, *Juncus canadensis*, *Ludwigia alternifolia*, *Nuphar advena*, and *Sagittaria graminea*. Long-beaked bald rush is known from Tamarack solely based on the following comment by Lyon (1927): "wet interdunal meadow, Tamarack." This might be one of the locations in Beverly Shores found by Gerould Wilhelm on 28 August 1992, off Suzanne Road (unpublished report). Plampin collected a specimen in McAllister Prairie (Shirley Heinze Land Trust) north of Keiser B on 11 August 1994.

Voucher Specimens:

Dritz & Rowlatt #310, 7 August 1983, Porter Co. (MOR)
Dritz #365, 25 August 1984, Porter Co. (MOR)

Schoenoplectiella hallii (A. Gray) Lye [*Schoenoplectus hallii* (A. Gray) S.G. Sm.; *Scirpus hallii* A. Gray]

The new segregation of this species into the genus *Schoenoplectiella* is attributed to Shiels and colleagues (Shiels and Monfils 2012, Shiels et al. 2014). Hall's bulrush is known from Tolleston Dunes, Inland Marsh, Cowles Dunes, and Furnessville. Since Ken Dritz found this species at Coulter Prairie on 9 August 1981 in the Chicago Region, this rare annual bulrush has fluctuated in quantity. The six plants observed here in 1983 were not only the most seen in any year but also the last, until this species made a surprising comeback by producing three plants in 1989. Plampin has not found this species in that location since then. Hall's bulrush was associated with *Agrostis hyemalis*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Eleocharis elliptica*, *E. engelmannii*, *Fimbristylis autumnalis*, *Hypericum canadense*, *Juncus marginatus*, *J. scirpoides*, *Lindernia dubia*, *Lipocarpha micrantha*, *Ludwigia alternifolia*, and *Rotala ramosior*. This Coulter Prairie population has not been seen in the 21st century, but

the decades between 1997 and 2017 have included a series of dry years. During dry years, perennial competition will eliminate the above-ground population, but the plant will persist in the seed bank.

Pavlovic found Hall's bulrush in 1987 in a similar habitat but much larger mined depression, in wet sand about a mile to the west at Tolleston Dunes A in Lake County. The population at that site in 1989 was much larger than the Coulter populations, numbering hundreds of plants (Pavlovic, pers. obs.). Associates included *Bulbostylis capillaris*, *Fimbristylis autumnalis*, *Juncus* sp., and *Lythrum salicaria*. In 2003, this species was growing with *Agalinis purpurea* var. *parviflora*, *Ageratina altissima* var. *altissima*, *Euthamia gymnospermoides*, *Fimbristylis autumnalis*, *Linum virginianum*, *Panicum rigidulum*, *P. virgatum*, and *Symphyotrichum dumosum*. Other populations appeared here in subsequent years (Plampin and Hamilla 2008a, 2008b) throughout the eastern half of the wetland. Pamplin and Hamilla noted that minimal *Phragmites* invasion at the time may increase to become a threat to Hall's bulrush. In Cowles Dunes A and B, Ken Dritz suggested there would be hundreds of plants, especially since hundreds were reported in five patches just to the north in the Dune Acres playground and soccer field (Dritz, pers. comm. with Plampin, 1991). Subsequent town park mowing may have eliminated this population, although it may still be present in the seed bank. Plants appeared abundantly in 2009, and Plampin was able to protect part of the population from mowing; however, only one of the five patches reappeared that year. Given the abundance of this annual in the wet meadows of Dune Acres, this species might be found in Cowles Dunes A and B in INDU.

Pavlovic found Hall's bulrush in Furnessville in 1987. There, it grows in a former sand mine around Olson's Pond in Furnessville F, east of 50 East Road where there were thousands of plants in 2007. In 2008, only three plants were found (Plampin and Hamilla 2008a). In 2017, Roger Hedge, Emily Stork, and Pavlovic searched unsuccessfully for this species. According to Sarah Pavlovic, expansion of a willow patch in this area may be contributing to the failure of *S. hallii* to appear, a point made previously by Plampin and Hamilla (2008a). In 2022, Scott Namestnik, Carie Satowski, and Pavlovic found more than 50 plants growing at the west end of Olson's pond. Jerry and Carol Baskin (2003) were able to show that seed germination in this species is triggered by the chemical ethylene that is released by rotting organic matter during water level drawdowns. Reznicek (Voss and Reznicek 2012) points out that this species produces cleistogamous flowers at the base of the sheaths besides those in the main stem that are visible.

Voucher Specimens:

Pavlovic #167, 29 July 1987, Lake Co. (MOR)
Dritz et al., #231, 9 August 1981, Porter Co. (MOR)
K. Quinlan s.n., 12 September 2003, Lake Co. (INDU)
Hamilla 2619, 26 August 2010, Porter Co. (INDU)
Plampin s.n., 9 August 1991, Porter Co. (MOR)
Pavlovic #203, 14 October 1993, Porter Co. (MOR)

Schoenoplectiella purshiana (Fernald) Lye [*Schoenoplectus purshianus* (Fernald) M.T. Strong; *Scirpus purshianus* Fernald]

Pursh's tufted bulrush is reported from West Beach, Cowles Dunes, Furnessville, Keiser, and Tamarack. Wilhelm (1990) wrote,

> *It is closely related to* Scirpus smithii A. Gray [now *Schoenoplectiella smithii* (A. Gray) Hayasaka], *with which it has been confused by local practitioners; Lyon (1927) reported it from Goose Lake,* [not in the Lakeshore, and long ago obliterated] *and numerous specimens from the Lakeshore have been named* S. smithii. *All of the Lakeshore material which I have seen, however, has the stout bristles and sculptured achenes of* S. purshianus, *to which element I am referring our material. The only place in the Chicago Region where*

we have determined S. smithii *is at Beulah Bog in Walworth County, Wisconsin*. [See *Schoenoplectiella smithii* abstract.]

Ken Dritz found a population of this bulrush on 1 September 1986 along the north shore of Long Lake in West Beach B (Wilhelm 1990). This species is frequent in drawdown periods at Little Lake and Blag Slough in Cowles Dunes A, where it grew with *Cephalanthus occidentalis*, *Dulichium arundinaceum*, *Eleocharis obtusa*, *Juncus canadensis*, *Nuphar advena*, *Persicaria hydropiperoides*, *Pontederia cordata*, *Proserpinaca palustris*, and *Typha angustifolia* (Pavlovic et al. 2009a). Plampin found one plant in a sedge meadow south of Dune Acres (Cowles Dunes B) on 27 August 1995, growing with *Agalinis* spp., *Fimbristylis autumnalis*, *Juncus canadensis*, *Rhynchospora capitellata*, and *Viola lanceolata*. Plampin found this species in Furnessville F in July 1994. There was a small population of this species along the south side of the Calumet Bike Trail in Keiser D, but it may have been eliminated by the bike trail renovation in 2003. Pursh's tufted bulrush was reported from Tamarack B by Lyon (1927) but may now be locally extinct. This species, as with the preceding and following, was moved to the genus *Schoenoplectiella* (Shiels and Monfils 2012, Shiels et al. 2014).

Voucher Specimens:

Dritz #363, 25 August 1984, Porter Co. (MOR)
Fox #959, 13 October 1983, Porter Co. (INDU)
Pavlovic #114, 2 October 1984, Porter Co. (MOR)
Plampin #5-1992, 26 August 1994, Porter Co. (MOR)

Schoenoplectiella smithii (A. Gray) Hayasaka [*Schoenoplectus smithii* (A. Gray) Sojak; *Scirpus smithii* A. Gray]

Like *S. hallii* and *S. purshianus*, this nomenclature is attributed to Shiels and colleagues (Shiels and Monfils 2012, Shiels et al. 2014). Smith's tufted bulrush is known from Miller Woods, West Beach, and Cowles Dunes. Carie Satkoski found Smith's tufted bulrush on a floating mat of wild rice in a pond in Miller Woods, growing with *Eleocharis intermedia* and possibly *Riccea fluitans*. While immature, the bristles were not widened at the base, and the upper leaf was straight rather than slightly bent, as it would be in *S. purshiana*. While Smith's tufted bulrush has been considered absent from the Indiana Dunes (see *S. purshiana* above), P. Rothrock verified a specimen collected by S. Namestnik from West Beach B (see specimen cited below). On 9 September 2017, Roger Hedge and Nathanael Pilla found Smith's tufted bulrush growing with a *Utricularia gibba* floating mat in Little Lake (Cowles Dunes A). This species is less common in the Dunes than *S. purshiana*.

Voucher Specimens:

Namestnik #1646, 6 October 2012, Porter Co. (MOR)
Hiebert #453, 11 July 1984, Porter Co. (MOR)
Bowles #608, 17 July 1984, Porter Co. (MOR)

Schoenoplectus subterminalis (Torr.) Sojak [*Scirpus subterminalis* Torr.]

Water bulrush was reported from West Beach based on a specimen collected by Charles Deam on 16 September 1930. Wilhelm and Rericha (2017) report that *Utricularia purpurea* is a consistent associate of this bulrush in the eastern sector of the greater Chicago Region. We have no modern reports for water bulrush. As noted by Rothrock (2009), this bulrush prefers soft water lakes (pH = 7.4) with alkalinity below 40 ppm and sulfur below 5 ppm in Minnesota (Moyle 1945).

Voucher Specimens:

Deam # 49821, 16 September 1930, Porter Co. (IND)

Scirpus expansus Fernald

This state endangered species, woodland bulrush, was found as a new state record along the NIPSCO right-of-way in DSP B by Gerould Wilhelm in 1994. A small patch was found in the NIPSCO right-of-way of Keiser D by Plampin on 20 September 1995 (see specimen cited

below). There may still be isolated patches within the NIPSCO right-of-way according to a report from Pam Benjamin to Plampin in July 1995.

Voucher Specimens:
Plampin #1-1994, 20 September 1995, Porter Co. (INDU)

Scirpus georgianus R.M. Harper
Bristleless dark green bulrush is known from Cowles Dunes, Keiser, and Tamarack. It was found by Hamilla and Plampin in a wetland in Dune Acres parkland south of the town proper (Cowles Dunes B) on 16 August 2010. Rericha and Wilhelm collected a specimen along the Calumet Bike Trail east of Mineral Springs Rd (Cowles Dunes B) (see specimen cited below).

Bristleless dark green bulrush was found in a wetland in Dunewood Campground (Keiser F) by Gerould Wilhelm, Plampin, and Myrna Newgent on 11 September 1997. Nathanael Pilla found it growing in the Great Marsh north of the Calumet Bike Trail in Tamarack B. *Scirpus georgianus* is rare in northern Indiana (Rothrock 2009).

Voucher Specimens:
Rericha and Wilhelm #4080, 4 August 2011, Porter Co. (MOR)

Scirpus hattorianus Makino
Early bulrush was first described from specimens collected in Japan, where it was introduced from North America (Rothrock 2009). Wilhelm (1990) found this species, which is similar to *S. atrovirens*, growing in Cowles Dunes and the DSP (see 1976 specimen listed below).

Voucher Specimens:
Wilhelm, Rowlett & Wilhelm #2391, 19 June 1976, Porter Co. (MOR)
Wilhelm & Rericha #22935, 13 June 2004, Porter Co. (MOR)

Scirpus polyphyllus Vahl
Deam (1940) excluded leafy bulrush from the northern half of Indiana, and Swink and Wilhelm (1979) believed the species was extirpated from the Chicago Region. Later, Swink and Wilhelm (1994) included this species in the Chicago flora based on their discovery of specimens collected by Mohlenbrock in 1963 and 1978 from Evanston, Illinois. Peattie (1930), however, reported it from Mineral Springs and went on to say that it was occasional eastward from there. Wilhelm (1990) postulated that Peattie's reports were based upon misidentified variants of *Scirpus atrovirens*, but his own descriptions may be of *Scirpus polyphyllus*. If Peattie secured any specimens, they have either been referred to as a different species, or they remain remote from the major herbaria. Peattie may have been paraphrasing Pepoon, who had made similar comments about this species three years earlier.

In 2013, Molly Hacker found this species in the Cowles Bog Wetland Complex (Cowles Dunes A) within the wet prairie and sedge meadow area of the Lake Plain Wet-Mesic Prairie Restoration being conducted by Dan Mason and crew. The specimen was verified by Dan Mason, Pavlovic, and Tony Reznicek.

Voucher Specimens:
Hacker s.n., 12 August 2013, Porter Co. (INDU)

Scleria muehlenbergii Steud.
Slender-stalked nut rush was collected from Dune Park by Levi Umbach between 1898 and 1903. We have no modern records for this species. It is likely extirpated, but might be found in Cowles Dunes, especially since a northeast portion of Goose Lake persists, if only marginally, southwest of Blag Slough. According to Wilhelm and Rericha (2017), *S. muehlenbergii* has sculpted, hairy achenes that distinguish it from *S. pauciflora*, *S. reticularis*, and *S. verticillata*. However, the species is consistently distinguished by its three-lobed hypogynium (structure at base of achene), reticulation on the seed, and branching

inflorescence with downward-facing branches irrespective of glabrous or hairy condition of the achenes (Flora of North America Editorial Committee 2002, Rothrock 2009, Smith 2018). Smith (2018) warns that this species can be difficult to find, as it often grows among *S. reticularis*.

Scleria pauciflora Muhl. ex Willd. var. *caroliniana* (Willd.) Alph. Wood

Few-flowered nut rush is reported from Miller, Inland Marsh (Coulter Prairie), Furnessville, and Tamarack. Deam (1940) noted this rush was found in 'Miller,' but it has not been found in Miller Woods proper. Gerould Wilhelm found it in Inland Marsh B in 1998 (unpublished report). Several specimens at the Field Museum of Chicago were collected at Dune Park by E.J. Hill and Agnes Chase between 1898 and 1903. Plampin and Hamilla (2008a) found few-flowered nut rush in Furnessville B on 10 October 2007, southeast of the Bowles and DeMauro *Epigaea repens* plot at the Pitcher Prairie south of Furnessville Road E. Associates included *Carex umbellata*, *Eleocharis* sp., *Fimbristylis autumnalis*, *Juncus marginatus* (doubtful identification?), *Gaylussacia baccata*, *Pteridium aquilinum*, *Quercus velutina*, *Rynchospora capitellata*, *Scleria triglomerata*, and *Vaccinium* spp. (Plampin and Hamilla 2008b). E.J. Hill collected a specimen from a sandy field at Furnessville in 1903, but the location information does not specify whether this was collected within INDU or at Furnessville. Bowles made the first discovery of this plant in the Indiana Dunes in Tamarack D in 1986. There it was growing with *Gentiana saponaria*, *Liatris aspera*, *Schizachyrium scoparium*, *Solidago rugosa*, and *Sorghastrum nutans*.

Voucher Specimens:

Bowles s.n., 14 October 1986, La Porte Co. (MOR)

Scleria reticularis Michx.

Netted nut rush is known from Inland Marsh, Cowles Dunes, and Keiser. This rare nut rush is known from Inland Marsh A, from the collection by Klick (#2759, MOR), and from Rowlett's collection at Coulter Prairie (see specimen cited below) (Inland Marsh B). Until netted nut rush was found at Little Lake (Cowles Dunes A) by Ken Dritz on 19 September 1984, this species was historically known only from Goose Lake, where it was collected by Levi Umbach, E.J. Hill, and Agnes Chase between 1897 and 1899, and by Bennet in 1959 (Mud Lake). Bowles et al. (1985) listed associates from Little Lake and two swales in Blag Slough: *Cephalanthus occidentalis*, *Drosera rotundifolia*, *Dulichium arundinaceum*, *Eleocharis palustris*, *Hypericum boreale*, *Juncus canadensis*, *Proserpinaca palustris*, *Rhynchospora capillacea*, *R. macrostachya*, and *R. scirpoides*. The fact that *Drosera intermedia* and *Rhynchospora capitellata* are so frequent with *Scleria reticularis* at Little Lake caused Wilhelm (1990) to question the authenticity of their respective cousins in the preceding association list. Pavlovic found netted nut rush associated with *Hypericum boreale* and *Panicum verrucosum* (see specimen listed below). Lois Howes found a population of this species in Cowles Dunes B growing with *Drosera intermedia* and *Rhynchospora capitellata*. Plampin found perhaps the same population on 30 September 1994. Plampin later found a population of this rush at McAllister Prairie (SHLT) on 13 September 2002, within Beverly Shores and north of INDU.

Voucher Specimens:

Rowlatt #1262, 13 August 1983, Porter Co. (MOR)
Dritz #322, 25 September 1983, Porter Co. (MOR)
Pavlovic #107, 25 September 1984, Porter Co. (MOR)

Scleria verticillata Muhl. ex Willd.

Low nut rush is known from Miller Woods, West Beach, and Furnessville. It is still common, though may be overlooked due to its diminutive size, in the wet calcareous sands of Miller Woods (A and C). This species is apparently confined to the panne communities of West Beach A and D, though the habitat may also be present in C and E. Low nut rush was reported from Furnessville F by Plampin on 3 September 1994.

Voucher Specimens:

Steyermark #65005, 14 September 1947, Lake Co. (MOR)
Wilhelm #6987, 23 September 1979, Lake Co. (MOR)
Wilhelm #6830, 11 June 1979, Porter Co. (MOR)

ERIOCAULACEAE — Pipewort Family

Plants in the pipewort family are aquatic or marsh herbs. They are caespitose perennial herbs with linear, basal, grass-like leaves. They have naked scapes that are sheathed at the base and terminated by a dense flowering head. Flowers are mostly monoecious, having two to three sets of parts. The family is found mostly in the tropics, but a few species are found in temperate zones. Sixteen and five species of *Eriocaulon* and *Lachnocaulon*, respectively, are found in North America.

Eriocaulon aquaticum (Hill) Druce [*Eriocaulon septangulare* Withering]

If choosing to separate the North American species from the Eurasian, then the North American species is *E. pellucidum* Michx. Pipewort was formerly known from Goose Lake in the Central Dunes of Dune Park and from the shore of Little Lake (Cowles Dunes A), as reported by Lyon (1927). Swink and Wilhelm (1994) record the following two sets of associates: *Bolboschoenus fluviatilis*, *Drosera intermedia*, *Eleocharis flavescens* var. *olivacea*, *Fimbristylis autumnalis*, *Fuirena pumila*, *Hypericum boreale*, and *Rhynchospora scirpoides*; and *Calamagrostis canadensis*, *Cephalanthus occidentalis*, *Ludwigia alternifolia*, *Pontederia cordata*, and *Rhynchospora capitellata*. Goose Lake, also called Mud or Walker Lake, was filled and built over when the NIPSCO power plant construction started in 1959 and Bethlehem Steel Mill construction began in 1963 (Engel 1983, Franklin and Schaeffer 1983). It is possible this plant may still grow in Blag Slough or in Little Lake.

Voucher Specimens:

Lamp #273, 18 August 1958, Porter Co. (MOR)
Hill #170.97, 30 August 1897, Porter Co. (F)

IRIDACEAE — Iris Family

Plants of the iris family are characterized by flat vertical leaves and bracts and their often-classic fleur-de-lis flower structure. This family is the source of many ornamental plants including irises, crocus, gladioli, and freesias (these last two flowers are from the Cape Floral region of South Africa (Fraser and Fraser 2011)). Plants from this family are perennial herbs that arise from bulbs, corms, or rhizomes. The flowers have petaloid sepals and petals, three stamens, and a single pistil composed of three fused carpels with a trifid style. The spice saffron comes from the stamens of *Crocus sativus*. The genus name *Iris* means "rainbow" in Greek.

Sisyrinchium angustifolium Mill.

Stout blue-eyed grass is reported from Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, and Hoosier Prairie. Wilhelm (1990) found this species at Coulter Prairie (Inland Marsh B) between 26 June and 6 July 1998. It is extant in several locations across Cowles Dunes B. Stout blue-eyed grass grows along the subdunal trail north of Cowles Dunes A. Bowles et al. (1985) recorded it from two locations along the NIPSCO right-of-way east of Mineral Springs Road and from an abandoned homesite area west of Waverly Road in Cowles Dunes B. Stout blue-eyed grass was first reported by Lyon (1927) and may be extant within the savanna complex of the DSP or Tremont area: "subdunal woods, Tremont, Mineral Springs." R. M. Tryon collected a specimen in the DSP in 1936. Richard Johnson and Plampin reported stout blue-eyed grass from Furnessville G on 1 September 1994. Wilhelm (1990) noted that "According to Bergendahl (1983), this species grows along the Bike Trail east of Kemil Road near NIPSCO transmission tower #8427 in Keiser D." It was

reported from Keiser B by Daniel Mason (NPS) and Tonkovich in the summer of 2000. The only record for this species at Hoosier Prairie A is John Bacone's 1988 list (Wilhelm 1990).

Voucher Specimens:

Otto #76, 2 August 1982, Porter Co. (MOR)
Tryon # 2605, 24 June 1936, Porter Co. (F)

Sisyrinchium atlanticum E.P. Bicknell

Eastern blue-eyed grass is known from Inland Marsh, Cowles Dunes, DSP, and Furnessville. It grows in the wet sands of the marsh complex in Inland Marsh A. Lyon (1927) reported this species from "subdunal woods, Mineral Springs." It is extant in the Howes Prairie in Cowles Dunes B and from Cowles Dunes A. In Howes Prairie (Cowles Dunes B), it was growing in the mesic prairie with *Carex* spp., *Comandra umbellata*, *Oenothera* spp., *Pedicularis* [*canadensis*], and *Salix humilis* (Hess specimen below). Eastern blue-eyed grass is known from the DSP based on the comment by Peattie (1930): "A rare and pretty plant, wet swales, Tremont and elsewhere back of the high dunes." These sightings might have been in the Furnessville Unit.

Voucher Specimens:

Wilhelm #6830, 11 June 1979, Porter Co. (MOR)
Hess et al. #5937, 103 June 1984, Porter Co. (MOR)

HYDROCHARITACEAE — Frog's Bit Family [includes Najadaceae from Swink and Wilhelm (1994)]

Plants in the Frog's bit family are aquatic freshwater and marine herbs that may be used in the aquarium trade. Most species typically have submersed, ribbon-like leaves, except for *Elodea*. *Najas* was formerly placed in the Najadaceae family in Swink and Wilhelm (1994).

Najas guadalupensis (Spreng.) Magnus

A specimen of southern naiad was found in Long Lake (West Beach) by Gerould Wilhelm and Norman Henderson in September 1979. Little is known about the abundance of this species at INDU. Both the typical form and the subspecies *N. guadalupensis* ssp. *olivacea* (Rosend. & Butters) Haynes & C.B. Hellquist may be present in the area (Wilhelm and Rericha 2017).

Voucher Specimens:

Wilhelm & Henderson #6970, 13 September 1979, Porter Co. (MOR)

JUNCACEAE — Rush Family

Rushes are wetland plants that have basal tufted leaves and reduced and inconspicuous flowers that are enclosed in bracts. The flowers have six tepals composed of look-alike sets of three sepals and three petals. The six or three stamens alternate with the tepals and surround the single, three-carpellate pistil. The rushes are used in basketry, chair seat construction, and in floor covering. The pith of some species has been used for candle wicks.

Juncus arcticus Willd. var. *balticus* (Willd.) Trautvetter [*Juncus balticus* Willd. var. *littoralis* Engelm.]

Baltic rush is known from Miller Woods A to E; West Beach A, B, and D; Inland Marsh A and B; Cowles Dunes B; DSP, Tamarack C; and Pinhook Bog B. It grows in moist sands and swale margins. At West Beach A, it is associated with *Potentilla anserina*. Baltic rush is rare in low swales at Howes Prairie in Cowles Dunes B. It is listed as an associate of *P. anserina* at the pannes at Beach House blowout (Bowles et al. 1985) in DSP. The DSP population may have been destroyed by sand burial when lake levels were high in the late 1980s. This species grows in the pannes at Crescent Dune in Tamarack C. At Pinhook Bog B, it grows in the

marginal waters and moats at the west end of the bog (Wilhelm 1990). Wilhelm and Rericha (2017) note that Baltic rush recently appeared in salt-impacted areas throughout the Chicago Region.

Voucher Specimens:
Swink #99799, 4 May 1946, Porter Co. (MOR)
Wilhelm #33381, 3 August 1978, Lake Co. (MOR)
Wilcox #59, 7 July 1982, La Porte Co. (INDU)

Juncus articulatus L.
Jointed rush is known from Cowles Dunes and Tamarack. According to Wilhelm (1990), "This species was unknown from the Chicago Region until the summer of 1989, when, on 20 July, Ken Dritz and Marlin Bowles found a small colony east of Mineral Springs Road, along the bike trail at pylon 8404" (Cowles Dune E). There it grew with *Agrostis gigantea*, *Andropogon gerardii*, *Centaurium pulchellum*, *Cyperus strigosus*, *Daucus carota*, *Juncus tenuis*, *J. torreyi*, *Lycopus uniflorus*, *Panicum virgatum*, *Poa compressa*, *P. pratensis*, *Salix discolor*, *S. nigra*, and *Solidago altissima*. A few days later, Ken Dritz found several colonies of this species on the Illinois side of Wolf Lake, where one of its associates was the closely related *Juncus alpinoarticulatus*. Plampin and Lydia Miramontes moved plants from the center of the bike trail (near pylon 8404) before NIPSCO installed its new natural gas pipeline in 2017. This species also grows in the seepage zones of Crescent Dune (Tamarack C).

Voucher Specimens:
Dritz #694, 22 July 1989, Porter Co. (MOR)

Juncus diffusissimus Buckley
Until this southern species was found by Sandy O'Brien in Miller Woods C, there were no records of slim-pod rush from northern Indiana (Deam 1940) or the Chicago Region (Swink and Wilhelm 1979). Recent attempts to locate the plant have been unsuccessful.

Because the single specimen upon which the record is based contains only a fraction of the rootstock, the plant might have persisted after a portion was collected. Speculation on its local nativity may arise, but rushes can be overlooked. A more recent collection comes from the Illinois portion of the Chicago Region (Wilhelm and Rericha 2017).

Voucher Specimens:
O'Brien #1323, August 1984, Lake Co. (INDU)

Juncus militaris Bigelow
Soldier rush was collected in the Central Dunes (Dune Park) region by Floyd Swink and then Bennett in 1950 and 1955, respectively. It had never been documented from the national park lands until found by Daniel Mason (NPS) in Little Lake in the Cowles Dunes A Unit in 1999. Soldier rush was known from Goose Lake (destroyed due to filling and the construction of the steel mill and the NIPSCO Bailly Generating Station). Morphologically, the rootstock is similar to *Eleocharis*. Dan Mason's specimen (cited below) was tentatively identified as *Eleocharis equisetoides*, but in February 2011 Gerould Wilhelm took Dan's specimen to Tony Reznicek at the University of Michigan Herbarium, who identified it as *Juncus militaris*. The extent and condition of the Little Lake population is unknown due to failure to relocate it.

Voucher Specimens:
Swink #1418650, 6 August 1950, Porter Co. (F)
Mason #229, 2 September 1999, Porter Co. (INDU)

Juncus pelocarpus E. Meyer
Brown-fruited rush is reported from Miller Woods, West Beach, and Cowles Dunes. Wilhelm (1990) wrote,

I have not seen this species here [Miller Woods]*, though I and others have seen it*

elsewhere in the Lakeshore and at Chamberlain Lake near South Bend in St. Joseph County. Krekeler (1981) gave this species a "stratum rank" of 7 in Miller Woods A, but he does not list any of the common Juncus *species which are there and might be mistaken for* J. pelocarpus.

Brown-fruited rush still grows along the north shore of Long Lake (West Beach B), where Pepoon, 96 years ago, reported it and implied that it was common. Associates at this site included *Bidens cernua*, *B. comosa*, *Cyperus diandrus*, *Lythrum salicaria*, *Fimbristylis autumnalis*, and *Eleocharis acicularis*. According to Wilhelm (1990), "This species was unknown from Cowles Dunes until Bowles et al. (1986) first recorded it from Little Lake." The associates included *Cephalanthus occidentalis*, *Cladium mariscoides*, *Dulichium arundinaceum*, *Hypericum boreale*, *Juncus brachycephalus*, *Ludwigia sphaerocarpa*, and *Rhynchospora scirpoides*. Brown-fruited rush is occasional at Little Lake where it grows with *Juncus canadensis*.

Voucher Specimens:

Umbach s.n., 15 August 1896, Lake Co. (F)
Dritz #164, 11 September 1980, Porter Co. (MOR)
Edwards #7, 1 October 1987, Porter Co. (INDU)

Juncus scirpoides Lam.

Round-headed rush is known from Miller Woods, Tolleston Dunes, West Beach, Inland Marsh, Bailly, Cowles Dunes, Furnessville, and Keiser. Round-headed rush is infrequent along swales in Miller Woods B, C, and F. According to Bowles et al. (1985), it grows in Miller Woods B in an area of "mid-successional prairie vegetation in a sand pit" with *Coreopsis tripteris*, *Cyperus bipartitus*, *Dichanthelium depauperatum*, *Equisetum arvense*, *Eupatorium perfoliatum*, *Fragaria virginiana*, *Juncus effusus*, *J. interior*, *Liparis loeselii*, *Panicum virgatum*, *Rhynchospora capillacea*, *Rudbeckia hirta*, *Sabatia angularis*, *Salix myricoides*, *Schizachyrium scoparium*, and *Symphyotrichum ericoides*. Bowles (1989) suggested that trail development north of the Douglas Center may have obliterated the Miller population. Round-headed rush grows in the southeast portion of Tolleston Dunes A, where it grows with *Cyperus lupulinus* ssp. *lupulinus*, *Eleocharis flavescens* var. *olivacea*, *Equisetum hyemale* ssp. *affine*, *Juncus alpinoarticulatus*, *Panicum virgatum*, *P. villosissimum*, *Populus tremuloides*, and *Salix myricoides* in a sand pit (Bowles et al. 1985). Scott Namestnik and Plampin found this species in the panne nearest to Lake Michigan in West Beach D on 21 August 2006. Round-headed rush is known from Inland Marsh B in a sand savanna, where it grew with *Salix myricoides* and *Scirpus cyperinus*. This rush is also reported from Mnoke Prairie (Bailly D) by Pam Benjamin in 1996, growing with *Bulbostylis capillaris*, *Carex muehlenbergii*, *Coreopsis palmata*, *Cyperus lupulinus* ssp. *lupulinus*, *C. schweinitzii*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Eragrostis spectabilis*, *Eupatorium perfoliatum*, *Euphorbia corollata*, *E. supina*, *Fallopia convolvulus*, *Fragaria virginiana*, *Crocanthemum canadense*, *Helianthus occidentalis*, *Hieracium gronovii*, *Hypericum kalmianum*, *Juncus greenei*, *Lechea mucronata*, *Lespedeza capitata*, *Liatris aspera*, *Ludwigia alternifolia*, *Monarda punctata* var. *villicaulis*, *Nuttallanthus canadensis*, *Nyssa sylvatica*, *Panicum virgatum*, *Poa compressa*, *Polygala polygama*, *Polygonum tenue*, *Populus deltoides*, *P. grandidentata*, *P. tremuloides*, *Potentilla simplex*, *Pseudognaphalium obtusifolium*, *Rosa carolina*, *Rumex acetosella*, *Salix myricoides*, *Schizachyrium scoparium*, *Scirpus cyperinus*, and *Symphyotrichum dumosum*. Round-headed rush is occasional in wet sands throughout the Cowles Dunes Unit. Bowles et al. (1985) recorded the following associates from the NIPSCO right-of-way in the vicinity of NIPSCO transmission tower #8404: *Asclepias incarnata*, *Carex intumescens*, *C. lanuginosa*, *C. scoparia*, *Cirsium muticum*, *C. vulgare*, *Eupatorium perfoliatum*, *Juncus canadensis*, *J. interior*, *Lycopus americanus*, *Onoclea sensibilis*, *Oxalis stricta*, *Panicum agrostoides*, *P. clandestinum*, *P. virgatum*, *Solidago altissima*, *S. graminifolia* var. *nuttallii*, *Stachys pilosa* var. *pilosa*, and *Thelypteris palustris* var. *pubescens*. This species was reported from DSP in 1957. Plampin found round-headed rush growing with *Eleocharis melanocarpa* south of U.S. 12 and east of 50 E. Main, north of Olson

Pond in Furnessville F on 24 October 1993. Plampin also found this species in Keiser E on 24 October 1993 and suggests this plant might be found in the Keiser F campsites.

Voucher Specimens:

O'Brien s.n., Fall 1984, Lake Co. (MOR)
Fox #77, 10 August 1984, Lake Co. (INDU)
Dritz #145, 11 August 1980, Porter Co. (MOR)
Dritz #140, 11 August 1980, Porter Co. (MOR)
Bennett s.n., 25 August 1957, Porter Co. (F)

JUNCAGINACEAE — Arrowgrass Family

Plants in the arrowgrass family are rush-like plants of fresh and saltwater marshes. The leaves are basal or cauline and linear. The three sepals and petals are of similar form. There are three stamens and three to six, sometimes partially fused, pistils. Some species of *Triglochin* produce hydrogen cyanide.

Scheuchzeria palustris L. [*Scheuchzeria palustris* L. var. *americana* Fernald]
Arrowgrass is known from Tamarack and Pinhook Bog. It is listed for Tamarack B based on the report by Peattie (1930). It is likely now locally extinct. First collected in Pinhook Bog B by Deam in 1929, it has not been found in the area since then. Arrowgrass has not been found in Pinhook Bog since Dan Mason (NPS botanist) began shrub management in 2007–2008.

Voucher Specimens:

Deam #47796, 15 September 1929, La Porte Co. (IND)

LILIACEAE — Lily Family

This easily recognized plant family has flowers with six tepals composed of three sepals and three petals of similar form. Six stamens are free or adnate to the tepals and surround the single, tricarpellate pistil. Lilies are widely cultivated and prized by gardeners. The remaining eastern North America genera in the family are *Erythronium* and *Lilium*. *Aletris farinosa* is now in the Nartheciaceae, *Allium* is now in the Alliaceae, *Clintonia* is in the Convallariaceae, *Trillium* is in the Trilliaceae, and *Uvularia* is in the Colchicaceae (Angiosperm Phylogeny Group 2009, Chase et al. 2009, Wilhelm and Rericha 2017).

Lilium philadelphicum L. [*Lilium philadelphicum* var. *andinum* (Nutt.) Ker Gawl.]
Prairie lily is known from Miller Woods, Cowles Dunes, and Hoosier Prairie. Agnes Chase collected a specimen in 1902 from Dune Park (Consortium of Midwest Herbaria 2021). More recently it has been seen in a marshy swale in Miller Woods E, but it may grow in B and C as well. Lyon (1927) reported a "few dozen plants in an interdunal meadow at Port Chester." This interdunal meadow is Howes Prairie (Cowles Dunes B). The plant is extant here, and it grows with *Castilleja coccinea*, *Houstonia caerulea*, *Hypoxis hirsuta*, *Liatris spicata*, *Platanthera lacera*, *Salix humilis*, *Scleria triglomerata*, and *Spiranthes cernua*. Pavlovic has seen this population decline over three decades. Prairie lily also grows in the Lupine Lane Prairie in Cowles Dunes B. Here, the number of plants fluctuates from year to year (Plampin, pers. obs., 1985–2015). Later, in his 1930 revision, Marcus Lyon reported another population "on a wooded dune at Mineral Springs." Presumably this population was somewhere in Cowles Dunes A. This lily is occasional in the mesic swales in the better portions of the Hoosier Prairie A (Wilhelm 1990).

Voucher Specimens:

Chase #1862, 4 July 1902, Porter Co. (F)
Hiebert #7, 1 July 1981, Porter Co. (MOR)

NAJADACEAE — Naias Family [now included in Hydrocharitaceae]

NARTHECIACEAE — Asphodel Family

The genus *Aletris*, formerly part of Liliaceae, is the only representative of this family in our area. The flowers are covered in small white scales (see below).

Aletris farinosa L.

Colicroot is found in Miller Woods A, B, C, and E; Inland Marsh A and B; Cowles Dunes A and B; DSP A; Furnessville A, B, and D; Keiser D; and occasionally at Hoosier Prairie A. It is typically found in mesic prairies, and it is abundant at Howes Prairie (Pine Lane Prairie in Cowles Dunes B). Pavlovic observed that the abundance of colicroot diminished in the mesic prairie after the extreme flooding in 2009. The species name "*farinosa*" refers to the flour-like "bloom" that covers the tepals. This species is never abundant and may benefit from occasional surveys to document its occurrence in the Dunes.

Voucher Specimens:

Lyon #92745, 2 July 1922, Porter Co. (BUT)
Hiebert #31, July 1981, Porter Co. (INDU)

ORCHIDACEAE — Orchid Family

The Orchid family is considered the most advanced plant family in the Monocotyledonae and is one of the largest of all plant families worldwide (Cronquist 1988). Orchids are well known for their elaborate and scented flowers that have coevolved with insects and birds to foster the dispersal of pollinia (pollen sacs). Most cultivated species are from the tropics. Orchids also possess dust-like seeds that lack the nutritive tissue (endosperm) required for germination and establishment. Germination of orchid seeds requires the presence of certain fungi (mycorrhizae) to provide sustenance to the embryo. As a result of the mycorrhizal symbiosis, many species are difficult to cultivate or transplant. Many species, including saprophytic orchids, obtain most of their nutrition from the fungal species and decaying organic matter, and therefore lack chlorophyll and the ability to photosynthesize. Some species exhibit dormancy and can persist underground without photosynthesis and emerge to bloom only under favorable conditions. If conditions are unfavorable, their flower buds can abort (Case 1987). These life history traits can result in widely fluctuating populations from year to year. The best-known use of orchids, besides cultivation for aesthetic appreciation, is the extraction of vanilla flavoring from the orchid *Vanilla planifolia* (Lawrence 1951).

Aplectrum hyemale (Muhl. ex Willd.) Torr.

Putty root is known only from the DSP, where Valdemar Schwarz first reported "more than 50 plants" of this species near The Pinery on 7 November 1981. He showed Floyd Swink about a half-dozen plants from this population on 21 May 1989. In 1989, Plampin reported "100+ plants at this location and farther east earlier in the season" (Wilhelm 1990). She noted that most of the putty root plants grew near *Liriodendron tulipifera* and *Packera aurea* (Plampin, pers. obs., 1989). This species grows as a single basal leaf from the autumn until the spring, when it withers before the inflorescence emerges and blooms. The common name putty root is derived from the mucilaginous roots (Homoya 1993). No specimen from Porter County has been collected due to its rarity in the dunes.

Calopogon tuberosus (L.) Britton, Sterns & Poggenburg var. *tuberosus* [*C. pulchellus* (Salisb.) R. Br.]

Grass pink is known from Cowles Dunes, Tamarack, Hoosier Prairie, and Pinhook Bog units. Grass pink has been reported from both Cowles Dunes A and B, though Gerould Wilhelm did not see it in either area (Wilhelm 1990, Cook 1999). The earliest specimens were collected by Marcus Lyon in 1922 and 1923. Gerould Wilhelm believes that with the

reintroduction of fire, grass pink will reappear. Lyon (1927) considered this orchid locally common at Mineral Springs, and the INDU herbarium has specimens possibly collected by J. A. Nieuwland from "Ind. Dunes" on 14 July 1929. Wilhelm (1990) noted that grass pink was reported by Lyon (1927) as having grown along the ditch by the CSSSBR near Tamarack A and predicted that grass pink is now extirpated from that location. Grass pink is frequent in the wetter areas of Hoosier Prairie A after prescribed burns (Wilhelm 1990). Grass pink is rare at Pinhook Bog B, east of Wozniak Road. It has not been seen recently, but could reappear given shrub thinning that has occurred there since 2007.

See Homoya (1995) for a lengthy description of how pollination is achieved by deception in this orchid that, unlike most others, has its lip exposed on top. Research has shown that, despite the absence of nectar production, grass pink still gets pollinated and consequently, reproductive success increases with inflorescence size (Firmage and Cole 1988). However, fruit-set does not increase with inflorescence size because of sequential flowering and limits on resources available to the plants.

Voucher Specimens:

Lyon s.n, 2 July 1922, Porter Co. (BUT)
Hiebert #21, 9 July 1981, La Porte Co. (MOR)

Corallorhiza maculata (Raf.) Raf.

Spotted coralroot is known from Miller Woods, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. It is rare but appears in Miller B, where it was found by Myrna Newgent in August 1983. In 1989, Plampin reported spotted coralroot from several small colonies, one of which is along the subdunal trail about one-half mile west of Mineral Springs Road in Cowles Dunes A (Wilhelm 1990). Alan Resetar found a population in the red maple swamp north of Cowles Bog A on 18 September 1993. Richard Johnson and Plampin reported two populations south of the Cowles Bog trail west of the boardwalk. In 1988, Emma Pitcher reported spotted coralroot from Cowles Dunes B along the "Lupine Stud. Tr" (Wilhelm 1990). According to Plampin, "Stud." is Lois Howes' designation for Studebaker Trail (Wilhelm 1990). *Corallorhiza maculata* var. *flavida* was found by Lorain Olson in Cowles Dunes A. Spotted coralroot also appears in Howes Prairie (Cowles Dunes B). On a second visit to the site, Lorain Olson and Myrna Newgent found more plants, and the identity was confirmed by Michael Homoya (Indiana DNR). Gerould Wilhelm (1990) wrote:

> *Lyon (1927) reported this rare orchid from "... subdunal woods, Tremont." Pepoon (1927) cited it as follows: ". . . bluffs of Fort Creek near Mt. Tom, rare. An abundant species as one goes eastward toward Michigan." Pepoon's comment is interesting in view of the fact that the plant is as rare as hen's teeth today, and that* Corallorhiza odontorhiza*, a species which he does not mention in his flora, is not infrequent in the Lakeshore at points eastward from Indiana Dunes State Park* [and Ogden Dunes]. *Curiously, neither Lyon (1927) nor Peattie (1930) mention* C. odontorhiza *either. Ken Dritz noted* C. maculata *along Trail 2* [in the Dunes State Park] *on July 25, 1981 (Dritz 1987); the blooming date pretty much confirms the identification. Plampin (1987d) noted: "Dick Brannon saw a dead stalk north of Trail 2 on 3/4/86 just east of* Conopholis americana. *I* [Plampin] *saw eleven and a half* [*sic*] *plants at various sites off Trail 10 on 8/17/86. Several grow near Keith Board's 1986 discovery of* Chimaphila umbellata *var.* cisatlantica [*Chimaphila umbellata* ssp. *umbellata*] *at the east end of the Park. Others grow to the north of the Pinery at the base of the dune. Still others seen in 1986 by park personnel.*

Plampin found one plant in Furnessville D in 1984 and again in 1985 (Wilhelm 1990). In Keiser C, Plampin found two plants east of the *Adiantum pedatum* site, west of *Asimina triloba* (Wilhelm 1990). Spotted coralroot is occasional to frequent in the Tamarack C Unit

(Plampin and Newgent 1994, Plampin et al. 2003).

Voucher Specimens:
Hiebert #24, 9 July 1981, Porter Co. (INDU)
Hiebert #341, 20 August 1982, Porter Co. (MOR)

Corallorhiza odontorhiza (Willd.) Poir.
Autumn coralroot is found in Tolleston Dunes, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Hoosier Prairie units. This species was found in Tolleston Dunes A by Nicole Kalkbrenner and Alan Resetar in the fall of 1998. On 28 August 2008, Stacey Leicht-Young and Krystal Frohnapple found autumn coralroot in a pine-oak forest in West Beach D that is infested with oriental bittersweet. They also observed this orchid in West Beach A on 9 September 2008. Plampin and Hamilla found two populations of approximately thirteen and sixteen plants in Inland Marsh A on the peninsula west of the Inland Marsh overlook on 13 August 2009. A few specimens were noted from Cowles Dunes B by Lois Howes. Plampin saw about fifteen plants in August 1985, reported that they did not reappear in 1986, and she noted four stalks near the same spot in 1989 (Wilhelm 1990). This location is east of the Dune Acres guardhouse along the Indian Trail, where she reported that *Smilax* is becoming invasive. Ben Sadock found autumn coralroot growing in Howes Prairie (Cowles Dunes B) on 3 September 1992. Plampin also found a population in Cowles Dunes A south of the east-west trail in the hydromesophytic swamp forest on 18 September 1983. Several plants of this species were found on 2 October 1989 by Linda Wetstein at DSP, along the east side of Trail 8, just north of Wilson Shelter. She showed them to Gerould Wilhelm, who remarked that "this is a rather remarkable discovery in view of the fact that Trail 8 long has been one of the more travelled by botanists, since it leads to both Trail 9 and Trail 10" (Wilhelm 1990). Autumn coralroot is rare along the trail in Furnessville D. Plampin found a colony of over 102 plants in the successional forest formerly in pasture in Furnessville F on 3 September 1994 growing with *Hamamelis virginiana*, *Prunus serotina*, *Sassafras albidum*, and *Viburnum acerifolium*. Molly Hacker, Plampin, and Hamilla saw over 60 individuals of this orchid at upper Olson's Pond in September 2010. Plampin and Hamilla found autumn coralroot growing in Furnessville B on 8 October 2007. This orchid is occasional in the dune complex portions of Keiser A, and according to Ken Dritz, it grew in Keiser C on 18 August 1985 (Wilhelm 1990). In Keiser D, Plampin showed Gerould Wilhelm several plants south of the parking area, east of Kemil Road. Autumn coralroot is common among the wooded dunes of the dune complex and even on the shoulder of the vacated road in the eastern portion of Tamarack C. According to Ken Klick (pers. comm. with Pavlovic), this orchid was still present at Hoosier Prairie A in 1982. Two varieties are known from the Indiana Dunes, but additional surveys are needed to determine their relative abundance and distribution: *Corallorhiza odontorhiza* (Willd.) Poir. var. *odontorhiza* and *C. odontorhiza* (Willd.) Poir. var. *pringlei* (Greenm.) Freudenst. (Magrath and Freudenstein 2002).

Voucher Specimens:
Howes s.n., 20 October 1951, Porter Co. (F)
Wilhelm #6958, 13 September 1979, Porter Co. (MOR)
Klick #1599, 25 August 1987, Porter Co. (INDU)

Cypripedium acaule Aiton
The pink lady's-slipper or moccasin flower has been reported from the Miller, Cowles Dunes, DSP, Tamarack, and Pinhook Bog units, but it is apparently extant only at Cowles Bog and Pinhook Bog. After seeing this species in Miller Woods, Pepoon (1930) wrote:

> *In 1916, escorting a party of fifty men and women, we came to the margin of the stemless lady's slipper* sanctum sanctorum. *We paused, drinking our fill and passed on, not one person violating the unwritten law of the orchid lover. An hour later, as we ate our lunch on the margin of the swamp, a party of robust young men and women from college came along, and each gloried in the rare specimen he had plucked.* "Cypripedium acaule, *your*

regal beauty is your doom!"

This species may now be extinct in Miller Woods. Chase's label, "in dune region NW of Miller, moist glen" suggests that it did grow somewhere in Miller Woods or on U.S. Steel Corporation land northwest of Miller Woods. Lyon (1927) reported this species from the "outer edge, tamarack swamp, Mineral Springs" in Dunes Acres A. Ken Dritz photographed one plant in bloom on 27 May 1989 in the hydromesophytic swamp north of the tamaracks. Ken Klick saw two non-flowering plants in this vicinity 24 May 1989. Daniel Mason (NPS) saw two plants in 2002. Later, Daniel Mason transplanted seedlings produced from hand pollinations using pollen from the Pinhook population, south of the boardwalk in Cowles Dunes A. One of these bloomed in 2007 (Mason, pers. comm. with Pavlovic, June 2007). Several clumps were blooming on 18 May 2011 (Mason, pers. comm. with Pavlovic).

Moccasin flower is known from DSP only based on Pearsall's specimen. Pearsall may have collected the only plant, we may not know the exact location of Pearsall's collected specimen, or the locality could have been mislabeled. According to Wilhelm (1990), "Cain's specimen, collected in May of 1927 from 'Furnessville, Ind.' was probably also collected in the Dunes State Park, at the eastern end; his specimen is in the Butler University Herbarium." Lyon (1927) reported "about a dozen plants in the woods at Tamarack Station," which area corresponds to Tamarack A, and has since been obliterated by drainage, logging, and peat fires.

Pink lady's-slipper has occurred by the hundreds in Pinhook Bog east of Wozniak Road but has declined due to shrub and tree invasion. Thinning of shrubs at Pinhook by Daniel Mason may improve the conditions for moccasin flower. Along the boardwalk, it grows with *Carex canescens*, *C. chordorrhiza*, *C. limosa*, *C. trisperma*, *Chamaedaphne calyculata*, *Drosera rotundifolia*, *Larix laricina*, *Pyrus floribunda*, *Rhynchospora alba*, *Sarracenia purpurea*, *Toxicodendron vernix*, *Vaccinium corymbosum*, and *V. macrocarpon*.

Elsewhere, pink lady's-slipper reproduction has been shown to be pollinator-limited (Davis 1986), and there is some evidence the plants closer to trails are less likely to flower (Bratton 1985). A study of pollination in Nova Scotia, Canada, shows that plants with ericaceous shrubs and open canopy have the highest pollination rates (Nicolè et al. 2005).

Voucher Specimens:

Chase #784, 25 May 1898, Lake Co. (F)
Friesner s.n., 29 May 1932, Porter Co. (BUT)
Pearsall s.n., July 1939, Porter Co. (F)
Wilhelm #6854, 15 June 1979, La Porte Co. (MOR)

Cypripedium candidum Muhl. ex Willd.

White lady's slipper is known from Cowles Dunes, DSP, and Hoosier Prairie, although it may now be found only at the last unit. White lady's slipper was reported growing at the "outer edge of the tamarack swamp" at Cowles Bog A by Lyon (1927). According to Wilhelm (1990), "this orchid was seen here in 1951, as evidenced by a letter from Mr. Seymour Segal to Charles Deam, in which Segal wrote that he had noted *Betula alleghaniensis*, *Coptis groenlandica*, *Cypripedium candidum*, *Cypripedium reginae*, *Gentianopsis virgata* ssp. *virgata*, *Parnassia glauca*, and *Thuja occidentalis*." Segal had photographs of the plant growing in an unidentified Cowles Bog A ditch. Ken Dritz saw it at Cowles Bog on 31 May 1980, and Bowles et al. (1986) listed the following associates: *Betula alleghaniensis*, *Cornus sericea*, *Decodon verticillatus*, *Lysimachia thyrsiflora*, *Thelypteris palustris* var. *pubescens*, *Toxicodendron vernix*, and *Typha angustifolia*. Bowles (1988) noted that only a single plant persisted, and that it was likely to succumb to shrub invasion without fire. In 1989, Plampin reported a colony found by Keith Board, who noted about twenty plants, in a *Cornus racemosa* thicket southeast of *Sarracenia purpurea* (Wilhelm 1990). Recent searches by Daniel Mason (NPS), Pavlovic, and Plampin have been unsuccessful in finding

this population. In 2008, Daniel Mason introduced plants into Cowles Dunes A that were obtained from a prairie managed by The Nature Conservancy (pers. comm. with Pavlovic, 18 May 2011). The plants were installed close to the tamaracks, but only one clump survived because the other plants were placed too deep in the ground and were too wet.

White lady's slipper is known from the DSP based on the 1939 Pearsall specimen. As with other prairie species, this orchid is adapted to fire, with increased flowering usually occurring after a burn. As a result of such management, the colony at Hoosier Prairie A increased more than 50% in size, from 16 to 28 flowering plants, in the period between 1983 and 1986 (Bowles 1987). Tom Post (pers. comm. with Pavlovic) recorded 32 stems and 26 flowers in this same plot in 1988. In addition, Tom noted 49 stems in an area east of the original plot. The time span of this population increase included recovery from an abnormally late fire in May of 1984 that burned off flowering bud and leaf tissue and apparently caused a short-term drop to four flowering plants during 1985. This decline, or dormancy, would be a natural response to the stress following removal of photosynthetic material during a growing-season fire. Tom Post attests to the species continued presence at Hoosier Prairie (pers. comm. with Pavlovic, 6 June 2020). Homoya (1993) notes the white lady's slipper is the least tolerant of disturbance among the lady's slippers, and it rapidly declines with increasing shade. The latter successional process may have caused its demise at Cowles Bog. Falb and Leopold (1993) found that plant and flower size of white lady's slipper increased with increasing light levels, and that the plants fluctuated widely in lifeform classes (dormant, vegetative, and flowering) among years.

Daniel Mason reports the possible presence of *C.* × *andrewsii* A.M. Fuller slightly west of the quaking mound in Cowles Dunes A. *Cypripedium* × *andrewsii* is a hybrid between *C. candidum* and *C. parviflorum* (Homoya 1993). Molly Hacker found leaves of the plants in 2011 thinking they were *C. parviflorum* var. *pubescens*. John Drake from The Nature Conservancy thinks the plants are too large to be this species and suggests they are *C.* × *andrewsii*. Further investigation could provide more information on these plants.

Voucher Specimens:

Deam #20008, 3 June 1916, Porter Co. (IND)
Pearsall s.n., July 1939; Porter Co. (F)

Cypripedium parviflorum Salisb. var. *makasin* (Farw.) Sheviak [*Cypripedium calceolus* L. var. *parviflorum* (Salisb.) Fernald]

Yellow lady's slipper has been reported from Cowles Dunes and DSP. The small yellow lady's slipper is very rare locally. Peter Grube found this species growing in Howes Prairie (Cowles Dunes B) in 2018. Lyon (1927) reported this orchid from "subdunal woods Tremont, Furnessville," and Keith Board in 1987 noted that he had seen it at DSP (Wilhelm 1990). Plampin, in 1989, reported that Keith had seen more than a hundred plants in 1987, but that their number had dropped to six or seven in 1989 (Wilhelm 1990). At that time, Plampin reported that someone drove through the population when repairing the boardwalk. Bowles (1988), in a study of the Keith Board population, noted four flowering stems growing with *Equisetum arvense*, *Fraxinus pennsylvanica*, *Galium aparine*, *Geranium maculatum*, *Lindera benzoin*, *Maianthemum stellatum*, *Osmorhiza claytonii*, *Parthenocissus quinquefolia*, *Podophyllum peltatum*, *Quercus bicolor*, *Sanicula* sp., *Symplocarpus foetidus*, *Ulmus rubra*, and *Viburnum prunifolium*.

Voucher Specimens:

Friesner s.n., 12 June 1936, Porter Co. (BUT)
Deam #40490, 4 July 1924, Porter Co. (IND)

Cypripedium parviflorum Salisb. var. *pubescens* (Willd.) O.W. Knight [*Cypripedium calceolus* L. var. *pubescens* (Willd.) Correll]

The large yellow lady's slipper is more common than the previous species in the Indiana

Dunes, but is known only from Miller Woods, Cowles Dunes, DSP, Furnessville, and Hoosier Prairie. On 19 May 1999, large yellow lady's slipper was found by Anita Ahrens et al. in Miller Woods F. Large yellow lady's slipper was rare in Cowles Dunes A, where it grew in a dogwood thicket east of the tamaracks (Wilhelm 1990) but was no longer extant. However, Daniel Mason has reintroduced this species to Cowles Bog (Cowles Dunes A), and two clumps were flowering on 18 May 2011 (Dan Mason, pers. comm. with Pavlovic). Molly Hacker saw two plants (one fruiting) separate from the introduced plants in August 2011. Large yellow lady's slipper is extant in the Howes Prairie (Cowles Dunes B) region (Cowles Dunes B). Plampin reported that the population on the north-facing side of the dune in the mesic woods, on the south side of Howes Prairie, was spreading (Wilhelm 1990), but the population has since declined perhaps as a result of excessive deer trampling. Plampin knows of two smaller populations in Howes Prairie (Plampin, pers. obs.).

Several plants growing along Pine Lane in Dune Acres have declined due to increased shade and invasion of oriental bittersweet. Ken Dritz saw large yellow lady's slipper in the DSP on 24 May 1981 (Wilhelm 1990). According to Wilhelm (1990), Lyon (1927) reported this variety from "damp woods" at Furnessville. There is also a specimen in The Field Museum of Chicago Herbarium collected by Eric Sherff on 30 May 1912 from "woods, among or near dunes" at Furnessville. According to Marlin Bowles (pers. comm. with Pavlovic), there are about one-half-dozen plants within a square meter at Hoosier Prairie A.

Voucher Specimens:
Swink s.n., 18 May 1946, Porter Co. (MOR)
Cain s.n., 1926, Porter Co. (BUT)

Cypripedium reginae Walter
Showy lady's slipper was known from Cowles Bog based on photographs taken by George Fuller and documentation by Lyon (1927). This rare species was seen in 1988 by Marlin Bowles at Cowles Bog (Cowles Dunes A). Bowles (1988) described one single-stemmed, sterile genet and observed that prescribed burning has stimulated expansion of the *C. reginae* population at another preserve in Lake County. This management treatment may be considered at Cowles Bog, where it also may benefit the remaining *C. candidum* population. Recent searches have failed to relocate this species.

Voucher Specimens:
Friesner s.n., 12 June 1936, Porter Co. (BUT)

Dactylorhiza viridis (L.) R.M. Bateman, A.M. Pridgeon & M.W. Chase [*Coeloglossum viride* (L.) Hartman; *Habenaria viridis* (L.) R. Brown var. *bracteata* (Muhl.) A. Gray]
Long bracted orchid was known from DSP, based only on the report by Lyon (1927) of its location in "rich wooded dunes, Tremont." Long bracted orchid is often confused with *Platanthera flava* (Homoya 1995). While this species was assigned to the genus *Coeloglossum* for a time, Bateman et al. (2018) and Bateman and Rudall (2018) have shown that this and *D. iberica* are basal to the group and include all the species previously assigned to the genus *Coeloglossum*.

Galearis spectabilis (L.) Raf. [*Orchis spectabilis* L.]
Showy orchid is a typical plant of mesic woods and is unmistakable when in bloom with its purple and white petals. There is only one unverified report of this plant in DSP by Joe Notek. He reported that a clump was trampled to death. The Indiana Dunes is certainly in the range of this species, but vegetative specimens of *Liparis liliifolia* are often confused with this species (Homoya 1993). Or was it the trampled *Aplectrum hyemale* mentioned above? It is hard to believe that the longitudinally pleated leaf of *Aplectrum* would be mistaken for the smooth leaf of *Galearis*. No specimen was collected. We give the report of this species a CoC of 10 irrespective of whether it is indigenous, adventive, or misidentified.

Goodyera pubescens (Willd.) R. Br.

Downy rattlesnake plantain, Indiana's most common orchid (Homoya 1993), is known from the DSP, Furnessville, Keiser, Tamarack, and Pinhook Bog. This species is recognized by its white-colored veins (Homoya 1993). This orchid appears frequently in the DSP. Lyon (1927) found this species to be "rather rare" in the rich wooded dunes at Tremont, while Pepoon (1927) considered it to be "very common on bluffs of Fort Creek near Mt. Tom." Wilhelm (1990) noted that "according to Ray Grow, of Gary, Indiana, and Lois Howes, this orchid is extant in the Dunes State Park south of Mt. Tom, not too far off of trail #2" (Plampin also saw this population). According to Wilhelm (1990), Keith Board knew of four locations for this orchid. Douglas Botka has seen this orchid several times since July 2013. In 1988, Pavlovic described removal of this orchid, east of the Dune Park Station, in Furnessville F. Quoting from Wilhelm (1990),

> *Last March . . . the Dune Park Station . . . wanted to expand their parking lot. We discovered a large* [doomed] *population of* Goodyera pubescens *. . . On September 10, Plampin went to the site and removed over a dozen . . . plants and also discovered and transplanted a large clump of* Lycopodium lucidulum [*Huperzia lucidula*] . . . [Later, we] *transplanted the plants to a similar area to the east* [still in Furnessville F] *in the park.*

In 1989, Plampin reported that the transplant had disappeared (Wilhelm 1990). The original colony was located at what is now the southwest corner of the east parking lot of the Dune Park Station. The transplant was about 750 feet northeast and about 300 feet north by northeast of the end of 50 East Road.

In 1988, Pavlovic reported a colony of downy rattlesnake plantain opposite 50 East Road, off the north side of U.S. 12. About 200 plants were found farther east by Plampin, Myrna Newgent, and Palmquist before a second parking lot expansion in 2005. Daniel Mason (NPS) had the plants moved to suitable sites in Keiser E and Tamarack C, where, with one exception, they did not flower. The exception was a group of transplants inserted among original plants in a young woods in Keiser C. Some of the 200 plants may have been survivors of the 1988 transplants. More plants may have been destroyed in the Dune Park Station parking lot expansion in 2022. The Tamarack population had declined by 2007 and could be reinvestigated. Of the two Keiser sites, one has declined by 30% but still persists, and the other has been quite stable (Plampin and Hamilla 2008b). In 1988, according to Wilhelm (1990), Emma Pitcher noted a colony within 100 meters east of Ditch A on a line with Ditch B (Furnessville F).

Downy rattlesnake plantain was known from Keiser based on the report by Lyon (1930): ". . . rare plant or two found in the Keiser and Tamarack subdunal woods," until its relocation in Keiser C on 21 June 1993 by Plampin and Craig Johnson. This species also grows in several places in Keiser E, including a former homesite in an ecotone between sand and young woods, and on bare sand adjacent to an old house, as reported on 25 February 1995 by Plampin and Myrna Newgent. There it grows with *Cephalanthus occidentalis*, *Decodon verticillatus*, *Lemna trisulcata*, *Persicaria amphibia*, *Proserpinaca palustris*, *Salix* spp., *Sparganium americanum*, and *Wolffia columbianum*. Another population with blue leaves in Keiser E, in a sand pit near abandoned tires, was later found by Plampin, who also found about 95 *Goodyera* growing in the trail nearby. Plampin also found downy rattlesnake plantain growing in Keiser F on 29 June 1995.

Wilhelm (1990) supposed that Lyon's (1927) sightings for this species locally were in Keiser. Pavlovic and Kenneth Cole found a large population in Tamarack C, and other populations have been found here by Plampin and Newgent (1992, 1994). In December 2015, Carie Satkoski and others found a population of this species while thinning blueberry bushes at Pinhook Bog. Consequently, on 22 December 2015, Tonkovich surveyed, photographed, and mapped GPS coordinates for three populations of this orchid while also surveying populations of *Huperzia lucidula*, *Rhynchospora alba*, *Sarracenia purpurea*, *Chamaedaphne*

calyculata, *Ilex mucronata*, and *Sphagnum* in the northern third of the bog. No herbarium specimen has been collected from the Indiana Dunes.

Isotria verticillata (Muhl. ex Willd.) Raf.

Large whorled pogonia is known only from Pinhook Bog B. This orchid was first collected by Lyon (BUT). There have been several pre-1990 sightings of large whorled pogonia by Dr. Delano Arvin and others in the southwestern portion of Pinhook Bog, east of Wozniak Road (Wilhelm 1990). According to Wilhelm (1990),

> *With directions from Ray Grow and Ken Dritz, Marlin Bowles and Marcy DeMauro located and mapped twelve vegetative stems of this long-celebrated orchid (Bowles et al. 1986). They noted the following associates:* Carex canescens *ssp.* disjuncta, Cypripedium acaule, Gaylussacia baccata, Larix laricina, Nyssa sylvatica, Pyrus *sp.*, Sarracenia purpurea, Sphagnum *sp.*, Triadenum fraseri, Vaccinium corymbosum, *and* V. vacillans [*V. pallidum*]. *Bowles (1988) reported twelve sterile stems in 1987 as well, but in somewhat different positions within the permanent plot.*

Large whorled pogonia has not been relocated since 1987. This orchid is distinguished from Indian cucumber root (a plant that has similar leaf morphology) by its hollow and hairless stem (Homoya 1993). Similar to its rarer congener, the federally endangered *Isotria medioloides*, *I. verticillata* may respond to both canopy thinning and local tree death that creates dead roots as a substrate for symbiotic fungi (Whigham et al. 2021).

Voucher Specimens:

Bowles & DeMauro #1243, 23 July 1985, La Porte Co. (INDU)

Liparis loeselii (L.) Rich.

Loesel's twayblade is known from Miller Woods, Tolleston Dunes, Calumet Prairie, West Beach, Cowles Dunes, DSP, Keiser, Tamarack, Hoosier Prairie, and Pinhook Bog. Loesel's twayblade is occasional in Miller Woods A, B, C, and F. Myrna Newgent and Plampin found it in Miller Dunes north of the Grand Calumet in June 1994. This species was also observed by Tonkovich in two of the pannes at Miller in 2000. Loesel's twayblade is occasional in Tolleston Dunes B and C and at Calumet Prairie. According to Plampin (1989b), this twayblade grows on the little peninsula in the big panne in West Beach A. Tonkovich confirmed the presence in that panne and observed it in three other pannes in West Beach. This twayblade is known locally from the panne communities in West Beach A, and Plampin and Myrna Newgent found it in West Beach B in September 1994. It is extant, though rare, in wet calcareous sands and swampy woods of both Cowles Dunes A and B. Plampin saw a single specimen on 3 June 1995 in a panne west of the last house in west Dune Acres. In 1987, Plampin reported that Lois Howes attributed the loss of a Cowles Dunes A population to ants! That same year, Keith Board noted that he had seen this species at DSP (Wilhelm 1990). Bowles et al. (1985) listed it as an associate of *Potentilla anserina* at the panne at Beach House Blowout. This panne was destroyed in the late 1980s by sand burial. "According to Wilhelm (1990), Bergendahl reported Loesel's twayblade from the Calumet Bike Trail near NIPSCO transmission tower #8424 in 1983. In 1989, Plampin reported twayblade growing along the bike trail, east of pylon #8425 (both in Dunes State Park B). Loesel's twayblade is reported from Keiser E. It is also found in the wetland southwest of the Dunewood Campground, Keiser F. Plampin, Myrna Newgent, and Lydia Miramontes found this twayblade in 2003 at Crescent Dune in Tamarack C, growing with *Myosotis laxa* (Plampin et al. 2003). In August 2015, Tonkovich and Hamilla again observed *L. loeselii* at the Crescent Dune panne.

This small orchid is occasional in thickets and in wet swales, especially in areas where fire has removed the duff at Hoosier Prairie A and B. This twayblade is occasional in the red maple swamps in the northwest portion of Pinhook Bog B.

Voucher Specimens:

Hess et al. #5940, 13 June 1984, Porter Co. (MOR)

Malaxis unifolia Michx.
Green adder's mouth orchid is known from Pinhook Bog and Hoosier Prairie. This rare orchid was first found in a red maple swamp forest at Pinhook Bog B in 1979. Gerould Wilhelm and Ken Dritz collected a specimen from Pinhook Bog B, but to-date plants have not since been relocated (Wilhelm 1990). At Pinhook, they were growing with *Acer rubrum*, *Aronia* × *prunifolia*, *Carex crinita* var. *crinita*, *Fraxinus americana*, *Ilex mucronata*, *I. verticillata*, *Larix laricina*, *Maianthemum canadense*, *Nyssa sylvatica*, *Quercus rubra*, *Toxicodendron vernix*, *Vaccinium corymbosum*, and *Woodwardia virginica* (Wilhelm 1990). Wilhelm (1990) added, "What a surprise that Ken Klick would find this extremely rare orchid in a young aspen thicket a couple hundred meters west of the truck parking lot, north of Main Street at Hoosier Prairie A in 1987!" The immediate associates included *Calamagrostis canadensis*, *Eryngium yuccifolium*, *Gaylussacia baccata*, *Helianthus mollis*, *Potentilla simplex*, and *Rubus pensilvanicus*. Klick described the following species as general associates: *Aralia nudicaulis*, *Doellingeria umbellata* var. *umbellata*, *Geranium bicknellii*, *Populus tremuloides*, *Pteridium aquilinum* var. *latisculum*, *Quercus velutina*, and *Rubus hispidus*. According to Wilhelm (1990), Ken noted 28 plants in a 4 m × 5 m plot in 1987, and in 1988, Tom Post noted 25 plants in the same quadrat.

Voucher Specimens:
Wilhelm & Dritz #6882, 23 June 1979, La Porte Co. (MOR)
Klick et al. #2777, 18 June 1987, Lake Co. (INDU)

Platanthera aquilonis Sheviak [*Habenaria hyperborea* (L.) R. Br. var. *huronensis* (Nutt.) Farw.]
When considering the northern green orchid, use of the names *Platanthera hyperborea* or *P. huronensis* have led to confusion over the years. Neither species occurs in Indiana or the Chicago Region. The species occurring in Indiana Dunes is a separate species named by Sheviak (1999). It is a self-fertilizing diploid species with unscented flowers, whereas *P. hyperborea* is a self-fertilizing tetraploid with different lip, column, and pollen-bearing structures. Meanwhile *P. huronensis* is an insect-pollinated species with strongly sweet-scented flowers. In summary, true *P. hyperborea* only occurs in Iceland and Greenland, and even *P. huronensis* does not reach south into Indiana.

Northern green orchid is known from Miller Woods, West Beach, and Cowles Dunes units. Marlin Bowles (1986a) found northern green orchid growing in a mesic panne in Miller Woods A with *Cladium mariscoides*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, *Pinus banksiana*, *Populus deltoides*, *Rhynchospora capillacea*, *Salix cordata*, and *S. myricoides*. Northern green orchid was found in a panne at West Beach A by Daniel Mason and Tonkovich in 1999 and 2000. It is known from Cowles Dunes A, as reported by Lyon (1927), who stated it grew at the "tamarack swamp, Mineral Springs, found but once." According to Gerould Wilhelm (1990), Emma Pitcher indicated that Lois Howes saw it "W of Cowles Bog" on 1 June 1963.

Platanthera aquilonis has pollen sacs that break apart so that the pollen falls down onto the stigma to self-pollinate instead of remaining in the distinct pollinia (Bateman et al. 2015). More information is available in the Flora of North America, vol. 26 (2002).

Voucher Specimens:
Otto #29, 18 June 1982, Lake Co. (MOR)

Platanthera ciliaris (L.) Lindl. [*Habenaria ciliaris* (L.) R. Br.]
The orange fringed orchid was known from Miller, Cowles Dunes, and DSP, but now is extant only at Pinhook Bog. Orange fringed orchid is probably extinct within Miller Woods, if it ever actually grew there. There are numerous specimens at the Field Museum of Chicago from the Miller area, but specific locality information is lacking. It is more likely orange fringed orchid occurred in the bog, now destroyed, east of Miller. In the vicinity of Cowles

Dunes, Lyon (1927) regarded orange fringed orchid as "locally common for about 1000 feet along the dune edge of the subdunal marsh, Port Chester; rare in an interdunal meadow, Port Chester, a few plants in ditch by railroad, Port Chester." This suggests that the plants were closer to the South Shore tracks than in Port Chester (Howes Prairie [Cowles Dunes B] proper). A collection by Peattie in 1920 from this last locale is housed in the herbarium at The Field Museum of Chicago. Until the 1970s, it grew in the Howes Prairie region of Cowles Dunes B according to Lois Howes (Wilhelm 1990). Lois Howes believed that the orange fringed orchid's disappearance was due to a chronic lack of fire. It has not reappeared after 36 years of prescribed burning. Pavlovic and Marlin Bowles transplanted several plants into Howes Prairie in 1992, a task necessitated by the replacement of the boardwalk at Pinhook Bog. None of the plants survived. Peattie (1930) reported this orchid from "Tremont," a location which implies DSP, but Wilhelm (1990) thought it might have referred to the well-known populations just to the west in the vicinity of Port Chester (the train stop), from which he made his 1920 collection that is at The Field Museum of Chicago. Peattie also may have been referring to the Furnessville F area south of DSP.

Orange fringed orchid is common in the Pinhook Bog B east of Wozniak Road. There is one population along the boardwalk and another larger one at the east end of Pinhook B. In 1986, three populations were mapped and enumerated by Bowles et al. (1986), and they were associated with *Acer rubrum*, *Andromeda polifolia* var. *latifolia*, *Carex chordorrhiza*, *C. limosa*, *Chamaedaphne calyculata*, *Drosera rotundifolia*, *Larix laricina*, *Rhynchospora alba*, *Sarracenia purpurea*, *Sphagnum* spp., and *Vaccinium oxycoccos*. Orange fringed orchids are butterfly-pollinated, and Robertson and Wyatt (1990) found evidence of flower ecotypes correlated with pollinator morphology. The Pinhook Bog population along the boardwalk has declined as canopy cover has increased and perhaps from poaching according to Daniel Mason (NPS). Subsequent shrub management by the NPS has increased local populations. A survey on 11 August 2008 by Daniel Mason, Hamilla, and Myrna Newgent revealed a total of eight patches and dozens of plants (Plampin and Hamilla 2008a). More plants appeared at the end of the boardwalk, where shrub clearing had occurred in 2013. Tonkovich and Hamilla found a third population in Pinhook in 2015.

Voucher Specimens:

Umbach #2357, 16 July 1908, Lake Co. (MOR)
Peattie #139, 13 August 1920, Porter Co. (F)
Lyon s.n., 8 August 1926, Porter Co. (BUT)
Wilhelm & Dritz #6974, 16 September 1979, La Porte Co. (MOR)

Platanthera clavellata (Michx.) Luer [*Habenaria clavellata* (Michx.) Spreng.]
The small green wood orchid, or club-spur orchid, is known from Miller Woods, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Pinhook Bog, Tolleston Dunes, and Hoosier Prairie units. Levi Umbach collected this species in 1898 in "Millers, swales." This orchid was not known recently from Miller Woods until it was found in 1994 in Miller Woods G. Plampin and Myrna Newgent found small green wood orchid growing in Tolleston Dunes on 7 July 1990. Wilhelm (1990) discusses the presence of this orchid in Cowles Dunes Unit:

> *Lyon (1927), in his 1930 revision, mentioned that in 1927 this orchid was "regarded as rare, but in 1929, next to* Spiranthes cernua [which Lois Howes had stated had also disappeared from the Howes Prairie with the cessation of fire] *it seemed to be the commonest orchid ... subdunal and interdunal meadows ... Mineral Springs, Port Chester.*

Small green wood orchid still occurs in the swamp complex portion of Cowles Dunes A and B and along the NIPSCO right-of-way in Cowles Dunes E, where Bowles et al. (1986) listed the following associates: *Aletris farinosa*, *Andropogon gerardii*, *Calamagrostis canadensis*, *Euthamia graminifolia*, *Sorghastrum nutans,* and *Schizachyrium scoparium*. They give the following associates for the swamp complex: *Acer rubrum*, *Carex folliculata*, *Ilex verticillata*, *Maianthemum canadense*, *Pinus strobus*, *Quercus palustris*, *Rubus hispidus*, and *Symplocarpus*

foetidus. Ron Hiebert found 30 individuals on 16 August 1982 in a wetland at the edge of the bike trail south of DSP (Wilhelm 1990). In the hydromesophytic swamp in DSP, Marlin Bowles (1987) found it growing with *Acer rubrum*, *Bartonia virginica*, *Carex folliculata*, *C. seorsa*, *Carpinus caroliniana* ssp. *virginiana*, *Doellingeria umbellata* var. *umbellata*, *Fagus grandifolia*, *Hamamelis virginiana*, *Impatiens capensis*, *Leersia virginica*, *Lindera benzoin*, *Liriodendron tulipifera*, *Maianthemum canadense*, *Onoclea sensibilis*, *Osmundastrum cinnamomeum*, and *Symplocarpus foetidus*.

Wilhelm (1990) reported that *Platanthera clavellata* grows in Furnessville F, 20 feet west of NIPSCO transmission tower #8416 along the Calumet Bike Trail with *Gentianopsis crinita*, *Sabatia angularis*, and *Xyris torta*, based on a report from Norman Bergendahl. It also grows in a ditch near utility pole #18 north of the old Buffalo and Mississippi railroad right-of-way in Furnessville G, where it was found by Keith Board and seen by Gerould Wilhelm, Plampin, and Myrna Newgent in 1994. Small green wood orchid is known from Keiser B, C, D, and F. The orchid is extant but rare in the swamp complex of Keiser C growing with *Acer rubrum*, *Betula papyrifera*, *Carex debilis* var. *rudgei*, *C. folliculata*, *C. intumescens*, *C. seorsa*, *C. virescens*, *Ilex verticillata*, *Lindera benzoin*, *Maianthemum canadense*, *Mitchella repens*, *Nyssa sylvatica*, *Osmunda regalis* var. *spectabilis*, *Osmundastrum cinnamomeum*, *Quercus rubra*, *Rubus hispidus* var. *obovalis*, *Saururus cernuus*, and *Thelypteris noveboracensis*. Plampin found 200 plants in Keiser E on 7 August 1997 growing near *Carex folliculata* and *Veronica scutellata*, and with *Cardamine bulbosa*, *Iris virginica*, and *Symplocarpus foetidus*. It also grows south of the Dunewood Trace (Keiser E). Small green wood orchid was reported by Lyon (1927) as having grown along the ditch by the CSSBR at Tamarack. It also grows along the bike trail at DSP and is reported from Pinhook Bog (Wilhelm 1990). Small green wood orchid was unknown from Hoosier Prairie A until it was reported by Ken Klick, who noted four plants growing near *Malaxis unifolia* with the same associates (Wihelm 1990).

Voucher Specimens:

Umbach s.n., 20 July 1898, Lake Co. (F)
Pearsall s.n., 1 August 1941, Porter Co. (F)
Jones #14, 9 July 1981, Porter Co. (MOR)
Wilhelm & Dritz #6948, 9 September 1979, Porter Co. (MOR)
Lyon s.n., 16 August 1925, Porter Co. (BUT)

Platanthera flava (L.) Lindl. var. *herbiola* (R. Br.) Luer [*Habenaria flava* (L.) R. Br. var. *herbiola* (R.Br.) Ames & Correll]

Northern tubercled orchid is known from Miller Woods, Tolleston Dunes, Inland Marsh, DSP, Keiser, Tamarack, and Hoosier Prairie. It is reported from Miller Woods G by Myrna Newgent et al. (Wilhelm 1990), and was found in C by Plampin, Hamilla, Myrna Newgent, and Daniel Mason on 17 September 2008. Plampin and Myrna Newgent found northern tubercled orchid in Tolleston Dunes B on 7 June 1990 and 11 July 1990. Pavlovic reported it from Inland Marsh A in 1994. It is also present in DSP. Lyon (1927) reported this species from "subdunal woods at Tremont." This was either the Dunes State Park or Furnessville. Ken Dritz relocated this species in the DSP in 1980 growing with *Acer rubrum*, *Arisaema triphyllum*, *Betula alleghaniensis*, *Carex stricta*, *Fraxinus pennsylvanica*, *Lindera benzoin*, *Onoclea sensibilis*, *Parthenocissus quinquefolia*, *P. vitacea*, *Quercus bicolor*, *Q. palustris*, and *Toxicodendron radicans*. Bowles (1987) mapped another population here and noted the following associates: *Acer rubrum*, *Cicuta maculata*, *Fraxinus americana*, *F. nigra*, *Hamamelis virginiana*, *Impatiens* sp., *Lindera benzoin*, *Liriodendron tulipifera*, *Onoclea sensibilis*, *Parthenocissus vitacea*, *Quercus alba*, *Sanicula* sp., *Scutellaria lateriflora*, *Toxicodendron radicans*, and *Urtica dioica* ssp. *gracilis*. Northern tubercled orchid is present in Keiser C. Wilhelm (1990) wrote:

> *Plampin noted that she "found 30–40 seedlings of an orchid, mostly one-leaved, some two, and one plant with flowers past prime near the* Platanthera psycodes*, I saw earlier in the*

week. We [Keith Board and Plampin] *are both pretty sure that it is* H. flava *var.* herbiola.*" Plampin noted that this Keiser Unit colony did not emerge during the drought year of 1988, but that 35 or more non-blooming plants appeared in 1989.*

In June of 2015, Carie Satkoski found this species growing in Keiser C northeast of Keiser Woods in an ash-dominated, early successional stand dying from emerald ash borer infestation. Of the several plants found, two were in flower and one was collected for the NPS working herbarium. In 2015, there were fewer plants, but three were in flower. Plampin found what she thought was this species at the south end of the seepage at Crescent Dune on 2 September 2010. Northern tubercled orchid was found at Hoosier Prairie A by Ken Klick in 1982. Bowles et al. (1986) previously mapped the population and noted four genets with the following associates: *Eleocharis elliptica*, *Eryngium yuccifolium*, *Euthamia graminifolia*, *Helianthus grosseserratus*, *Pycnanthemum virginianum*, *Spartina pectinata*, and *Spiraea alba*. Bowles (1987) noted eight genets in 1986 and cited similar associates.

Voucher Specimens:

Swink s.n., 21 June 1952, Lake Co. (MOR)
Dritz #113, 19 July 1980, Porter Co. (MOR)
Lyon s.n., 13 July 1924, Porter Co. (BUT)

Platanthera hookeri (Torr. ex A. Gray) Lindl. [*Habenaria hookeri* Torr.]
Hooker's orchid is only known from the DSP, where it may now be extirpated. Wilhelm (1990) wrote that "Lyon (1927) reported Hooker's orchid from two locations within DSP: 'Tremont, rich wooded dune. A single flowering plant found. Three or four times non-flowering plants, apparently of this species have been found. . . .a few plants are to be found in the subdunal woods at Furnessville.'"

Swink and Wilhelm (1979) reported that this orchid grew at the east end of the park with *Pinus strobus*, and it was last seen by Valdemar Schwarz in 1969 in the Pinery (Homoya 1993). *P. orbiculata*, with which it could be confused, is unknown from this part of Indiana (Deam 1940). While Wilhelm (1990) thought this orchid may have been subjected to over-collecting, Homoya (1993) cited three reasons why Hooker's orchid is rare in Indiana: habitat destruction, habitat alteration, and being at the southern limit of its range.

Voucher Specimens:

Pearsall s.n., 14 June 1941, Porter Co. (F)

Platanthera lacera (Michx.) G. Don [*Habenaria lacera* (Michx.) R. Br.]
Green fringed orchid is known from Tolleston Dunes, Calumet Prairie, Inland Marsh B, Cowles Dunes, DSP, Keiser C and F, Tamarack B and D, Hoosier Prairie, and Pinhook Bog units. Keith Board saw more than twelve *Platanthera lacera* in Tolleston Dunes B on 29 June 1990, growing southeast of *Botrychium simplex*. Gerould Wilhelm noted at least 50 individuals in the Calumet Prairie. In Howes Prairie (Cowles Dunes B), it grows in mesic prairie with *Aletris farinosa*, *Lilium philadelphicum*, *Oenothera fruticosa* ssp. *tetragona*, and *Scleria triglomerata*. Tom Post and Michael Homoya found plants in DSP just east of State Road 49. Craig Johnson found green fringed orchid in Keiser C south of Mertz by an abandoned road on 21 June 1993. Plampin also found this species in Keiser C on 25 July and 3 August 1994. Plampin and Myrna Newgent found this orchid in Keiser F on 17 August 1994 south of the ditch on the south side of the RV dump station near the Dunewood Campground (Plampin and Newgent 1994). Plampin and Myrna Newgent found one, and later Myrna found six of these orchids in "full glorious bloom" in Tamarack B on 29 June 1993 (site visited by Pavlovic and photographed later in the month). Wilhelm (1990) saw one stem of this orchid in a mound of *Sphagnum* in the far eastern part of Tamarack D, where it grew with *Epigaea repens*. Plampin saw another green fringed orchid under a black gum tree in a "pole forest" in Tamarack D on 7 July 1990. The only record Wilhelm (1990) had for this orchid at Hoosier Prairie A is from the Indiana Division of Nature Preserves' species

list (Bacone 1988, 1995). Gerould Wilhelm reported he had seen this species just west of Hoosier Prairie in a railroad prairie. Green-fringed orchid is reported from Pinhook B, but there is currently no further information.

Voucher Specimens:
Hiebert #317, 2 July 1982, Lake Co. (INDU)

Platanthera psycodes (L.) Lindl. [*Habenaria psycodes* (L.) Spreng.]
The purple fringed orchid is known from Miller Woods, Calumet Prairie, West Beach, DSP, Keiser, and Tamarack. In 1986, this fringed orchid was seen and photographed by Robert Peloquin on the edge of wetland 35 in Miller Woods (Whitman et al. 1990, Wilhelm 1990). According to Wilhelm (2000), purple fringed orchid is occasional in the Calumet Prairie. Morgan Conley, an INDU resource management employee, found purple fringed orchid growing on the south shore of Long Lake in the West Beach C subunit on 21 July 2017 (photograph confirmed the identity).

First reported from DSP by Lyon (1927) from "wet subdunal woods, Tremont," purple fringed orchid was found by Ken Dritz in DSP. In 1989, Plampin noted that this orchid grows in four locations in the state park. At the first location it was growing with *Arisaema triphyllum*, *Betula alleghaniensis*, *Caulophyllum thalictroides*, *Cicuta maculata*, *Dryopteris carthusiana*, *Geranium maculatum*, *Glyceria striata*, *Hamamelis virginiana*, *Iris virginica*, *Lilium michiganense*, *Lindera benzoin*, *Lysimachia ciliata*, *Onoclea sensibilis*, *Parthenocissus quinquefolia*, *Quercus bicolor*, *Tilia americana*, and *Toxicodendron radicans*. About the second location, Plampin wrote,

> *I found three plants on the "peninsula" in Fort Creek north of Trail 2 with* Lysimachia *spp.,* Asarum canadense, Symplocarpus foetidus, Asimina triloba, Hamamelis virginiana, *and* Quercus *spp. The plant nearest the trail increased to two stalks* [from 1984 to 1985].

Tom Post also found purple fringed orchid east of S.R. 49 in the hydromesophytic forest growing with *Myosotis laxa* (21 July 1994). Keith Board found a single plant growing within sight of passing motorists in the west side of Kemil Road. Purple fringed orchid, which associates with *Platanthera flava* var. *herbiola*, was first reported from the Keiser stop by Lyon (1927). According to Wilhelm (1990):

> *It remained unheralded until Plampin saw it on 22 July 1987 in Keiser C. Plampin wrote: "I saw one ... at the northeast end of the hydromesophytic forest about 500–750 feet east of Kemil . . . free-standing with the following associates nearby:* Onoclea sensibilis, Aralia nudicaulis, Ribes *sp.,* Arisaema, Prunus *sp.,* Symplocarpus foetidus, Ulmus americana, Podophyllum peltatum.*"*

In 1989, Plampin reported that Alan Resetar saw *Platanthera psycodes* near the methane well in Keiser C (Wilhelm 1990). Others were seen in Keiser C on 3 August 1990 (Plampin and Newgent 1992) and by Keith Board. The purple fringed orchid is known from the Tamarack Unit solely based on the following comment by Lyon (1927): "Tamarack, subdunal woods, a single plant." The purple fringed orchid has not been reported in the area since 1989.

Voucher Specimens:
Dritz #114, 19 July 1980, Porter Co. (MOR)

Pogonia ophioglossoides (L.) Ker Gawl.
Rose pogonia is known from Miller Woods, West Beach, Hoosier Prairie, and Pinhook Bog. Dale Otto found rose pogonia in Miller Woods A in 1982, and its presence here was later verified by Keith Board (Wilhelm 1990). In 1989, Plampin reported that in some years, hundreds of plants can be seen just east of the USX slag pile around the panne (Wilhelm 1990). Listed below is a Kjellmark specimen (MOR) from the same location and with the following associates: *Arctostaphylos uva-ursi*, *Cornus sericea*, *Hypericum kalmianum*, *Pinus*

banksiana, *Ptelea trifoliata* ssp. *trifoliata*, and *Rhus aromatica*. Daniel Mason (NPS) and Tonkovich found rose pogonia in pannes of West Beach A in 1999 and 2000. Plampin and Myrna Newgent saw this orchid in the most northerly panne east of the bathhouse and west of Ogden Dunes in the West Beach B area on 8 September 1994. Rose pogonia was reported from Hoosier Prairie A by John Bacone on 22 February 1988 and 24 October 1995 (Wilhelm 1990). Irene Herlocker-Meyer knew of two populations, both north of Main Street at Hoosier Prairie A. This orchid is apparently rare in Pinhook B east of Wozniak Road, just north of the boardwalk.

Voucher Specimens:

Otto #28, 18 June 1982, Lake Co. (INDU)
Kjellmark #101, 10 June 1988, Lake Co. (MOR)
Wilhelm & Dritz #6900, 23 June 1979, La Porte Co. (MOR)

Spiranthes lacera (Raf.) Raf.

Slender lady's tresses is extant in the Howes Prairie (Cowles Dunes B) region of Cowles Dunes B. The lip of this species has a distinctively green center (Homoya 1993). Slender lady's tresses was first seen at Inland Marsh B on 6 June 2002 on a Shirley Heinze Land Trust Hike.

Voucher Specimens:

Hiebert #369, 2 September 1982, Porter Co. (MOR)

Spiranthes lucida (H.H. Eaton) Ames

Shining lady's tresses is known from Cowles Dunes and Keiser. This species has a spotty record in the Chicago Region, with populations appearing and disappearing (Swink and Wilhelm 1994, Wilhelm and Rericha 2017). This is the only spring-blooming lady's tresses in the flora of the Indiana Dunes. It has a distinctive yellow spot on the petal lip. This orchid has appeared after human or natural disturbance in early successional habitats. In 1980, Ken Dritz photographed the species in La Porte County, Indiana, but these plants disappeared in 1981 (Wilhelm 1990). Its first appearance at INDU in 1988 was described by Ken Klick, who sent Gerould Wilhelm the following message in a letter (Wilhelm 1990):

> *On May 13, 1987, Ron Hiebert, Ken Klick, Linda Lobik, and Sandy O'Brien observed a blooming* Spiranthes lucida *. . . in a razed homesite area (15-108), NE SE NE Sec. 23 T37N R6W. The area is part of the Dune Acres Area, Survey V* [Cowles Dunes B] *. . . Marlin Bowles, several days later, confirmed the identification and photographed the plant. The species occurred in an abandoned gravel driveway that had not been used for approximately eight years. The gravel was interspersed with moist sand from which grew* Arenaria serpyllifolia, Aster lateriflorus [*Symphyotrichum lateriflorum*], Daucus carota, Festuca elatior [*Schedonorus arundinaceum*], Medicago lupulina, Melilotus alba, Plantago lanceolata, Poa pratensis, *and* Taraxacum officinale.

Wilhelm (1990) continued, "Bowles' slide is filed in the herbarium at MOR. In the slide, there is a seedling elm growing within an inch of the orchid, a fact which suggests that the life of this *Spiranthes* is doomed without fairly frequent fire in her land." In 2003, a new population was found by Laura Rericha, which was confirmed by Dan Mason (NPS) and Lydia Miramontes in July 2003. This population of more than 40 plants is east of the artesian well and south of the abandoned Beverly Drive; it sits at the edge of a sedge meadow in the former wet mesic lawn of an abandoned homesite (Keiser B). Beaver activity has since reduced or exterminated the population, but some plants may remain along the road edge. Leon Glickenstein found this population according to Dan Mason (NPS, pers. comm. with Pavlovic). Glickenstein also found this plant along the edge of Beverly Drive and some of these plants may remain today.

Voucher Specimens:

Bowles s.n., 1 June 1987, Porter Co. (MOR)

Spiranthes magnicamporum Sheviak

Great Plains ladies' tresses is known from Miller Woods, Inland Marsh, Cowles Dunes, and Hobart Prairie Grove. Great Plains ladies' tresses was found in Miller Woods in 2007 along the Indiana Harbor Belt railroad bed by Myrna Newgent (Plampin and Hamilla 2008a, 2008b). It was possibly found by Molly Hacker in a wet swale between foredunes adjacent to Lake Michigan in 2009, but those plants may be a form of *Spiranthes cernua* that also has an odor. *Spiranthes magnicamporum* and *S. cernua* are difficult to distinguish. The three most useful characteristics of Great Plains ladies' tresses are its coumarin-like odor, thickened yellowish lip, and widely spreading lateral sepals (Homoya 1993). Some races of *S. cernua* also have this odor and a yellowish lip. Ultimately, examination of the seeds is the most reliable identification tool; the seeds of *S. magnicamporum* are monoembryonic, while those of *S. cernua* are polyembryonic (Homoya 1993). In 1992, the Great Plains ladies' tresses was reported from Coulter Prairie (Inland Marsh B, owned by SHLT) by Thomas Post. On 29 September 1996, Keith Board and Ken Dritz reported Great Plains ladies' tresses from Inland Marsh A. Molly Hacker found this orchid growing along the shoulder of Mineral Springs Road in Cowles Dunes A on 16 September 2013. It is also known to occur along the bike trail (former railroad line) at Hobart Prairie Grove. There is no specimen from the Dunes deposited in herbaria.

Spiranthes ovalis Lindl. var. *erostellata* Catling

Oval ladies' tresses is known from Bailly, Inland Marsh, and Pinhook Bog. This orchid, known formerly from Steuben County in far northeastern Indiana and from Kalamazoo County, Michigan, may be expanding its range. Plampin reported that Eva Hopkins showed her at least 25 plants blooming under *Fagus grandifolia* amid *Glechoma hederacea* and *Pilea* sp. in her yard on the Valparaiso Moraine in Porter County on 8 October 1996. Being skeptical of the identification, Eva Hopkins had the two plants verified by Floyd Swink (MOR #127997, 6 November 1995). Plampin reported that Eva recorded the number of plants in bloom over time: five on 1 October 1990, thirteen on 1 October 1991, two on 30 September 2008, and fifteen on 19 October 2010. Plampin, Hamilla, and Daniel Mason (NPS) found eighteen blooming plants at Pinhook A on 25 September 2008, growing in and on either side of the new trail in the upland, east of the new parking lot at this bog (Plampin and Hamilla 2008a). This elephantine-lipped species was found growing with *Asplenium platyneuron*, *Dryopteris intermedia*, *Fraxinus americana*, *Onoclea sensibilis*, *Rubus* spp., *Solidago altissima*, and various grasses. Keith Board saw this plant in Coulter Prairie (Inland Marsh B) in 2001 and showed it to Ken Dritz. It was growing in damp somewhat sterile, flat ground (Plampin and Hamilla 2008a). Keith Board and Ken Dritz also found this orchid growing east of Michigan City in La Porte County on 25 September 1994 (MOR #124207). On 7 October 2009, Stacey Leicht-Young, Pavlovic, and Laura Cremin found this species growing in successional forest with an understory dominated by *Celastrus orbiculatus* in Bailly B. This orchid is found along trail edges and other areas where there is neither full sun nor full shade (Homoya 1993). According to Eva Hopkins, the flowers persist after the first frost in the fall. There is no specimen from the Dunes deposited in local herbaria.

Triphora trianthophoros (Sw.) Rydb.

The elusive three-birds orchid was reported from DSP by Lyon (1927), who stated, "subdunal woods, Tremont, found once." A 1942 collection by Gordon Pearsall from this locale is housed in The Field Museum of Chicago. Robert Pringle, a resident of Dune Acres from 1956 to 1965, took notes about the flora of the dunes (Pringle notes in copy of Wilhelm [1980] housed at the U.S. Geological Survey offices). He noted that Seymour Segal recorded two locations for this orchid in the DSP, but there is no date of observation. However, Pringle speculated that this species must appear above ground infrequently, say every 30 years. Homoya (1993) notes the frequent dormancy causing populations to fluctuate widely from year to year. In addition, three-birds orchid is known to exhibit episodic flowering synchrony related to bud development and nighttime temperatures, making it a matter of timing or luck to see this species in bloom (Homoya 1993). Pringle wrote in his annotated

Special Flora (Wilhelm 1980) that "Ray Grow may know of the location and date of the last find, which I believe was by Mrs. Baldwin of Chicago. I understand that the plant was more common at Turkey Run State Park."

Voucher Specimens:

Pearsall s.n., 27 August 1942, Porter Co. (F)

POACEAE — Grass Family

The grass family is recognized by generally having round hollow culms, swollen nodes, two-ranked leaves, greatly reduced flowers, and fruit that is a grain. The flowers, called florets, are borne one or more to a spikelet and are subtended by up to three types of bracts. The palea and lemma form the innermost bracts that surround each floret and then the glume(s)—the outermost bracts, below the single or compound cluster of florets—if present. The glume or glumes are at the base of the spikelet. Grasses, including corn (*Zea mays* L.), wheat (*Triticum aestivum* L.), rice (*Oryza sativa* L.), oats (*Avena sativa* L.), barley (*Hordeum vulgare* L.), rye (*Secale cereale* L.), sugar cane (*Saccharum officinarum* L.), and millet (*Panicum miliaceum* L.), are of great economic importance because they have been the source of most of our food grains.

Ammophila breviligulata Fernald

Marram grass, also beach or dune grass, is common along the upper beach and lower foredune communities of Miller Woods A, West Beach A and D, Cowles Dunes A and B, DSP A, Keiser A, and Tamarack C. It also occurs in blowouts where sand movement is prevalent. This dune-building beach grass declines in absolute abundance in the eastern portions of the park where shoreline erosion has been greatest. Besides cottonwood, this species is the predominant dune builder. It flowers prolifically only where there is active sand movement. While marram grass facilitates succession by introducing organic matter to the sand, dense swards with a thick litter layer inhibit dune succession (Olson 1958d, Poulson 1993b). Natural area managers may consider not planting the Natural Resource Conservation Service's "Cape improved" variety in dune restorations because of its low genetic diversity (Fant et al. 2008).

Voucher Specimens:

Wilhelm & Bacone #5198, 3 August 1978, Lake Co. (MOR)
Hiebert #81, 4 August 1981, Porter Co. (MOR)
Greenman s.n., 31 July 1909, Porter Co. (F)
Tryon s.n., 3 August 1935, Porter Co. (F)
Wilhelm et al. #15236, 25 August 1987, La Porte Co. (MOR)

Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp [*Hierochloë odorata* (L.) P. Beauv.]

Sweet grass, or vanilla grass, is known only from Hoosier Prairie A. Sweet grass is of great cultural significance to Native Americans in northeastern North America because it was considered the first plant created, represents the land, and the three braids of sweet grass reflect the balancing of body, mind, and soul (Toupal 2006, Kimmerer 2013). Smudging of sweet grass is said to drive away negativity. Research has shown that active cutting of sweet grass by 50% promotes clump persistence and growth (Kimmerer 2013). This suggests that if sweet grass is still present at Hoosier Prairie, it might benefit from Anishinaabe harvesting.

Voucher Specimens:

Hiebert & Payton #280, 14 May 1982, Lake Co. (INDU)

Aristida longespica Poir. var. *geniculata* (Raf.) Fernald [*Aristida intermedia* Scribn. & C.R. Ball]

False arrow feather was seen locally by Levi Umbach in 1915, then not reported again until

Ken Dritz noted having seen it in Miller Woods A on 25 September 1988 (Wilhelm 1990). In 1989, Ken Dritz reported it growing along the cindery rail bed and high dunes in Tolleston Dunes B (Wilhelm 1990). This easily overlooked rare annual grass is known from West Beach A and Inland Marsh B and is occasional in moist sand north of the Swamp Complex in Keiser E.

Voucher Specimens:

Umbach s.n., September 1915, Lake Co. (MOR)
Dritz #147, 11 August 1980, Porter Co. (MOR)

Aristida tuberculosa Nutt.

Beach three-awn grass is known from Tolleston Dunes, West Beach, Inland Marsh, DSP, Furnessville, and Keiser. This species is abundant in the open sandy areas in the southwestern and far eastern sectors of Tolleston Dunes A. A system of monitoring this species in Tolleston Dunes A was set up in 1986 (Bowles et al. 1986) but has not been resampled since 1990. Bowles et al. (1990) found beach three-awn grass growing with *Artemisia campestris* ssp. *caudata*, *Asclepias syriaca*, *Cyperus houghtonii*, *Dichanthelium ovale* ssp. *pseudopubescens*, *Euphorbia corollata*, *Krigia virginica*, *Monarda punctata* var. *villicaulis*, *Nuttallanthus canadensis*, *Prunus serotina*, *P. pumila*, *Quercus velutina*, *Schizachyrium scoparium*, and *Triplasis purpurea*. According to Bowles (1989), this population appears to have changed little since 1985. There is also a small population in the far southwestern corner of Tolleston Dunes B and another in C. In Tolleston Dunes B it was growing with *Artemisia campestris* ssp. *caudata*, *Carex muehlenbergii*, *C. tonsa*, *Corispermum americanum*, *Cyperus schweinitzii*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Euphorbia corollata*, *Koeleria macrantha*, *Lespedeza capitata*, *Monarda punctata* var. *villicaulis*, *Nuttallanthus canadensis*, *Opuntia cespitosa*, *Polygonum articulatum*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, *Rhus copallinum* var. *copallinum*, *Rubus flagellaris*, *Sassafras albidum*, *Schizachyrium scoparium, Tephrosia virginiana*, and *Triplasis purpurea*. This species is known locally from West Beach A and B. Myrna Newgent, Mulcahey, and Plampin saw scattered populations growing with *Brickellia eupatorioides* var. *corymbulosa*, *Pinus banksiana*, and *Schizachyrium scoparium* to the south and west of the new Portage Lakefront Park on NPS lands (West Beach D). It is reported from Inland Marsh B (second specimen below), where it was growing with *Arabidopsis lyrata*, *Cyperus schweinitzii*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Euphorbia corollata*, *Crocanthemum canadense*, *Lithospermum caroliniense* var. *croceum*, *Lupinus perennis* var. *occidentalis*, *Monarda punctata* var. *villicaulis*, *Populus deltoides*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, *Rosa carolina*, *Rubus flagellaris*, *Salsola tragus*, *Vaccinium angustifolium*, and *Viola pedata*. Wilhelm (1990) noted, based on information from Floyd Swink, that this species was extant at the Dunes Prairie Nature Preserve of the DSP. A nice population in a blowout north of Furnessville Road in Furnessville A was monitored by Marlin Bowles, DeMauro, and Pavlovic in 1985. Bowles et al. (1986) reported that it was "local throughout blowout area," and listed the following associates: *Cyperus schweinitzii*, *Dichanthelium ovale* ssp. *pseudopubescens*, *Prunus pumila*, *P. serotina*, *Quercus velutina*, *Schizachyrium scoparium*, and *Triplasis purpurea*. Bowles (1989) reported that the population he sampled in 1985 was still doing well. Beach three-awned grass is extant in a sandy blowout in Furnessville A that Plampin found on 2 December 1995. Pavlovic and Megan Korte found dozens of plants at that site on 21 August 2013. Pavlovic found a small population in Furnessville D on 3 July 2009. This species is occasional in the sandy blowout area east of Kemil Road, between U.S. 12 and the swamp complex in Keiser E. Plampin found numerous plants in a former farm field in Keiser F on 23 October 1995. Pavlovic has observed that sites in Tolleston Dunes are becoming more shaded and areas of bare sand are diminishing despite frequent fires. Elsewhere in Furnessville the sand blows are undergoing succession whether or not they have been burned. These trends suggest possible future extirpation of this sand blow dependent annual plant.

Voucher Specimens:

Dritz #635, 25 September 1988, Lake Co. (MOR)
Dritz #141, 11 August 1980, Porter Co. (MOR)
Dritz #42, 18 April 1980, Porter Co. (MOR)

Bouteloua curtipendula (Michx.) Torr. var. *curtipendula*

Side oats grama is only known from the Peddicord property at Hobart Prairie Grove. It is rare and occurs only on a southwest-facing bluff or hill prairie above Lake George. The habitat is a hill prairie with other species planted by Sandy O'Brien (Nathanael Pilla, pers. comm. with Pavlovic, 3 March 2021). The population was threatened by ongoing off-road vehicle activity, but even though that activity has been discontinued, the habitat continues to be threatened by erosion. During late fall of 2011, Sandy O'Brien, with permission of the landowner, began terracing the scar, mulching, and sowing native grass seed. Extreme rainfall events have continued to contribute to erosion despite Sandy's efforts. Elsewhere in Indiana, side oats grama is most commonly found in gravel hill prairies (Betz 1978, Betz and Lamp 1992). In December 2015, the Save The Dunes organization acquired this Peddicord property for management and eventual transfer to INDU. Individuals conducting illegal camping activity in this area may continue to contribute to this species' decline. We consider this species to be adventive but include it because it is locally rare.

Brachyelytrum aristosum (Michx.) P. Beauv. ex Branner & Coville

Northern shorthusk was unknown from the Indiana Dunes until recently, even though specimens were collected over 20 years ago. Those two specimens were thought to be *B. erectum* until the new species name was applied in 2003 (Saarela et al. 2003). Bill Hess, Pordrasky, and Marlin Bowles found it growing in DSP on 9 April 1984. Northern shorthusk grows in DSP and Keiser. Gerould Wilhelm and Ken Dritz found it in 1988 growing in Keiser D along the Calumet Bike Trail with *Calamagrostis canadensis*, *Carex folliculata*, *Doellingeria umbellata* var. *umbellata*, *Euthamia graminifolia*, *Eutrochium fistulosum*, *Osmundastrum cinnamomeum*, *Persicaria careyi*, *Persicaria sagittata*, *Prunus serotina*, *Rubus hispidus* var. *obovalis*, *R. occidentalis*, *Solidago rugosa*, *Stachys pilosa* var. *pilosa*, *Thelypteris palustris* var. *pubescens*, and *Vitis labrusca*. Karen Quinlan and E. Greiner found this grass in Keiser E in September 2003 (Wilhelm 1990). On 17 September 2003, D. Hickey found it growing in Keiser E. Porter County is at the southwestern edge of its range This and the next species have a brickwork pattern of veins when the blade is viewed with backlighting (Wilhelm and Rericha 2017).

Voucher Specimens:

Hess et al. #6004, 4 September 1984, Porter Co. (MOR)
Wilhelm & Dritz #16362, 27 July 1988, Porter Co. (MOR)

Brachyelytrum erectum (Schreb.) P. Beauv.

Long-awned wood grass, a mesic forest species, is reported from Bailly, Cowles Dunes, DSP, Furnessville, Keiser, and Heron Rookery. It grows on the high bluffs south of the Little Calumet River in Bailly G. It is occasional in the swamp complex portion of Cowles Dunes B and D. Long-awned wood grass is extant on shaded slopes of the dunes complex in DSP and is frequent in the swamp complex portions of Furnessville C, D, E, and G (Wilhelm 1990). This grass is still frequent in Keiser C. Long-awned wood grass is frequent in the woods south and north of the Little Calumet River in the Heron Rookery (Wilhelm 1990).

Voucher Specimens:

Post #614, 12 July 1994, Porter Co. (MOR)

Bromus kalmii A. Gray

Prairie brome is very rare in the Indiana Dunes region, being only located in Howes Prairie (Cowles Dunes B). The lemmas of this species have densely appressed-pilose hairs that are about 1 mm long (Swink and Wilhelm 1994). With Lois Howes' guidance, Gerould Wilhelm saw one or two plants on a dry sand ridge in Cowles Dunes B in 1979 (Wilhelm 1990). It

still grows in the same location in an area where the NPS thinned the undergrowth in 2008 (Pavlovic, pers. obs.). Gerould Wilhelm attributed this grass to the DSP, but one wonders if it was in Furnessville instead based on Lyon (1927) reporting it there: "open wooded dunes, Furnessville."

Voucher Specimens:
Pavlovic #36, 11 August 1983, Porter Co. (MOR)

Bromus nottowayanus Fernald
Glossy-leaved brome was not known from the Indiana Dunes or the DSP until Doug Botka found it growing there in 2018 (pers. comm. with Pavlovic, 24 February 2019).

Danthonia compressa Austin
Flattened oatgrass was unknown from Indiana until it was found in DSP by Doug Botka in 2019. This boreal species was unknown from the Chicago Region; its closest location is in Cheboygan County, Michigan. We have given it a CoC value of 10. This occurrence is most likely a waif, possibly transferred to the area on someone's shoes perhaps from further north.

Voucher Specimens:
Namestnik, S. #4485, 29 July 2019, Porter Co. (IND)

Dichanthelium boreale (Nash) Freckmann [*Panicum boreale* Nash]
Northern panic grass is known to grow at Miller Woods, West Beach, Inland Marsh, Calumet Prairie, DSP, and Hoosier Prairie. Northern panic grass is reported from Miller Woods F (Wilhelm 1990). It is occassional in the savanna complex of West Beach C and the sand mined part of West Beach B (Wilhelm 1990). Northern panic grass is rare in the savanna portions of Inland Marsh A and in the NIPSCO right-of-way throughout Inland Marsh B (Wilhelm 1990). Northern panic grass is occasional in the Calumet Prairie (Wilhelm 1990). It is extant on the north side of Trail 10 in one of the more savanna-like phases of the dune complex of the DSP. Wilhelm (1990) reported that Ken Dritz found this grass growing in low prairie along the Hoosier Prairie A loop trail.

Voucher Specimens:
Wilhelm #6825, 11 June 1979, Porter Co. (MOR)

Dichanthelium dichotomum (L.) Gould ssp. *dichotomum* [*Panicum dichotomum* L.]
Forked panic grass is known from Cowles Dunes, Furnessville, Keiser, DSP, and Pinhook Bog. This inconspicuous grass is occasional in the savanna complex portion of Cowles Dunes B and along the Bike Trail in E. This taxonomically complicated species is probably extant somewhere among the dunes of the savanna complex or dune complex in the DSP, where Lyon (1927) recorded it. In 1979, Gerould Wilhelm noted a single clump of this species along a trail at the north edge of the swamp complex in Furnessville B. He made a field identification but felt there was not enough material to sacrifice a specimen. He also noted a small clump in Furnessville A and larger colonies in D and G. Amy Manke and Julie Stumpf (part of Pavlovic's Exotic Project, 1998–2000) found it growing with *Gaultheria procumbens*, *Maianthemum canadense*, *Parthenocissus quinquefolia*, *Prunus serotina*, *P. virginiana*, *Quercus alba*, *Rubus allegheniensis*, *Sassafras albidum*, *Vaccinium pallidum*, and *Viburnum acerifolium* in Keiser F. This grass is occasional on the low, heath-covered peninsula which protrudes into the northeastern quadrant of Pinhook Bog A. Wilhelm and Rericha (2017) call this *D. dichotomum* (L.) Gould without a subspecies designation since they separate the other closely related entity (below) at the species level.

Voucher Specimens:
Manke & Stumpf #2095, 12 August 1998, Porter Co. (INDU)

Dichanthelium dichotomum (L.) Gould ssp. *lucidum* (Ashe) Freckmann & Lelong [*Panicum lucidum* Ashe]
Bog panic grass, prior to Ken Dritz finding it in 1982, was known from the Chicago Region

solely based on a Levi Umbach specimen from Dune Park, the location of which was destroyed in 1963. The Ken Dritz and Gerould Wilhelm specimen was growing with *Aletris farinosa*, *Danthonia spicata*, *Dichanthelium latifolium*, *Drosera rotundifolia*, and *Lycopodiella inundata* in *Sphagnum* in Cowles Dunes E, part of the NIPSCO right-of-way. Wilhelm and Rericha (2017) segregate this taxon from the previous at the species level as *D. lucidum*. They state that many authorities place both entities "into synonmy with *D. dichotomum*, with which it is similar, except that the fertile lemma does not protrude beyond the second glume and sterile lemma."

Voucher Specimens:

Wilhelm & Shimp #14858, 21 May 1987, Porter Co. (MOR)
Dritz & Wilhelm #269, 20 June 1982, Porter Co. (MOR)

Dichanthelium linearifolium (Scribn.) Gould [*Panicum linearifolium* Scribn.]
Slender-leaved panic grass is rare, but extant, in the dry savannas of Tamarack C west of Mount Baldy. This panic grass is occasional on sandy soils near Lake Michigan (Swink and Wilhelm 1994). No specimen has been collected for this species in the Dunes.

Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *oligosanthes* [*Panicum oligosanthes* J.A. Schultes]
Few-flowered panic grass is reported from Miller Woods D, Inland Marsh C, Cowles Dunes, DSP, and Hoosier Prairie. This species is rare in the Indiana Dunes compared to *Dichanthelium oligosanthes* ssp. *scribnerianum*. Gerould Wilhelm reported it from the NIPSCO right-of-way south of Coulter Prairie. Few-flowered panic grass is reported from a disturbed site in Cowles Dunes C. This species was known from the DSP based on the report by Lyon (1927), who stated, "rich wooded dune, subdunal meadow, Tremont." Few-flowered panic grass was found by Irene Herlocker-Meyer and Greg Livovitch in Hoosier Prairie B on 30 May 2000.

Voucher Specimens:

Wilhelm & Dritz #6724, 27 May 1979, Porter Co. (MOR)
Wilhelm #6838, 12 June 1979, Porter Co. (MOR)
van Oettingen #366, 14 September 1982, Porter Co. (MOR)

Dichanthelium perlongum (Nash) Freckmann [*Panicum perlongum* Nash]
Long-stalked panic grass is known from Miller Woods, West Beach, and DSP. This species, less common than its close relative *Dichanthelium depauperatum*, is occasional in the sand savannas of Miller Woods C and probably in the other subunits as well. Gerould Wilhelm reported (unpublished report) this rare grass on 3 June 1998 from West Beach E. This species is probably extant within the state park dune complex or the savanna complex where Lyon (1927) saw it growing on a very open wooded dune near Tremont in the DSP.

Voucher Specimens:

Lyon s.n., 27 June 1926, Porter Co. (NEI)

Glyceria borealis (Nash) Batchelder
Northern manna grass occurs in Miller Woods and Tamarack. Northern manna grass was collected in Miller by Levi Umbach in 1896. It was found again by Sandy O'Brien (#63, INDU) in Wetland 37 of Miller C (Whitman et al. 1990). On 16 March 1992, Thomas Post saw northern manna grass in Miller E and F. This grass was reported by Lyon (1927) from Tamarack B, but it is now almost certainly extirpated. It is also possible that this report was from the eastern portions of Keiser C.

Voucher Specimens:

Wilhelm #12953, 10 July 1985. Lake Co. (MOR)

Glyceria grandis S. Watson

American manna grass was newly found by Tony Troche on 12 July 2015 at Yellow Birch Fen, Inland Marsh B, specifically on the Shirley Heinze Land Trust property where it grows south of the *Clintonia borealis* population. Deam recorded this species from only three Indiana counties in the north central portion of the state (Deam 1940). No specimen has been collected for this species in the Dunes.

Milium effusum L. ssp. *cisatlanticum* (Fernald) A. Haines [*Milium effusum* L. var. *cisatlanticum* Fernald]

Wood millet is known from DSP, Keiser, and the Heron Rookery. In DSP, this rare grass is extant in the hydromesophytic swamp west of Kemil Road (Wilhelm 1990). Ken Dritz reported wood millet from along Trail 2 in 1987 (Wilhelm 1990). This population was monitored by Bowles et al. (Bowles et al. 1986), who recorded the following associates: *Acer saccharum*, *Amphicarpaea bracteata*, *Carpinus caroliniana* ssp. *virginiana*, *Carya ovata*, *Cornus florida*, *Elymus hystrix*, *Fraxinus americana*, *Geranium maculatum*, *Hamamelis virginiana*, *Lindera benzoin*, *Maianthemum racemosum* ssp. *racemosum*, *Parthenocissus vitacea*, *Podophyllum peltatum*, *Prenanthes alba*, *Prunus serotina*, *Quercus alba*, *Q. rubra*, *Sanicula odorata*, and *Sassafras albidum*. Bowles (1988) indicated that this species and *Poa alsodes* are well mixed along the Trail 2 transect. Reported by Lyon (1927) in Keiser C, this grass has been relocated here. It is occasional in the low swales and depressions among the beech trees south of the Little Calumet River in Heron Rookery A. Bowles et al. (1986) sampled one of the populations here and recorded the following associates: *Acer saccharum*, *Fagus grandifolia*, *Fraxinus americana*, *Hamamelis virginiana*, *Lindera benzoin*, *Osmorhiza claytonii*, *Parthenocissus vitacea*, *Prunus serotina*, *Sanguinaria canadensis*, *Sanicula odorata*, *Solidago caesia*, *Ulmus americana*, and *Viola pubescens*.

Voucher Specimens:

Swink s.n., 18 May 1970, Porter Co. (MOR)

Muhlenbergia tenuiflora (Willd.) Britton, Sterns & Poggenburg

Slender satin grass is reported from DSP (Wilhelm 1990). Douglas Botka saw this grass growing in DSP in 2016. No recent specimen has been collected there, but Deam collected a specimen (IND) on 16 September 1930 on a dune slope at Ogden Dunes Beach, between West Beach and Portage Lakefront.

Voucher Specimens:

Glassman #3476, 22 August 1955, Porter Co. (NHMU)

Oryzopsis asperifolia Michx.

Rough-leaved rice grass is known from DSP and Tamarack. This rare grass was reported from DSP by Lyon (1930), who noted it as rare, on a rich wooded dune at Tremont. During the Indiana Division of Nature Preserves forays on 25 May 1989, Michael Homoya spotted it along the north side of the east Beach House Blowout extension of Trail 9 (Wilhelm 1990). This rare grass was unknown from Tamarack until it was found in subunit C by Ken Dritz in 1980. Rough-leaved rice grass was growing with *Anemone americana*, *Aquilegia canadensis*, *Aralia nudicaulis*, *Eurybia macrophylla*, *Hamamelis virginiana*, *Prenanthes alba*, *Prunus virginiana*, *Sassafras albidum*, *Solidago caesia*, *Toxicodendron radicans*, *Vaccinium angustifolium*, and *Viburnum acerifolium*. At Tamarack, Wilhelm (1990) writes,

> *Sadly, however, Bowles (Bowles 1988) wrote: "Initial sampling in 1984 found 11 plants, which at that time was located sufficiently close to the Lake Michigan bluff line so as to be threatened by ongoing lakeshore erosion (Bowles et al. 1985)." By 1987, the bluff had eroded, destroying nine of the original eleven plants. Each of the two remaining plants were situated only a few meters from the new bluff line. These plants were removed, placed in planters, and transplanted to an* [east-facing] *inland ravine bluff, but they failed to survive.*

Voucher Specimens:

Post & Klick #530, 9 June 1989, Porter Co. (INDU)
Dritz #53, 10 May 1980, Porter Co. (MOR) [This is from the extirpated population].

Panicum verrucosum Muhl.

Warty panic grass, rare in the interior United States, is common at Little Lake in Cowles Dunes A, particularly when the water levels are low and extensive mud flats are exposed. Bowles et al. (1985) give the following associates at Little Lake: *Calamagrostis canadensis*, *Cephalanthus occidentalis*, *Dulichium arundinaceum*, *Eleocharis palustris*, *Hypericum boreale*, *Juncus canadensis*, *Proserpinaca palustris*, and *Rhynchospora scirpoides*. "*Verrucosum*" refers to the warty ridges on the spikelets of warty panic grass. This coastal plain disjunct persists as seeds in the substrate if periodic emergence and reproduction occur.

Voucher Specimens:

Wilhelm & Dritz #12317, 19 September 1984, Porter Co. (MOR)

Patis racemosa (Sm.) Romasch., P.M. Peterson & Soreng [*Piptatherum racemosum* (Sm.) Eaton; *Oryzopsis racemosa* (Sm.) Ricker]

Black-seeded rice grass grows in a scattered population in the dune complex communities of West Beach A and D and Cowles Dunes A. Pavlovic and Stacey Leicht-Young observed numerous patches deep in the valleys of the high dunes in West Beach A on 5 August 2008. Gerould Wilhelm's and Kathryn McEachern's collections are from West Beach D. These represent the only locations for this species in Porter County. Bowles et al. (1985) listed the following associates: *Carex pensylvanica*, *Galium circaezans* var. *hypomalacum*, *Hamamelis virginiana*, *Juniperus virginiana* var. *virginiana*, *Maianthemum stellatum*, *Parthenocissus quinquefolia*, *Pinus strobus*, *Polygonatum biflorum*, *Quercus rubra*, *Solidago caesia*, *Tilia americana*, and *Toxicodendron radicans*. The INDU herbarium has records from Cowles Dunes A and Dune Acres. Even in the central part of its range to the north, black-seeded grass has a patchy distribution among counties. Southern outliers extend into the mid-south (southern Illinois, southwest Indiana, western Kentucky and Tennessee, northern Alabama, Arkansas and Mississippi). Romaschenko et al. (2012) showed that this species and the next do not belong with other species in the genus *Piptatherum*, and each should be in separate genera as well.

Voucher Specimens:

Wilhelm #6991, 30 September 1979, Porter Co. (MOR)
McEachern #2, 7 August 1987, Porter Co. (MOR)

Piptatheropsis pungens (Spreng.) Romasch., P. M. Peterson & Soreng [*Piptatherum pungens* (Torr.) Dorn; *Oryzopsis pungens* (Torr.) Hitchc.]

Short-horned rice grass is rare, though possibly extant in DSP. Wilhelm (1990) writes,

> *Lyon (1927) wrote that it grew "along side of dune about 0.25 mile east of Waverly Beach, Dunes State Park, May 22, 1926* [he cited Weatherwax's specimen #538, which is in Bloomington]. [The specimen was] *identified by Agnes Chase who credits it with being the first report for Indiana, and the most southern station recorded to date.*

In 1940, Deam wrote: "A few tufts of this species have been found in Porter County over a limited area about 0.25 mile east of Waverly Beach in Dunes State Park. This is the only locality now known in Indiana." Swink and Wilhelm (1979) and Wilhelm and Rericha (2017) pointed out that Potzger later collected a specimen in nearby La Porte County. The botanist, Doug Botka, found this species again in DSP in 2019. Romaschenko et al. (2012) showed that this species is genetically separated from *Piptatherum* and *Patis*.

Voucher Specimens:

Deam #46637, 29 May 1929, Porter Co. (IND)

Piptochaetium avenaceum (L.) Parodi [*Stipa avenacea* L.]
Black oat grass is known from DSP and Tamarack. According to Wilhelm (1990), this rare grass is extant along the north side of Trail 10, in a savanna-like portion of the dune complex in DSP. Bowles (1987) mapped another population from sand dune talus at the base of the foredune complex along Trail 10; there he noted the following associates: *Hamamelis virginiana*, *Maianthemum stellatum*, *Prunus serotina*, *Quercus velutina*, *Q. alba*, *Sassafras albidum*, *Solidago caesia*, and *Toxicodendron radicans*. This rare grass was found by Norman Henderson and then found again by Christy Fox in the burned-over portion of Tamarack C, where Bowles et al. (1985) mapped the population and listed the following associates: *Carex pensylvanica*, *Comandra umbellata*, *Lactuca* sp., *Maianthemum racemosum* ssp. *racemosum*, *Prunus serotina*, *Pteridium aquilinum* var. *latiusculum*, *Q. velutina*, *Q. alba*, *Sassafras albidum*, and *Solidago* sp. Also see association list under *Melampyrum*. The plant is much more abundant in Tamarack C than in the widely scattered populations in DSP (Plampin et al. 2003). Of the 12 previously located patches (1992–1993) in Tamarack C, seven were extirpated in 2002 but thirteen new patches were found, with one having hundreds of plants (Plampin et al. 2003). Like its closely related relative, *Hesperostipa* (*Stipa*) *spartea*, the sharp achenes with long awns tend to embed in hikers' socks.

Voucher Specimens:
Henderson #17, 25 June 1982, Porter Co. (MOR)

Poa alsodes A. Gray
Grove blue grass is known from Cowles Dunes, DSP, and Heron Rookery. According to Wilhelm (1990), on 3 May 1987, Ken Dritz saw grove blue grass in Cowles Dunes D. In DSP, this rare grass is extant in a mesophytic portion of the swamp complex east of Wilson Shelter. In 1980, Ken Dritz gave its associates as *Anemone americana*, *Arisaema triphyllum*, *Botrychium virginianum*, *Carpinus caroliniana* ssp. *virginiana*, *Caulophyllum thalictroides*, *Euonymus obovatus*, *Galium pilosum*, *Geranium maculatum*, *Hamamelis virginiana*, *Lindera benzoin*, *Maianthemum canadense*, *Mitella diphylla*, *Ostrya virginiana*, *Panax trifolius*, *Podophyllum peltatum*, *Prenanthes alba*, *Ribes cynosbati*, *Smilax ecirrata*, *Tilia americana*, and *Trillium flexipes* (Wilhelm 1990). Bowles et al. (1986) began monitoring this population and recorded some additional associates: *Amphicarpaea bracteata*, *Liriodendron tulipifera*, *Quercus alba*, *Q. rubra*, *Sanicula odorata*, and *Sassafras albidum*. Bowles (1988) indicated that this species is well mixed with *Milium effusum* ssp. *cisatlanticum* along Trail 2. At Heron Rookery A, grove blue grass is occasional to frequent locally, particularly along the slopes of the oxbows and margins of depressions on the south side of the Little Calumet River. Bowles et al. (1986) mapped one of the populations there and recorded the following associates: *Acer saccharum*, *Carpinus caroliniana* ssp. *virginiana*, *Euonymus obovatus*, *Fagus grandifolia*, *Lindera benzoin*, *Liriodendron tulipifera*, *Osmorhiza claytonii*, *Parthenocissus vitacea*, *Prenanthes alba*, *Prunus serotina*, *Quercus rubra*, *Solidago caesia*, and *Viola pubescens*.

Voucher Specimens:
Dritz #60, 18 May 1980, Porter Co. (MOR)
Hiebert #401, 25 May 1983, Porter Co. (MOR)

Poa paludigena Fernald & Wiegand
The elusive and diminutive bog blue grass is found in Cowles Dunes and DSP. This grass is visible only during two weeks in June (Pavlovic, personal observation). According to Wilhelm (1990),

> *This species was discovered new to the Indiana Dunes National Lakeshore by Michael Homoya during his now legendary stroll through Cowles Bog and Indiana Dunes State Park in June of 1988. On 24 May 1989, Mike guided me to the area of Cowles Dunes A, where it grows along the southern edge of the hydromesophytic swamp. There, in the partly shaded ecotone, it grows on hummocks and along old, saturated logs of* Betula alleghaniensis *with* Cardamine bulbosa, Carex seorsa, Cornus sericea, Doellingeria

umbellata, Fraxinus americana, F. nigra, Glyceria striata, Ilex verticillata, Larix laricina, Lindera benzoin, Myosotis laxa, Onoclea sensibilis, Osmundastrum cinnamomeum, Parthenocissus quinquefolia, Platanthera clavellata, Rubus pubescens, Solidago patula, Symphyotrichum puniceum, Symplocarpus foetidus, Thelypteris palustris *var.* pubescens, Toxicodendron vernix, Typha angustifolia, Ulmus americana, *and* Vaccinium corymbosum. *Ken Dritz examined this site three days later and noted scattered plants, but this weak little grass was no longer in evidence when Ken revisited the site eight days later.*

According to Wilhelm (1990), in 1988, Michael Homoya reported having seen this grass in the swamp complex in an area about 0.25 mile north of the old Furnessville Station, evidently off the west side of the boardwalk along Trail 2 in DSP. Marlin Bowles and Pavlovic visited this site on 10 June 1990.

Voucher Specimens:

Wilhelm, Homoya, et al., #17054, 24 May 1989, Porter Co. (MOR)
Pavlovic #181, 10 June 1990, Porter Co. (MOR)

Poa saltuensis Fernald & Wiegand ssp. *languida* (Hitchc.) A. Haines [*Poa languida* Hitchc.]

Weak blue grass is known from Cowles Dunes, DSP, and Furnessville. It was noted by Ken Dritz and Sue Rowlatt in 1982 from Cowles Dunes E. Reported from DSP by Marcus Lyon (1930) from: "Tremont, subdunal woods," it has been seen by Ken Dritz at Mt. Jackson. There it grows with *Acer rubrum*, *Anemone americana*, *Aquilegia canadensis*, *Aralia nudicaulis*, *Carex pensylvanica*, *Epigaea repens*, *Eurybia macrophylla*, *Gaultheria procumbens*, *Hamamelis virginiana*, *Krigia biflora*, *Muhlenbergia schreberi*, *Parthenocissus quinquefolia*, *Polygonatum biflorum*, *Polygonatum pubescens*, *Prunus virginiana*, *Quercus velutina*, *Rubus allegheniensis*, *Solidago caesia*, and *Viburnum acerifolium*. Weak blue grass is occasional on mesophytic hummocks in the swamp complex of Furnessville B and G (Wilhelm 1990).

Voucher Specimens:

Dritz & Rowlatt #265, 6 June 1982, Porter Co. (MOR)
Dritz #215, 31 May 1981, Porter Co. (MOR)
Wilhelm & Betz #14786, 13 May 1987, Porter Co. (MOR)

Schizachyrium littorale (Nash.) E.P. Bicknell

As mentioned in Table 3, seashore bluestem is a new segregate from *Schizachyrium scoparium*. While we only have one specimen collected in Indiana, we speculate that this species occurs at Miller Woods, West Beach, Cowles Dunes, DSP, Keiser, and Tamarack. If the specimen below was collected at "Big Blowout," then it should be labeled Dunes State Park rather than "Dune Park."

Voucher Specimens:

Thieret and Thieret sn, 10 September 1949, Porter Co. (UTC)

Sphenopholis nitida (Biehler) Scribn.

Shining wedge grass is known from DSP and Pinhook Bog. At DSP, it was collected by Keith Board. Shining wedge grass was found at Pinhook Bog by Charles Deam. It is not know whether the species is still found at the bog and whether it survived the changes in surrounding land use. Swink and Wilhelm (1994) state that this grass was seen by Dale K. Otto in Dune Acres, but Wilhelm and Rericha (2017) make no mention of this. We did not find a Dale Otto specimen in the INDU Herbarium.

Voucher Specimens:

Deam #46669, 30 May 1939, La Porte Co. (IND)
Board, #188, 7 June 1991, Porter Co. (MOR)

Sphenopholis obtusata (Michx.) Scribn.
Prairie wedge grass was seen by Gerould Wilhelm in Inland Marsh B on 26 June and on 6 July 1998 (unpublished report). No specimen of this species in the Indiana Dunes has been collected. Prairie wedge grass is scattered but broadly distributed across the continental U.S. Jenkins and Parker (2000) found that prairie wedge grass in southern Indiana bottomland forest only occurred in reference forest and was absent from clear cuts, canopy gaps and former agricultural land.

Torreyochloa pallida (Torr.) G.L. Church var. *pallida* [*Glyceria pallida* (Torr.) Trin.]
Pale manna grass is known from DSP based on the following comment by Lyon (1927): "Tremont, edge of Dune Creek, in open woods." The only modern records are from Furnessville C and G (Wilhelm 1990). At the former site, Dritz reports the plant grows with *Alopecurus aequalis*, *Cephalanthus occidentalis*, *Glyceria striata*, *G. septentrionalis*, *Lemna minor*, *L. trisulca*, *Ranunculus hispidus* var. *nitidus*, *R. flabellaris*, and *Rosa palustris*. Wilhelm saw this plant growing in the old Buffalo and Mississippi Railway right-of-way (Furnessville G) on 7 June 1997. Nathanael Pilla and Adam Balzer found this species growing in Keiser G on 10 June 2020.

Voucher Specimens:
Dritz #393, 2 June 1985, Porter Co. (MOR)

Zizania aquatica L. var. *aquatica*
Prior to the publication of Wilhelm and Rericha (2017), southern wild rice was the only *Zizania* species reported in the Chicago Region. Southern wild rice is known from natural occurrences only from Miller Woods and possibly from Cowles Bog; it has been introduced to Keiser and Cowles Dunes A. Wild rice is occasional, but not common, in the marsh communities throughout Miller Woods A, C, D, and E. There is a specimen in the Kathryn Kalmbach Herbarium (Denver Botanical Garden) of southern wild rice collected at the Miller beach on 20 September 1964 by Alvah C. Armstrong (#5722). Wild rice is recorded for the Cowles Dunes A, because of the following statement by Cook and Jackson (1978):

> *Blag Slough (Pond B) lay just northeast of Mud Lake across a low ridge. It was named for Civil War veteran George Blag, who lived around the turn of the century as a hermit in a shack along the trail between the slough and Lake Michigan. The slough and the wild rice that grew nearby attracted ducks and geese.*

Wilcox et al. (1985), Hilgenkamp (1990), and Pavlovic et al. (2009a) mapped the vegetation of Blag Slough in 1982–1984, 1990, and 2005, respectively, and never found wild rice there, but water levels were low during that period. Given the annual life cycle of wild rice, it is not likely that it disappeared because of heavy metal contamination that occurs at Blag Slough (Pavlovic, pers. obs.). It could be that constant flooding from the unsealed adjacent NIPSCO fly ash ponds flooded Blag Slough and prevented the germination of wild rice. Water levels may have declined after the fly ash ponds were sealed in 1980, viable seeds were not present, and water levels would have been too low for germination even if wild rice seed had persisted. In 2016 and 2017, Plampin, accompanied by Hamilla, saw wild rice growing on the west side of Mineral Springs Road in the restored wetland complex. It has been introduced into the west end of the Great Marsh in Keiser B through restoration efforts by Daniel Mason (NPS). On 16 August 2012, Terry Bonace and Plampin found it on the north side of the road, suggesting it has dispersed across Beverly Drive. While Swink and Wilhelm (1994) recognize three varieties of this species, others such as Gleason and Cronquist (1991) and the Flora of North America treatment (Flora of North America Editorial Committee 2007) recognize two species in the Indiana Dunes, this species and *Z. palustris*. Wilhelm and Rericha (2017) recognize both species. Native Americans from the Potawatomi Band are harvesting and propagating this species in INDU (Laura Brenan, pers. comm. with Pavlovic, 2022).

Voucher Specimens:

Armstrong #5783, 20 September 1964, Lake Co. (KKH)
Wilhelm #6984, 23 September 1979, Lake Co. (MOR)

Zizania palustris L. var. *palustris*

Northern wild rice is reported from Miller Woods, Tolleston Dunes, and West Beach. It is not clear whether Huron H. Smith's 20 August 1913 collection at Miller "from the margin of the Calumet River," means it was collected on the Grand or the Little Calumet River, but the former is more likely. Nevertheless, Gerould Wilhelm did collect a specimen from a slough on the north side of the Penn Central Railroad northwest of Miller. Lyon (1930) reported northern wild rice, an annual, from "the east end of Long Lake" (West Beach C), the only location in the Indiana Dunes from which he recorded this species. That same year Charles Deam collected a specimen on the Lake County side of Long Lake. Peattie (1930) reported this species as *Zizania aquatica* var. *angustifolia* and *Zizania aquatica* var. *interior*, being found at Miller and east and west Lake County (Wolf Lake and Grand Calumet), respectively. The two *Zizania* species have been common in the Dunes (Pavlovic, pers. obs., 1983–2020).

Voucher Specimens:

Wilhelm #6984, 23 September 1979, Lake Co. (MOR)
Deam #49820, 16 September 1930, Porter Co. (IND)

PONTEDERIACEAE — Pickerelweed Family

Plants in the Pickerelweed family are floating or rooted wetland plants that have opposite or whorled leaves. This family hosts one of our country's worst aquatic weeds, water hyacinth (*Eichhornia crassipes* (Mart.) Solms). Only one species, *Heteranthera dubia* (Jacq.) MacMill. from this family is represented in the special flora.

Heteranthera dubia (Jacq.) MacMill.

Mud plantain is locally rare in West Beach F and Cowles Dunes A (Wilhelm 1990). This species can be distinguished from plants in the genus *Potamogeton* because its strap-like leaves lack a midvein (Swink and Wilhelm 1994). Mud plantain appears in Cowles Dunes A marsh west of Mineral Springs Road in the Cowles Bog wetland complex restoration project conducted by the NPS (Plampin, pers. obs.). Mud plantain is widely distributed across the Chicago Wilderness region and probably underreported in the Indiana Dunes (Wilhelm and Rericha 2017).

Voucher Specimens:

Wilhelm & Wetstein #18539, 11 September 1990, Porter Co. (MOR)
Alix s.n., 15 August 2003, Porter Co. (Purdue University Northwest, Westville Campus collections)

POTAMOGETONACEAE — Pondweed Family (ZOSTERACEAE in Swink and Wilhelm [1994])

Pondweeds are perennial aquatic herbs usually of freshwater sites. Leaves are alternate or opposite, often two-ranked and floating or submersed. The flowers are bisexual or unisexual, small, and borne in axillary spikes or panicles of spikes. Flowers have a four-parted perianth with clawed segments, four stamens, and four separate pistils. Many species in this family are important food plants (seeds) for waterfowl. Robin Scribailo, Mitchell Alix, and Nathanael Pilla have contributed much to our local knowledge of distribution of pondweeds.

Potamogeton bicupulatus Fernald [*Potamogeton diversifolius* Raf. var. *trichopyllus* Morong]

Snail-seed pondweed is known from possibly Cowles Dunes A and DSP. We have included it

here because Floyd Swink found it growing in Goose Lake, Porter County, Indiana, in 1952. Since Blag Slough contains a small north portion of the former Goose Lake, it is possible that this species may still be extant there. In addition, there are multiple specimens collected by Hill, Levi Umbach, and Chase from Goose Lake as well as DSP. Robin Scribalo and Mitch Alix (pers. comm. with Pavlovic) have never seen this species in the Indiana Dunes. It may be extirpated from the dunes or hiding in the seed bank that is dormant due to the dominance of hybrid cattails in the DSP marsh complex.

Voucher Specimens:
Swink #1820, 23 August 1952, Porter Co. (MOR)

Potamogeton diversifolius Raf.
Waterthread pondweed occurs at West Beach, Cowles Dunes, and Furnessville. This little pondweed is confined to pannes at West Beach A, which are deep enough to retain water for most of the growing season. This pondweed is known from Cowles Dunes A based on a report by Lyon (1927), in which he attributes it to Little Lake. Plampin found it growing in Little Lake at Cowles Dunes A. It was also known from Goose Lake based on specimens collected by Swink and others (see first record below). Pavlovic collected a specimen from Furnessville D.

Voucher Specimens:
Swink s.n., 30 August 1947, Porter Co. (BUT)
Plampin #1990-4, 20 July 1990, Porter Co. (INDU)

Potamogeton pulcher Tuck.
Spotted pondweed is known from Miller Woods, Cowles Dunes, and DSP. While rare, this distinctive pondweed grows with *P. pusillus* in swales in Miller Woods C, E, F, and G. There are a total of six reports of this species in Miller Woods (Pilla 2017). Plampin and Myrna Newgent spotted it growing with *Brasenia schreberi* in Little Lake in Cowles Dunes A in 1991, a record that was verified by Gerould Wilhelm. There are a total of four reports for spotted pondweed at Little Lake (Pilla 2017). Pavlovic recalls seeing this species to the west in a mud flat in Blag Slough. Nathanael Pilla and Adam Balzer found it growing in the Great Marsh of DSP on 16 August 2016 (Nathanael Pilla, pers. comm. with Pavlovic, 2017). According to Pilla (2017), this species is known to hybridize with *P. amplifolius*, a very similar species (Mazerolle and Blaney 2010, Kaplan et al. 2018). Since both species occur at Miller Woods, hybrids might be found there.

Voucher Specimens:
Wilhelm #12995, 10 July 1985, Lake Co. (MOR)
Plampin #1-1991, 22 July 1991, Porter Co. (INDU)

Potamogeton pusillus L.
Small pondweed grows in the wetlands of Miller Woods, West Beach, and Cowles Dunes. At Miller it grows with *P. foliosus*, a species that it closely resembles (see Lake Co. specimen below). On 11 June 2017, Nathanael Pilla and Noah Dell found small pondweed growing in a wetland adjacent to Little Lake in Cowles Dunes A.

Voucher Specimens:
Simonin #21&31, 6 August and 6 September 1983, Lake Co. (MOR)
Wilhelm & Henderson #696, 13 September 1979, Porter Co. (MOR)

Potamogeton robbinsii Oakes
Fern pondweed is only known in the Indiana Dunes from Miller Woods A and E, where it was reported by Wilhelm (1990). Gerould Wilhelm did not cite the verified Wilcox specimen listed below. Investigations by Robin Scribailo, Mitch Alix, and Nathanael Pilla did not reveal the presence of fern pondweed. It is possible that the invasion of *Phragmites* into many of the Miller Woods ponds has eliminated the presence of this species above ground, while a seed bank persists below. The pond number on the Wilcox specimen label (see below) allows

for the possibility of confirming this find. Robin Scribailo and Mitch Alix (pers. comm. with Pavlovic) collected a specimen from outside the park on the east side of the Grand Calumet Lagoons in the late 1990s.

Voucher Specimens:

Wilcox #43, 10 June 1982, Lake Co. (MOR)

Potamogeton strictifolius A. Benn.

Stiff pondweed is known in the Indiana Dunes from West Beach only, where it was found by Scribailo and Alix (2002b) in Long Lake. We lack a voucher specimen for stiff pondweed.

Potamogeton zosteriformis Fernald

Flat-stemmed pondweed is reported from West Beach C. Robin Scribailo and Mitch Alix found it there as well.

Voucher Specimens:

Wilhelm & Henderson #6968, 13 September 1979, Porter Co. (MOR)

SPARGANIACEAE — Bur-reed Family

Bur-reeds are perennial and rhizomatous aquatic herbs. The leaves are alternate and simple. The flowers are unisexual, located on separate heads, with the staminate being above. The staminate flowers have three to six tepals and three or more stamens. The pistillate flowers have three to six tepals and a single unicarpellate pistil.

Sparganium americanum Nutt.

American bur-reed is known from Miller Woods, Cowles Dunes, DSP, Keiser, and Hoosier Prairie. American bur-reed is extant in a swale in Miller Woods F. Gerould Wilhelm says that before it was found in 1984 in Little Lake (Cowles Dunes A) during a drought, this plant had not been recorded in this unit. Gerould Wilhelm writes,

> *This species was unknown from the Cowles Bog* [Dunes] *Unit until its discovery in 1984 at Little Lake in Cowles Bog A during that now famous dry period when a mother lode of special flora species was discovered. This species and* S. androcladum *are very closely related. The following voucher specimen* [Dritz #378] *has pistillate lateral branches and dull achene bodies less than 5 mm long. It is somewhat aberrant in that the leaves are not as notably flat, broad, and flaccid as is seen on some specimens collected from the southern United States.*
>
> *Some individuals in the population are without lateral branches and have somewhat larger achenes than is typical for the species. Indeed, one could convince himself in the field that* S. androcladum *is also at Little Lake, inasmuch as none of the specimens from Little Lake dried with tan, glossy achene bodies and wrinkled beak bases, I have concluded that there is only one species present locally.*

According to Nathanael Pilla (pers. comm. with Pavlovic) both *S. americanum* and *S. androcladum* occur at Little Lake. Pilla and Tonkovich, on two separate visits to Little Lake in October 2015, saw two different species of *Sparganium* that had to be *S. americanum* and *S. androcladum* based on the size of the fruiting heads with longer beaks clearly fitting in the range of *S. androclaum* compared to others that were mature and in the range of *S. americanum*. They found them both in far-apart areas of Little Lake as well as in closer proximity in particular locations.

This emergent aquatic plant is also known to occur in the diked wetland in southwest Cowles Dunes A. American bur-reed was also found in the ecotone between the Great Marsh and Howes Prairie in Cowles Dunes B in 1998. Wilhelm (1990) writes,

> *This bur-reed was reported from Indiana Dunes State Park by Peattie (1930), in which*

he stated that it was rare in Dunes Creek. Holly Bennett collected a bur reed, perhaps technically in the Cowles Dunes Unit, and identified his specimen as Sparganium androcladum*, but it has the smaller heads and dull achenes of* S. americanum*, so I am referring it here.*

Pavlovic found American bur-reed in Keiser B. Myrna Newgent found this plant in Keiser F in a drainage pond of the former golf course with *Alisma* spp., *Alnus incana* ssp. *rugosa*, and *Sagittaria latifolia* on 29 June 1995. Keith Board and Plampin found a second population on the south side of the RV dump station growing with *Ageratina altissima* var. *altissima*, *Alisma* sp., *Alnus incana* ssp. *rugosa*, *Bidens* sp., *Boehmeria cylindrica*, *Fraxinus* sp., *Pilea* sp., *Sambucus nigra* ssp. *canadensis*, and *Solidago rugosa* on 30 September 1996. The only record we have for this species at Hoosier Prairie A is Bacone (1988). This species still occurs in Little Lake even though five specimens were collected in the mid-1980s, to which Pavlovic regretfully contributed.

Voucher Specimens:

Dritz #378, 23 September 1984, Porter Co. (MOR)
Bennett s.n., 15 August 1953, Porter Co. (F)
Pavlovic #1179, 28 July 1985, Porter Co. (INDU)
Stewart s.n., 13 August 1998, Porter Co. (IND)

Sparganium androcladum (Engelmann) Morong

Branched bur-reed is known only from the Cowles Dunes area. As noted above, this species is similar to *S. americanum*. Tryon collected a specimen in Lake County south of U.S. 12 and east of Miller, which could be in Tolleston Dunes.

Voucher Specimens:

Tryon #1749, 6 August 1935, Lake Co. (MIN)
Wilhelm #16372 & 17525, 30 August 1988 & 31 August 1989, Porter Co. (MOR)

TRILLIACEAE — Trillium Family

Plants in the genus *Trillium* were traditionally placed in the Lily family (Liliaceae) because they have three sepals and three petals. However, most current authorities separate them either into the Trilliaceae or, as the latest phylogenetic data suggests, into the Melanthiaceae (Stevens 2023). One of the distinguishing morphological characters used to separate *Trillium* out of the Liliaceae is the presence of one or two whorls of three leaves below a single flower (Farmer et al. 2002). All the species of *Trillium* in the Indiana Dunes are perennials and produce seeds that have ant-attracting structures called elaiosomes (Case and Case 1997).

Trillium cernuum L. [*Trillium cernuum* var. *macranthum* Eames and Wiegand subsumed into *T. cernuum*]

Nodding trillium is known in the Indiana Dunes only from small populations in Keiser F. Bowles (1988) studied the population and recorded two flowering ramets and five sterile genets. The species was growing with a *Carex gracillima* colony under *Cornus alternifolia*, *Hamamelis virginiana*, and *Sassafras albidum*, with *Maianthemum racemosum* ssp. *racemosum*, *Parthenocissus quinquefolia*, and *Prunus virginiana*. Plampin and Myrna Newgent found more extensive populations along the south side of the east-west dune ridge and one large population to the west. They also found a small population in Keiser F just north of the hydromesophytic swamp. Since finding these populations, the plants have been observed to be chronically browsed by deer. Only the individuals in one of four meter-square exclosures erected in 1992 have increased in size and flowered. Pavlovic photographed a large flowering individual that grew to reproductive size inside the deer exclosure in 2009, when there were 15 plants. That individual was 49 cm tall. Plants that grow under brush piles

appear to be browsed less often and, therefore, are larger in size than those accessible to deer (Pavlovic, pers. obs., 1992, 2005). When Hamilla and Plampin observed these plants on 1 May 2012, they found three plants in flower and one in bud in the official plot, and five plants in bud in a cage. Garlic mustard and oriental bittersweet may be additional threats to this species. Pavlovic has shown that the more common *Trillium recurvatum* is impacted by deer browse similar to white trillium (Knight 2007, Huebner et al. 2010, Koh et al. 2010, Dávalos et al. 2014, Pavlovic et al. 2014).

Voucher Specimens:

Wilhelm & Shimp #14863, 21 May 1987, Porter Co. (MOR)

Trillium erectum L.

Pavlovic observed a specimen of ill-scented trillium from an abandoned homesite north of Hawleywood Road, Furnessville E. It is likely that this species was introduced by a former homeowner. It now appears to be extirpated possibly due to deer browsing when deer populations were high from 1990s to 2010.

Voucher Specimens:

Klick #168, 11 May 1989, Porter Co. (INDU)

XYRIDACEAE — Yellow-eyed-grass Family

These are small perennial or annual herbs with basal linear or filiform leaves. The flowering head is composed of bracts subtending the bisexual flowers. The inner of the three sepals forms a hood over the yellow petals when the flower is in bud. Petals are fused into a tube with three lobes. The stamens are three and often alternate with the corolla lobes. The female portion of the flower consists of a single pistil.

Xyris difformis Chapm. var. *difformis*

Tall yellow-eyed-grass is known from Pinhook Bog. It is occasional in open areas of the Pinhook Bog, but was not collected until 1980 when Bowles et al. (1985) recorded thirteen small colonies along the 120 m of boardwalk, two of them around the open wetland at the end of the boardwalk, and the others in sedge-dominated openings south of the boardwalk. This species grows along the north side of the boardwalk as well. It is associated with *Carex limosa*, *Chamaedaphne calyculata*, *Drosera intermedia*, *Larix laricina*, *Pyrus floribunda*, *Rhynchospora alba*, *Sarracenia purpurea*, *Triadenum virginicum*, and *Vaccinium oxycoccos*. Hamilla and Tonkonvich saw this species on 11 August 2015 at the south end of Pinhook Bog when searching for *Sphagnum* species. They found *Xyris difformis* under a *Larix* with a red species of *Sphagnum* and other associates *Sarracenia purpurea*, *Vaccinium oxycoccus*, *Rhynchospora alba*, *Drosera rotundifolia*, *Platanthera ciliaris*, *Dulichium arundinacea*, *Toxicodendron vernix*, and seedling *Pinus strobus*. Tonkovich also found this species of *Xyris* on 22 December 2015 in the northern part of Pinhook (bog proper) west-southwest of where Dan Mason's crew did a lot of cutting in an opening. It was again under a young *Larix* with *Sarracenia purpurea*, *Vacinnium oxycoccos*, *Pinus strobus* seedlings, *Chamaedaphne calycullata*, *Rhynchospora alba*, and some agaric fungi and the funnel chantarelle, *Cantharellus tubaeformis*.

There is a specimen collected by Agnes Chase from Dune Park on 6 September 1897 (New Mexico State University Herbarium) and another collected by P.A. Scott from Little Lake on 15 July 2006 (BUT) that need to be verified as to whether they are this or the more common *X. torta*.

Voucher Specimens:

Dritz #116, 19 July 1980, La Porte Co. (MOR)

Xyris torta Sm.

Yellow-eyed-grass is reported from Tolleston Dunes, West Beach, Inland Marsh, Cowles

Dunes, DSP, Keiser, Tamarack, and Hoosier Prairie. This species was found by Plampin in the company of Hamilla, Susan Masi, and Joy Marburger on 25 August 2008 in Tolleston Dunes A, southeast of the *Schoenoplectiella hallii* population. It is known from West Beach C, according to a report by Lyon (1930). Ken Dritz has seen it in recent years in Inland Marsh B. Roger Hedge, Emily Stork, and Pavlovic observed this population on 26 July 2017. This species is extant in an acid swale south of Pine Lane (Howes Prairie) in Cowles Dunes B. Lois Howes saw yellow-eyed-grass in bloom on 8 August 1981 (Howes 1985). In 1989, Plampin noted that it also grew in the southeast end of Howes Prairie (Cowles Dunes B) (Wilhelm 1990). Hamilla and Plampin saw this plant in Cowles Dunes E on 23 July 2009. Recorded from DSP based on reports by both Lyon (1927) and Peattie (1930), this species was found again by Ron Hiebert along the bike trail south of the DSP. It was also reported by Lyon (1927), who noted it from Keiser as growing in the ditch along the CSSBR. It is still occasional along the bike trail in Keiser D, but the invading *Vitis labrusca* may exclude it. Pavlovic found this species in the wetland south of the Dunewood Campground in 1992 (Keiser F). This species is probably extinct in Tamarack B, though Lyon (1927) reported it from the ditch along the CSSBR at Tamarack (Wilhelm 1990). This plant is rare in the moist, peaty areas of the Hoosier Prairie A, becoming occasional in areas that have been burned.

Voucher Specimens:

Hiebert #330, 16 August 1982, Porter Co. (MOR)

MAGNOLIIDAE: The Flowering Plants—Class Magnoliopsida (Dicots)

The eudicots (Dicotyledons), have two seed leaves, netted venation, and flower parts usually in fours or fives (Lawrence 1951). The dicots can also have secondary growth and thus many grow true wood, whereas no monocots produce wood. The Dicot families are presented below in alphabetical order.

ACANTHACEAE — Acanthus Family

Plants in this family are armed or unarmed perennial herbs and shrubs. The leaves are opposite, simple, and without stipules. Vegetative parts have cytoliths, calcium carbonate concretions that appear as protuberances or streaks. Four to five petals are fused into a two-lipped corolla. The four stamens are of two lengths. The single pistil is composed of two carpels. This pantropical family is largely limited in North America to the southeast and southwest of the U.S.

Ruellia humilis Nutt.

Wild petunia is rare in Furnessville F. In the early 1980s, Emma Pitcher spotted a plant growing along South State Park Boundary Road. She thought this was an adventive occurrence. This species is quite variable morphologically. No specimen has been collected.

ANACARDIACEAE — Cashew Family

Trees and shrubs in this family have resinous bark, trifoliate to pinnately compound leaves, and usually unisexual flowers by reduction. There are five to 10 stamens (in the latter case, the stamens are usually in two whorls of five). The pistil is single chambered, produced by the fusion of three carpels. Besides the cashew (*Anacardium occidentale* L.), this family provides us with mangos (*Mangifera indica* L.), pistachios (*Pistacia vera* L.), mombin (*Spondias mombin* L.), and Kaffir plum (*Harpephyllum caffrum* Benth.). Resins, oils and varnishes are obtained from the varnish tree (*Toxicodendron vernicifera* L.) and mastic tree (*Pistacia lentiscus* L.) (Lawrence 1951). The Mediterranean sumac spice is derived from the red fruits of *Rhus coriaria* native to southern Europe. Sometimes people who are sensitive to poison ivy may develop an allergic reaction by copious eating of cashews, mangos, or pistachios since they share similar biochemistry to *Toxicodendron*. Reddish fruits of *Rhus typhina* and *R. glabra*, can be squashed and sieved to produce "sumac-ade" (Gibbons 1966).

Rhus aromatica Aiton var. *arenaria* (Greene) Fernald

Fragrant sumac is known from Miller Woods, Tolleston Dunes, West Beach, Bailly, Cowles Dunes, DSP, Furnessville, and Tamarack. Lyon (1927) noted this species to be "common and characteristic" on the "open wooded dunes, particularly toward the lakefront." Bowles et al. (1985) listed foredune blowout associates of this species in Miller Woods A as *Arabidopsis lyrata*, *Artemisia campestris* ssp. *caudata*, *Calamovilfa longifolia*, *Celastrus scandens*, *Maianthemum stellatum*, *Ptelea trifoliata*, *Schizachyrium scoparium*, *Solidago simplex* var. *gillmanii*, and *Toxicodendron radicans*. It was found in Tolleston Dunes B in 1997. This variety of fragrant sumac is extant on the high dunes in West Beach A, B, D, and E (Wilhelm 1990). From a monitoring plot installed at West Beach, Bowles et al. (1985) listed the following associates: *Euphorbia corollata*, *Prunus serotina*, *Schizachyrium scoparium*, *Tilia americana*, *Toxicodendron radicans*, *Tradescantia virginiana* [*ohiensis*], and *Vitis* sp. Fragrant sumac is reported from Bailly B by Plampin and Newgent (1994). Fragrant sumac is common in open portions of Cowles Dunes A and B. According to Wilhelm (1990), "Fragrant sumac is extant in the foredune complex area, particularly in the neighborhood of Big Blowout and Furnessville Blowout" in DSP. Emma Pitcher reported this species in 1987 from Furnessville B, where it grew along the "shoulder of Furnessville Road, near its highest point" (Wilhelm 1990). Pavlovic found it still growing within three feet of the road edge despite the recent pipeline installation and road repaving in 2018. There is a small but healthy colony of this plant along the wooded foredune ridges west of Mount Baldy in Tamarack C. This species persists if there are frequent fires that immediately top kill the plants that subsequently resprout and that help maintain the open habitats it prefers. This situation is exemplified by the plant in Furnessville, where it grows along the regularly mown roadside.

Voucher Specimens:

Wilhelm & Bacone #5187, 3 August 1978, Lake Co. (MOR)
Hiebert #468, 15 May 1986, Porter Co. (MOR)
Wilhelm & Dritz #6719, 27 May 1979, Porter Co. (MOR)
Wilhelm et al. #15234, 25 August 1987, La Porte Co. (MOR)

Toxicodendron rydbergii (Small ex Rydb.) Greene [formerly included as part of *Rhus radicans* L.]

Western poison ivy is characteristic of open habitats in the Lake Michigan dunes, where it is distinguished from poison ivy (*T. radicans*) by its lack of aerial roots, slightly folded leaves, and mostly glabrous petioles. We do not have adequate information about the distribution of this species that has only been recently recognized as occurring in the Chicago Region (Swink and Wilhelm 1994, Wilhelm and Rericha 2017). Herbarium specimens indicate it is found in the DSP (A) and Keiser. We have early specimens from Waverly Beach (Cowles Dunes B), Tremont Beach (DSP), and east of DSP (Keiser A). This species may occur throughout the dunes adjacent to Lake Michigan, but further documentation is required.

Voucher Specimens:

Tryon, #1071, 30 June 1935, Porter Co. (F)
Deam #20001, 3 June 2016, Porter Co. (IND)
Deam #58490, 20 September 1937, Porter Co. (IND)

Toxicodendron vernix (L.) Kuntze [*Rhus vernix* L.]

Poison sumac is known from Calumet Prairie, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Hoosier Prairie, and Pinhook Bog. This species is common to bogs and fens and still grows at Calumet Prairie. Poison sumac is also still common in the Cowles Bog area of Cowles Dunes A where it can be seen growing on the west side of Mineral Springs Road in the Cowles Bog Wetland Complex. It is rare in a low swale with *Betula pumila* and at the edge of the Great Marsh east of the Dune Acres security office in Cowles Dunes B (Wilhelm 1990). There is also a small colony along the north and south sides of the bicycle path about 100 yards east of Mineral Springs Road in Cowles Dunes E. Evidently rare at DSP, there

are several plants scattered here and there in the swamp complex and just east of Route 49 along the bike trail (Wilhelm 1990). Laughlin (1953) indicated that there was a specimen of tree stature, with a trunk diameter of 5 inches in DSP (Wilhelm 1990). The only site Gerould Wilhelm knew of in Furnessville F was a small colony along the north side of the Calumet Bike Trail just east of Route 49 near tower #8811. In 1987, Plampin noted that poison sumac grows 0.25 miles east of Kemil Road, north of the 600-foot contour near the northeast edge of Keiser C (Wilhelm 1990), but she has not seen it recently. She notes that there is one shrub in the swamp southwest of the new birding parking lot on the south side of Beverly Drive just east of Kemil Road in Keiser B. According to Pavlovic, poison sumac is frequent along Beverly Drive and east of the CSSSBR station both north and south of the Calumet Bike Trail in Keiser B. It has been found growing in Keiser F. Plampin, Myrna Newgent, and Pavlovic found a plant with *Alnus incana* ssp. *rugosa*, *Botrychium* spp., *Ilex verticillata*, *Micranthes pensylvanica*, and *Packera aurea* in proximity to the former Tamarack Bog (see *Vaccinium macrocarpon*) (Plampin and O'Brien 1999). According to Wilhelm (1990), "the inclusion of poison sumac at Hoosier Prairie A is based upon a report by Ken Klick (pers. comm.), who found a single seedling." This shrub to small tree is common in Pinhook Bog east and west of Wozniak Road. It has brilliant scarlet fall coloration but can cause a rash worse than poison ivy. While conducting rare plant restoration work at Pinhook Bog in 1992, Sandy Whisler and Pavlovic learned you can get the rash from poison sumac roots.

Voucher Specimens:

Wilhelm & Dritz #17418, 31 July 1989, Porter Co. (MOR)
Hess #6034, 11 September 1985, La Porte Co. (MOR)

APIACEAE — Parsley Family

This is an important vascular plant family because of its numerous foods, condiments, ornamentals, and poisonous species. This plant family was formerly known as the Umbelliferae in reference to the characteristic inflorescence type called an umbel. Umbels are inflorescences where the flower stalks (pedicels) arise from the same point, producing a globose or flat-topped structure. Important in identification is the structure of the fruit, the schizocarp, composed of the fusion of two fruits or mericarps. One should be cautious in ingesting these plants until after conclusive identification because of the abundance of similar species which are poisonous species such as poison hemlock (*Conium maculatum* L.), water hemlock (*Cicuta maculata* L.), and fool's parsley (*Aethusa cynapium* L.). Some species such as giant hogweed (*Heracleum mantegazzianum* Sommier & Levier) and wild parsnip (*Pastinaca sativa* L.) produce phytophotodermatitis—the sap in contact with the skin produces a rash only in the presence of light. Plants used as flavoring include dill (*Anethum graveolens* L.), angelica (*Angelica archangelica* L.), chervil (*Anthriscus cerefolium* (L.) Hoffm.), celery (*Apium graveolens* L. var. *dulce* (Mill.) DC), caraway (*Carum carvi* L.), coriander (*Coriandrum sativum* L.), fennel (*Foeniculum vulgare* Mill.), and parsley (*Petraselinum crispum* (Mill.) Nyman ex A.W. Hill) (Lawrence 1951).

Hydrocotyle umbellata L.

Water pennywort is known from West Beach, Keiser, Tolleston, and Tamarack. This species was reported by Lyon (1930) from "sandy margin, east end of Long Lake," possibly in West Beach C. Nicole Kalkbrenner found this species in Keiser B in 1994, but no specimen or photograph vouches for its occurrence. Scribailo and Stewart (1995) found this species in Keiser E and Tamarack C while conducting a vegetation survey along the major ditches in the Great Marsh drainage. We lack a specimen to vouch for the presence of this species in Keiser and Tamarack. Since Long Lake spans the Lake and Porter county boundary, we must accept that Levi Umbach's specimen from Millers was collected in Lake County (not specified) and that Deam's was collected in Porter County as specified.

Voucher Specimens:

Umbach s.n., 14 August 1897, Lake Co. (F)
Deam #49811, 16 September 1930, Porter Co. (IND)

Polytaenia nuttallii DC.

Known from nowhere else in the Indiana Dunes, this rare umbellifer, prairie parsley, was reported from the Hoosier Prairie A by Betz in 1969 (Wilhelm 1990). Bowles et al. (1986) mapped a second population and listed the following associates: *Comandra umbellata*, *Comptonia peregrina*, *Coreopsis tripteris*, *Primula meadia*, *Euphorbia corollata*, *Fragaria virginiana*, *Helianthus mollis*, *Phlox glaberrima* ssp. *interior*, *Populus deltoides*, *Potentilla simplex*, *Pteridium aquilinum* var. *latiusculum*, *Rubus hispidus*, *Salix humilis*, *Solidago altissima*, and *Sorghastrum nutans*. Bowles (1987) mapped yet another population and noted the following associates: *Baptisia lactea*, *Coreopsis tripteris*, *Parthenium integrifolium*, *Populus tremuloides*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, *Salix humilis*, *Solidago altissima*, *Sorghastrum nutans*, and *Spartina pectinata*. Recent searches for this species at Hoosier Prairie have been unsuccessful. Did the population die off or were the plants illegally harvested for the plant trade?

Voucher Specimens:

Hiebert #410, 7 June 1983, Lake Co. (INDU)

Sanicula trifoliata E.P. Bicknell

Beaked black snakeroot grows at Keiser and Pinhook Bog. Christy Fox found this species growing in Keiser F. According to Wilhelm (1990), "It is occasional in the mesophytic forest south of Pinhook Bog A, east of Wozniak Road." The seed of this *Sanicula* species exhibits non-deep complex morphophysiological dormancy (Hawkins et al. 2007, 2010). Thus, seeds require warm and cold stratification to germinate, which only permits 48% of the seed to germinate at a time.

Voucher Specimens:

Wilhelm & Dritz #6902, 23 June 1979, La Porte Co. (MOR)

APOCYANACEAE - Dogbane/Milkweed Family

According to Angiosperm Phylogeny Group (2016) and Stevens (2023), the milkweed special flora that were formerly in the Asclepiadaceae are now in Apocyanaceae family. Dogbanes and milkweeds are known for their complex flower structure and their milky sap (although not all species have milky sap, e.g. butterfly weed (*Asclepias tuberosa*)). The milkweed flowers have five reflexed sepals and five fused petals, often with a corona. The corona is a complex structure composed of five, often brightly colored, units called hoods having upward-projecting asymmetrical cones called beaks. Within the corona structure are the complex five anthers and the two carpels. Often one of the two carpels aborts, thus only producing one fruit. Monarch butterflies become unpalatable to birds after the caterpillars eat various species of *Asclepias*, especially *A. syriaca*. Cultivated *Hoya* lianas are from this family and have the recognizable umbel inflorescence and flower structure, as well as fragrant nectar.

Asclepias purpurascens L.

Purple milkweed is known from Cowles Dunes, DSP, Furnessville, Calumet Prairie, and Hobart Prairie Grove. Pavlovic thought that he was the first to see this purple milkweed in the Indiana Dunes in 1983 while sampling Howes Prairie (Cowles Dunes B) vegetation in Cowles Dunes B; however, he found that Lois Howes observed it on 28 June 1981 (Howes 1985). Charlie Deam found it previously though, based on the specimen collected in 1920 (see below). Wilhelm (1990) reports it from the Furnessville Unit. According to Sandy O'Brien, purple milkweed appeared at Hobart Prairie Grove in 2003 as the result of a fire.

Pavlovic saw it there on a hike in 2012. This plant does not bloom every year, so given that and its rarity, collecting this plant would have negative impacts on its reproduction. Gerould Wilhelm reported purple milkweed from Calumet Prairie in the 1990s.

Voucher Specimens:
Deam, #31541, 10 July 1920, Porter Co. (IND)

Asclepias sullivantii Engelm. ex A. Gray
We have included prairie milkweed based on the specimen collected by Charles Deam in 1916. It was found growing in "prairie habitat along roadside" one mile west of Porter. This location could have been along Beam Street (a portion of Indian Boundary Road) or some road to the south. The early report of this species in this area may suggest its possible presence in Mnoke Prairie and environs, although its chance of survival is remote.

Voucher Specimens:
Deam #21231, 25 August 1916, Porter Co. (IND)

Asclepias viridiflora Raf.
Short green milkweed inhabits the dunes at Miller Woods B, the dune complex of West Beach A, Cowles Dunes A, and either Cowles Dunes B or DSP. Lyon (1927) found it in a "very open wooded dune, Port Chester, found but once." But Wilhelm and Rericha (2017) record it from Porter County and throughout the Chicago Region. At Miller, short green milkweed grew with *Carex pensylvanica*, *Ceanothus americana*, *Quercus velutina*, and *Rhus aromatica* var. *arenaria*.

Voucher Specimens:
Hiebert #524, 7 July 1988, Lake Co. (INDU)
Hiebert #8b, 2 July 1981, Porter Co. (MOR)
Tryon #2298, 31 August 1935 Porter Co. (MU)

AQUIFOLIACEAE — Holly Family

Species in the holly family include evergreen and deciduous trees and shrubs with alternate leaves. Flowers have three to six sepals, four to five petals and stamens, and one pistil. Rudimentary pistils and stamens are present in male and female flowers, respectively. Species are often cultivated for foliage and fruit, and *Ilex* is prized for its hard white wood and decorative red fruits.

Ilex mucronata (L.) M. Powell, V. Savolainen & S. Andrews [*Nemopanthus mucronatus* (L.) Trel.]
Mountain holly is known from Cowles Dunes, Keiser, and Pinhook Bog. According to Wilhelm (1990), "This rare shrub is still occasional locally in the swamp complex area of Cowles Dunes A." Botanists made at least 11 collections of this species from Cowles Bog prior to 1945. Plampin collected it in 1989 (#1, INDU) and listed the following associates: *Betula alleghaniensis*, *Caltha palustris*, *Carex* sp., *Cornus sericea*, *Onoclea sensibilis*, *Osmunda regalis* var. *spectabilis*, *Symplocarpus foetidus*, *Typha* sp., *Vaccinium corymbosum*, and *Viola cucullata*. Plampin found four or five shrubs in Cowles Dunes B east of Mineral Springs Road, north of NIPSCO pole #957/772, in the parkland of Dune Acres, where INDU has a management cooperative agreement (Wilhelm 1990). Plampin has been unable to relocate these shrubs. Though rare, this northern shrub has grown in the hydromesophytic swamps of Keiser C (Wilhelm 1990), but various searches by Craig Johnson (pers. comm. with Pavlovic) and Plampin and Hamilla failed to relocate this shrub. A hunt during fruiting season in Keiser C might be helpful. This is one of the most common shrubs in Pinhook Bog B east of Wozniak Road.

Voucher Specimens:
Freisner s.n, 29 May 1932, Porter Co. (BUT)

Swink s.n., 18 May 1947, Porter Co. (MOR)
Wilhelm #6853, 15 June 1979, La Porte Co. (MOR)

ARALIACEAE — Ginseng Family

Most species in this family are woody plants, often with prickly stems and alternate palmately or pinnately compound leaves. Flowers are unisexual (dioecious or polygamous) or bisexual, small and greenish, and often borne in umbels or heads. Sepals are five, but the petals, normally five, can be as few as three and as numerous as ten. The pistil is composed of five fused carpels, from which a berry or drupe arises. *Schefflera* is in the ginseng family and is a common ornamental plant in office buildings. English ivy (*Hedera helix* L.) is another member of this family that is widely planted and locally invasive. The most famous species locally is ginseng (*Panax quinquefolius* L.), a species that is harvested and cultivated for its presumed medicinal properties (Souther and McGraw 2014). Chinese rice paper is made from the pith of the rice-paper plant, *Tetrapanax papyriferus* (Hook.) K. Koch, (Lawrence 1951).

Aralia hispida Vent.

Bristly sarsaparilla has been reported from Tolleston Dunes, Inland Marsh, and Cowles Dunes. Marlin Bowles, Marcella DeMauro, and Pavlovic set up a monitoring plot for bristly sarsaparilla in a *Rubus* thicket in Tolleston Dunes A (Bowles et al. 1986), but soon thereafter the population disappeared. Before then, it was listed as growing with *Artemisia campestris* ssp. *caudata*, *Cyperus lupulinus* ssp. *lupulinus*, *Dichanthelium ovale* ssp. *pseudopubescens*, *Krigia virginica*, *Monarda punctata* var. *villicaulis*, *Quercus velutina*, *Rhus copallinum* var. *copallinum*, and *Schizachyrium scoparium*. This plant was probably extirpated by an invasion of *Rubus* species; Bowles (1990) feared a takeover by that plant. Efforts by Plampin and Hamilla (2008b) to relocate this species west of County Line Road failed. Ken Dritz (#142, MOR) listed associates for this species in the Coulter Prairie (Inland Marsh B, east of County Line Rd.) as *Ailanthus altissimus*, *Arabidopsis lyrata*, *Asclepias tuberosa*, *Conyza canadensis*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Elymus canadensis*, *Euphorbia corollata*, *Lepidium virginicum*, *Lithospermum caroliniense* var. *croceum*, *Lonicera tatarica*, *Monarda punctata* var. *villicaulis*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, *Rosa carolina*, *Rubus flagellaris*, *Sassafras albidum*, *Solanum ptychanthum*, *Solidago caesia*, *Tradescantia ohiensis*, and *Vitis riparia* (Wilhelm 1990). The Coulter population disappeared by 1990 and had not returned with the reintroduction of fire (Plampin and Hamilla 2008b), but a new population was found again on 30 June 2009 by Paul Quinlan (former SHLT employee) with Karen Quinlan, Plampin, Hamilla, Myrna Newgent, and Anne Walsh. Paul Quinlan found an additional plant in a restored site nearby in the summer of 2010 (Quinlan, pers. comm. with Pavlovic). Laura Rericha and Gerould Wilhelm placed a Coulter Prairie voucher of this species at the Morton Arboretum in 2006, so apparently they had found it first; however, it is unfortunate that a specimen of so rare a species with tenuous populations had to be recollected when it was previously documented by Ken Dritz.

Bristly sarsaparilla was common enough for at least 11 historic specimens to be collected in the vicinity of Cowles Bog (Cowles Dunes A) (Consortium of Midwest Herbaria 2021). Bristly sarsaparilla flowers start out as male, producing pollen first, and then turning female in having receptive stigmas (Thomson and Barrett 1981, Thomson et al. 1982, Thomson 1988, Thomson et al. 1989). Sequential flowering and copious nectar production encourage trap lining pollination by bees (*Bombus*), but visitation of most productive flowers can be hampered by the presence of wasps (*Vespula*) (Thomson 1989). Botanist collection of large flowering plants from populations could negatively impact pollination in this species, a possible outcome of overcollection at Cowles Bog (Pavlovic et al. 1992).

Voucher Specimens:
Fox #73, 10 August 1984, Lake Co. (MOR)

Swink s.n., 30 June 1946, Porter Co. (MOR)
Deam #21220, 25 August 1916, Porter Co. (IND)
Tryon #1469, 19 July 1935, Porter Co. (F)

Aralia racemosa L.

Spikenard is known from Inland Marsh, Bailly, DSP, Furnessville, Keiser, Tamarack, and Hobart Prairie Grove. Plampin found this plant in the Heinze Land Trust's Yellow Birch Fen south of Stage Coach Road (Inland Marsh B). It is rare in the little ravine northwest of the Bailly Homestead in Bailly Unit B. According to Plampin, there is one plant of spikenard west of Kemil Road in the DSP, south of a beech mound, between the beech trees and the fence (Wilhelm 1990). Pavlovic, Stacey Leicht-Young, and Krystal Frohnapple found a plant in Furnessville Woods in 2008 (Furnessville C). Spikenard is known from Keiser C from the report by Lyon (1927), and it is possible that it might yet be extant. Gerould Wilhelm (1990) wrote that "Remarkably enough, this rare plant still grows in the ditch along the east side of the road which marks the western edge of Tamarack A." In 2004, Sandy O'Brien, Karen Quinlan, Rebecca Shields Moose, and Pavlovic found this species on a ravine bluff in Hobart Prairie Grove. Spikenard makes up for its rarity in the Dunes with its large size and copious reddish fruits.

Voucher Specimens:
Friesner s.n., 10 June 1939, Porter Co. (BUT)
Swink #1587, 27 July 1952, Porter Co. (F)
Photographs from Hobart Prairie Grove in possession of Noel B. Pavlovic (see cover).

Panax quinquefolius L.

Ginseng is rare in the Indiana Dunes and was probably never common. We have deleted the specific location information about ginseng due to its popularity among collectors for medicinal use and profit. There are so few plants that it would not be profitable in time or money to search for them. Even without collecting of this species, it is unlikely the small (<10 individuals) populations are viable (Lewis and Zenger 1982, Nantel et al. 1996, Cruse-Sanders and Hamrick 2004, Souther and McGraw 2014).

Panax trifolius L.

Dwarf ginseng is known from Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and the Heron Rookery. Plampin saw dwarf ginseng in Bailly D on 20 May 1988 (Wilhelm 1990). Dwarf ginseng is frequent on beech hummocks in the swamp forest of Cowles Dunes D. Dwarf ginseng is still common in the swamp complex west of Kemil Road and other hydromesophytic swamps throughout the DSP (Wilhelm 1990). Dwarf ginseng is occasional in the hydromesophytic swamps of Furnessville D, E, and G. Though extant in Furnessville F, populations have declined as Northern Indiana Commuter Transportation District (NICTD) has expanded the Dune Park CSSSBR parking lot (Pavlovic, per. obs.). Dwarf ginseng is still frequent on the hummocks in the swamp complex of Keiser C and in subdunal woods remnants of B. Dwarf ginseng is rare but still found in Tamarack A. This species is occasional among the beeches north and south of the Little Calumet River at the Heron Rookery. Like hepatica (*Anemone acutiloba* and *A. americana*) and salt and pepper (*Erigenia bulbosa*), dwarf ginseng is a welcome sight in the early spring.

Voucher Specimens:
Swink s.n., 4 May 1946, Porter Co. (MOR)
Hiebert #233, 30 April 1982, Porter Co. (MOR)
Deam #8051, 4 May 1911, Porter Co. (IND)
Payton #8, 4 May 1982, Porter Co. (MOR)

ARISTOLOCHIACEAE — Birthwort Family

Plants in the birthwort family are herbs or climbing woody shrubs with alternate, simple, entire leaves. The three-lobed calyx is composed of three fused sepals that are often brightly colored and foul-smelling. The inner whorl of three petals is absent or vestigially

present as three tiny teeth, as in *Asarum canadense* L. Flowers have three to 36 stamens that are fused around the pistil. The single pistil is formed of four to six carpels with four to six chambers. This largely tropical family is represented by *Asarum* and *Aristolochia* in North America.

Aristolochia serpentaria L.
Virginia snakeroot grows in Bailly, Hobart Prairie Grove, and Pinhook Bog. It is rare, except for a colony of 35 plants found in 2001 in the woods along the north bluff of the Little Calumet River in Bailly D, not far from Howe Road (Plampin, pers. obs.). Virginia snakeroot was also known from Hobart Prairie Grove, where, according to Sandy O'Brien, the only location has been destroyed by ORVs. This rare and easily overlooked vine was not recorded from La Porte County, Indiana, until it was documented by Ken Dritz on the bluffs north of Pinhook Bog A in 1979.

Voucher Specimens:
Wilhelm & Dritz #6752, 28 May 1979, Porter Co. (MOR)
Plampin & Newgent #3-1992, 2 July 1992, Porter Co. (MOR)
Wilhelm & Dritz #6940, 6 July 1979, La Porte Co. (MOR)

ASTERACEAE — Aster Family

The Asteraceae is considered the most advanced plant family and is the second largest worldwide next to the Orchidaceae. It was formerly called the Compositae because the flowering heads (an inflorescence) are composed of a composite of smaller flowers. The flowers are borne on a disk called the receptacle that is surrounded by sepal-like bracts called involucral bracts or phyllaries. Flowers consist of three types: ligulate, ray, and tubular (or disk). Flowers can be male, female, or both. The flowers have five fused petals (rarely four), five (rarely four) stamens, and a single style that is two-cleft. The Aster Family provides us with many ornamental flowers and commodities such as lettuce (*Lactuca*), sunflower seeds (*Helianthus annuus* L.), artichokes (*Cynara cardunculus* L.), and safflower oil (*Carthamus tinctorius* L.). Many species of Asteraceae provide the vibrant fall colors of our native prairies. There has been much recent renaming of genera common to North America, specifically *Aster* (the asters) and *Solidago* (the goldenrods), which could cause much confusion to the novice and experienced botanist alike.

Arnoglossum plantagineum Raf. [*Cacalia plantaginea* (Raf.) Shinners or *C. tuberosa* Nutt.]
Prairie Indian plantain is known only from Hoosier Prairie A. This plant is occasional in the high quality/less disturbed portions of the prairie. While this species is distributed across the Chicago Region, it is found more commonly south of Indiana Dunes (Wilhelm and Rericha 2017).

Voucher Specimens:
Hiebert #316, 2 July 1982, Lake Co. (MOR)

Bidens aristosa (Michx.) Britton
Swamp marigold is reported from DSP, and a specimen was collected from Hoosier Prairie (see specimen listed below), but Gerould Wilhelm was unsure of its identity in 2002 as noted on the herbarium sheet. The DSP population may be just outside the state park to the west of the main entrance road. Plampin saw it there when Emma Pitcher pointed it out to her in the early 1980s. Swamp marigold is more common to the south in the Kankakee valley (Wilhelm and Rericha 2017). Nevertheless, botanists should be on the lookout for this species in the Indiana Dunes.

Voucher Specimens:
Hiebert #367, 27 August 1982, Lake Co. (MOR)

Bidens discoidea (Torr. & A. Gray) Britton

Swamp beggar's ticks grows in swamp woods in DSP, Furnessville, Keiser, and Pinhook Bog. Wilhelm (1990) reported this species from DSP, but we have no specific location information. Swamp beggar's ticks is occasional to frequent in the swamp complex portions of Furnessville C and D and Keiser C (first specimen below). Swamp beggar's ticks is frequent in the hydromesophytic swamp forest off the west side of Wozniak Road at Pinhook Bog A.

Voucher Specimens:

Wilhelm #6960, 13 September 1979, Porter Co. (MOR)
Wilhelm & Dritz #6972, 16 September 1979, La Porte Co. (MOR)
Wilcox #83, 17 September 1984, La Porte Co. (MOR)

Bidens vulgata Greene

Tall beggar's ticks grows in Bailly H. This species often occurs as a ruderal weed in disturbed habitats (Swink and Wilhelm 1994). We have no specimen to cite from Porter County, but Wilhelm and Rericha (2017) record it from Porter County and throughout the Chicago Region.

Cirsium pitcheri (Torr. ex Eaton) Torr. & A. Gray

The federally threatened Pitcher's thistle, or dune thistle, is known from Miller Woods, West Beach, Cowles Dunes, DSP, and Keiser and is reported from Tamarack. This monocarpic perennial is endemic to the sand dunes of the western Great Lakes and reaches its southern limit at the Indiana Dunes. It grows on the shores of Lakes Michigan, Huron, and Superior. Hoober (1934) considered this species to have ancestral affinities to the Atlantic coastal plain, but Loveless and Hamrick (1988) presented genetic evidence suggesting that it originated from Platt thistle (*C. canescens*) in the Great Plains. From there, it migrated east during the hypsithermal period (eight to nine thousand years ago) when the prairie peninsula formed (Fant et al. 2014). It is likely that it migrated to the Great Lakes via the upper Midwest since the highest genetic diversity is centered around the Straits of Mackinac. Pitcher's thistle was formerly listed in Indiana as threatened, but it is now endangered. This species is extant in Miller Woods A, from where it was reported by Bowles et al. (1986) occurring with *Artemisia campestris* ssp. *caudata*, *Calamovilfa longifolia*, *Populus deltoides*, *Prunus pumila*, *Rhus aromatica*, *Schizachyrium scoparium*, and *Solidago simplex* var. *gillman*ii. This population is extant but declining due to the interruption of wind by jack pines growing to the north, successional growth from oak invasion that has been temporally alleviated by beaver activity, and pre-dispersal predation by introduced weevils (*Cleonus pigra*, *Larinus carlinae,* and *Rhynocyllus conicus*) and native goldfinches (Havens et al. 2012).

Pitcher's thistle is locally rare but extant in the foredune complex communities of West Beach A and D. Two experimental reintroduction populations initiated in 1994 by A. Kathryn McEachern, Svata Louda, and Pavlovic at West Beach D are continuing to thrive. Native populations are declining here in a blowout being invaded by red and black oak. Pitcher's thistle is now rare to occasional on the dunes of the foredune complex in Cowles Dunes A and B, except for a large blowout population in the latter subunit. Lois Howes saw Pitcher's thistle in bloom in the blowout above Howes Prairie on 5 June 1979 (Howes 1985). Several populations occur in the town of Dune Acres, one of which was found by Sandy O'Brien in 2007. In 2008, John Ervin of the Indiana Department of Nature Preserves found a new population south of the "Pageant Blowout," just west of the DSP fence. In that year, seed was collected from a lone adult growing along Boté Drive in Porter Beach to augment this population. In 2011, this population was augmented with seed from Cowles Dunes B and with juveniles transplanted from a private garden in Whiting, Indiana. In DSP, Pitcher's thistle is still common in and around the blowouts of the foredune complex, particularly in Big Blowout north of the Pinery, where Bowles et al. (1986) listed it with the following associates: *Arabidopsis lyrata*, *Calamovilfa longifolia*, *Corispermum americanum*, *Schizachyrium scoparium*, and *Solidago simplex* var. *gillman*ii. It was reported from Keiser

A based on the following comment by Lyon (1927): "blowouts and lake face of dunes, fairly common at Keiser, rare elsewhere." Pitcher's thistle is still rare locally, but all patches adjacent to the parking lot have been extirpated so that it is only found on the high dune facing Lake Michigan in Keiser Blowout (Pavlovic et al. 2005). Wayne Lampa (pers. comm. with Pavlovic) reported having seen Pitcher's thistle in the foredune complex areas of Tamarack C as late as 1978, but it has not been seen here since Pitcher's thistle has been declining due to multiple factors. The NPS and Pavlovic had reintroduced Pitcher's thistle to a high blowout dune east of Central Avenue in Tamarack C. From 2005 to 2010, Kathryn McEachern and Pavlovic became concerned about the impact of American goldfinch seed predation on viability of the populations. More recent studies have shown that goldfinches become satiated from eating seed when local Pitcher's thistle populations are at high density, thus a lower proportion of seed is consumed (Pavlovic, pers. obs.). With declining populations, goldfinches have been consuming a higher proportion of seed, contributing to further decline. Since 2011, three threatening non-native weevils have been found at Indiana Dunes: the thistle head weevil (*Larinus carlinae*, formerly *L. planus*) (Hoebeke and Spichiger 2016), the seed eating weevil (*Rhinocyllus conicus*), and the sluggish weevil (*Cleonus pigra*). The last weevil is the most serious because the larvae mine the root of plants that are about to flower. These plants die before setting seed. The two other weevils have larvae that mine the base of the flower heads and thus reduce seed set (Havens et al. 2012). The total of 76 historic collections of flowering plants in regional herbaria from Lake and Porter Counties of Indiana (Consortium of Midwest Herbaria 2021), points to the current lack of genetic diversity in the Indiana populations (Fant et al. 2014).

Voucher Specimens:

Hiebert #180, 18 June 1981, Porter Co. (INDU)

Bachmann s.n., 11 August 1973, Porter Co. (MOR)

Erigeron pulchellus Michx.

Robin's plantain is known from West Beach C, Cowles Dunes A and B, DSP, and Hobart Prairie Grove. It is reported from DSP based on the Bechtel specimen. This species grows in low sand flats near Lake Michigan. In the Chicago Region it is often found on dry partly shaded banks (Wilhelm and Rericha 2017).

Voucher Specimens:

Friesner s.n. 14 October 1933, Porter Co. (BUT)

Bechtel #14766, May 1933, Porter Co. (NYBG)

Eupatorium sessilifolium L. [*Eupatorium sessilifolium* var. *brittonianum* Porter subsumed into *E. sessilifolium*]

Upland boneset is known from Cowles Dunes and DSP. Upland boneset is known from Cowles Dunes A on the basis of the following report by Lyon (1927): "open wooded dunes, Mineral Springs … ??? not common." On 20 September 2007, Plampin found more than 40 plants growing at Cowles Dunes A under *Tilia americana* with *Fraxinus americana*, *Hamamelis virginiana*, *Parthenocissus quinquefolia*, *Toxicodendron radicans*, *Smilax* spp., *Solidago caesia*, and *Vitis riparia*. Plampin found the populations in the town of Dune Acres (outside INDU) on 14 September 2004. Lyon (1927) also reported this species from DSP. Douglas Botka found it growing in DSP in September 2015. Upland boneset is rare in the dunes but can be locally abundant on sand dunes near Lake Michigan. The Indiana Dunes are in the northwest of its range, but there are records to the north in south central Michigan as well as in northern Illinois, southern Wisconsin, and western outliers in Iowa and Minnesota (BONAP 2021, Voss and Reznicek 2012).

Voucher Specimens:

Plampin #1990-6, 3 August 1990, Porter Co. (INDU)

Eurybia furcata (E.S. Burgess) G.L. Nesom [*Aster furcatus* E.S. Burgess]

Forked aster was known from DSP and Furnessville, but recent searches failed to locate

it until it was found again on 27 August 2010 by Scott Namestnik (specimen is deposited at MOR). Tom Post, Myrna Newgent, Plampin, and Pavlovic had searched for this plant in Cowles Dunes B and D with historic information in hand but to no avail. Forked aster was known from the DSP based on the following comment by Lyon (1927): "subdunal woods, Tremont. Specimen in Blake Herbarium." The representative specimen may have been collected in the far western portion of Furnessville F north of the CSSSBR tracks or in the extreme east portion of Cowles Dunes D. The 2010 population was found west of Tremont Road north of the Calumet Bike Trail and south of State Park Road, thus confirming the speculation below. The next day, Sarah and Noel Pavlovic located the newly found population and found a larger patch on the east side of Tremont Road in DSP. If we had known about Bennett's 1959 collection in the Field Museum of Chicago and New York Botanical Garden (formerly Wabash College Herbarium), we would have known about this location sooner.

Voucher Specimens:

Peattie #213, 16 August 1920, Porter Co. (F)
Bennett #6880, 16 August 1959, Porter Co. (F)

Eurybia schreberi (Nees) Nees

Schreber's aster is rare in the Chicago Region. It is only reported from Cook and Will Counties in Illinois and Porter County in Indiana (Wilhelm and Rericha 2017). Peattie collected a specimen from Tremont. This location could be within DSP or Furnessville E or F. We consider it extirpated until relocated, if it still grows in this vicinity at all.

Voucher Specimens:

Peattie #363, 20 September 1920, Porter Co. (F)

Euthamia caroliniana (L.) Greene ex Porter & Britton (*Solidago tenuifolia* Pursh)

Slender-leaved goldenrod is known from Miller Woods, Tolleston Dunes, Inland Marsh, Hoosie Prairie, and Cowles Dunes. It is occasional in marshes throughout these units. Wilhelm (1990) reported slender-leaved goldenrod from Miller Woods and Tolleston Dunes. Lois Howes saw slender-leaved goldenrod in bloom in Lupine Lane and Pine (Howes) Prairies on 14 September 1981 (Howes 1985). Plampin reported this species in Cowles Bog A in September 1993, but older specimens listed below are from this unit. Old reports from DSP and Keiser need to be verified. Slender-leaved goldenrod was reported by the Indiana Nature Preserves from Hoosier Prairie in 1995, but it was collected by Betz in 1972. Slender-leaved goldenrod is reported from Hoosier Prairie based on a Indiana Division of Nature Preserves 25 Oct 1995 plant list.

Voucher Specimens:

Betz s.n., 10 September. 1972, Lake Co. (MOR)
Lyon s.n., 30 July 1922, Porter Co. (IND)
Deam 29792, 13 September 1919, Porter Co. (IND)
Oettingen, S von 378, 23 September 1982, Porter Co. (MOR)

Hasteola suaveolens (L.) Pojark. [*Cacalia suaveolens* L.]

Sweet Indian plantain was seen in flower by Plampin and Myrna Newgent at Bailly D in the Little Calumet River floodplain on 19 May 1994 and in seed on 19 October 1995. No doubt it was growing in a moraine bluff fen (Swink and Wilhelm 1994, Wilhelm and Rericha 2017). There is a specimen collected by Deam in the EIU herbarium from north of the Gary School property, but labeled from Porter County. Gary Schools does not have property in Porter County. Although not reported to date, Calumet Prairie is a potential location to look for this species.

Helianthus hirsutus Raf.

Hispid sunflower is typical of dry-mesic to dry savannas and prairies according to Wilhelm and Rericha (2017). Hispid sunflower grows in Tolleston Dunes D, Calumet Prairie, and

Cowles Dunes. Pavlovic collected a specimen in Cowles Dunes D along the Calumet Bike Trail. Lydia Miramontes-Lloyd and Molly Hacker found hispid sunflower growing in Furnessville G in 2010.

Voucher Specimens:

Umbach #6336, 17 September 1912, Porter Co. (MOR)
Pavlovic #150, 27 August 1985, Porter Co. (MOR)

Lactuca floridana (L.) Gaertn.

Blue, or woodland, lettuce is a biennial with bluish flowers. It is reported from West Beach E (Wilhelm 1990). No representative specimen or photograph documents this occurrence. This species is common in finer soil woodlands and savannas throughout the Chicago Region (Wilhelm and Rericha 2017).

Lactuca hirsuta Muhl. ex Nutt.

Hairy wild lettuce, found in the Chicago Region at Bridgman Dunes in Berrien County, Michigan, was found growing in a small sandy opening west of Mount Baldy in Tamarack C with sand prairie and black oak savanna species (Wilhelm 1990). This plant appears in several scattered populations to the south of Lake Michigan on the leeward side of the oldest Tolleston-aged dune (Plampin et al. 2003). Plampin et al. (2003) monitored this and other Tamarack populations. Of the thirteen known populations in 1992, six were extirpated, but they also found three new small patches (three, five, and seven plants, respectively). According to Wilhelm (1990), the population near Lake Michigan has the smooth stems of the variety *sanguinea* (Bigelow) Fernald, and the involucres and pappus clearly distinguish it from *L. canadensis*. This species is not widely reported in the Chicago Region, and its native range is east and south, mostly in the Atlantic and Gulf Coast regions (Wilhelm and Rericha 2017). More research could help to better understand the relationships between *L. hirsuta* and *L. canadensis* and their varieties.

Voucher Specimens:

Wilhelm et al. #15224, 25 August 1987, La Porte Co. (MOR)
Plampin & Newgent #10-1992, 31 August 1992, La Porte Co. (MOR and INDU)

Liatris scariosa (L.) Willd. var. *nieuwlandii* (Lunell) E. G. Voss

While Gerould Wilhelm did not record savanna blazing star from Tolleston Dunes, Nicole Kalkbrenner did report it from the Woodland Dune and Savanna tract (Tolleston Dunes C). We suspect that this is the occasional aberrant *L. aspera* with long pedicels. The nearest location for this species is Cressmoor Prairie in Hobart, managed by the SHLT. But it is reported from Coulter Prairie (Inland March B) based on a SHLT plant list from June 2001. This site is across County Line Road from Woodland Dune and Savanna. Seeing a specimen would be helpful in determining the presence of this species at Tolleston Dunes C (Bowles et al. 1988). Blazing stars are characterized by having pits on the upper and lower leaf surfaces (Pavlovic, pers. obs., 1998).

Prenanthes aspera Michx.

Rough white lettuce is known from mesic prairies in the southwestern sector of the Chicago Region, and is rare in the eastern sand sector (Wilhelm and Rericha 2017). It has long been known from Hoosier Prairie A. It is currently listed as a threatened species in Indiana.

Voucher Specimens:

Hiebert & Pavlovic #489, 14 August 1986, Lake Co. (MOR)

Prenanthes crepidinea Michx.

Great white lettuce is reported from the Heron Rookery A. Like the orchid putty root (*Aplectrum hyemale*), the basal leaves of great white lettuce disappear before the flower stalk emerges (Swink and Wilhelm 1994). According to Yatskievych (2006), great white lettuce forms large colonies of basal rosettes that are easily observed in the spring and dieback by midsummer. No specimen or photograph documents this occurrence.

Rudbeckia subtomentosa Pursh

Sweet black-eyed Susan grows in Cowles Dunes E. This species is typical of thickets adjacent to prairies and moist open woods (Swink and Wilhelm 1994). It is not clear whether the Deam specimen (see below) was collected in the Bailly Unit or to the south.

Voucher Specimens:

Bennett s.n., 21 August 1960, Porter Co. (BUT)
Deam #21264, 25 August 1916, Porter Co. (IND)

Solidago simplex Kunth var. *gillmanii* (A. Gray) G.S. Ringius [*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald)]

Dune goldenrod is still known from Miller Woods, West Beach, Cowles Dunes, DSP, Keiser, and Tamarack. Still occasional in the dunes of Miller Woods A, from where Bowles et al. (1986) reported it was growing with *Artemisia campestris* ssp. *caudata*, *Calamovilfa longifolia*, *Cirsium pitcheri*, *Corispermum americanum*, *Elymus canadensis*, *Euphorbia corollata*, *Lithospermum caroliniense* var. *croceum*, *Populus deltoides*, *Prunus pumila*, *Schizachyrium scoparium,* and *Solidago nemoralis*. Ray Schulenberg found it growing at Miller Woods A with *Ammophila breviligulata*, *Calamovilfa longifolia*, *Elymus canadensis*, and *Vitis riparia* (Wilhelm 1990). This species is frequent along the dunes in the foredune and dune complex in West Beach A and D, in Cowles Dunes A, and the foredune complex of DSP (Wilhelm 1990). Pavlovic observed numerous patches at West Beach on 22 July 2022. They were behind blowouts, where there was an active but thin accretion of sand. Dune goldenrod is occasional in the blowouts of Keiser A. This species was occasional in the foredune complex areas of Tamarack C, but Plampin et al. (2003) noted this population was substantially reduced in numbers. Of the 11 previously known patches in 1992, only three were extant in 2002, with some of the loss probably from shoreline erosion at the east end of INDU (Palmpin et al. 2003). Wilhelm and Rericha (2017) split the former *S. racemosa* var. *gillmanii* into *S. simplex* and *S. deamii* on the basis of the length of the involucral bracts (<5 mm long in *S. deamii*). We have not surveyed for these separate species. See Peirson (2010) and Peirson et al. (2012, 2013) for additional details on nomenclature and *Solidago* biogeography. A total of 87 specimens of dune goldenrod were collected in Indiana Dunes prior to 1965. This collection is corroborated in a letter written by Charles Deam to Floyd Swink dated 11 January 1947, where he notes that Freisner collected 50 sheets of this species in the dunes near the Keiser Stop (Mohar 2000). One might question how such collecting impacted the genetic diversity of this species with a sporophytic breeding system

Voucher Specimens:

Schulenberg & Wilhelm #74-303, 5 September 1974, Lake Co. (MOR)
Hiebert #153, 29 September 1981, Porter Co. (MOR)
Bennett #7977, 2 September 1962, Porter Co. (F)
Tryon #4272, 16 September 1939, Porter Co. (F)

Solidago speciosa Nuttall

Showy goldenrod is one of the most prominent showy flowers in the late August and early September blooming period in oak savannas. It is common in the West Unit of INDU, where fire has maintained open savanna conditions. Showy goldenrod is known throughout Indiana Dunes except for the Heron Rookery and Pinhook Bog. Cochrane and Iltis (2000) pointed out that this species has three varieties: *jejunifolia*, *rigidiuscula*, and *speciosa*. Variety *jejunifolia* blooms earlier than the latter two varieties: they are distinguished by leaf width and inflorescence size at the time of blooming, so it is difficult to distinguish them unless they are in bloom. The Flora of North America lists the following three varieties: *pallida* (not present here), *speciosa* (includes var. *jejunifolia*), and *rigidiuscula* (FNA 2022). These varieties differ in flower size and flowering period, which accounts for the wide phenological spread of this species within Indiana Dunes (Leicht-Young et al. 2009b). Showy goldenrod was added to the Indiana State List of Threatened and Endangered Plants in 2020 as a watch list species (Indiana Department of Natural Resources 2020), but it is no longer a state listed

species. Whether or not this species is impacted by bracken fern invasion, at Miller Woods for instance, is unclear without further inspection. Bracken fern often dies back while showy goldenrod is beginning to bloom, suggesting a phenological separation.

Voucher Specimens:

Hiebert #49, 21 August 1981, Lake Co. (MOR)
Chase #2091, 7 September 1903, Porter Co. (F)
Pavlovic #72,30 July 1983, Porter Co. (MOR)
Wilhelm #15250, 25 August 1987, La Porte Co. (MOR)

Solidago ptarmicoides (Torr. & A. Gray) B. Boivin [*Aster ptarmicoides* Torr. & A. Gray; *Oligoneuron album* (Nutt.) G.L. Nesom]

Flat-topped aster or stiff white goldenrod is known from Miller Woods, West Beach, and Hoosier Prairie. Though this species is not an aster, it resembles one. Bowles et al. (1986) discussed the occurrence of this species in Miller Woods A, where it grows with *Cladium mariscoides*, *Dichanthelium acuminatum* ssp. *fasciculatum*, *Eleocharis elliptica*, *Fragaria virginiana*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, *Linum medium* var. *texanum*, *Panicum virgatum*, *Pinus banksiana*, and *Schizachyrium scoparium*. According to Bowles (1989), the Miller population was remaining stable. This species is characteristic of the pannes in West Beach A, B, C, and D. Peattie (1930), however, apparently considered it to be common in the "rich calcareous meadows of Long Lake." Bowles et al. (1986) listed the following associates from a "late successional graminoid and savanna panne:" *Arctostaphylos uva-ursi*, *Calamovilfa longifolia*, *Hypericum kalmianum*, *Liatris cylindracea*, *Lobelia kalmii*, *Pinus banksiana*, *Sabatia angularis*, *Schizachyrium scoparium*, and *Solidago nemoralis*. According to Bowles (1989), the West Beach population is similar to what it was in 1985 (Wilhelm 1990). Flat-topped aster is rare at Hoosier Prairie A. It is known from a dry portion of the prairie, near the center of the southern half. Bowles (1987) notes that it has not been seen here since 1979.

Voucher Specimens:

Swink #701, 15 September 1951, Lake Co. (F)
Jones #51, 20 August 1981, Lake Co. (MOR)
Hiebert #96, 28 August 1981, Porter Co. (MOR)

Symphyotrichum boreale (Torr. & A. Gray) A. Löve & D. Löve [*Aster borealis* (Torr. & A. Gray) Prov.; *Aster junciformis* Rydb.]

Rush aster grows at Miller Woods, Tolleston Dunes, West Beach, Inland Marsh, Cowles Dunes, DSP, and was formerly known from Keiser and Tamarack. It is frequent in wet calcareous sands of Miller, less common in wet calcareous sands in the western and northern portions of Tolleston Dunes A, occasional to frequent in the wet calcareous sands of West Beach A and D (Wilhelm 1990). It is occasional at Inland Marsh A, and it is occasional in wet calcareous meadows and interdunal depressions at Cowles Dunes A and B. At Cowles Bog, it grows with *Carex leptalea*, *Eleocharis rostellata*, *Muhlenbergia glomerata*, *Parnassia glauca*, *Solidago uliginosa*, *Thelypteris palustris* var. *pubescens*, and *Typha angustifolia* (Wilhelm 1990). Rush aster is probably extant in DSP marsh complex, where Lyon (1927) reported it. This species may well have been extirpated from Keiser and the Great Marsh in Tamarack B during the drainage and land modification efforts after World War I (Applied Ecological Services 1984).

Voucher Specimens:

Klick #2803, 4 October 1988, Porter Co. (MOR)

Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *interior* (Wiegand) G.L. Nesom [*Aster simplex* Willd. var. *interior* (Wiegand) Cronquist or *A. lanceolatus* Willd. var. *interior* (Wiegand) Semple & Chmielewski]

Marsh aster was collected from West Beach, Cowles Dunes A and is occasional in the wetter

portions of Hoosier Prairie A. Marsh aster is considered invasive in Europe (Chmielewski and Semple 2001, Jedlička and Prach 2006).

Voucher Specimens:

Parkhurst 78LR 205, 16 September 1978, Lake Co. (IND)
Manke & Stumpf s.n, 31 August 1999, Porter Co. (INDU)

Symphyotrichum ontarionis (Wiegand) G.L. Nesom [*Aster ontarionis* Wiegand]
Ontario aster is known only from Tamarack. Typical of forested floodplains or alluvial floodplains in southern Porter County along the Kankakee River, this species was reported by Nathanael Pilla (pers. comm. with Pavlovic) in 2017. We have no specimen to vouch for this species' presence in the Indiana Dunes, but Bennett collected a specimen on 10 October 1957. The label reads "moist soil in woods on interdune flat, Port Chester, Porter Co."

Voucher Specimens:

Bennett s.n., 10 October 1957, Porter Co. (F)

Symphyotrichum sericeum (Vent.) G.L. Nesom [*Aster sericeus* Vent.]
Silky aster is known from Tolleston Dunes, Inland Marsh, and Bailly. This species is named silky for the fine and soft hairs that cover the leaf and stem surfaces. Silky aster is characteristic of prairies to the west and reaches its eastern limit in INDU. Never widely distributed in the Indiana Dunes, this species is most abundant in the Tolleston Dunes sand ridges of West Beach C. Smaller populations are reported from Inland Marsh A and B and Tolleston Dunes C (Wilhelm 1990). Bowles et al. (1986) listed the following associates from a dry mesic sand savanna in West Beach C: *Carex pensylvanica*, *Comandra umbellata*, *Euphorbia corollata*, *Helianthus divaricatus*, *Ionactis linariifolia*, *Koeleria macrantha*, *Liatris aspera*, *Quercus velutina*, *Rosa carolina*, *Schizachyrium scoparium*, *Sorghastrum nutans*, *Symphyotrichum oolentangiense*, and *Viola pedata*. Some of the Tolleston Dunes C populations are under dense oak canopies and may decline without canopy thinning (Pavlovic, pers. obs., 2016). Lois Howes saw silky aster in 1957 on the ridge west of Goose Lake in Dune Park (Howes 1985). Silky aster was reported by Alan Resetar in 1993 as growing in Mnoke Prairie (Bailly D), and it has been seen there by Plampin. It is rare and possibly extirpated from the Cowles Dunes Unit. Lyon (1927), in reference to an area in West Beach, mentioned that he had not noticed this species further east, but the Mnoke Prairie population is further east, and there are two specimens from points still further east, one from the Goose Lake area (now filled and developed) and one from Cowles Dunes.

Voucher Specimens:

Just & Nieuwland s.n., 15 September 1929, Porter Co. (F)
Umbach s.n., 12 September 1899, Porter Co. (MOR and F)

BETULACEAE — Birch Family (sometimes Corylaceae)

Plants in the birch family are monoecious (sexes in different flowers on the same individual) trees and shrubs. Leaves are alternate and simple with deciduous stipules. The minute male flowers are arranged in penduluous, cylindric, catkin inflorescences, where each flower or cluster of two to three flowers (cymule) is subtended by an obvious bract. Female flowers subtended by bracts and clustered in lateral or terminal pendant catkins, or erect, compact, cone-like (strobiloid) clusters; each flower with a single pistil but two styles. Female cymules have two flowers, except in *Betula*, which have three. Fine charcoal is made from *Alnus* and *Betula* wood. Birch beer was made from the sugary sap of *Betula* spp., and wintergreen flavor oil was extracted from birch twigs (Lawrence 1951). The hard wood of *Ostrya caroliniana* is used for mallets (Lawrence 1951).

Alnus incana (L.) Moench ssp. *rugosa* (Du Roi) Clausen [*Alnus rugosa* (Du Roi) Spreng.]
Speckled alder is reported from Miller Woods, West Beach, Calumet Prairie, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. This *Alnus* species has been seen at Miller Woods F

and in low ground along Long Lake, West Beach C. Speckled alder is frequent in the swamp complex portions of Cowles Dunes A and the east Great Marsh ecotone in B, and along the north side of the NIPSCO right-of-way in Cowles Dunes E (Wilhelm 1990). This alder is frequent in and along the margins of the hydromesophytic swamp and along the NIPSCO right-of-way in DSP. Speckled alder is occasional along the bike trail in the western portion of Furnessville F and in the swamp complex portions of B and C (Wilhelm 1990). It is frequent in the hydromesophytic swamps and their remnants north of the CSSSBR in Keiser B and C, southwest of Beverly Shores. Speckled alder is also found in Keiser C and D, north of U.S. 20 in Keiser E, and occasional in the wetlands south and west of the campground in Keiser F (Wilhelm 1990). This alder is frequent in the low wooded tracts along the traction line of Tamarack B and occasional in the former bog in Tamarack C.

Voucher Specimens:

Wilhelm & Shimp #14774, 7 May 1987, Porter Co. (MOR)
Wilhelm #6931, 29 June 1979, Porter Co. (MOR)
Wilhelm #6784, 9 June 1979, Porter Co. (MOR)

Alnus serrulata (Aiton) Willd.

Smooth alder is reported from Keiser based on a collection made by Charles Deam (see first specimen below). If this species is extant, it might be found between Lake Shore County Road and the Beverly Shores train station. Another specimen is housed at the Field Museum of Chicago, but its online location is incorrect (see second specimen below). It was collected by Agnes Chase in 1903 from Dune Park. The online citation says, "Indiana Dunes State Park," a protected area that was created in 1925, so "Dune Park" on the label is correct since the DSP did not exist in 1903. Dune Park refers to the central dunes that were destroyed in the early 1960s between the west and east units of INDU.

Voucher Specimens:

Deam #8778, 17 June 1911, Porter Co. (NBG)
Chase #2105, 7 Aug 1903, Porter Co. (F)

Betula alleghaniensis Britton [*B. lutea* F. Michx.]

Yellow birch is frequent in the swamp complex area of Cowles Dunes A. The specimen just past the west end of the Cowles Bog boardwalk, with the large burls, was referred to as the Cowles tree by May Theilgaard Watts (1957). Cowles pointed out the tree to her students, and, after visiting the bog, relaxed on the dune opposite the tree (Watts 1957). About six small yellow birch trees were cut while the Cowles Bog boardwalk was replaced by the NPS (Pavlovic, pers. obs., 2016). Yellow birch also grows in the forested fen section of Coulter Prairie, south of Stagecoach Road in Inland Marsh B.

Voucher Specimens:

Swink s.n., 18 May 1947, Porter Co. (MOR)

Betula papyrifera Marshall

Paper birch is known from Tolleston Dunes, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Hoosier Prairie. Plampin and Myrna Newgent saw a clump, one live and four dead, in Tolleston Dunes B on 1 June 1990. Paper birch is rare but still present in the swamp complex of Cowles Dunes A, where it grows with *Acer rubrum*, *Betula alleghaniensis*, *Cornus sericea*, and *Nyssa sylvatica*. Lyon (1927) implied that, while this species was then common in the tamarack swamp [Cowles Bog], it was "destroyed by fire" where it grew in an interdunal meadow (possibly Howes Prairie in Cowles Dunes B). Marlin Bowles and Marcy DeMauro initiated a monitoring plot for INDU at the Cowles Dunes A population (Bowles et al. 1986). There it grows with *Acer rubrum*, *Amelanchier* sp., *Aralia nudicaulis*, *Maianthemum canadense*, *Quercus rubra*, *Sassafras albidum*, *Smilax lasioneura*, and *Symplocarpus foetidus*. Known from DSP, based on Laughlin's (1953) report, in which he cites two trees "about 75 feet south of No. 2 trail in the east central part." In addition, in 1983, Bergendahl noted

that paper birch grows in the swampy woods north of tower #8818. The lone paper birch found by Plampin in Furnessville D in 1992 has since died. This rare birch, once reported from a "subdunal field" at Keiser, is still represented by a small but declining population in the rich wooded swamp complex of Keiser C and scattered individuals near the Dunewood Campground in Keiser F, as noted by Cristy Fox (1985). Hamilla and Tonkovich discovered that the paper birch in Keiser F south of the ditches south of the Dunewood campground and north of U.S. 20 ("Golfwood Dr. area") were all dead and decaying. At Keiser C, it was associated with *Acer rubrum*, *Carex debilis* var. *rudgei*, *C. folliculata*, *C. intumescens*, *C. seorsa*, *C. virescens*, *Ilex verticillata*, *Lindera benzoin*, *Maianthemum canadense*, *Mitchella repens*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Osmunda regalis*, *Platanthera clavellata*, *Quercus rubra*, *Rubus hispidus*, *Saururus cernuus*, and *Thelypteris noveboracensis*. At the latter site, Bowles et al. (1986) recorded 21 trees in less than one hectare, with an average DBH of 22 centimeters. The population at Keiser C is declining because of forest succession and the short-lived nature of these plants. On 23 February 1995, Plampin saw a now dead paper birch in Keiser E near the three species of *Lycopodium* and *Goodyera pubescens*. In 1993, Plampin reported paper birch from Tamarack A and B. Paper birch also occurs at Hoosier Prairie A based on the 25 October 1995 Nature Preserves list.

Voucher Specimens:

Kjellmark #86, 3 May 1988, Porter Co. (MOR)
Wilhelm #6954, 12 September 1979, Porter Co. (MOR)

Betula populifolia Marshall

Gray birch is reported from Miller Woods, Cowles Dunes, DSP, and Pinhook Bog. The taxonomy of local populations of gray birch presents a frustrating morphological and identification problem in determining whether populations are native or exotic.

Wilhelm (1990) wrote,

> *Voss (1985) pointed out that most of the Michigan specimens have the merely acuminate leaves and larger pistillate scales of* B. pendula*, an Old-World birch commonly cultivated locally. This observation appears to be valid in the Chicago Region as well. We have a specimen from St. Joseph County, Indiana, which appears to be genuine* B. populifolia*, and Deam (1940) believed it to be native to Lake and La Porte counties. Most of the current populations in the dunes region today, however, are young trees and appear to be referable to* B. pendula*. Until we are more certain of the taxonomy, I will regard the gray birch as a member of the special flora conditionally.*

If it is a European weed, then its presence at any site would not be classified as presence of special flora. At Miller, Eric Kjellmark reported gray birch growing with *Arctostaphylos uva-ursi*, *Cornus sericea*, *Hypericum kalmianum*, *Ptelea trifoliata* ssp. *trifoliata*, and *Rhus aromatica*. Wilhelm (1990) writes that gray birch has been reported from the NIPSCO ponds area in Cowles Dunes A, where it was being monitored by the Indiana Dunes National Lakeshore (Bowles et al. 1985); it is listed as growing with *Cephalanthus occidentalis*, *Juncus effusus* var. *solutus*, *Persicaria amphibia*, *P. hydropiperoides*, *Rubus* sp., *Scirpus cyperinus*, and *Spiraea tomentosa* var. *rosea*. Pavlovic has not seen specimens from this population, but the caveats expressed above regarding whether this is an introduced or native species may be valid for the Cowles Dunes A population as well.

The plants growing in Blag Slough are most likely *B. pendula* rather than this *B. populifolia*. Ken Klick thought the Blag Slough plants were *B. populifolia*. Plampin attempted to identify the plants based on seed characters (Cunningham 1957). At DSP, Kendall Laughlin (1953) reported one tree "11 feet south of No. 2 trail and about 400 feet west of its junction with No. 5." Swink and Wilhelm (1979) and Wilhelm and Rericha (2017) suggested that reports for Porter County, Indiana, are based upon naturalized specimens. Wilhelm and Rericha

(2017) reported that Bennett collected a specimen from an interdunal swale at Tremont in 1959. Peattie (1930) mentions that in his time, *B. populifolia* had been "repeatedly reported from our region ... though generally as second-hand information. It may yet be found in this region, but has probably been confused with *Populus tremuloides* saplings." Deam (1940) excluded this species from Porter County, Indiana, suggesting that some reports for this species may be based on planted specimens. Wilhelm (1990) wrote, "There is one small tree in a conservative portion of Pinhook Bog B. . .growing with *Chamaedaphne*, *Vaccinium*, *Cladium*, *Drosera*, *Sarracenia*, and *Juncus*." About this Gerould Wilhelm (1990) stated, "I have not seen it, but the specimen has many leaves acuminate-caudate enough to allow one to suspect the native species." Continued investigation of the species is warranted.

Voucher Specimens:

Bennett #1715, 1959, Porter Co. (F)
Hess et al. #5973, 16 July 1984, La Porte Co. (MOR)

Betula pumila L.

Dwarf birch is still occasional among the tamaracks in the swamp complex portion of Cowles Dunes A, but it is rare in a swampy slough in Cowles Dunes B. Near Cowles Bog, Eric Kjellmark (former INDU Science Division employee) listed the following associates: *Carex haydenii*, *C. hystericina*, *Cornus sericea*, *Larix laricina*, *Toxicodendron vernix*, *Typha angustifolia*, *T.* × *glauca*, and *Typha latifolia*.

Voucher Specimens:

Steyermark #40900, 9 August 1941, Porter Co. (F)
Wilhelm & Bacone #6738, 27 May 1979, Porter Co. (MOR)
Kjellmark #119, 8 July 1988, Porter Co. (MOR)

BORAGINACEAE — Borage Family

This family is easily recognized when in bloom by its coiled indeterminant inflorescence called a helicoid cyme. This means the younger flowers develop above the older flowers on the same stem and the inflorescence can grow from the tip in a continuously opening spiral. The five petals are partially fused. Heliotrope (*Heliotropium* spp.), borage (*Borage officinale* L.), and comfrey (*Symphytum officinale* L.) are typical species of this family (Lawrence 1951).

Myosotis laxa Lehm.

Small forget-me-not is known from Miller Woods, Calumet Prairie, Bailly, Cowles Dunes, DSP, and Tamarack. This species is rare in the Chicago Region and is listed as threatened in Indiana. It was formerly listed as endangered in Indiana, but recent finds have demonstrated that its frequency was greater than expected. Deam (1940) wrote that it was "frequent in the Mineral Springs Bog in Porter County and also reported from Lake County by Pepoon as occurring on the banks of a cold brook near Miller and on the margin of the Little Calumet River. Probably restricted to these two counties." Swink and Wilhelm (1979), nearly forty years later, wrote "in our area known only from Lake and Porter Counties in Indiana," but it is now known from La Porte County also. It is occasional in Miller Woods C (Wilhelm 1990). Tom Post and Myrna Newgent found small forget-me-not at Calumet Prairie. It was also recorded there at two different areas in 2012 by Tonkovich. In 2000, David Beamer and Pavlovic found the densest (50–100 per m^2) and largest population in size and extent (10 m × 50 m) in INDU in a fen on the south side of the Little Calumet River in Bailly D. Small forget-me-not is still frequent in the rills and swampy woods of Cowles Dunes A, and B. Tonkovich reports this species reappeared in 2011 and was also seen in 2014 in the large 50-acre restoration area of the Cowles Dunes Wetland Complex, where NPS removed cattail and where restoration has been ongoing since 2010. Three colonies were monitored by Marlin Bowles and Marcy DeMauro, two in Cowles Bog and another along the NIPSCO right-of-

way just east of Wagner Road (Bowles et al. 1985). They listed plant associates at Cowles Bog as *Calamagrostis canadensis*, *Carex vulpinoidea*, *Impatiens* sp., *Leersia oryzoides*, *Phalaris arundinacea*, *Typha angustifolia*, and *T. latifolia*.

The population east of Wagner Road found by Sarah Pavlovic was extant as of the summer of 2003, but it has been impacted by brush removal vehicles and reconstruction of the Calumet Bike Trail in Cowles Dunes E and possibly by the replacement of the natural gas pipeline in 2017–2018. It also is possible that these disturbances could release the seed bank to create larger populations. Deam listed small forget-me-not as an associate of *Linnaea borealis* var. *longiflora*, but *Linnaea* was absent where Gerould Wilhelm made note of it. Plampin reported in 1989 that this rare aquatic grows in the swamp complex near the former dam at the west end of Trail 2, along the north side of the peninsula in Fort Creek (Dunes Creek) in DSP. Small forget-me-not also grows in DSP in a swamp east of SR49 and southwest of the maintenance building. In 1983, Bergendahl reported that it grew along the bike trail between towers #8421 and #8422 opposite Teale Road and south of DSP (Wilhelm 1990). This species had grown in a tiny spring that issued forth from the base of the foredune just west of Crescent Dune, hidden under the willows and other shrubbery, but this dune is now eroded away. On 20 June 2002, Myrna Newgent observed small forget-me-not in the beach nourishment access site, and on 18 July 2002, Plampin saw this species in a clay seep to the east of the panne north of Crescent Dune in Tamarack C (Plampin et al. 2003). The latter is a large population of thousands of plants growing with *Sium suave* and the former with *Potentilla anserina* (Plampin and Hamilla 2008a). In August 2015, Tonkovich and Hamilla again observed *M. laxa* in the areas east of the panne at Crescent Dune, but it was not as extensive as reported in the past. Unfortunately, shrubby willows and several invasive species (*Eleagnus*, *Phragmites*, and young *Lythrum salicaria*) were spreading into the open areas. It was no longer found in areas where *Potentilla anserina* subsists.

Voucher Specimens:

Wilhelm #6956, 8 September 1979, Porter Co. (MOR)

Lyon s.n., 18 June 1922, Porter Co. (BUT)

Myosotis verna Nutt.

The delicate white forget-me-not is scattered among mesic sites at Hoosier Prairie A.

Voucher Specimens:

Hiebert #412, 7 June 1983, Lake Co. (INDU)

BRASSICACEAE — Mustard Family

The mustard family was formerly known as the Cruciferae because the four petals form a cross. Structure of the fruit is most important for identification. Fruits are single carpels with a septum between the opposite rows of seeds. Fruits that are at least three times as long as wide are called siliques, whereas those that are shorter and wider are called silicles. The flowers have six stamens, two short and four long, and a single pistil. Mustards are important plants, providing us with many foods including broccoli, cauliflower, and cabbage (all three are varieties of the same species, *Brassica oleracea*); as well as horseradish (*Armoracia lapathifolia*), watercress (*Nasturtium officinale*), white mustard (*Sinapis hirta*), and black mustard (*Brassica nigra*).

Cakile edentula (Bigelow) Hook. [ours most properly as *Cakile edentula* ssp. *edentula* var. *lacustris* Fernald]

Sea rocket or lake rocket occurs at Miller Woods, West Beach, Cowles Dunes, DSP, and Tamarack. Its absence in the foredunes in Keiser adjacent to Beverly Shores could be an oversight, or it is possible that erosion and human trampling is too intense for this annual. Sea rocket is occasional along the Beach in Miller Woods A and occasional to rare in the foredune complex communities of West Beach A and D (Wilhelm 1990). Sea rocket often

grows on bare sand on the upper beach or in blowouts. Bowles et al. (1986) listed the following species as usually nearby: *Ammophila breviligulata* and *Euphorbia polygonifolia*. Bowles (1989) recorded a significant decline in extent and numbers in the West Beach population of this vulnerable species.

This species is sensitive to human trampling on the beach and increases in abundance with increasing distance from access points (Pavlovic and Bowles 1996). In wet years, plants are frequent in the high and dry dunes near the lake, often in locally high densities (5–10 per m^2). Sea rocket is rare to frequent along the upper edge of the beach community in the foredune complex of Cowles Dunes A, and probably B as well (Wilhelm 1990). Most of the Cowles Dunes B individuals are likely in the town of Dune Acres rather than in INDU. Bowles et al. (1986) listed the following associates in Cowles Dunes A: *Ammophila breviligulata*, *Euphorbia polygonifolia*, *Populus deltoides*, and *Prunus pumila*. Extant, and in places common, along the beach community of the foredune complex of DSP. Bowles et al. (1986) sampled a population of this species at the east end of the park and recorded the following associates: *Ammophila breviligulata*, *Euphorbia polygonifolia*, *Populus tremuloides*, and *Prunus pumila*. Bowles (1989) noted that at DSP, overall numbers dropped 40% in the original transects. This species is extant in the beach and foredune areas along the shore of Lake Michigan in Tamarack C, including on the lake-facing side of Mt. Baldy (Wilhelm 1990). We attribute fluctuations in the numbers of this species to interannual variation in precipitation rather than extrinsic factors causing extirpation. Nevertheless, chronic human trampling can eliminate this species (Pavlovic and Bowles 1996).

Voucher Specimens:

Wilhelm & Bacone #5197, 3 August 1978, Lake Co. (MOR)
Hiebert #61, 24 July 1981, Porter Co. (MOR)
Jones s.n., 16 August 1975, Porter Co. (INDU)
Hiebert #343, 20 July 1982, Porter Co. (MOR)
Wilhelm et al. #15230, 25 August 1987, La Porte Co. (MOR)

Cardamine parviflora L. [*Cardamine parviflora* var. *arenicola* (Britton) O.E. Schulz]
Small-flowered bitter cress grows at Hoosier Prairie A. On 22 May 1910, Charles Deam collected a specimen of this species just outside the eastern border of INDU (Tamarack D).

Voucher Specimens:

Swink & Altvatter #10694, 9 May 1992, Lake Co. (MOR)

Draba reptans (Lam.) Fernald
Common whitlow grass is known from Miller Woods B based on Pavlovic's observation and collection in 1992 (see below). Pavlovic saw this species in the same area again in 2013, indicating the continuation of disturbance conditions that favor this annual mustard. Charles Deam collected a specimen (#20074, 3 June 1916, Porter Co. [IND]) in open oak woods near Mud Lake, suggesting it could be present in Cowles Dunes A.

Voucher Specimens:

Pavlovic & Poulson #200, 13 May 1992, Lake Co. (INDU)

Rorippa sessiliflora (Nutt.) Hitchc.
Sessile-flowered cress is known from Tamarack D based on Wilhelm (1990). There is no representative specimen or photograph, so further verification may be needed. This species is typically found in mudflats and receding marsh zones. Wilhelm and Rericha (2017) do not list this species for Lake, Porter, or La Porte Counties. Not having a specimen for documentation may be why Wilhelm and Rericha (2017) did not list it for these counties.

Sinapis arvensis L. [*Brassica kaber* (DC.) L.C. Wheeler]
The annual native charlock is known from Tamarack E (Wilhelm 1990). There is no representative specimen or photograph, so further verification may be needed. See Wilhelm and Rericha (2017) for discussion on history and enthnobotany of this species.

Turritis glabra L. [*Arabis glabra* (L.) Bernh.]
Tower mustard is known from Cowles Dunes, Furnessville, and Tamarack. Rare now in the NIPSCO Greenbelt of Cowles Dunes A, where it was reported by Lyon (1927) as growing in a "wet subdunal meadow, Mineral Springs." Pavlovic found a population during the summer of 2003 growing along the Calumet Bike Trail just east of Waverly Road in Furnessville F. That same year, Joy Marburger found this species along the South Shore, south of Tamarack B on 24 June 2003 (Plampin et al. 2003). According to Plampin (pers. obs., 2003), there were hundreds of plants further to the east. There were a few plants of this rare crucifer along the CSSSBR in the Town of Pines (specimen cited below) but, according to Plampin et al. (2003), this population is now gone. However, they did find additional populations in Tamarack B and C. This species appears to fluctuate among years due to its annual habitat and response to climate variability (Plampin et al. 2003; Pavlovic, pers. obs.).

Voucher Specimens:
Lyon s.n., 15 June 1924, Porter Co. (BUT)
Wilhelm #6776, 9 June 1979, Porter Co. (MOR)
Pavlovic, 14 July 2003, Porter Co. (INDU)

CABOMBACEAE — Water-shield Family

Water-shields, which were often included in the water-lily family (Nymphaeaceae), have only two genera: *Brasenia* and *Cabomba*. These perennial, rhizomatous, aquatic herbs with adventitious roots can have only floating leaves or both floating and submersed leaves (only in *Cabomba*). The floating leaves are peltate (petiole attached to the center underside of the blade), linear to broadly elliptic and entire, whereas the submersed leaves are palmately dissected into thin lobes. The small bisexual flowers are borne singly, usually at or above the water surface. Flowers appear six-parted due to the three similarly colored sepals alternating with three petals. Stamens are in multiples of three, ranging from 3–36, with slender filaments and obvious anthers. The two to eighteen separate carpels are inversely club-shaped with short styles and either rounded stigmas (*Cabomba*) or very elongate stigmas (*Brasenia*). The leathery, indehiscent, nutlet fruits are subtended by the persistent perianth.

Brasenia schreberi J.F. Gmel.
Water-shield is known from Tolleston Dunes, West Beach, Cowles Dunes, and Pinhook Bog; it is extirpated from Tamarack. Known from Long Lake in West Beach C, it may be found in west Long Lake in Tolleston Dunes B, where Plampin noted a few plants within a square meter on 29 June 1992. They were on the south side of a marsh on the north side of Long Lake and south east of the *Platanthera flava* var. *herbiola* population. The plants were not in flower, perhaps due to dry conditions. Lyon (1927) mentions that "late in the wet season of 1924 a few leaves were collected in the mud of an interdunal meadow, Mineral Springs." Lois Howes saw water-shield in bloom in Little lake on 1 August 1979. Water-shield is occasional in Little Lake (Cowles Dunes A), where Wilcox found it growing with *Nymphaea* sp. and *Ceratophyllum*. Nathanael Pilla saw water-shield growing in Little Lake on 12 June 2016. He and Tonkovich also saw *Brasenia* on 23 October 2015 in the north-northeast arm of Little Lake, where they saw a lot of *Rhynchospora macrostachya* along with *Ludwigia sphaerocarpa*, *Potamogeton pulcher*, *Dulichium arundinaceum*, *Juncus canadensis*, and some *Nuphar* and *Pontederia* as well. Water-shield is reported by Lyon (1927) from Tamarack B, but this species may be extirpated locally. This species grows in a large minerotrophic pool near the east side of Wozniak Road at the west edge of Pinhook Bog B, with *Eleocharis palustris*, *Potamogeton natans*, and *Utricularia vulgaris* ssp. *macrorhiza*.

Voucher Specimens:
Wilcox #84, 27 June 1985, Porter Co. (MOR)
Burger #12482, 18 June 1988, Porter Co. (F)

CALLITRICHACEAE — Water-Starwort Family

This monogeneric family includes slender and delicate annual herbs of aquatic and terrestrial habitats. Leaves are opposite and entire. Plants are monoecious (single sex flowers borne on the same plant) with flowers that lack sepals and petals. Male flowers have a single stamen and female flowers have a single pistil. This cosmopolitan genus is of little economic importance.

Callitriche heterophylla Pursh

The large water-starwort is known in the Indiana Dunes from Cowles Dunes, DSP, Furnessville, and Hoosier Prairie. This starwort was found by Plampin and Myrna Newgent in the Waverly Road ditch in Cowles Dunes B on 28 August 1992. This species is noted from the NIPSCO right-of-way at the DSP (B). Plampin found a *Callitriche* species in Olson's Pond in Furnessville F in 1994, but it lacked flowers, so Wilhelm was uncertain of the species, although it was most likely *C. heterophylla*. At Hoosier Prairie A, large water-starwort is found in marshes and ditches throughout.

Voucher Specimens:

Dritz #381, 11 May 1985, Lake Co. (MOR)
Newgent and Plampin s.n., 28 August 1992, Porter Co. (MOR)

CAMPANULACEAE — Bluebell Family

Plants in the bluebell family are mostly perennial (some annual) herbs with simple opposite leaves. Flowers typically have five sepals, petals, and stamens. The petals are fused to form a tube or bell-like corolla, and the stamens are partially fused to the lower petals. The pistil is composed of two, three, or five carpels, and the ovary is inferior (i.e., below the fused sepals and petals). This family is mostly recognized for the large number of ornamental flowers that are cultivated.

Campanula rotundifolia L.

Harebell grows in Tolleston Dunes, West Beach, Inland Marsh, Cowles Dunes, DSP, Keiser, and Tamarack. Kurz (1923) reported harebell from West Beach A, and it probably yet grows in C and D. It also grows in Inland Marsh A and B. It is still occasional in the foredunes, dry dunes, and sandy prairies of Cowles Dunes A and B and DSP. Harebell is occasional in the dune complex portion of Keiser A and among the dunes and roadside cuts in Tamarack C. Harebell is common on more mesic or shaded slopes (Pavlovic, personal observation).

Voucher Specimens:

Hiebert #56, 21 July 1981, Porter Co. (MOR)

CAPRIFOLIACEAE — Honeysuckle Family

Plants in the honeysuckle family are mostly shrubs with opposite simple leaves. Flowers have five sepals and five petals that are fused into a tubular or two-lipped flower. The five stamens are partly fused to the corolla tube. The female portion of the flower is composed of two, three, five, or eight carpels. Fruits are capsules or berries. The delicate northern herb, *Linnaea* is named for Carolus Linnaeus, the inventor of the binomial system of nomenclature for living organisms. There is a large statue of Linnaeus at the Chicago Botanic Garden, and another along the Midway Plaisance on the campus of the University of Chicago. Some of our most invasive, introduced terrestrial weeds, including Japanese honeysuckle (*Lonicera japonica*) and Asiatic bush honeysuckles (*Lonicera* spp.) are representatives of this family. Many species are grown for their ornamental flowers and foliage. *Valerianella*, formerly in the Valerianaceae, has been moved to the Valerianoideae subfamily of the Caprifoliaceae (Angiosperm Phylogeny Group 2016). Plants that were in the valerian family consisted of annual and perennial herbs with opposite leaves that

are often simple or pinnately divided. The flowers are bisexual or unisexual (dioecious). The sepals are rudimentary. The corolla is composed of five united petals that are often spurred. Stamens are one to four. The tricarpellate pistil has only one functional carpel. The root extract, or oil, of common valerian or garden heliotrope (*Valeriana officinalis*) simulates apple flavor and is used as a flavoring in food. The root was formerly used as a sedative (Lawrence 1952).

Diervilla lonicera Mill.

Bush honeysuckle is known from Miller Woods, Tolleston Dunes, Calumet Prairie, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Hoosier Prairie. Though absent from Miller Woods A, north of the Grand Calumet lagoons, this species is common throughout the black oak savannas of the other subunits. Bush honeysuckle is occasional to common along the old Tolleston dune slopes in Tolleston Dunes A, B, and C (Wilhelm 1990). According to Wilhelm (5 July 1998), one of the largest populations of bush honeysuckle occurs at Tolleston C. This species is known from nearly throughout West Beach and Inland Marsh A and B wherever there is high quality black oak savanna. Bush honeysuckle is frequent to common in those areas of the Cowles Dunes A, B, and C that are dominated by black oak. It is frequent in the black oak savannas and woodlands throughout DSP. Bush honeysuckle is reported for Furnessville C, D, and G. It is occasional in the dune complex portions of Keiser A and is occasional to frequent in the dune complex of Tamarack C and in the savanna remnant in Tamarack D. Bush honeysuckle is known from Hoosier Prairie A, according to Bacone (1988). This native woody shrub with inconspicuous yellow flowers is a preferred food plant for deer (Pavlovic, personal observation). In the dunes where fire is prevalent, bush honeysuckle is a short shrub because of frequent top killing of the plants that is followed by resprouting.

Voucher Specimens:

Wilhelm #6790, 9 June 1979, Lake Co. (MOR)
Wilhelm #6816, 11 June 1979, Porter Co. (MOR)
Otto #8, 4 June 1982, Porter Co. (MOR)

Linnaea borealis L. var. *longiflora* Torr. [*Linnaea borealis* var. *americana* (J. Forbes) Rehder]

Twinflower was known from West Beach A, where it was reported by Kurz (1923) to be growing on a decaying stump with *Cornus canadensis*; and reported by Pepoon (1927), who stated: "Northeast of Miller, near Lake Michigan, in a hollow in the sand dunes … thousands of plants extending for one-fourth of a mile, will eventually be covered by a moving dune, which at present is about seventy-five feet distant." Twinflower was known from Cowles Dunes A on the basis of Lyon's (1927) report, in which he states that it was rare in the tamarack swamp at Mineral Springs. The associates listed by Deam (1940) for his voucher of this species from Cowles Dunes A are extant in the Cowles Bog area. Twinflower, a boreal species, is presumed to be extirpated from the Dunes.

Voucher Specimens:

Deam #21226, 25 August 1916, Porter Co. (IND)

Lonicera dioica L.

Red honeysuckle grows in Miller Woods, Tolleston Dunes, Calumet Prairie, West Beach, Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Pinhook Bog. This shrub was recorded from Miller Woods A by Ken Dritz in 1987, Miller Woods C by Peloquin in 1986, and Miller Woods G by Myrna Newgent in 1990 (Wilhelm 1990). It appeared in 4% of the quadrats sampled at Miller Woods by Henderson (1982). Red honeysuckle occurs occasionally on open north slopes throughout Miller B and C. It is rare on the northern exposures of the black oak sand ridges in the western and north-central portion of Tolleston Dune A. Pam Benjamin, Plampin, and Myrna Newgent saw it in Tolleston Dunes B in 1990.

Red honeysuckle is rare in the dune complex of West Beach A and D and in the mesophytic portions of the savanna complex of West Beach C (Wilhelm 1990). Plampin noted this species in bloom "on the higher side of [the] trail on a wooded dune," in Bailly D in May 1988 (Wilhelm 1990). Red honeysuckle is an inconspicuous vine until it blooms in late May, when the red flowers with yellow stamens are back-dropped by the green connate and perfoliate leaves. Red honeysuckle is extant in the black oak savanna areas of both Cowles Dunes A and B. It is known from the cedar mound portion of Cowles Bog, where, according to Plampin, it grows with *Betula alleghaniensis*, *Caltha palustris*, *Cornus sericea*, *Enemion biternatum*, *Ilex verticillata*, *Prunus serotina*, *Ribes americanum*, *Symplocarpus foetidus*, *Toxicodendron vernix*, and *Viola macloskeyi* ssp. *pallens* (Wilhelm 1990). In DSP, red honeysuckle is frequent within the dune complex. Red honeysuckle is rare in the swamp complex of Furnessville E, and Pitcher in 1987 noted one plant along the north edge of Furnessville Road in Furnessville A (Wilhelm 1990). Pavlovic found this species growing in Keiser C in May 1984 along an abandoned road that extended west of Derby Ditch and the old Mount Vernon replica (now destroyed) from the 1933 Chicago World's Fair. This species is extant in Tamarack B in the neighborhood of Brown Ditch. There is a small population (several individuals) on a low, wooded, southeast-facing ridge along the north margin of Pinhook Bog A and several patches along Wozniak Road. This species may be rare partly because it has separate male and female plants. Red honeysuckle is considered a shrub, but it often vines up adjacent plants (Weeks and Weeks 2012). Failure to observe this plant may be due to the common failure to bloom; thus, the plants are inconspicuous.

Voucher Specimens:

O'Brien #5, 9 August 1984, Lake Co. (INDU)
Swink s.n., 18 May 1946, Porter Co. (MOR)

Valerianella chenopodiifolia (Pursh) DC.

Great Lakes corn salad was found by Ken Dritz in the Indiana Dunes along the Little Calumet River (Heron Rookery B) in 1988 (Swink and Wilhelm 1994). It has long been known from along Trail Creek southeast of Michigan City, just northeast of the Heron Rookery (Wilhelm 1990). Sarah and Noel Pavlovic found a population in Furnessville F, just west of Tremont Road on 12 May 1998. This population occurs in a slough adjacent to a small tributary of Dunes Creek. This state-endangered annual species may have a persistent seed bank that allows populations to reappear only rarely when flooding followed by drawdown conditions are favorable for its germination. When it appears above ground, the plants can be quite dense (hundreds per square meter) due to their narrow growth form (Pavlovic, pers. obs., 1998).

Voucher Specimens:

Dritz #582, 30 April 1988, Porter Co. (MOR)
Pavlovic & Pavlovic #2057, 12 May 1998, Porter Co. (MOR)

Viburnum trilobum Marshall [*Viburnum opulus* L. var. *americanum* Aiton]

American highbush cranberry might have occurred in the INDU region, but modern collections are from the headwaters of the Little Calumet River in La Porte County. Peattie (1930) reported that this species occurred east of Pine, which means it could have been in INDU. Deam (1940) lists *Viburnum trilobum* Marshall from La Porte County, but his map incorrectly shows herbarium specimens in Porter County. The introduced and invasive European highbush cranberry, *Viburnum opulus* var. *opulus*, is more common throughout northwest Indiana in mesic to wet-mesic habitats. This invasive plant may be sold erroneously by native plant nurseries and at native plant sales as the native species. The invasive species has cup-shaped glands at the base of the leaf blade, whereas the native species has club-shaped glands (Wilhelm and Rericha 2017).

CARYOPHYLLACEAE — Pink Family

Also known as the carnation family, pinks are well known for their attractive and often colorful flowers, such as carnation (*Dianthus*). These annual or perennial herbs have swollen nodes with simple, entire, opposite leaves that are often connected by the thin line across the node. The flowers consist of five free sepals, five often cleft petals, five or ten stamens in two whorls, and a single pistil of two to five carpels that develops into a simple capsule. The invasive baby's breath (*Gypsophila*) is a representative of this family.

Minuartia michauxii (Fenzl) Farw. [*Arenaria stricta* Michx.]

Neither Gerould Wilhelm nor Pavlovic has seen stiff sandwort in the Indiana Dunes, though it is extant a little further west at the Clarke and Pine Nature Preserve. It is reported from Miller Woods, West Beach, DSP (Kurz 1923), and Tamarack C. Myrna Newgent found stiff sandwort in bloom on 9 June 1994 in a panne in Miller A. Both Liz McCloskey and Plampin found separate populations in Miller B in the U.S. Steel mitigation sites on 16 June 1993, growing with *Celastrus scandens*, *Hesperostipa spartea*, *Quercus velutina*, *Rhus copallinum* var. *copallinum*, *Rosa carolina*, and *Tradescantia ohiensis*. *Minuartia michauxii* is rare in West Beach A. Stiff sandwort had not been seen in DSP since Deam's collection in 1916; however, Douglas Botka reported seeing this species in DSP in June 2013. Wayne Lampa (pers. comm. with Pavlovic) reported this plant from Tamarack C, where it grows with *Anemone cylindrica*, *Asclepias tuberosa*, *Hesperostipa spartea*, *Lithospermum caroliniense* var. *croceum*, *Panicum virgatum*, *Pedicularis canadensis*, *Phlox pilosa*, and *Schizachyrium scoparium*. This population was not relocated by Plampin et al. (2003).

Voucher Specimens:

Umbach #5510, 28 June 1912, Lake Co. (MOR)
Deam #20997, 3 July 1916 Porter Co. (IND)

Silene virginica L.

Fire pink grows in Bailly A (Wilhelm 1990) but is probably introduced. Attempts to make this the state flower of Indiana rather than the peony have failed so far (Homoya 2012). This species is a favorite nectar source for hummingbirds (Homoya 2012). Fire pink was growing in an abandoned homesite (Wilhelm 1990).

Voucher Specimens:

Kjellmark #89, 19 May 1988, Porter Co. (INDU)

CELASTRACEAE — Staffweed Family

The bittersweet or staffweed family are trees, shrubs, vines, and herbs. Their simple leaves are alternate or opposite with some having stipules and others lacking them. Flowers are bisexual and actinomorphic with often greenish petals (four or five). The four or five (sometimes 10) stamens alternate with the petals. The pistil is composed of two to five carpels. The seeds often have a red aril. One of the most invasive plants in the terrestrial habitats of Indiana Dunes is Asiatic bittersweet, *Celastrus orbiculatus* Kunth, (Leicht-Young et al. 2010b). Burning bush (*Euonymus alatus* (Thunb.) Siebold) is locally abundant in the eastern half of INDU.

Celastrus scandens L.

American bittersweet is known from Miller Woods, Tolleston Dunes, West Beach, Inland Marsh, Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Hobart Prairie Grove, and Pinhook Bog. American bittersweet is listed here because of its known decline through hybridization with Asiatic bittersweet (Zaya et al. 2015). At West Beach, scattered American bittersweet plants are found throughout the non-forested dunes and constitute the largest population (50–100) in the West Unit of INDU (Pavlovic, pers. obs., 2005–2022). American bittersweet is common in the open dunes along the Lake Michigan coast and is occasional in

the interior dunes and moraines, where it is found in canopy gaps or edges of open aquatic habitats (Pavlovic and Frohnapple 2007). Populations in Tamarack appear to be extirpated due to loss of habitat from dune erosion and sand burial in combination with proliferation of Asiatic bittersweet (Pavlovic, personal observation, 2008).

CERATOPHYLLACEAE — Hornwort Family

These plants are rootless, perennial, aquatic species that produce flowers of both sexes on the same individual. Predominant reproduction is vegetative (Szalontai et al. 2018). The whorled sessile leaves branch dichotomously. The leaf branches are filiform and have serrate edges. Flowers are small and inconspicuous. Male flowers have ten to fifteen sepals and ten to twenty stamens. The female flowers have similar sepals and enclose a single pistil composed of a single carpel with a single ovule. The single genus in the family comprises six species worldwide, with only two in the Chicago Region (Wilhelm and Rericha 2017, Szalontai et al. 2018).

Ceratophyllum echinatum A. Gray

Spiny hornwort is listed as rare in Indiana (Scribailo and Alix 2002a) and is rare in the Indiana Dunes. It has only been found in the DSP, where it grows with *Ricciocarpus natans*. While Wilhelm (1990) had coontail (*C. demersum*) known from West Beach and the DSP, Nathanael Pilla (pers. comm. with Pavlovic, 25 September 2018) says coontail is widespread throughout the Indiana Dunes wetlands.

Voucher Specimens:

Balzer and Pilla s.n. 17 September 2016, Porter Co. (MOR)

CISTACEAE — Rockrose Family

The rockrose family includes shrubs, subshrubs, or herbs with alternate leaves. The species in this family are characterized by the arrangement of the sepals. The outer two sepals are narrow, while the three inner sepals are wide. They have five petals subtending numerous stamens and a single superior tricarpellate pistil. The three local genera of this family are quite diverse in their flower morphology. *Crocanthemum* (formerly *Helianthemum*) has conspicuous flowers with large petals, *Hudsonia* has small yellow flowers, and *Lechea* has minute inconspicuous blooms. *Crocanthemum* has stellate hairs, whereas *Hudsonia* and *Lechea* have simple hairs. According to Kubitzki and Chase (2003), *Helianthemum* is now *Crocanthemum* because North American frostweed lineages are different from European frostweeds (*Helianthemum*). This reclassification is confirmed by the more recent paper concerning North American *Crocanthemum* (Obae et al. 2013) and the accepted name change in Wilhelm and Rericha (2017) and the online Flora of Michigan (Michigan Flora Online 2019).

Crocanthemum bicknellii (Fernald) Janch. (*Helianthemum bicknellii* Fernald)

Rockrose is known only from Hoosier Prairie A, as reported by Wilhelm (1990) and possibly vouched for by the Swink specimen listed below. The more common species, *C. canadense* is common in the barrens, savannas, and prairies in Indiana Dunes. Both species produce late-flowering apetalous cleistogamous flowers (Obae et al. 2013). *C. bicknellii* has three to many flowers born in a terminal corymb, whereas *C. canadense* has one to two flowers overtopped by a lateral branch (Wilhelm and Rericha 2017). Rockrose may persist in Hoosier Prairie but its presence has not been confirmed.

Voucher Specimens:

Swink #149, 7 July 1951, Lake Co. (F)

Hudsonia tomentosa Nutt.

False heather is known from Tolleston Dunes, West Beach, Inland Marsh, and Furnessville;

it was extirpated from Cowles Dunes around 1990 from shading and deer trampling (see below). In the open sandy areas in the southwestern and southeastern sectors of Tolleston Dunes A, this species is abundant, as noted by Bowles et al. (1986) and Pitcher and Plampin in 1985 (Wilhelm 1990). It is rare in Tolleston Dunes B, where it occurs as a single clump west of County Line Road and as patches in high dunes further west. It is also found in Tolleston Dunes C. Bowles et al. (1986) listed associates as *Aristida tuberculosa*, *Artemisia campestris* ssp. *caudata*, *Cyperus houghtonii*, *Dichanthelium ovale* ssp. *pseudopubescens*, *Euphorbia corollata*, *Koeleria macrantha*, *Krigia virginica*, *Linaria canadensis*, *Panicum virgatum*, *Polygonum articulatum*, *Schizachyrium scoparium*, and *Triplasis purpurea*. Bowles (1989) reported that the Tolleston Dunes population declined in frequency but that the distribution patterns remain essentially unchanged since it was sampled in 1985. No plants were seen here by Roger Hedge, Emily Stork, and Pavlovic on 26 July 2017. False heather is reported from West Beach D. Now rare, this species is known from an area of pure sand near the communication tower in Inland Marsh A, where it has been monitored by INDU (Bowles et al. 1986), and from the Coulter Prairie, Inland Marsh B. In the Coulter Prairie, it grows in sand with *Arctostaphylos uva-ursi*, *Aristida longespica* var. *geniculata*, *A. purpurascens*, *A. tuberculosa*, *Artemisia campestris* ssp. *caudata*, *Bulbostylis capillaris*, *Calamovilfa longifolia*, *Carex tonsa*, *Cyperus houghtonii*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Eragrostis spectabilis*, *Euphorbia corollata*, *Crocanthemum canadense*, *Hieracium umbellatum*, *Lechea mucronata*, *Liatris aspera*, *Nuttallanthus canadensis*, *Opuntia cespitosa*, *Panicum virgatum*, *Polygonum articulatum*, *Pseudognaphalium obtusifolium*, *Quercus velutina*, *Rumex acetosella*, *Salix rigida*, *Schizachyrium scoparium*, and *Solidago speciosa*. According to Bowles et al. (1986), additional associates include: *Carex muehlenbergii*, *Corispermum americanum*, *Dichanthelium ovale* ssp. *pseudopubescens*, *Lithospermum caroliniense* var. *croceum*, *Oenothera rhombipetala*, *Prunus pensylvanica*, *Pteridium aquilinum* var. *latiusculum*, and *Rhus copallinum* var. *copallinum*. The largest and densest remaining (10 × 10 m) population in the Indiana Dunes is the one at Coulter Prairie (Inland Marsh B), as seen by Pavlovic and Roger Hedge on 26 July 2017. Rare overall, and to this end, Lyon (1927) pointed out "dry open inland places, fairly common around Wilson and Baillytown [both stations are now destroyed]; a few plants at Mineral Springs, not found elsewhere." This species often grows in disturbed sand associated with sand mining or railroad beds, and in natural sand blows. Lois Howes guided Gerould Wilhelm to a small, extant population near the south edge of the foredune complex in Cowles Dunes B (Wilhelm 1990). In 1987, Pitcher reported having seen it in 1984, but in 1989 Plampin, who visited the site annually, wrote to Wilhelm stating that of the seven or eight plants known there in 1987, only one or two were still apparent (Wilhelm 1990). Further, she noted that deer "trample through the plot with enthusiasm" (Wilhelm 1990). This plant had been extirpated from this site by the early 1990s despite reintroduction attempts by Pavlovic, Plampin, Sandy Whisler, and Myrna Newgent. Richard Johnson and Plampin found a small patch in Furnessville F on 1 September 1994 growing with *Cyperus filiculmis*, *Lechea* spp., *Monarda punctata*, *Rumex acetosella*, and *Solidago nemoralis*. False heather is dependent on algae for nitrogen fixation and it is this symbiosis that makes it impossible to transplant (Nelson et al. 1986, Massicotte et al. 2010).

Voucher Specimens:

Wilhelm #14935, 10 July 1987, Lake Co. (MOR)
Kurth & Hiebert #1, 27 May 1986, Porter Co. (MOR)

Lechea stricta Leggett ex Britton

Bushy pinweed, a rare *Lechea* species, is known to reach the southeastern edge of its range in northwestern Indiana (Hodgdon 1938). It has been reported from Hoosier Prairie A (Wilhelm 1990), but the report is suspect until a recently collected specimen is seen. E.J. Hill collected two specimens from Lake County, Indiana, with one dated 10 September 1881 and the other with no date. Since Hill's specimens are labeled, "Lake Co, IN," we can only surmise that it was collected in the northern part of the county where sandy soils are abundant.

CONVOLVULACEAE — Morning Glory Family

Often these plants are climbing herbs, shrubs, or trees, and some occasionally have milky sap. Leaves are alternate and simple. Flowers have five sepals, petals (united to each other and pleated), and stamens, and two to five united carpels that form a single pistil. This family includes many cultivated ornamentals, including morning glory (*Ipomoea purpurea* (L.) Roth), woodrose (*I. tuberosa* L.), moonflower (*I. alba* L.), cypress vine (*I. quamoclit* L.), and Christmas vine (*Poranopsis paniculata* (Roxb.) Roberty). The sweet potato (*Ipomoea batatus* (L.) Lam.) is commercially important (Lawrence 1951). Plants in the *Cuscuta* genus are parasitic annuals that have endomycorrhizae fungal associations. The white, yellow, or orange stems of *Cuscuta* look like networks of silly string twining over host plants.

Calystegia spithamaea (L.) Pursh

Low bindweed was found by Nathanael Pilla at Hobart Prairie Grove on 1 June 2017. There were more than 20 individuals.

Voucher Specimens:

Pilla s.n., 1 June 2017, Lake Co. (SEINet online photograph, vPlants [https://vplants.org/portal/collections/individual/index.php?occid=14418761&clid=0

Cuscuta pentagona Engelm.

Prairie dodder is reported from Miller Woods and Tamarack. Tonkovich reports it from Miller C in 2011 and 2012. Prairie dodder is reported from Tamarack B (Wilhelm 1990). There is no specimen to vouch for this species, so further exploration might be warranted.

Cuscuta polygonorum Engelm.

Knotweed dodder is locally rare in Tolleston Dunes C according to Nicole Kalkbrenner (pers. comm. with Pavlovic, 1994). The Swink specimen (see below) may have been collected south of Inland Marsh C.

Voucher Specimens:

Swink #7126, 31 August 1986, Porter Co. (MOR)

Ipomoea pandurata (L.) G. Mey.

Alan and Donna Resetar found wild sweet potato in Bailly F and showed that plant to Plampin on 20 August 1993. Nathanael Pilla found this species growing in the NIPSCO right-of-way south of the Cowles Bog Wetland Complex Prairie on 7 August 2014. It is possible that construction of the new natural gas pipeline eliminated this population. This species typically has white corollas with a purple throat (Swink and Wilhelm 1994).

Voucher Specimens:

Pilla s.n., 7 August 2014, Porter Co. (SEINet online photograph, vPlants [https://swbiodiversity.org/seinet/taxa/index.php?taxon=87692])

CORNACEAE — Dogwood Family

Dogwoods are opposite- (rarely alternate-) leaved shrubs, trees, and rarely herbs. The flowers are dioecious, monoecious, or polygamous with cymose and paniculous inflorescences. Leaves have lateral veins that are mostly parallel. Flowers have four or five small sepals, five petals (in flowering dogwood, petals are absent and the white "petals" are leafy bracts), and five stamens. The pistil consists of one or two fused carpels. The dogwood family is important for ornamental plants. Plampin reports that jelly and sherbet made from the fruits of *Cornus mas*, called Cornelian cherry, are quite delicious.

Cornus canadensis L.

The boreal species bunchberry was known from West Beach and Cowles Dunes; however, it may now be extirpated. No one has seen a flowering specimen since the mid-1980s. Kurz (1923) reported that this species, growing with *Linnaea borealis* var. *longiflora*, dominated

a decaying stump in what is now part of West Beach A. This boreal species was represented in the Chicago Region more recently by a small population in Cowles Bog, Cowles Dunes A. Wilhelm (1990) wrote, "In reference to this population, Lyon (1927) stated: 'tamarack swamp, Mineral Springs, not common nor found elsewhere.'" Bowles et al. (1985) recounted how, guided by Ken Dritz, they located two colonies about 10 meters apart; there were four plants in one and thirty-seven in the other. Pavlovic accompanied Marlin Bowles and Marcy DeMauro to install monitoring plots in 1984. These plants grew in moss and organic matter among elevated roots of mature trees of *Acer rubrum* near the transition zone between the more firmly supported hydromesophytic swamp and the more unstable shrub and sedge community to the south. The elevated organic mounds or hummocks originally were the habitat for white pine prior to their extraction in the 1850s (Cook and Jackson 1978). Wilhelm (1990) noted that additional associates include *Betula alleghaniensis*, *Carex seorsa*, *Maianthemum canadense*, *Osmundastrum cinnamomeum*, *Salix nigra*, and *Symplocarpus foetidus*. Bowles (1988) indicated that the population was stable, and Pavlovic noted that, though not in flower, these plants were still there 24 May 1989.

Del Arvin saw a flowering plant on the cedar mound in 1979. Recent searches have not reported finding this species (Daniel Mason, pers. comm. with Pavlovic, 1998). Plampin knew of three additional separate populations in Cowles Bog proper, including one on the cedar mound shown to her by Ken Klick and two on hummocks amid the tamaracks. At one of these sites, a paper birch (*Betula papyrifera*) grew out of the stump of a yellow birch (*Betula alleghaniensis*). Now that the hummocks in the red maple swamp have been altered by increased water levels, organic decay, and beaver activity, bunchberry may be extirpated (Pavlovic, pers. obs., 2020).

Voucher Specimens:

Tryon, Jr. #1494, 19 July 1935, Porter Co. (F)
Swink #1117, 31 May 1952, Porter Co. (F)
Hess, Stroynoff and Pordrasky #5949, 13 June 1984, Porter Co. (MOR)

Cornus rugosa Lam.

Rough-leaved dogwood is reported from Miller Woods, West Beach, Cowles Dunes, DSP, and Tamarack. The mesic conditions this species prefers are limited in Miller Woods, yet Gerould Wilhelm sighted a single sapling in Miller Woods C in 1979 (Wilhelm 1990). It was growing near the base of a steep north-facing sand ridge slope, but he was unable to relocate the plant on subsequent visits. Sally Weeks of Purdue University found two populations in Miller Woods B in 2005 of around thirty and one hundred plants, respectively (Pavlovic, pers. obs., 2005). If Gerould Wilhelm's find was in Miller Woods C, then Sally found new populations. The plants are threatened by *Quercus velutina*, *Sassafras albidum*, and *Viburnum acerifolium*. When Hamilla and Plampin monitored the Miller Woods B population, dense sprouts from sassafras (*Sassafras albidum*) and oak obscured their presence. Thinning of oak and sassafras might benefit these shrubs. Dan Mason (NPS) conducted a controlled burn here to kill the oak sprouts, but this was not successful. Plampin and Hamilla (2008b) suggested woody sprout control might benefit these populations that were extant in 2008. At West Beach in the 1980s, rough-leaved dogwood was known only from subunits A and D, where it was represented by populations in the mesophytic hollows of the dune complex. Bowles et al. (1986) noted the population was nearly continuous along a 200-meter dune ridge and grew with *Aralia nudicaulis*, *Cornus florida*, *Hamamelis virginiana*, *Maianthemum canadense*, *Maianthemum racemosum* ssp. *racemosum*, *Pinus strobus*, *Polygonatum biflorum*, *Quercus alba*, *Q. rubra*, *Q. velutina*, and *Tilia americana*. Sally Weeks was unsuccessful in relocating this population in 2005. It is not clear why this species would be declining, although it is possible that deer browsing could be a cause. Fire also might be implicated, but the site of the West Beach population had not been burned until after 2002. Recent research on deer browsing of wild lupine suggests deer are abundant in West Beach (Pavlovic 2013). Rough-leaved dogwood was rare but nevertheless extant in the dune complex area

of Cowles Dunes A, and it was still frequent on shaded slopes in the dune complex of the DSP in the 1980s. Bowles et al. (1986) listed the following associates: *Acer saccharum*, *Aralia nudicaulis*, *Eurybia macrophylla*, *Fraxinus americana*, *Hamamelis virginiana*, *Lindera benzoin*, *Liriodendron tulipifera*, *Maianthemum canadense*, *Maianthemum racemosum* ssp. *racemosum*, *Parthenocissus quinquefolia*, *Prunus serotina*, *Pyrola elliptica*, *Quercus rubra*, *Thelypteris noveboracensis*, and *Tilia americana*. It was reported from Tamarack C by Plampin and Myrna Newgent in 1993 but was not relocated in 2008 (Plampin and Hamilla 2008b).

Voucher Specimens:

Lyon s.n., 29 August 1925, Porter Co. (IND)
Hamilla 2620, 1 July 2010, Lake Co. (INDU)

CRASSULACEAE — Stonecrop Family

Stonecrops are annual or perennial herbs with alternate, opposite, or whorled succulent leaves. Flowers have 4–30 sepals and petals that are usually equal in number. Stamens are equal to or twice the number of petals. The three or more separate pistils have superior ovaries. The largest genus, *Crassula*, gives the name to the physiological photosynthetic pathway, Crassulacean Acid Metabolism (CAM). CAM plants take in CO_2 at night and convert it to a four-carbon malic acid, which is then used in photosynthesis during the day. This mechanism reduces water loss and maximizes CO_2 uptake (Kluge and Ting 1978, Koch and Kennedy 1980, Martin et al. 1981).

Sedum ternatum Michx.

Wild stonecrop, typically found in eastern mesophytic forests, grows at the Hobart Prairie Grove according to Sandy O'Brien (pers. comm. with Pavlovic, 2003). There is no specimen to vouch for this species, so further exploration might be warranted. This white-flowered sedum grows on rocks in mesophytic coves in Great Smoky Mountains National Park (Pavlovic, pers. obs., 1975), and its nearest populations to Indiana Dunes are in southern Porter County, Indiana (Wilhelm and Rericha 2017).

DROSERACEAE — Sundew Family

Plants of the sundew family have modified leaves with gland-tipped hairs for capturing and consuming invertebrates. The flowers are bisexual, and often have five sepals and petals, four to twenty stamens, and one pistil of three to five carpels with three to five styles. These carnivorous plants are believed to have originated in Australia and dispersed throughout the world by way of Africa.The famous Venus fly trap (*Dodonea viscosa*) is now believed to be closely related to sundews (Rivadavia et al. 2003).

Drosera intermedia Hayne

Narrow-leaved sundew is known from Miller Woods, Inland Marsh, Cowles Dunes, Keiser, Hoosier Prairie, and Pinhook Bog. Wilhelm (1990) had not seen this species in Miller Woods, but the potential habitat is still there, suggesting that the voucher from Levi Umbach (see below) might be significant in documenting its occurrence. Apparently once known from Inland Marsh A, it has not been seen there recently. Swink's June 1952 specimen (see below) probably came from Inland Marsh B. Plampin, Paul Labus, Myrna Newgent, and Judy Gaskell found a population in a wetland in Coulter Prairie (Inland Marsh B) on 27 September 1994. This species is extant in Cowles Dunes A, where it grows in a low swale at the east edge of Little Lake during a dry year. Lyon (1927) recorded it from an "interdunal meadow" at Mineral Springs, which more likely refers to Little Lake (Cowles Dunes A) rather than Howes Prairie (Cowles Dunes B). Lois Howes showed Gerould Wilhelm a population south of Lupine Lane in Cowles Dunes B, where it was growing with *Bartonia virginica*, *Chamaedaphne calyculata*, and *Rubus hispidus* (Wilhelm 1990). Plampin notes there are several populations southwest of Lupine Lane besides the one mentioned previously. These

patches are all in the management cooperative agreement area in Dunes Acres parkland (Cowles Dunes and INDU). Plampin notes this species "appears" after adequate moisture, and at one site grows with *Cladium mariscoides*, *Rhynchospora capillacea*, *Scleria reticularis*, and formerly, a plant of *Schoenoplectiella purshiana*. Narrow-leaved sundew is known from Keiser A on the basis of the following comment by Lyon (1927): "one season at an interdunal pond between Tamarack and Keiser, but destroyed by fire in 1922." The fire mentioned by Lyon may have been one of the peat fires that occurred after Kintzele Ditch was constructed.

Narrow-leaved sundew occurs within the town of Beverly Shores in the Heinze Land Trust's McAllister Prairie. While rare in the Hoosier Prairie A in general, this sundew is locally abundant in damp peaty areas where fire has kept the duff removed, or even in old tire tracks or excavations (Wilhelm 1990). This sundew is less common than *Drosera rotundifolia*, with which it grows in Pinhook Bog B (Wihelm 1990).

Voucher Specimens:

Umbach s.n., 17 July 1896, Lake Co. (F)
Umbach #983, 4 September 1897, Lake Co. (F)
Swink s.n., 21 June 1952, Porter Co. (MOR)
Wilhelm & Dritz #12312, 19 September 1984, Porter Co. (MOR)
Swink #486, 25 August 1951, La Porte Co. (F)

Drosera rotundifolia L.

Round-leaved sundew is known from Cowles Dunes, DSP, Keiser, Tamarack, and Pinhook Bog. It was reported by Lyon (1927) from the "Dunes at Port Chester [Cowles Dunes B], ditch by railroad," where it was extant along the CSSSBR (Wilhelm 1990). This species is extant in the NIPSCO right-of-way north of the CSSSBR (Hamilla and Plampin 2008b) at the former *Lycopodiella inundata* site (Ken Dritz and Wilhelm #270) south of Cowles Dunes E. It was growing with *Aletris farinosa*, *Dichanthelium dichotomum* ssp. *lucidum*, *Dichanthelium latifolium*, *Lycopodiella inundata*, and *Sphagnum*. Installation of the gas pipeline in 2017 to 2018 may have eliminated all these plants. Round-leaved sundew is known from DSP based on the following comment by Lyon (1927): "Furnessville, subdunal meadow, the latter being the only place where we have found sundew within the State Park." According to Wilhelm (1990), Bergendahl noted "sundews" growing along the Calumet Bike Trail south of DSP, as well as along the same trail east of Kemil Road in Keiser C. According to Plampin, the bike trail populations are either being overgrown by *Vitis labrusca* or are being affected by disturbance of the soil from tree cutting activity conducted by NIPSCO.

Plampin found round-leaved sundew in 1994 growing in the wetlands south of the Dunewood Campground in Keiser F. This plant was reported by Lyon (1927) as having grown along the ditch by the CSSSBR at Tamarack. Peattie (1930) implied that this species was common in such habitats, but that is no longer true. Round-leaved sundew is locally common at Pinhook Bog, particularly in the more open portions of the bog east of Wozniak Road where it grows with *D. intermedia* (Wilhelm 1990).

Voucher Specimens:

Dritz & Wilhelm #270, 20 June 1982, Porter Co. (MOR)
Lyon s.n., 29 August 1925, Porter Co. (BUT)

ERICACEAE — Heath Family

Plants in the heath family are usually associated with acid soils and consist of perennial herbs, shrubs, subshrubs (rarely trees or vines) with alternate and leathery leaves. Flowers have four to five sepals, petals, stamens, and united carpels forming the pistil. Flowers are usually tubular, or bell-shaped. Plants in this family are found in both the northern and southern hemispheres, including the now merged "southern heaths" of the former Epacridaceae family (Stevens 2001). The heath family is well known for its ornamental plants (*Rhododendron* and *Azalea*) and fruit such as blueberries (*Vaccinium*) and

huckleberries (*Gaylussacia*). Genera that were formerly in the Pyrolaceae are now in the heath family and include *Chimaphila*, *Monotropa*, and *Pyrola*. These plants that were in the wintergreen family are perennial herbs, sometimes with a semi-woody habit, having evergreen alternate or subalternate leaves. Flowers are bisexual with four to five separate or slightly fused sepals, four or five separate petals, ten stamens, and a superior ovary of four or five united carpels. Closely allied with the Monotropaceae, current phylogenetic data place both the Monotropaceae and Pyrolaceae within the Ericaceae. Species are often cultivated, but collection from the wild should be avoided, because transplanting disrupts the fungal (mycorrhizal) relationship and results in the death of the plant. Many of the species in this family are denizens of boreal regions of the northern hemisphere. Thus, the Indiana Dunes populations are often at the southern limits of their range and are declining due to many factors in relation to direct or indirect human activity.

Andromeda polifolia L. var. *latifolia* Aiton [*Andromeda glaucophylla* Link]
Bog rosemary is occasional in Pinhook Bog B (Wilhelm 1990). Bowles et al. (1986) mapped two of these populations and noted the following associates: *Acer rubrum*, *Carex limosa*, *Chamaedaphne calyculata*, *Drosera rotundifolia*, *Larix laricina*, *Pinus strobus*, *Platanthera ciliaris*, *Sarracenia purpurea*, *Vaccinium corymbosum*, and *V. oxycoccos*.

Voucher Specimens:
Wilhelm & Dritz #6907, 23 June 1979, La Porte Co. (MOR)

Arctostaphylos uva-ursi (L.) Spreng. [*Arctostaphylos uva-ursi* var. *coactilis* Fernald & J.F. Macbr.]
Bearberry is known from Miller Woods, Tolleston Dunes, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. Bearberry is occasional in Miller Woods A and B, particularly around the larger pannes; occasional in Tolleston Dunes B and C; frequent in the dry sandy dunes at West Beach A and Inland Marsh B; occasional in Cowles Dunes A and B; frequent in Dunes State Park A; and rare in Furnessville B, Keiser A, and Tamarack C. The Inland Marsh B (Coulter Prairie) populations have disappeared.

Plampin saw one population in Lupine Lane Prairie (Cowles Dunes B), but it has disappeared since the initiation of prescribed burns. While boreal shrubs such as this species experience fire further north, high intensity burns after several decades of fire suppression do not favor this slow-growing species. Fire suppression has led to a build-up of copious oak leaf litter that hinders bearberry vegetative spread and results in high temperatures when fire is reintroduced. The resulting high temperature top-kills bearberry stems (Pavlovic, pers. obs., 1983–2000). Bearberry is still present in Keiser A. Some sizeable populations in Tamarack C had been extirpated while others remain but have declined (Plampin et al. 2003, Plampin and Hamilla 2008a). Of the five plants found in 2003, five remained in 2008, but they were less than half in plant foliage diameter (Plampin and Hamilla 2008b). Overcollection of this plant by humans, especially in the East Unit of INDU, has resulted in small area patches that appear to be more vulnerable to fire than larger patches that only get burned at the periphery (Pavlovic, pers. obs., 1998–2000). The small patches in the East Unit are in stark contrast to the large patches still found in the secondary dunes of the West Unit of INDU, the former often in organic soils and the latter in early successional sand (Pavlovic, pers. obs., 1988–2022).

Voucher Specimens:
Smith #751, 27 April 1969, Lake Co. (MOR)
Teuscher s.n., 28 April 1923, Porter Co. (MOR)
Podrasky & Sherman #8, 17 July 1984, Porter Co. (MOR)
Swink s.n., 7 April 1946, Porter Co. (MOR)

Chamaedaphne calyculata (L.) Moench [*C. calyculata* var. *angustifolia* (Aiton) Rehder]
Leatherleaf is reported from Cowles Dunes, DSP, Keiser, Tamarack, and Pinhook Bog.

Peattie (1930) reported that it grew at Mineral Springs and even added that it was "frequent in the high dune country," which probably refers to the highest recent dunes north of the lower elevation Tolleston dunes, likely at Dune Park. Plampin in 1989 noted several populations east and west of the Studebaker Trail in Cowles Dunes B (Wilhelm 1990). In 1990, leatherleaf still grew in a swale southeast of Lupine Lane (Cowles Dunes B), where it was fenced (Wilhelm 1990), but is no longer extant (Pavlovic, pers. obs., 1993). Ken Dritz reported seeing this species at Little Lake in Cowles Dunes A on 25 August 1984 (Wilhelm 1990), but Plampin thinks this population is in the wetland to the east of Little Lake. It is unclear where the Floyd Swink specimen (see below) was collected, whether in the Keiser or the Tamarack Unit. We know, based on the herbarium specimen notes, that Floyd was between Broadway in Beverly Shores and Mt. Baldy to the east. In 1989, Plampin reported leatherleaf outside of the Indiana Dunes boundaries in the SHLT's McAllister Prairie (Keiser H) in Beverly Shores, which is north of Keiser B and north of the Great Marsh proper. This is probably where Floyd Swink collected his specimen. Lyon (1927) reported this leatherleaf from the subdunal marsh at Tamarack, where it probably is no longer present. Although this shrub is rare in most of the Indiana Dunes, it is common in the bog east of Wozniak Road at Pinhook Bog B (Wilhelm 1990).

Voucher Specimens:

Klick s.n., August 1987, Porter Co. (INDU)
Swink s.n., 4 May 1947, Porter Co. (MOR)
Hiebert #435, 14 June 1984, La Porte Co. (MOR)

Chimaphila maculata (L.) Pursh

Spotted wintergreen grows in Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack, and was formerly known from West Beach. *Chimaphila maculata* was reported from West Beach A by Pepoon (1927) as growing near the "shore of Lake Michigan in hollows among the sand hills, associated with *Linnaea*, northeast of Miller," and by Peattie (1930) as growing "in dune hollows at Miller, with *Linnaea borealis* [*L. borealis* var. *longiflora*]." Today these populations may be extinct (Pavlovic, pers. obs.). Deam (1940) excluded this species from Porter County, apparently because no herbarium record existed from this county at that time. In 1989, Wilhelm (1990) noted that there where three plants north of Little Lake in Cowles Dunes A, but that it disappeared in 1988 when the trail was "improved" (Wilhelm 1990). Wilhelm (1990) noted, in Cowles Dunes B, "three plants ... on side of dune in dry oak woods near swale with the official plot of *Lycopodium clavatum*" in 1987. Pam Benjamin counted ten plants, which may have succumbed to fire or litter burial, in Cowles Dunes B; the stand in Howes Prairie consisted of 40 plants in 1989 (Wilhelm 1990). Yet another population in Cowles Dunes B, probably referred to by Emma Pitcher (1988a) from Pine Lane, was flourishing at the time (Wilhelm 1990). Lois Howes saw spotted wintergreen on 25 October 1980 (Howes 1985). On 23 March 2003, Plampin found more than fourteen plants with *Osmunda regalis* and *Quercus velutina* near the bottom of the west-facing slope, south of the north-south trail in Lupine Lane Prairie (west of Howes Prairie). Wilhelm (1990) reported that both Keith Board and Plampin reported seeing this species in DSP in 1987. Spotted wintergreen was reported in the Furnessville Unit by Mr. Mike Madany (see Swink and Wilhelm 1979: p.187). It is extant in several areas not far off the trail in Furnessville D (Wilhelm 1990). Large and small patches were found by Hamilla in Furnessville D on 16 October 2008. Plampin spotted this species in Keiser A in 1990. It also occurs in Keiser E, where it was spotted by Hamilla on 1 October 2007 growing near *Comptonia peregrina*. Additional populations are scattered south of the Lake Michigan Ecological Research Station's (formerly the Calumet Dune Interpretive Center) secured parking lot (Keiser E). Spotted wintergreen grows in Keiser F, as noted by Keith Board and Plampin on 8 March 1990 and Dan Mason (NPS) and Tonkovich in summer 2000. Several large populations occur in Tamarack C (Wilhelm 1990), but Plampin et al. (2003) found that all of the prior known populations had disappeared. They did find seven additional populations, some with more than 50 individuals. We have been concerned that this species may be fire-sensitive and may

decline with the reintroduction of too frequent or intense fire. It appears to prefer more open woodland and often grows in disturbed or cut-over woods.

Voucher Specimens:

Wilhelm #6961, 13 September 1979, Porter Co. (MOR)

Chimaphila umbellata (L.) W.P.C. Barton ssp. *umbellata* [*Chimaphila umbellata* var. *cisatlantica* S.F. Blake]

Prince's pine, or pipsissewa, is known from the Cowles Dunes, DSP, and Tamarack. There are several very old (pre-1910) specimens at the Field Museum of Chicago from nearby areas of Gary in Lake County (Pine and Millers), but it is unknown if they were within the current INDU boundaries. Pipsissewa was reported from West Beach A by Kurz (1923), but no recent records are known, so it may be extirpated. This species was reported between Mineral Springs (Cowles Dunes) and DSP by Lyon (1927), who stated that it grew in "rich wooded dunes, Tremont, Mineral Springs, found twice." In DSP, a small population north of the campground disappeared, possibly as a result of human trampling (Tom Post, pers. comm. with Pavlovic). A second population was known to occur at the east end of DSP. The 210 shoots monitored by Bowles et al. (1986) were reduced to three by 20 September 2007 (Plampin and Hamilla 2008a). This population may have been reduced by drought, human trampling, deer browsing, and perhaps prescribed burns. Nitrogen enrichment may also be responsible for killing these plants. Pipsissewa is extant in the northeast corner of the DSP, where it was found in 1986 by Keith Board (Wihelm 1990). On 4 October 2008, Keith Board showed Plampin and Hamilla approximately 53 pipsissewa plants at this DSP location north of Trail 10, growing with *Arabidopsis lyrata*, *Arctostaphylos uva-ursi*, *Juniperus communis*, *Pinus banksiana*, *Quercus velutina*, and *Sassafras albidum* (Plampin and Hamilla 2008b). A hunt for pipsissewa in similar habitat to the west did not turn up any more plants (Plampin, pers. obs., 2009). Whether these populations persist today needs to be clarified, given the declines in populations examined so far. Keith Board found sixteen plants embedded in a population of *Chimaphila maculata* in Tamarack C on 18 December 1993 (see Plampin and Newgent 1994 and Plampin et. al. 2003). Though the original patch is gone, *C. maculata* continues to grow nearby. Plampin and Hamilla (2008a, 2008b) could not find the Tamarack C pipsissewa plants. These plants might survive under one of the large *Quercus velutina* uprooted in the violent windstorm of August 2006.

Voucher Specimens:

Bowles #663, 15 September 1986, Porter Co. (MOR)

Epigaea repens L. [*E. repens* var. *glabrifolia* Fernald]

Trailing arbutus is known from Cowles Dunes, DSP, Furnessville, and Tamarack. Trailing arbutus is extant in Cowles Dunes A as of 23 October 2007, when seen by Carie Satkoski, Hamilla, and Plampin. These plants are in the NPS/Dune Acres town park cooperative agreement area, a site that has never been burned. All other populations in Cowles Dunes may be gone, including those mentioned by Fishbein (1987). Another patch in Cowles Dunes A was surveyed by Hamilla, Plampin, and Naida Lehmann in the fall of 2007. This patch has been protected during the prescribed burns that NPS conducted. On 16 March 1990, Plampin found one large population of approximately 50 plants in Cowles Dunes B east of Mineral Springs Road. She and Sandy O'Brien attempted to relocate these plants in 2006, to no avail. Deer activity and frequent prescribed fire may have contributed to its extirpation. According to the late Ray Grow, of Gary, Indiana, and Lois Howes, this species was extant in at least two areas in the western portion of the DSP, one of which is just north of where Trails 8, 9, and 10 converge south-southeast of Mt. Jackson (Wilhelm 1990). Bowles et al. (1986) mapped three populations for the DSP, and they listed the following associates: *Acer rubrum*, *Amelanchier arborea*, *Hamamelis virginiana*, *Maianthemum canadense*, *M. racemosum* ssp. *racemosum*, *Pinus strobus*, *Prunus virginiana*, *Pteridium aquilinum* var. *latiusculum*, *Quercus alba*, *Q. rubra*, *Q. velutina*, *Sassafras albidum*, and *Vaccinium pallidum*; see also the association list under *Poa saltuensis* ssp. *languida*. Wilhelm (1990) warned that "the stands

south of Trail 2 near the dam are endangered by trippers and campers plunging down the dune." The plants are extant along Trail 9 (Pavlovic, pers. obs., 2018–2021). Emma Pitcher found trailing arbutus growing in Furnessville A and B, but many of these patches have declined because they persisted adjacent to trails and were inadvertently trampled by hikers and disturbed by trail maintenance. INDU natural resource staff reported trailing arbutus in Furnessville A in the spring of 2013. Ken Dritz, also with the help of Mrs. Pitcher, listed the associates mentioned below.

For the colony in Furnessville B, Bowles et al. (1986) listed the following associates: *Aronia* × *prunifolia*, *Gaylussacia baccata*, *Nyssa sylvatica*, *Populus grandidentata*, *P. tremuloides*, *Quercus alba*, *Q. velutina*, *Rhus copallinum* var. *copallinum*, *Rubus hispidus*, *Sassafras albidum*, and *Vaccinium angustifolium*. Marlin Bowles' plots had no plants when visited by Plampin and Hamilla on 30 October 2007. Trailing arbutus was known originally from the Tamarack Unit solely based on the specimen collected by Floyd Swink. Ken Dritz tried to relocate this population during the spring of 1980 but was unable to find it. Pavlovic found trailing arbutus on a high dune in Tamarack C in 1983. Wilhelm (1990) writes that Ken Klick found "many plants [that] cover a north-facing, recently burned-over savanna just west of Montana Avenue" in Tamarack C. This population was north of Pavlovic's find, and it has declined; there are still others declining in Tamarack C. Together with other populations of trailing arbutus in Tamarack C, these plants were monitored by Plampin et al. (2003). Of the five previously known populations, two out of five were extirpated, one was only one plant and two new patches were fewer than five plants. This species also has been found in Tamarack D, where it grows with *Apios americana*, *Carex pensylvanica*, *Agalinis purpurea*, *Hypericum gentianoides*, *Krigia biflora*, *Platanthera lacera*, *Polygala sanguinea*, *Populus tremuloides*, *Potentilla simplex*, *Rhus copallinum* var. *copallinum*, *Rubus flagellaris*, *Schizachyrium scoparium*, *Solidago juncea*, *Sorghastrum nutans*, *Symphyotrichum dumosum*, *Vaccinium pallidum*, *Vernonia missurica*, and *Viola sagittata* var. *sagittata*. Trailing arbutus faced and still faces several threats. The actinomycorrhizal nature of this species makes transplanting difficult and usually unsuccessful (Wood 1961).

As evidence of human harvesting of trailing arbutus, we know that when Abraham Lincoln's funeral train came through Michigan City in 1865, Henrietta Colfax, the lighthouse keeper, collected this plant for a large memorial wreath.

Since trailing arbutus is dioecious (Clay and Ellstrand 1981), populations that have declined have become unisexual, making sexual reproduction impossible (Daniel Mason, pers. comm. with Pavlovic). Patches of this species grow too far from each other for successful pollination. There also are not always enough plants for pollen to ripen when the stigmas are receptive. We hypothesize that large patches persist with fire regimes because fire burns only the periphery of the patch, whereas small remnant clumps are almost completely scorched by fire and are slow to recover because of their intrinsic slow growth rate. Beckman (1994) found the management burns had a negative effect on flowering and stem survival in trailing arbutus. Daniel Mason (NPS) has hand-pollinated several plants to obtain seed to germinate for use in trailing arbutus restoration, but such efforts have been unsuccessful. Because of these multiple threats, we predict that trailing arbutus may be extirpated from Indiana Dunes.

Voucher Specimens:

Lansing #3680, 29 May 1914, Porter Co. (F)
Hess & Bowles #5898, 8 May 1984, Porter Co. (MOR)
Dritz #49, 4 May 1980, Porter Co. (MOR)
Swink s.n., 4 May 1947, Porter Co. (MOR)

Hypopitys monotropa Crantz [*Monotropa hypopitys* L.]

The new name of pinesap, *Hypopitys monotropa*, is based on phylogenetic relationships discovered through genetic research (Neyland and Hennigan 2004). The saprophytic

pinesap is known from Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Hoosier Prairie. Plampin spotted this species in Bailly C in 1994. Pinesap is extant in the savanna complex of Cowles Dunes B, where it grows with *Cornus racemosa*, *Geranium maculatum*, *Osmunda regalis* var. *spectabilis*, *Parthenocissus quinquefolia*, *Prunus serotina*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, and *Sassafras albidum*. Pinesap is also occasional along the subdunal trail in Cowles Dunes A, where it grows at the edge of the swamp with *Monotropa uniflora*. Pinesap was recorded by Lyon (1927) from shaded slopes in the dune complex of DSP, and in 1987 by Keith Board, who noted that it is extant (Wilhelm 1990). This little plant is rare in the savanna complex portion of Furnessville D (Wilhelm 1990). Reported from Keiser by Lyon (1927). It is extant in Keiser C, where Ken Dritz recorded it in bloom on 9 August 1981 (Wilhelm 1990). This plant also grows in Keiser E, as found by Myrna Newgent on 30 November 1995. Pinesap was reported from Tamarack B and C by Plampin and Newgent (1992, 1994). John Bacone reported the only record for this species at Hoosier Prairie A (Bacone 1988). Populations of pinesap fluctuate with interannual climatic variation—they seem to be more abundant in wetter years (Nathanael Pilla and Pavlovic, pers. obs., 2017).

Voucher Specimens:

Plampin #3-88, 31 July 1988, Porter Co. (INDU)
Wilhelm #6957, 13 September 1979, Porter Co. (MOR)

Monotropa uniflora L.

Indian pipe grows in Miller Woods, Tolleston Dunes, West Beach, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Heron Rookery, and Hobart Prairie Grove. This species is known from Miller Woods B and C as reported by Henderson (1982), who found it in 4% of his vegetation quadrats. It is also reported from Miller Woods A. Indian pipe also grows in Tolleston Dunes A and in the Marquette Trail section of high dunes east of Grand Boulevard in Tolleston Dunes B. Tonkovich saw some flowering plants in an area east of Ogden Dunes in 2015 when NPS staff took trips to look at potential burn areas. It was on a wooded, south slope of a high dune. On 11 July 1987, this species was common and coming into bloom along the subdunal trail in Cowles Dunes A. Indian pipe is extant in the savanna complex areas of Cowles Dunes B (Wilhelm 1990). It is frequent among the dune slopes of the dune complex and the savanna complex in DSP. Hamilla found this plant in Furnessville F on 25 July 2014 in the area adjacent to an interdunal pond. Indian pipe was found by Plampin in Keiser A in December 1992; it is rare near the north edge of the old growth portion of Keiser C. This saprophytic plant is occasional among the wooded dunes in the eastern portion of Tamarack C as well as in Tamarack B. In 1990, Plampin and Keith Board reported Indian pipes from Heron Rookery A (Wilhelm 1990). Indian pipe is also reported from Hobart Prairie Grove (Sandy O'Brien, pers. comm. with Pavlovic).

Voucher Specimens:

Pavlovic #80, 14 September 1983, Porter Co. (INDU)
Hiebert #342, 20 August 1982, Porter Co. (MOR)

Orthilia secunda (L.) House [*Pyrola secunda* L.]

One-sided shinleaf may be extinct, not only in the Chicago Region, but also in the state of Indiana. Wilhelm (1990) writes, "Though Deam (1940) does not mention it, Kurz (1923) reported it from the Long Lake Dunes, which I am construing now as part of West Beach A." This location could also be Tolleston Dunes B. There are three potential collections from Lake County in the Field Museum of Chicago: one each from Pine Station and Clarke, and two from Millers (the area of the town of Miller described in Table 3)—one from 1898 and the other from 1916 (see below). We list it as reported for Miller Woods, though its location may not have been the national park. It is known from the Cowles Dunes only from the comments by Lyon (1927) and Peattie (1930), both of whom reported it from Mineral Springs. Father Julius A. Nieuwland collected one-sided shinleaf from Mineral Springs on 14 June 1911, but he identified it as *Pyrola elliptica*. According to Barbara Hellenthal, curator of

the Greene/Nieuwland Herbarium, the specimen was annotated by Charles Deam and more recently by Gerould Wilhelm (personal communication with Pavlovic, 13 December 2016).

Voucher Specimens:
Eifrig s.n., 24 June 1916, Lake Co. (F)
Nieuwland #916, 14 June 1911, Porter Co. (NEI)

Pyrola americana Sweet [*Pyrola rotundifolia* L. var. *americana* (Sweet) Fernald]
Round-leaved shinleaf grows at West Beach, Cowles Dunes, DSP, Furnessville, and Keiser. Wilhelm (1990) writes, "Known only from the deep dune hollows in the western portion of West Beach A." However, this little shinleaf can be found in the savanna complex portion of both Cowles Dunes A and B. In 1990, Gerould Wilhelm reported round-leaved shinleaf along Trail 10 northeast of the Wilson Shelter in the DSP. There, Bowles et al. (1986) recorded the following associates: *Acer rubrum*, *Amelanchier arborea*, *Carex pensylvanica*, *Fraxinus americana*, *Hamamelis virginiana*, *Maianthemum racemosum* ssp. *racemosum*, *Quercus velutina*, *Smilax bona-nox* [*sic*; almost certainly *S. rotundifolia*], and *Vaccinium angustifolium*. They also recorded round-leaved shinleaf from the head of Trail 2, where it grows with *Acer rubrum*, *Hamamelis virginiana*, *Pinus strobus*, *Quercus alba*, and *Q. rubra*. West of Route 49, there is a small colony on a steep south-facing slope at the north edge of the swamp complex. Found by Emma Pitcher in 1979 in Furnessville A, it has been documented by the von Oettingen specimen (below). Bowles et al. (1986) mapped and described this location, and listed the following associates: *Carex pensylvanica*, *Comandra umbellata*, *Gaultheria procumbens*, *Hamamelis virginiana*, *Poa compressa*, *Pteridium aquilinum* var. *latiusculum*, *Quercus alba*, *Q. velutina*, *Sassafras albidum*, and *Vaccinium pallidum*. The plants grew near the Marlin Bowles plot in 2007. On 27 May and 1 June 2022, Lydia Miramontes Loyd found ten patches totaling an estimated 380 plants east of the population mapped by Bowles, and seven patches totaling an estimated 438 plants to the west (pers. comm. with Pavlovic). Another population was found by Plampin and Hamilla on 30 September 2008 in Furnessville D, and additional populations were found there in the spring of 2013. Round-leaved shinleaf was found in Keiser A by Myrna Newgent on 7 January 1993.

Voucher Specimens:
von Oettingen #313, 9 July 1982, Porter Co. (MOR)

Pyrola elliptica Nutt.
Large-leaved shinleaf inhabits Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. Wilhelm (1990) notes that Lois Howes showed a small population growing along the east-west trail in Cowles Dunes A, and Plampin noted that shinleaf was extant in Cowles Dunes B south of Pine Lane, also known as Howes Prairie (Cowles Dunes B), and off of Pine Lane. Lois Howes saw it in bloom there on 10 June 1981 (Howes 1985). Mary Fisher-Dunham and Tonkovich monitored large-leaved shinleaf in Howes Priairie on 15 December 2015. They found that mastication for fire line preparation had gone directly through the population and piled 5 to 10 inches of debris on the population periphery. Only one fruiting plant was found and the capsules were insect-damaged. It is not known if the population still exists. Ken Dritz reported shinleaf as extant in the Pinery in DSP (Wilhelm 1990). Bowles et al. (1986) listed it as an associate of *Cornus rugosa* just southeast of the Pinery along Trail 10, where they noted that it grows throughout the pine groves. They listed the following associates: *Aralia nudicaulis*, *Arisaema triphyllum*, *Cornus rugosa*, *Hamamelis virginiana*, *Liriodendron tulipifera*, *Maianthemum canadense*, *Medeola virginiana*, *Osmorhiza claytonii*, *Parthenocissus quinquefolia*, *Pinus strobus*, *Quercus rubra*, *Smilax lasioneura*, and *Viburnum acerifolium*. Large-leaved shinleaf was found by Emma Pitcher in Furnessville A in 1979 (Wilhelm 1990). Plampin reported a pink form of this species in Furnessville D during a visit with Ron Hiebert and Emma Pitcher sometime before 1986 (Wilhelm 1990). Lorain Olsen found this species in Keiser E in May 1993 growing north of *Trillium cernuum*. Large-leaved shinleaf was previously unrecorded from Tamarack C until a report from Wayne Lampa in 1980

(Wilhelm 1990). Bowles et al. (1986) mapped another population farther west in Tamarack C and noted the following associates: *Cornus sericea*, *Maianthemum racemosum* ssp. *racemosum*, *Pedicularis canadensis*, *Poa pratensis*, *Prenanthes alba*, *Prunus serotina*, *Pteridium aquilinum* var. *latiusculum*, *Quercus alba*, *Q. velutina*, and *Sassafras albidum* (Wilhelm 1990). Of the four patches found previously, two were extirpated and two new large populations (100 to 200 individuals) were found in 2002 from Tamarack C. (Plampin et al. 2003)

Voucher Specimens:

Hiebert #8a, 1 July 1981, Porter Co. (MOR)
Lyon s.n., 1922, Porter Co. (BUT)
von Oettingen #311, 9 July 1982, Porter Co. (MOR)
Lampa s.n., 4 May 1980, La Porte Co. (MOR)

Vaccinium macrocarpon Aiton

Cranberry is known from West Beach, Cowles Dunes, DSP, Keiser, Tamarack, and Pinhook Bog. Cranberry was known from West Beach A, solely from a report by Kurz (1923). Lyon (1927) reported this species from "quaking bog; edge of Little Lake, rather rare" (Cowles Dunes A). May Theilgaard Watts noted the presence of cranberry in Cowles Bog (Cowles Dunes A) (Watts 1957). Cook and Jackson (1978) referred to a large "cranberry marsh" south of Little Lake (Cowles Dunes A), and Meyer (1952) characterized the entire Great Marsh area as cranberry marsh (DSP, Keiser, and Tamarack units). Apparently, the marsh was ditched and drained along with Little Lake during the construction of the Dune Acres golf course in about 1922, at which time the cranberries were destroyed (Cook and Jackson 1978, Wilhelm 1990). The plants apparently have not been able to reestablish themselves. Cook and Jackson discussed at great length the gathering and use of cranberries in the Great Marsh area. They mentioned that most of the cranberries were the large native variety (this would be *Vaccinium macrocarpon*), but that there were small amounts of the European variety as well. This "European" variety was alleged to be smaller than the native. We can assume that they were referring to *Vaccinium oxycoccos*, which is native to North America as well as Europe. Cranberry was reported from the Furnessville area by Peattie (1930) and may have been extirpated from DSP as a result of water level fluctuations, cattail and buttonbush invasion, and fire suppression. Cranberry is known from the Tamarack Unit based on the following comment by Lyon (1927): "5 mi west of Michigan City and Tamarack, Nieuwland Herbarium." This latter location is probably the tamarack bog north of the Pines and associated with the former Tamarack CSSSBR stop. Plampin and Hamilla (2011, 2014) describe the history of cranberry in the former Fish Lake at the east end of Tamarack B and possibly D. South of Beverly Drive and Kansas Avenue was "Boomerang Bog," a tamarack swamp shaped like a boomerang that was a likely site for cranberry to grow (Bowles et al. 2015). The former Fish Lake was north of the CSSSBR tracks and abutted the dunes to the southeast of the present Central Avenue parking lot. Michigan City entrepreneur Chauncey Blair, drained Fish Lake before 1859 and established a commercial cranberry marsh in the former Fish Lake. This area became the Indiana State Prison farm between 1918 and 1926. When exactly cranberry farming ceased is unclear because dates are missing from Gene McDonald's 1965 account of creating the marsh (Wilhelm 1990). We know that Chauncey Blair marketed cranberries as late as 1882 from this spot and his other cranberry marshes elsewhere (Plampin and Hamilla 2014). In an Ogden Dunes printed account, Mr. Grieger from Furnessville was born in the cranberry shed, possibly in 1910 (Plampin and Hamilla 2011). Cranberry is reported from Pinhook Bog B but has not been seen recently.

Voucher Specimens:

Wilcox #49, 5 October 1982, La Porte Co. (MOR)

Vaccinium myrtilloides Michx.

Canada blueberry was not reported from Indiana Dunes until 2000 when it was found at The Gaylord Tract of Hoosier Prairie B as part of an exotic plant survey. An unknown specimen was collected during that survey by Amy Davies and Trevor Balzor that Pavlovic

subsequently identified. The specimen was sent to Dr. Van der Kloet, the North American blueberry expert, for confirmation, and the specimen is retained in his herbarium. Revisiting the collection site at Hoosier Prairie D with Tom Post confirmed the presence of a population scattered among *V. pallidum* and *V. angustifolium*. Heavy deer browse prevents the plants from blooming and fruiting. Canada blueberry was formerly known in Indiana only from Bear Creek near Fountain in Fountain County (Deam 1940). Tom Post and Pavlovic, with the assistance of LuAnn Forste and Lisa Schilling, relocated the Gaylord Tract population in 2003 and fenced a portion of the population. Tom Post has found this plant and population in the exclosure in the last few years (2017–2019). On 6 June 2020, Tom and Sandi Post visited the enclosure and found six to eight distinct non-flowering plants growing with *Vaccinium angustifolium*, *Gaylussacia baccata*, *Sassafras albidum*, *Rosa multiflora*, and *Frangula alnus*. Tom trimmed the overhanging shrubs to give the plants more light. The habitat is mesic sand savanna a few inches above wetlands. It is possible that Canada blueberry was found by Marlin Bowles and Marcy DeMauro in 1985 when monitoring *Lycopodium clavatum* (see this species abstract) in Cowles Dunes B. Until a specimen is seen at the now extirpated *L. clavatum* site, we will assume this rare boreal species has not been found in Cowles Dunes B.

Voucher Specimens:
Post # 630, 30 May 2002, Lake Co. (MOR)

Vaccinium oxycoccos L.
Dwarf cranberry has not been found in Cowles Dunes A (see *V. macrocarpon*) (Cook 1999) even though the habitat would be right for it to grow there. Dwarf cranberry is common throughout Pinhook Bog B. Bowles et al. (1986) mapped a population of this species here and recorded the following associates: *Acer rubrum*, *Chamaedaphne calyculata*, *Drosera rotundifolia*, *Larix laricina*, *Pinus strobus*, *Sarracenia purpurea*, *Sphagnum* sp., *Vaccinium corymbosum*, and *V. macrocarpon*.

Voucher Specimens:
Wilhelm & Dritz #6979, 16 September 1979, La Porte Co. (MOR)

EUPHORBIACEAE — Spurge Family

The spurges include many dry habitat shrubs, trees, or herbs that often look cactus-like. Most have alternate leaves with stipules and latex sap. The stipules are often modified into glands, hairs, or spines. Flowers are unisexual, with both sexes being borne on the same plant. Two types of flowers are recognized: the euphorbia type and the non-euphorbia type (Lawrence 1951). In the former, the flowers arise from a modified cymose inflorescence altered into a cup called the cyathium. Within the cyathium are multiple, single-anthered, male flowers and a single tricarpellate pistillate flower. The non-euphorbia type is monoecious or dioecious with male flowers having five to ten stamens and the female flowers having a three-carpellate chambered pistil. This latter flower type lacks the cyathium. Spurges are recognized as the "cacti" of the African deserts (Lawrence 1951, Elpel 2013). Most spurges are poisonous, but the family contains many prized ornamental species. We obtain the poisonous castor beans (*Ricinus*), rubber (*Hevea*), tung oil (*Aleurites*), and edible manioc, cassava, or tapioca (*Manihot*) from this family.

Euphorbia polygonifolia L. [also known as *Chamaesyce polygonifolia* (L.) Small]
Sand spurge, an annual, grows on the beaches, foredunes, and blowouts. It is reported from Miller Woods, Tolleston Dunes, West Beach, Cowles Dunes, DSP, Keiser, and Tamarack. This species is occasional in the foredune and dune complex portions of Miller Woods A, where it was monitored by NPS staff (Bowles et al. 1986). While Bowles (1989) notes that this Miller population had declined significantly, it had rebounded in 2006–2008 during a series of wet years (Pavlovic, pers. obs). One plot has completely lost this species due to the invasion and growth of jack pine. Sand spurge is common in sand-mined portions of

Tolleston Dunes B (Wilhelm 1990). This little plant is occasional in the foredune and dune complexes in West Beach A and D, although in the drought year of 1988, Bowles (1989) was unable to locate any extant populations at West Beach. Bowles et al. (1986) recorded the following associates from Cowles Dunes A: *Ammophila breviligulata*, *Cakile edentula*, and *Corispermum americanum*. Bowles (1989) resampled this population and noted a sharp reduction in plant frequency and density. In Cowles Dunes B, Plampin noted that in 1989 there were sixteen or so plants growing south of the *Cirsium pitcheri* population, north of the northwest end of Howes Prairie (Cowles Dunes B), about a quarter mile south of Lake Michigan, with *Artemisia campestris* ssp. *caudata*, *Corispermum americanum*, *Prunus pumila*, *Salsola tragus*, and *Schizachyrium scoparium*. Bowles et al. (1986) described the DSP population of this species as discontinuous along the lakeshore. They listed the following associates: *Ammophila breviligulata*, *Cakile edentula*, *Populus deltoides*, and *Prunus serotina*. When Bowles (1989) resampled this population, no plants were found. Sand spurge is extant, though in very small numbers, in the blowout section of Keiser A. Though rare, it is extant in the open sands of the foredune complex in Tamarack C. One location, more than 0.6 miles from Lake Michigan, is the most inland site for this species. Plampin reported sand spurge as abundant in Tamarack C in 2003, which is consistent with our observations at Miller. Higher populations and larger plants may have been a result of the rainy July that year. Annuals such as this may show dramatic and positive changes in population size in response to high rainfall years and high seed production and germination that maximizes population growth (=geometric mean of population size) (Pavlovic, pers. obs.,1985–2022; Pavlovic and Bowles 1994).

Voucher Specimens:

Schulenberg & Wilhelm s.n., 5 September 1974, Lake Co. (MOR)
Hess et al. #6006, 4 September 1984, Porter Co. (MOR)
Lansing #3359, 16 September 1911, Porter Co. (F)
Hiebert #344, 20 August 1982, Porter Co. (MOR)

FABACEAE — Bean Family (formerly LEGUMINOSAE)

Leguminous herbs, shrubs, and trees comprise the world's third largest flowering plant family. Many species in this family symbiotically produce nitrogen in nodules containing *Rhizobium* bacteria. The family is split into three distinct subfamilies (the Mimosoideae, Caesalpinoideae, and Papilionoideae) based on differences in flower morphology as well as other characteristics (Lawrence 1951). Some authorities split these species into three individual families. Within Indiana Dunes, we have no native representatives of the Mimosoideae, but readers may be well acquainted with acacia (*Acacia*), mimosa tree (*Albizia julibrissin* Durazz), and mesquite (*Prosopsis* spp.).

Legumes have alternate pinnate, pinnately compound, palmate, or simple leaves. Many *Acacia* species in Australia have lost the true leaf (developmentally or through abscission) and retain the thickened leaf-like petiole called a phyllode, which assumes a vertical aspect (Pate and McComb 1981). The loss of the leaf and its replacement by the vertical phyllode functions as a leaf and presumably aids in water retention since the phyllode is perpendicular to the sun's rays early and late in the day when temperatures are lower. Within Indiana Dunes, Caesalpinoideae are represented by senna (*Senna*, *Chamaecrista*, or *Cassia*), honey locust (*Gleditisia triacanthos* L.), and Kentucky coffee tree (*Gymnocladus dioicus* (L.) K. Koch). Most of the Indiana Dunes species are in the Papilionoideae, which are characterized by their typical pea flower. All species within this family produce a legume fruit that can be a human food source: peas (*Pisum sativum* L.), green beans (*Phaseolus vulgaris* L.), and lentils (*Lens culinaris* Medik.).

Acmispon americanus (Nutt.) Rydb. [*Lotus americanus* (Nutt.) Bisch.]
Charles Deam with Floyd Swink (Wilhelm and Rericha 2017) found this adventive western

plant growing most likely in the "Dritz Pits" that is now called Coulter Prairie (Inland Marsh B) (see below). It may have been a waif that is no longer present. It was growing with *Opuntia cespitosa* and *Phemeranthus rugospermus*.

Voucher Specimens:

Deam #55642, 14 August 1935, Porter Co. (IND)

Baptisia tinctoria (L.) R. Br.

Yellow wild indigo occurs at Hoosier Prairie. According to Irene Herlocker-Meyer, George Bunce noted yellow wild indigo at Hoosier Prairie A in the mid-1970s. While sampling plots on 8 September 1978, John Bacone and Gerould Wilhelm noted it in one 0.25-m^2 quadrat out of thirty along Transect 35 (Wilhelm 1990). According to Wilhelm (1990), "Yellow wild indigo was recorded from a quadrat about 370 meters south of Main Street. It grew with *Aronia* × *prunifolia* and *Symphyotrichum lanceolatum* var. *interior*." The status of yellow wild indigo 40 years later at Hoosier Prairie is unknown. No specimen has been collected for this species and probably should not be collected due to its rarity. According to Wilhelm and Rericha (2017), the caterpillars of the eastern tailed blue butterfly feed on the yellow wild indigo inflorescences.

Chamaecrista nictitans (L.) Moench [*Cassia nictitans* L.]

Wild sensitive plant is known from Miller Woods and Keiser. Wild sensitive plant is locally rare in sand blows of Miller Woods B. The first specimen below was collected in the sand blowout east of the Calumet Interpretive Center in Keiser E, where it may be adventive. This species is distinguished from the more common *C. fasciculata* by having club-shaped glands versus disk-shaped glands on the petioles, five stamens versus ten, and calyx less than 5 mm versus greater than 5 mm long (Wilhelm and Rericha 2017).

Voucher Specimens:

Medley #13900, 4 October 1975, Porter Co. (MOR)

Schulenberg, Howes & Kropp #76-988, 9 October 1976, Porter Co. (MOR)

Crotalaria sagittalis L.

Rattlebox is known from Hoosier Prairie A, but it was also collected from the old Dune Park, now destroyed (Wilhelm 1990). It could possibly be found in Cowles Dunes A. This annual legume is found on dry-mesic to dry sand prairies and possibly sand blows, given the associates listed in Wilhelm and Rericha (2017).

Voucher Specimens:

Umbach # 6004, 10 August 1912, Porter Co. (MOR)

Dalea candida Willd. [*Petalostemon candidus* (Willd.) Michx.]

White prairie clover grows with *Lathyrus venosus* on the open slope above Lake George at Hobart Prairie Grove. This species does not occur in sand dunes but is more likely on the richer soil moraines such as Hobart Prairie Grove. There is no specimen available, but Pavlovic and Sandy O'Brien have seen it multiple times at Hobart Prairie Grove. White prairie clover occurs in the lake plain in Gary and further west (Wilhelm and Rericha 2017).

Desmodium canescens (L.) DC.

Showy tick trefoil was reported from the NIPSCO right-of-way in Bailly D by Plampin on 4 August 1994. We have no record of a specimen or a photograph to vouch for this species.

Desmodium ciliare (Muhl. ex Willd.) DC.

Hairy tick trefoil grows in Cowles Dunes, Furnessville, Keiser, and Hoosier Prairie. Lyon (1927) stated that it grew at the "edge of the woods, Mineral Springs," Cowles Dunes A. Sidney Glassman collected hairy tick trefoil from Keiser A on 19 August 1956. This rare legume also grows at Furnessville A (Wilhelm 1990). Hairy tick trefoil is rare to occasional in "the better portions of the Hoosier Prairie" A (Wilhelm 1990).

Voucher Specimens:
Jones #32, 6 August 1981, Porter Co. (INDU)

Desmodium cuspidatum (Muhl. ex Willd.) DC. ex G. Don
Levi Umbach collected bracted tick trefoil in Cowles Dunes B in 1912 (see specimen below), where it has not been seen since. The park's only extant location is on a bluff above Lake George at Hobart Prairie Grove! Steyermark (1963) notes the leaves of this species are browsed by white-tailed deer.

Voucher Specimens:
Umbach #6252, 29 August 1912, Porter Co. (MOR)

Desmodium perplexum B.G. Schub.
Lyon collected a specimen from "dunes at Tremont," which is presumably DSP, a conjecture that is confirmed by numerous collections (Consortium of Midwest Herbaria 2021). In 1956, Sidney Glassman collected a specimen west of the Beverly Shores train station. This species was collected near Mt. Baldy in 1987 (Wilhelm 1990). It is not clear whether specimens from the Indiana Dunes called *D. glabellum* are now this species. We have not seen the specimen from the Butler Herbarium to confirm that it is not *D. paniculatum*, a similar species (Wilhelm and Rericha 2017). Since this species often grows with *D. paniculatum*, it may be more common within Indiana Dunes than we currently know.

Voucher Specimens:
Lyon s.n., 16 September 1923, Porter Co. (BUT)
Bennett #8363, 12 September 1964, Porter Co. (F)
Wilhelm, Shimp, and Swink #15245, 25 August 1987, La Porte Co. (MOR)

Desmodium rotundifolium DC.
Within Indiana Dunes, round-leaved tick trefoil is only known from Pinhook Bog. Round-leaved tick trefoil is locally rare at the edge of dry woods on the bluff north of Pinhook Bog A, east of Wozniak Road. The specimens below are nonflowering given the early collection in the year.

Steyermark (1963) notes this plant is reportedly eaten by wild turkey. In the Chicago Region, it is only found in oak savannas east of Porter and Newton Counties (Wilhelm and Rericha 2017).

Voucher Specimens:
Armstrong #1542, 31 May 1965, La Porte Co. (KKH)

Gymnocladus dioicus (L.) K. Koch
Kentucky coffee tree is rare in Heron Rookery A (Wilhelm 1990). The seeds of this tree were used by Native Americans as game pieces and to make a drink (Zaya and Howe 2009). Zaya and Howe (2009) discuss the likelihood that this species was dispersed by now extinct megafauna and say this is perhaps why the species is declining. We do not have a specimen to vouch for its occurrence.

Lathyrus japonicus Willd. var. *maritimus* (L.) Kartesz & Gandhi [*L. japonicus* Willd. var. *glaber* (Ser.) Fernald]
Beach pea has been reported at Miller Woods, DSP, Keiser, and Tamarack. This species was rare based on a report from Miller A by Marlin Bowles, who saw it in 1978 (Wilhelm 1990). In 1987, Emma Pitcher noted it from the "edge of the Grand Calumet lagoon" (Wilhelm 1990). Lyon (1927) reported it from DSP in "open sand of rear foredune area or lake face of first line of dunes." In the mid-1980s, beach pea was extant in Big Blowout, where it was being monitored by INDU staff (Bowles et al. 1985). This population is now extirpated. It was growing with *Ammophila breviligulata*, *Artemisia campestris* ssp. *caudata*, *Asclepias syriaca*, *Cirsium pitcheri*, *Equisetum hyemale* ssp. *affine*, *Lithospermum caroliniense* var. *croceum*, *Ptelea trifoliata* ssp. *trifoliata* var. *mollis*, *Salix humilis*, *Tradescantia ohiensis*, and

Vitis riparia. There is an extant population in a blowout between Lynx Blowout and Big Blowout that Pavlovic has seen repeatedly over the last few years. This rare plant is known from Keiser as reported by Lyon (1927): "open sand of rear foredune area or lake face of first line of dunes, Keiser ... ? rather rare." It is reported from Tamarack C by Plampin, but not seen since 2003 (Plampin et al. 2003). This perennial beach pea was restored by John Dollard and Daniel Mason (NPS) at the dunes of Miller Woods and Cowles Dunes (Dollard and Carrington 2013). They had problems with drought and sand burial in their restoration. John Dollard told Pavlovic that he had good success in starting plants under cottonwood trees where there is litter and some shade. In 2015, planting at Miller Woods was done on the second dune (secondary dune) back from Lake Michigan because severe fall storms, like that on Halloween 2014, have buried the restoration plantings on the foredune. The NPS staff reported good seed set at Miller in 2015 providing seeds that can be used in further restoration. On 3 August 2018, Pavlovic visited this population and was amazed at the abundance of beach pea on the south side of the foredune. But in 2020, this population was nearly wiped out from shoreline erosion caused by high lake levels. Nevertheless, plants still persist on this second dune (Pavlovic, pers. obs., 30 June 2022), confirming the persistence of early successional species when populations are distributed among the primary and secondary foredunes. John Dollard (NPS) also started a population at Crescent Dunes in the Tamarack Unit. In December 2021, Carie Satkoski and Pavlovic saw dormant plants at Miller Beach and at Cowles Dunes beach.

Voucher Specimens:

Umbach #307, 19 June 1897, Lake Co. (F)

Dritz & Wilhelm #268, 20 June 1982, Porter Co. (MOR)

Lathyrus ochroleucus Hook.

Pale vetchling was known from Miller Woods and DSP. This rare vetchling is recorded from Miller Woods C by Robert Peloquin (Whitman et al. 1990). Known from DSP based on the report by Pepoon (1927: p. 129), where he states that it was one of "the strikingly interesting species" that grew on the bluffs of Fort Creek. The presence of this species needs to be confirmed at Miller, where it may be extant. There is a MOR specimen from INDU, collected by an unknown person from La Porte County. There is no specimen in the INDU herbarium.

Lathyrus venosus Muhl. ex Willd.

Veiny pea is known from Bailly, Hobart Prairie Grove, and Pinhook Bog. Ken Dritz and Gerould Wilhelm noted this rare pea at the Chellberg Farm in Bailly B on 30 June 1979 (Wilhelm 1990). At Hobart Prairie Grove, it occurs on an open, steep, south slope with other prairie plants, and in several ravine slopes (Pavlovic, pers. obs., 2007–2011). This rare pea was found at Pinhook Bog along the eastern road shoulder of Wozniak Road by Ken Dritz on 17 June 1984 (Wilhelm 1990). It evidently is a remnant from the savanna along the western margin of the bog, where it grows with weedy associates.

Voucher Specimens:

Wilhelm #12942, 25 June 1985, La Porte Co. (MOR)

Strophostyles leiosperma (Torr. & A. Gray) Piper

The smooth wild bean is rare in the old field south of the Hoosier Prairie A parking lot. According to Wilhelm (1990), Ken Klick had not seen it growing anywhere else on the prairie. We have not searched that area to determine whether it is extant.

Voucher Specimens:

Hiebert #360, 27 August 1982, Lake Co. (INDU)

Vicia caroliniana Walter

Wood vetch is rare in the open forests on the bluffs at Hobart Prairie Grove where Sandy O'Brien and Pavlovic have observed this species. Only photographs of this species should be taken to vouch its occurrence.

FUMARIACEAE — Fumitory Family

See Papaveraceae family for *Corydalis sempervirens*.

GENTIANACEAE — Gentian Family

Plants in the gentian family are annual or perennial herbs with opposite leaves. Flowers have four to five sepals and petals, the latter fused into a tubular or bell-shaped flower. Stamens are presented in the same number as the petals, and the superior ovary has a single chamber (locule) composed of two fused carpels (Lawrence 1951). Plants are of little economic importance except in the garden trade for their flowers. A species of *Gentiana* is used in the secret recipe to produce Angostura bitters in Venezuela (Elpel 2013, Johnson et al. 2019). Buckbean (*Menyanthes trifoliata*) was formerly in this family but is now in the Menyanthaceae (Wilhelm and Rericha 2017).

Bartonia virginica (L.) Britton, Sterns & Poggenburg

Screwstem is an ephemeral annual found in the swamp forests of the Indiana Dunes, especially on the north sloping surface south of the Great Marsh and north of the Calumet and Algoma dunes. It grows in Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Hoosier Prairie, and Pinhook Bog. Screwstem is occasional in the acid sands of Cowles Dunes A, B, and D (Wilhelm 1990). This species is extant in the marsh and swamp complexes of DSP. Even though Lyon (1927) regarded it as "rather rare," screwstem is common in the marsh and swamp complexes of the DSP (Wilhelm 1990). Bowles (1988) listed it as an associate of *Platanthera clavellata* (see text for that species).

Screwstem is found in a moist, acid, sandy swale in the Pitcher Prairie North and South, in the Furnessville A, and in B and E as well (Wilhelm 1990). In 1989, Plampin reported this inconspicuous annual plant growing along the CSSSBR with *Sphagnum* in three sites west of pylon #8435, just south of Keiser B and in Keiser C and F (Wilhelm 1990). Once known from Tamarack A, as reported by Lyon (1927), this species has likely been extirpated there. It is, however, occasional in moist mossy acid grounds in Tamarack D (Wilhelm 1990). Screwstem occurs at Hoosier Prairie A as well. Screwstem is occasional in the hydromesophytic swamp forest off the west side of Wozniak Road at Pinhook Bog A (Wilhelm 1990).

Voucher Specimens:

Pitcher & Plampin #6, 28 August 1985, Porter Co. (INDU)
Wilhelm & Dritz #6977, 16 September 1979, La Porte Co. (MOR)

Frasera caroliniensis Walter [*Swertia caroliniensis* (Walter) Kuntze]

American columbo grows in the mesic oak woodland bluff slope on the north side of the Little Calumet River in Bailly D. This population was threatened by the invasion of garlic mustard and canopy closure. There is a photograph of this species on page 427 in Pepoon (1927). Columbo is truly ephemeral since all traces of this plant disappear by 1 July. American columbo is a monocarpic perennial that lives for 6 to 15 years before flowering (Threadgill et al. 1981, Baskin and Baskin 1986). It has a taproot that increases in size as the juvenile rosette plant ages, storing carbohydrates that contribute to flower and seed production. Fire is unlikely to kill the larger juveniles but may produce multiple shoots from one root. Flowering appears to be synchronous in populations. Seed germination requires cold moist stratification for the embryo to mature prior to germination (Baskin and Baskin 1986). Seeds that stay dry on the plant germinate the second year afterwards. We lack a specimen of columbo but because of its rarity, a specimen should not be collected. This population is quite healthy as of April 2020 (Pavlovic, pers. obs.) because a park volunteer, Mark Montgomery, single handedly removed the invasive shrubs and herbs and thinned the understory.

Gentiana alba Muhl. ex Nutt. [*Gentiana flavida* A. Gray]

Before 1989, white gentian grew in the Howes Prairie area of Cowles Dunes B, where it had

long been observed by Lois Howes. She believed, however, that its disappearance in recent years was due to a chronic lack of fire. Prescribed burns since 1986 have not induced it to reappear. Lyon (1927) was aware of the same population, describing it as in the "woods at edge of interdunal meadow, Mineral Springs, a few plants." Dan McDowell reportedly saw this species south of Howes Prairie (Cowles Dunes B) in 2007. White gentian was known from DSP according to Lyon (1927): "open inland shrub-covered duneside, Mt. Green, Tremont." Mt. Green is now called Mt. Jackson (Cottman 1930). This population may need to be relocated, protected, and restored if it still exists.

Voucher Specimens:
Tryon, Jr. #2390, 27 September 1935, Porter Co. (F)

Gentiana puberulenta J.S. Pringle
Wilhelm's (1990) last sighting of downy gentian in a small prairie opening in the savanna complex of West Beach D occurred in 1979. This gentian, frequent in the heavy soil prairies of northern Illinois, is extant in Indiana at Hoosier Prairie A, at SHLT Cressmoor Prairie, and at Hobart Prairie Grove.

Voucher Specimens:
Buhl #130, 12 October 1929, Lake Co. (F)

Gentiana saponaria L.
Soapwort gentian is known from Tolleston Dunes, Inland Marsh, Cowles Dunes, Furnessville, Keiser, Tamarack, and Hoosier Prairie. In 1989, Plampin found this species in October at the extreme southeast corner of Tolleston Dunes A, north of the B&O Railroad, in a disturbed moist area with *Andropogon gerardii*, *Helianthus occidentalis*, *Rhus copallinum* var. *copallinum*, *Schizachyrium scoparium*, *Solidago* sp., *Sorghastrum nutans*, *Spiraea tomentosa* var. *rosea*, and *Symphyotrichum* spp. (Wilhelm 1990). She did not see it here in 2008. Soapwort gentian is occasional in the wet sandy prairies of the marsh complex in Inland Marsh A (Wilhelm 1990). Soapwort gentian is extant in the moist sandy flats and prairies in Cowles Dunes A, B, and E. In Cowles Dunes B, soapwort gentian is frequent (Pavlovic, pers. obs., 1983–2022). Wilhelm (1990) reported that Emma Pitcher found it growing in moist swales in what Gerould Wilhelm called the Emma Pitcher Prairies (Furnessville A and B) and Furnessville D. In 1988, Pitcher reported one plant, possibly introduced, near her driveway in Furnessville F (Wilhelm 1990). Soapwort gentian has been collected from Keiser E. Soapwort gentian is frequent in the moist acid sands of Tamarack D; lack of management and encroachment by invasive species may have destroyed this population. According to Wilhelm (1990), soapwort gentian "is locally frequent in the dampish swales of Hoosier Prairie A, particularly where fire has removed the duff." This species is the most common gentian in the Indiana Dunes (Pavlovic, pers. obs., 1983–2022).

Voucher Specimens:
Hiebert #150, 28 September 1981, Porter Co. (MOR)
Hiebert #377, 23 August 1983, Porter Co. (MOR)
Bowles #664, 19 October 1986, La Porte Co. (MOR)

Gentianopsis virgata (Raf.) Holub ssp. *virgata* [*Gentiana procera* Holm]
Small-fringed gentian is known from the Cowles Bog in Cowles Dunes A. This is a fen species; it can grow anywhere that calcareous waters flow to the surface.

Voucher Specimens:
Hiebert #165, 9 October 1981, Porter Co. (IND)
Klick #2811, 5 October 1988, Porter Co. (INDU)

Sabatia angularis (L.) Pursh
Rose gentian, or rose pink, is known from the pannes of Miller Woods and West Beach and the wet meadows of Tolleston Dunes, Cowles Dunes, DSP, Furnessville, and Hobart Prairie Grove. It is occasional to common in the wet calcareous sands of Miller Woods A

(Pavlovic, pers. obs., 3 August 2018), the west end of Miller Woods E, and along the NIPSCO right-of-way in G. This plant grows in low meadows west of Long Lake of Tolleston Dunes A and B (Wilhelm 1990). Rose gentian is confined to the wet calcareous sands of the panne communities in West Beach A. Marcus Lyon (1927) reported that rose gentian was rather rare in an interdunal meadow at Mineral Springs, Cowles Dunes A, where Plampin saw it in the 1980s. When referring to the interdunal meadow now known as Howes Prairie (Cowles Dunes B), Lyon usually identified this area as Port Chester in Cowles Dunes B. Lois Howes reported that this species grew in Howes Prairie (Cowles Dunes B) until the 1970s. It has not returned with the reintroduction of fire into Howes Prairie (Pavlovic, pers. obs., 1983–2022). The decline of this species in this area could be the result of fire suppression in recent years, succession from panne vegetation to marsh vegetation, or altered hydrology. Since this species is a biennial, it may not persist long in the seed bank. Rose gentian grows in wet meadows along the NIPSCO right-of-way adjacent to DSP. According to Wilhelm (1990) "The only known report of this species from the Furnessville Unit is along the Bike Trail, where Bergendahl reported it as growing, on August 14, 1982, near tower #8415, and 20 feet west of tower #8416 with *Gentianopsis crinita*, *Platanthera clavellata*, and *Xyris torta*." *Sabatia angularis* is rare in the meadows along the bike trail at the Hobart Prairie Grove. Michele Dudash (Dudash and Fenster 2001) did her population genetics and breeding system study in the pannes of Miller Woods A.

Voucher Specimens:

Wilhelm & Bacone #5215, 3 August 1978, Lake Co. (MOR)
Hiebert #63, 24 July 1981, Porter Co. (MOR)

GERANIACEAE — Geranium Family

Geraniums are mostly herbs and subshrubs with alternate or opposite leaves. Leaves can be palmately or pinnately lobed, dissected, or compound. Sepals are free or slightly fused together, subtending the five free petals. Stamens are five, ten, or fifteen in number. The superior ovary is three-chambered and is composed of three fused carpels. The family is best known for the cultivated geranium (*Pelargonium*) native to the fynbos of South Africa (Fraser and Fraser 2011).

Geranium bicknellii Britton

Northern cranesbill is known from Cowles Dunes and Hoosier Prairie. Ken Klick (pers. comm. with Pavlovic, 1987) found northern cranesbill in Howes Prairie (Cowles Dunes B), presumably a result of the controlled burn of 1986 in Cowles Dunes B. Bowles (1988) laid out a permanent quadrat and mapped the location of six flowering genets. This species has not been seen since, despite numerous prescribed burns. It might persist in the soil seed bank. Northern cranesbill, which characteristically appears with *Corydalis sempervirens* after fire (Swink and Wilhelm 1979), appeared in Hoosier Prairie A after the spring fire of 1984 (Bowles 1990). Bowles et al. (1985) mapped the known locations and recorded the following associates: *Baptisia lactea*, *Bidens frondosa*, *Erechtites hieraciifolius* var. *hieraciifolius*, *Helianthus mollis*, *Pteridium aquilinum* var. *latiusculum*, *Pyrus floribunda*, *Quercus velutina*, *Rhus copallinum* var. *copallinum*, *Tradescantia ohiensis*, and *Vaccinium angustifolium*. Additional associates include *Carex pensylvanica*, *Corydalis sempervirens*, *Helianthus divaricatus*, *Maianthemum canadense*, *Quercus alba*, and *Q. velutina*. Northern cranesbill is an annual species having a persistent seed bank whose seeds are stimulated to germinate by the heat of fires (Abrams and Dickmann 1984). Like many of our rare species, it is characteristic of boreal forests.

Voucher Specimens:

Klick #2793, 7 June 1988, Lake Co. (MOR)

GROSSULARIACEAE — Currant Family (formerly included in the Saxifragaceae)

In North America, the only native genus in this family is *Ribes*. These are shrubs with deciduous or semi-evergreen leaves. The leaves are alternate, stipulate, and often lobed. The inflorescences are typically racemes, either terminal or axillary. Flowers have five (sometimes four) sepals and petals, four to five stamens, and a single bi-carpellate pistil. The ovary is inferior. Currants and gooseberries (*Ribes*) are grown for their fleshy fruit.

Ribes hirtellum Michx.

Northern gooseberry was collected by Deam in 1913. Gerould Wilhelm saw a gooseberry plant in 1979 in the Cowles Bog area (Cowles Dunes A) that had weak nodal spines and could have been northern gooseberry, but he did not verify the identification (Swink and Wilhelm 1979). Subsequently, Ken Klick collected a specimen growing in Cowles Bog with *Carex leptalea*, *C. prairea*, *Cypripedium candidum*, *Eleocharis rostellata*, *Lysimachia thyrsiflora*, *Parnassia glauca*, *Sarracenia purpurea*, *Toxicodendron vernix*, and *Typha angustifolia*. According to Wilhelm (1990), northern gooseberry is occasional in the swamp complex of Furnessville B. Wilhelm and Rericha (2017) note this species is common in fens and bogs and is associated with *Larix laricina*.

Voucher Specimens:

Deam #12981, 25 May 1913, Porter Co. (IND)
Klick #2795, 9 June 1988, Porter Co. (INDU)

HALORAGACEAE — Water-Milfoil Family

Plants in the water-milfoil family are aquatic or terrestrial herbs with opposite, alternate, or sometimes whorled leaves. The submersed leaves are pectinate. Flowers are very reduced and unisexual, with both sexes borne on the same plant (monoecious). Flowers have, if present at all, two to four sepals and petals that are greatly reduced. Stamens are usually four to eight. The single inferior ovary has one to four locules produced by the fusion of four carpels.

Myriophyllum verticillatum L.

Water milfoil was unknown from northwestern Indiana until collected in 1982 at Miller Woods C (see specimen listed below). Scribailo and Stewart (1995) reported it was growing with *Potamogeton pusillus*, *Nuphar variegata*, and *Nymphaea odorata* ssp. *tuberosa*.

Voucher Specimens:

Simonin #17, 20 August 1982, Lake Co. (MOR)

HYPERICACEAE — St. John's Wort Family

Plants in the St. John's Wort family are trees, shrubs, and herbs with opposite, simple, entire leaves. Oil glands are often present, which produce translucent dots on the leaves. Flowers are bisexual with numerous stamens and a single superior ovary composed of three or five carpels. Sepals and petals are from four to five in number. This family was originally called Guttiferae. Some taxonomists now call the family Clusiaceae (e.g., USDA Plants 2022). ITIS (2022) and Wilhelm and Rericha (2017) retain the family Hypericaceae. Confusion exists as to the relations between these family divisions; some place Hypericoidea and Clusioidea in the Clusiaceae, but others separate them into two families. Some species are grown as garden ornamentals and used in herbal medicine (Lawrence 1951).

Hypericum boreale (Britton) E.P. Bicknell

Northern St. John's Wort is occasional in sandy flats and meadows in Tolleston Dunes, Inland Marsh, Cowles Dunes, Furnessville, Keiser and Tamarack. This yellow-flowered plant

often has clasping leaves suggestive of the pink-petaled *Triadenum*.

Voucher Specimens:

Dritz #636a, 25 September 1988, Lake Co. (MOR)
Oettingen #348, 3 August 1982, Porter Co. (MOR)

Hypericum canadense L.

Canadian St. John's Wort is occasional but known from sand flats and swales at Miller, Tolleston Dunes, Inland Marsh, Cowles Dunes, Furnessville, Keiser, Hoosier Prairie, West Beach, and Pinhook Bog. Interestingly, this species has been mostly collected from the Dunes since before contemporary times. The occurrences that we have are all from Wilhelm (1990).

Hypericum kalmianum L.

Kalm's St. John's Wort is known from Miller Woods, Tolleston Dunes, Calumet Prairie, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. Kalm's St. John's Wort is associated with calcareous wet swales throughout the Dunes. Kalm's St. John's Wort is occasional to frequent in moist sands and swales of Miller Woods A, C, E, and F (Wilhelm 1990). It occurs in the Calumet Prairie and in Tolleston Dunes A (seen by Plampin on 16 July 2008), B, and C. At Tolleston Dunes A, Plampin found it in a wet meadow northwest of the former *Aralia hispida* colony. She noted that the plant was quite tall but was not *H. pyramidatum*. This St. John's Wort is occasional throughout West Beach in subunits A, C, and D (more common in the pannes), and Inland Marsh A and B where low alkaline flats are still intact. Kalm's St. John's Wort is occasional in low alkaline swales and wetlands in Cowles Dunes A and B (also in the east Great Marsh ecotone) (Wilhelm 1990). Kalm's St. John's Wort is rare in DSP, where it is confined to the few calcareous swales and pannes. This St. John's Wort is rare but widespread in the eastern portion of the Furnessville Unit, in A, B, and E (Wilhelm 1990). Kalm's St. John's Wort was found in the wetlands south of the Dunewood Campground in Keiser F by Cristy Fox (1985). Kalm's St. John's Wort is known from moist sandy open ground in Tamarack C and D (Wilhem 1990).

Voucher Specimens:

Wilhelm #1517, 5 September 1974, Lake Co. (MOR)
Hiebert #12, 2 July 1981, Porter Co. (MOR)
Podrasky & Sherman #7, 17 July 1984, Porter Co. (MOR)

JUGLANDACEAE — Walnut Family

Plants in the walnut family are resinous or aromatic trees with alternate, pinnately compound leaves. Male flowers are in pendulous catkins, and female flowers are in upright spikes. Male flowers have three to six or no sepals, no petals, three to many stamens, and a rudimentary pistil. Female flowers have four sepals, no petals, and two- or three-carpellate pistils. This family is a source for wood (*Juglans nigra*) and nuts such as pecans (*Carya illinoensis*). Black walnut (*Juglans nigra*) is sometimes poached for its fine and very valuable wood (Watts 1957).

Carya glabra (Mill.) Sweet [includes the former species *C. ovalis* (Wangenh.) Sarg.]

Pignut hickory is represented within Indiana Dunes by a couple of trees along the fence row north of Pinhook Bog A, east of Wozniak Road. Specimens labeled as *C. ovalis* were also collected here, but that name is now considered a high latitude variation of *C. glabra* by most sources. Wilhelm and Rericha (2017) separate out *C. ovalis*.

Voucher Specimens:

Wilhelm & Dritz #6935, 6 July 1979, La Porte Co. (MOR)
Wilhelm & Ware #7001, 17 October 1979, La Porte Co. (MOR). This specimen is identified as C. ovalis

Carya laciniosa (F. Michaux) G. Don
Kingnut hickory is occasional along the high terraces above Salt Creek in Bailly H (Wilhelm 1990). There are also "a few magnificent trees in the southwest sector" of the Heron Rookery A, and it grows in Heron Rookery B (Wilhelm 1990). Little Calumet River ditch erosion (Pavlovic, pers. obs., 1984–2020) may have killed some of these trees.

Voucher Specimens:
Wilhelm #6896, 17 October 1979, Porter Co. (MOR)

Juglans cinerea L.
Butternut prefers fens and seeps often associated with floodplains and bottomlands. Butternut grows at Bailly, DSP, Furnessville, Keiser, Tamarack, Heron Rookery, Hobart Prairie Grove, and Pinhook Bog. Butternut is occasional along the floodplain of the Little Calumet River and the seeps on the moraine bluffs at Bailly A and Heron Rookery A (Wilhelm 1990). This tree is also present in the Dunes Creek drainage systems throughout the DSP A and Furnessville F. At the latter site, this tree appears in the former Buffalo and Mississippi Railway bed east of the Dune Park Station. This population was cut in 2020 for the expansion of the Dune Park Station Parking Lot. White walnut, another name for this nut-bearing tree, grows along the seep zone on the south side of the Great Marsh in the DSP, Keiser C, and Tamarack A and C. At Hobart Prairie Grove, butternut grows in the seeps and bluffs that drain into Lake George (Pavlovic, pers. obs., 1991–2011). Butternut grows in the seep zones around Pinhook Bog (Wilhelm 1990). This species is threatened by the butternut canker pathogen (*Sirococcus clavigignenti-juglandacearum*) (Broders and Boland 2010). If the invasive exotic *Juglans ailantifolia* Carr. invades the Indiana Dunes region, it may threaten butternut through hybridization, as has happened in the northeast states (Zhao and Woeste 2010). The closely related black walnut (*J. nigra*) is threatened by the invading thousand cankers disease (*Geosmithia morbida*) that is spread by the walnut twig beetle (*Pityophthorus juglandis*) (Daniels et. al. 2016). Ironically, this disease is native to the desert southwest where other *Juglans* species have coevolved with it and are resistant. Imagine eastern North America without these fine walnut trees!

Voucher Specimens:
Pavlovic #1164 & 1165, 26 April 1985, Porter Co. (INDU)

LAMIACEAE — Mint Family (formerly Labiatae)

Mints are mostly aromatic herbs with square stems and opposite or whorled simple leaves. Flowers are bisexual. Sepals are fused, and the five petals are fused to form a small two-lipped flower. The two or four stamens are fused in part to the petals. The superior ovary is composed of two carpels having two or four locules. Four nutlets form the fruit. Many mints are grown ornamentally (e. g., *Coleus*); others for aromatic oils including sage (*Salvia*), lavender (*Lavendula*), rosemary (*Rosmarinus*), and mint (*Mentha*); and still others for flavorings such as marjoram (*Origanum majorana* L.), basil (*Ocimum*), thyme (*Thymus*), and savory (*Satureja*).

Agastache nepetoides (L.) Kuntze
Yellow hedge hyssop was found in Tamarack B by Nathanael Pilla and Noah Dell in August 2017. The only Porter County specimen is from Chesterton, not the Dunes.

Clinopodium arkansanum (Nutt.) House [*Satureja arkansana* (Nutt.) Briq.]
Low calamint is known from Miller Woods and Hoosier Prairie. It is locally abundant in the pannes of Miller Woods A, where Bowles et al. (1986) reported it growing with *Cladium mariscoides*, *Equisetum hyemale* ssp. *affine*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, *Linum medium* var. *texanum*, *Panicum virgatum*, *Pinus banksiana*, *Populus deltoides*, *Rhynchospora capillacea*, *Salix myricoides*, *Schizachyrium scoparium*, and *Symphyotrichum dumosum*. This population, revisited by Pavlovic on 28 June 2019, was reduced by high water

levels in the pannes due do almost historic highs of Lake Michigan. Given a persistent seed bank, low calamint is expected to increase in population size as Lake Michigan levels drop from the 2019 high levels. Gerould Wilhelm looked unsuccessfully for this species in the pannes of West Beach, but low calamint is known from one of the long-abandoned fields, which now are part of the Hoosier Prairie A, where it can be common. Bowles et al. (1986) mapped this population and listed the following associates: *Coreopsis tripteris*, *Equisetum hyemale* ssp. *affine*, *Packera paupercula*, *Phlox glaberrima* ssp. *interior*, *Poa compressa*, *Pycnanthemum virginianum*, *Schizachyrium scoparium*, *Solidago altissima*, *S. ohioensis*, *Sorghastrum nutans*, *Spartina pectinata*, *Symphyotrichum ericoides*, and *Zizia aurea*. Low calamint also grows with *Cypripedium candidum* at Hoosier Prairie (Myrna Newgent and Plampin, pers. obs.). When underfoot, low calamint effuses a rich, sweet, mint aroma (Pavlovic, pers. obs., 2008).

Voucher Specimens:

Wilhelm & Bacone #5216, 3 August 1978, Lake Co. (MOR)
Rothrock #4748, 10 July 2008, Lake Co. (IND)

Clinopodium vulgare L. [*Satureja vulgaris* (L.) Fritsch var. *neogaea* Fernald]
Dogmint is found only in Keiser, though it has been reported from Hoosier Prairie (Wilhelm 1990). Dan Mason, Tonkovich, and Michael Huft found dogmint growing along the Great Marsh trail east of Broadway in Beverly Shores in Keiser B in 2000. This species is native to woods, thickets and rocky shores (Fernald 1970). It is not to be confused with the introduced basil (*Ocimum basilicum* L.) that grows along old roadbeds and other disturbed areas such as the planted population along the Calumet Bike Trail at the former intersection with Wagner Rd. (Pavlovic, pers. obs., 2000–2014).

Voucher Specimens:

Jones #1045, 12 July 1985, Porter Co. (MOR)
Kjellmark #57, 23 June 1987 (INDU)
Bonace s.n., 12 July 2015, Porter Co. (MOR)

Physostegia virginiana (L.) Benth. ssp. *praemorsa* (Shinners) P.D. Cantino [*P. virginiana* var. *arenaria* Shimek]
False dragon, or prairie obedient plant, grows in Tamarack B and Hoosier Prairie B. This taxon is referred to as *P. praemorsa* Shinners by Wilhelm and Rericha (2017). Plampin and Richard Johnson found the population south of East State Park Boundary Road, where it may have escaped from a former homesite. In 2005, Mark Klein, Plampin, Mary Wagner, and Lindy Hanson-Lucas found this species in tangled growth in the floodplain at Brown Ditch in Tamarack B, growing near the unit's sole *Larix laricina*. Prairie obedient plant is common in Hoosier Prairie B. The flowers are labeled obedient because they can be pushed laterally, and stay in their new position. The typical species, *Physostegia virginiana* (L.) Benth., is found in Tolleston Dunes, Calumet Prairie, Cowles Dunes, DSP, Furnessville, Keiser, Hobart Prairie Grove, and Hoosier Prairie.

Voucher Specimens:

Hiebert #354, 27 August 1982, Lake Co. (INDU)

Scutellaria parvula Michx. var. *missouriensis* (Torr.) Goodman & C.A. Lawson [*S. parvula* var. *leonardii* (Epling) Fernald]
Small skullcap, a plant of dry prairies, is reported at Hoosier Prairie A (Wilhelm 1990). Sutter et al. (2011) found that this species declined in central U.S. glades that experienced fire suppression and invasion of non-native shrubs, especially Chinese privet (*Ligustrum sinense* Lour.). No specimen or photograph exists to vouch for this species.

Stachys aspera Michx.
Hyssopleaf hedgenettle is known from DSP. In 1994, Gerould Wilhelm found this plant growing along the NIPSCO right-of-way in DSP B (Wilhelm 2000). It was formerly called

S. hyssopifolia var. *ambigua* A. Gray. Wilhelm and Rericha (2017) state there are no modern specimens in the Chicago Region and none in Porter County.

Stachys hyssopifolia Michx.

Hyssop hedge nettle is found growing in wet mesic meadows within Indiana Dunes. Hyssop hedge nettle is known from Inland Marsh, Cowles Dunes, DSP, and Furnessville. Hiebert collected this species in Inland Marsh (see specimen below). Ken Dritz and Marlin Bowles found it growing in Blag Slough in Cowles Dunes A. Lois Howes saw hyssop hedge nettle in bloom in Howes Prairie on 6 August 1981 (Howes 1985). Pavlovic saw hundreds of these hedge nettles in the wet mesic meadows of Howes Prairie (Cowles Dunes B), especially in 1986 after the first research burn. Bennett collected a specimen from the DSP (see below). Hyssop hedge nettle is rare in Furnessville F.

Voucher Specimens:

Bennett #6897, 29 August 1959, Porter Co. (F)
Hiebert #53, 21 July 1981, Porter Co. (MOR)
von Oettingen #356, 6 August 1982, Porter Co. (MOR)
Dritz & Bowles #950, 11 August 1991, Porter Co. (MOR)
Jones #233, 5 August 1981, Porter Co. (INDU)

Trichostema dichotomum L.

Blue curls is rare within Indiana Dunes. It has been reported from Tolleston Dunes, Inland Marsh, and Furnessville. This annual mint of the black oak savanna grows along the north side of the railroad tracks in Tolleston Dunes A, where it was reported by Pitcher and Plampin in 1985. It grew with *Eragrostis spectabilis*, *Helianthus petiolaris*, and *Polanisia dodecandra* ssp. *dodecandra*. Blue curls is known from Inland Marsh B, where three populations have been seen since 1989 on various SHLT hikes (Plampin, pers. obs.). At least five populations were observed in Inland Marsh B, with two larger populations estimated at having hundreds and thousands of plants, respectively (Plampin and Hamilla 2008b). Plampin and Keith Board found more than 25 fruiting plants growing in a sand blow west of the Furnessville D on 16 December 1995. Plampin saw this species again the following year in the same location but not in 2008 (Plampin and Hamilla 2008b). Unless seeds have long-term viability, it is likely blue curls has been extirpated from Furnessville. Populations would be expected to fluctuate widely from year to year as precipitation varies. The plant's name derives from the fused petals and stamens that curl upward from below the pistil.

Voucher Specimens:

Klick et al. s.n., 4 September 1987, Lake Co. (MOR)

LENTIBULARACEAE — Bladderwort Family

Plants in this family are annual or perennial carnivorous plants of moist and wet habitats. The leaves are alternate or in rosettes. Submersed leaves are different in form from the aerial leaves. Most species persist as turions—small dormant buds—buried in the soil. The flowers are zygomorphic with two to five sepals, five fused petals forming a bilabiate corolla, two stamens, and a single-chambered bicarpellate pistil. The species in the genus *Pinguicula* (butterworts) trap arthropods on their fly paper-like basal leaves. All species in the Indiana Dunes are in the genus *Utricularia* and trap invertebrate prey in bladders.

Utricularia cornuta Michx.

Horned bladderwort grows in Miller Woods, West Beach, Cowles Dunes, and Pinhook Bog. Horned bladderwort presents a golden May display in the pannes of Miller Woods and West Beach. Horned bladderwort is common in the pannes of West Beach A and B. Bowles et al. (1986) listed the following associates from a panne border: *Carex viridula* ssp. *viridula*, *Cornus sericea*, *Eleocharis elliptica*, *Hypericum kalmianum*, *Juncus alpinoarticulatus*, *Juncus arcticus* var. *balticus*, *Pinus banksiana*, *Populus deltoides*, *Rhynchospora capillacea*, and

Salix myricoides. According to Robin Scribailo (pers. comm. with Pavlovic), *Potamogeton illinoensis* is a common associate with horned bladderwort. Horned bladderwort was also seen by Stacey Leicht-Young in Cowles Dunes A on 9 September 2010 growing in a mud flat. This sighting is not far-fetched since Alva Armstrong collected a specimen near Baillytown on 8 August 1961 on wet sandy shores (specimen not listed below). This species was found at Pinhook Bog by Nathanael Pilla on 11 September 2015, based on a photograph he shared with Pavlovic. Apparently, Michael Huff saw this species previously in 2014 in the same location?

Voucher Specimens:

Swink s.n., 11 August 1946, Lake Co. (MOR)
Dritz & Levins #150, 12 September 1981, Porter Co. (MOR)

Utricularia geminiscapa Benj.

Bog bladderwort grows at Pinhook Bog. Wilhelm (1990) wrote,

> *For years we all, in our provincialism, have assumed that the dense masses of bladderwort in the deep pools of Pinhook Bog were* Utricularia vulgaris [*U. vulgaris* ssp. *macrorhiza*]. *Then enters Anton Reznicek, curator of the herbarium of the University of Michigan. On a brief tour to Pinhook Bog on August 21, 1988, he noted matter-of-factly that these plants represented a species, bog bladderwort, heretofore unknown from Indiana and the Chicago Region. He pointed out the small, submerged cleistogamous flowers. Haber (1979) described the discovery of several new populations for this species in eastern Canada and noted that in most cases it has been overlooked because of its obscure blooms and vegetative resemblance to* U. vulgaris [*U. vulgaris* ssp. *macrorhiza*]. *Naturally, Marlin Bowles and I attended to the matter with all deliberate speed. We found what Tony described. In all of the deep pools we searched, we found* Utricularia geminiscapa, *mostly in association with* Nuphar advena, *but where it hugged the pool edges it also grew with* Chamaedaphne calyculata *var.* angustifolia [*C. calyculata*], Drosera intermedia, Rhynchospora alba, *and* Xyris caroliniana [*Xyris difformis*]. *In another location at Pinhook Bog, it grows with* Chamaedaphne calyculata *var.* angustifolia [*C. calyculata*], Decodon verticillatus, Drosera intermedia, Nuphar advena, *and* Typha angustifolia. *Interestingly, however, the bladderworts in the marginal pools and moats of the bog were* Utricularia vulgaris [*U. vulgaris* ssp. *macrorhiza*]*! Haber (1979) documented the acid pH ranges preferred by* U. geminiscapa. *Wilcox & Simonin (1988) noted that the pH ranges for the Schwingmoor at Pinhook Bog average 3.68 and that these portions of the bog have mean specific conductance values of 64* [microsiemens], *with mean calcium concentrations of 2.7 mg* l^{-1}. *The moat is more minerotrophic, with mean pH levels at 5.45, mean specific conductance levels at 115* [microsiemens], *and mean calcium levels at 3.8 mg* l^{-1}. *Though Haber (1979) noted that pH levels in the bog pools he studied run a little higher than the mat itself, they rarely exceeded 5.0. In the Chicago Region,* U. vulgaris *is found routinely in clear alkaline waters. Tony* [Anton], *since he did not have a formal collecting agreement with the Indiana Dunes National Lakeshore, deferred to local botanists to document his discovery. . . Bowles (1989) mapped some of the locations where we saw this bladderwort.*

Voucher Specimens:

Wilhelm & Bowles #16367, 29 August 1988, La Porte Co. (MOR)

Utricularia gibba L.

Humped bladderwort is known from Miller Woods, Tolleston Dunes, West Beach, Cowles Dunes, Inland Marsh, and Hoosier Prairie, but is considered extirpated from Tamarack. Wilhelm (1990) saw this species in Miller Woods A. Simonin (#31, MOR) reported this species as an associate of *Potamogeton pusillus* in wetland #39 of Miller Woods C and wetland #5 of Miller Woods B (numbers refer to wetland numbers assigned by Doug Wilcox). Wilcox and Simonin (1987) reported this species from three wetlands in Miller

Woods A, three wetlands in B, and one wetland in C. Plampin and Hamilla (2008b) found humped bladderwort in wetland C46 and C50 in Miller Woods C on 4 September 2007 (wetland numbers are Daniel Mason's). Plampin and Myrna Newgent found humped bladderwort growing on the north side of Long Lake and south of the Marquette Trail on 30 June 1992 in Tolleston Dunes B. This species was found along the north shore of Long Lake, where it was common on 24 July 1988 (West Beach A) (Wilhelm 1990). Plampin and Hamilla (2008b), on 13 August 2007, found this bladderwort growing in a wetland in Inland Marsh A. Lyon (1927) reported this species from Little Lake (Cowles Dunes A), and it is still there. Lois Howes saw it in bloom in Little Lake on 12 July 1979 (Howes 1985). Lyon (1927) reported this species from Tamarack B, but it may now be extirpated. Wilhelm (1990) noted that "According to Ken Klick, humped bladderwort is still alive at Hoosier Prairie A." It was listed for Hoosier Prairie on the Indiana Division of Nature Preserves dated 20 October 1995.

Voucher Specimens:

Hess et al. #6009, 4 September 1984, Lake Co. (MOR)
Wilhelm #6983, 15 September 1979, Porter Co. (MOR)

Utricularia intermedia Hayne

Flat-leaved bladderwort was reported from Dune Park by Hill in 1906, creeping over fallen leaves and muddy bottoms of dried-up sloughs. It was not seen again until it was reported by Carie Satkoski in wetland 54 in Miller Woods C on 4 September 2007. That same year, on 16 August, Plampin and Hamilla (2008b) found it growing in Little Lake in Cowles Dunes A.

Voucher Specimens:

Hill #186.1906, 4 July 1906, Porter Co. (F)

Utricularia minor L.

Small bladderwort is known from Miller Woods, Cowles Dunes, Keiser, and Tamarack. According to Bowles et al. (1985, 1986), this species has been reported from Miller Woods C. Their postulation that it might still be extant was confirmed when it was found again by Scribailo and Alix in 2002. See Plampin and Hamilla (2008b) for further location information at Miller C. Small bladderwort was known from Cowles Dunes based on the specimen listed below. Daniel Mason (NPS) found small bladderwort in a wetland in Keiser B on 21 June 2007. This population was not relocated in 2007, but it may have been surveyed too late in the summer (Plampin and Hamilla 2008a). Plampin, Myrna Newgent, and Lydia Miramontes found small bladderwort in the panne at Crescent Dune on 30 June 2003 in Tamarack C. More than 90 plants in three colonies grew with *Chara* sp. and *Juncus arcticus* var. *balticus*. This population was present and abundant in 2007 (Plampin and Hamilla 2008a).

Voucher Specimens:

Hebert #2277, July 1930, Porter Co. (BUT)

Utricularia purpurea Walter

Purple bladderwort grows at West Beach, Inland Marsh, Tolleston, and Cowles Dunes, but is extirpated from Tamarack. Robin Scribailo reported purple bladderwort from Tolleston B. Lyon (1930) reported purple bladderwort from Long Lake in West Beach C. It is extant in the fifth marsh west of Stagecoach Road in Inland Marsh A. Lyon (1927) reported this species from Little Lake (Cowles Dunes A), where, in 1987, Plampin reported it still occurs (Wilhelm 1990). Gerould Wilhelm saw one individual there in August 1988 during that year's drought. In contrast, Plampin reports there were hundreds in bloom on 4 July 1976. Like the preceding species, this plant was reported by Lyon (1927) from Tamarack B, but it is likely locally extinct there. Purple bladderwort populations persist as turions—buried vegetative units (Winston and Gorham 1979)—until infrequent high rainfall creates aquatic conditions permitting it to sprout, grow, and bloom. The population size appears to be positively correlated with rainfall (Pavlovic, pers. obs., 1987–2002).

Voucher Specimens:

Wilhelm #14972, 2 July 1987, Porter Co. (MOR)
Pavlovic #193, 25 July 1991, Porter Co. (INDU)

Utricularia subulata L.

Hair bladderwort is known from West Beach and Hoosier Prairie and reported from Cowles Dunes. In 1983, Ken Klick found what he thought might be a bryophyte in the West Beach A pannes, but in 1984, when he found the same plant at Hoosier Prairie, he identified the plants at both sites as *Utricularia subulata*. These plants may be the first record of this species in the Chicago Region, an unexpected location because this species usually inhabits wetlands of the coastal plain along the Atlantic seaboard and the Gulf of Mexico (Wilhelm 1990). After Ken Klick's initial finds, this species turned up in more locations of West Beach A pannes and several sites south of Tefft, and in Berrien County's Warren Dunes State Park (Wilhelm 1990). Bowles et al. (1985) listed associates for this species in a panne as *Carex viridula* ssp. *viridula*, *Gentianopsis crinita*, *Hypericum kalmianum*, *Juncus arcticus* var. *balticus*, *Rhynchospora capillacea*, *Solidago ptarmicoides*, and *Triglochin maritima*. In 1986, Ken Klick found it at West Beach growing in wet sand with *Hypericum kalmianum*, *Rhynchospora capillacea*, *Scleria verticillata*, *Triglochin maritima*, and *Utricularia cornuta*. Tonkovich has seen the hair bladderwort consistently in several of the West Beach pannes since 2000. At Hoosier Prairie, *Utricularia subulata* grows in the sandy, organic, tire-track seeps left by the NIPSCO mowers, with *Aletris farinosa*, *Cyperus bipartitus*, *Drosera intermedia*, *Eleocharis elliptica*, *Juncus alpinoarticulatus*, *J. brachycephalus*, *Linum medium* var. *texanum*, *Lycopodiella inundata*, *Rhexia virginica*, *Rhynchospora capitellata*, *Viola lanceolata*, and *Xyris torta*. In 1988, Ken Klick found that hair bladderwort plants growing here produce plentiful chasmogamous flowers as well as cleistogamous ones.

What would explain the long delay in discovering this cryptic species when so many competent botanists have explored the dunes for many years? Did this species recently arrive from the coastal plain? Swink and Wilhelm (1994) solved the mystery: "Our first record for this species was found in the Notre Dame herbarium, resting under the name *U. minor*. It was collected by Hebert, in 1930, at Mineral Springs [Cowles Dunes A] in Porter County." Wilhelm (1990) notes that Hemipteran insects called "toad bugs" associate with this species and suggest hunting for hair bladderwort where these toad look-alikes hop about, such as in the Clarke and Pine Nature Preserve in Lake County. Plampin observed that toad bugs bite and that their presence does not automatically guarantee the bladderwort. Where toad bugs inhabit a sedge meadow near *Schoenoplectiella hallii* in Tolleston Dunes A, no *U. subulata* have so far been found. Plampin reported this plant on 20 September 2004 from the first waste lagoon south of Lake Michigan, just west of Burns Ditch (West Beach D), where it grows with *Juncus balticus* var. *littoralis* and *J. scirpoides*. The Cowles Dunes plants have likely disappeared, but they may still be worth looking for in Little Lake, Blag Slough, and other wetlands in subarea A.

Voucher Specimens:

Hess et al. #5994, 18 July 1984, Lake Co. (MOR)
Klick #2738, 9 September 1986, Porter Co. (INDU)

LINACEAE — Flax Family

Plants in the flax family are mostly herbs with alternate or opposite, simple, entire leaves with stipules at their petiole bases. Flowers have five free sepals, five free petals, five to ten or more stamens, and a superior ovary composed of five fused carpels. *Linum* species are known as a source of linen and linseed oil. Some species are grown for their ornamental flowers.

Linum striatum Walter

Stiff yellow flax is reported by Daniel Mason (NPS) and Tonkovich as occasional in a panne in Miller Woods A. It also grows in West Beach A (Wilhelm 1990). *Linum striatum* is closely related to *L. virginianum* (Wilhelm 1990). Stiff yellow flax is frequent along the NIPSCO right-of-way in Cowles Dunes E and rare in Cowles Dunes A and B (Wilhelm 1990). Gerould Wilhelm observed stiff yellow flax in the NIPSCO right-of-way south of the Dunes State Park B.

Voucher Specimens:

Vanderkamp s.n., 10 August 1976, Porter Co. (MOR)
Wilhelm & Dritz #17416, 31 July 1989, Porter Co. (MOR)
Alix s.n., 22 July 1998, Porter Co. (BUT)

Linum virginianum L.

Slender yellow flax has been found growing at Cowles Dunes, Furnessville, and Tamarack. Slender yellow flax is extant in Cowles Dunes (though not common), in the Howes Prairie of Cowles Dunes B, and along the bike trail in Cowles Dunes E (Wilhelm 1990). Lois Howes saw slender yellow flax in bloom on 20 July 1981 in Howes Prairie (Howes 1985). This little yellow flax is rare in the Pitcher Prairie portion of Furnessville B, and Furnesville E and F (Wihelm 1990). Plampin and Newgent (1992) reported this species from Tamarack A and B.

Voucher Specimens:

Plampin & Newgent #5-1992, 11 August 1992, Porter Co. (INDU)

MELASTOMATACEAE — Melastoma Family

The Melastoma family is represented by herbs, shrubs, or trees usually with opposite simple leaves, though sometimes alternate with the abortion of one of the leaves. Often one leaf of the pair is smaller. Venation is often palmate but may be parallel and transversely anastomosing. The sepals and petals are mostly five in number, with the stamens being twice the number of ovaries. The single pistil is superior and composed of four to fourteen carpels. The distinctive bent stamens and the venation are diagnostic characters for this family that is more common in tropical regions of the world.

Rhexia mariana L. var. *mariana*

Pale meadow beauty was thought to have never occurred within Indiana Dunes until Scott Namestnik found it growing along the Calumet Bike Trail on 6 September 2014 (Namestnik 2018). The nearest collections are introductions in Allegan and Ottawa counties in Michigan. This species occurs south of the Ohio and New Rivers, but extends up the Atlantic Coast to Maryland, Delaware, and New Jersey. It is absent in Ohio, but introduced to West Virginia, Pennsylvania, and Indiana (BONAP 2021). The Friesner Herbarium at Butler University in Indianapolis, Indiana, has a specimen collected by Stanley A. Cain on 1 September 1927 at the "Calumet Trail" in a mesic sand prairie in Porter County (see specimen below). Stanley Cain was the preeminent vegetation ecologist in the Great Smoky Mountains (Cain 1930, 1931, 1934), who was scooped by the young upstart named Robert H. Whittaker. Whittaker was instrumental in developing the concept of ecological gradients, and he provided proof for Gleason's individualistic species distributions and their description through ordination techniques (Whittaker 1956, 1960).

Since the Calumet Bike Trail did not exist in 1927, the GIS coordinates for the Cain collection are a modern artifact. Calumet Trail in 1927 probably indicated the old Calumet Trail that U.S. 12 generally follows on the north side of the Calumet Dunes. It is likely that the observation by Scott Namestnik in 2014 was the same as or near Cain's collecting site.

Voucher Specimens:

Namestnik #2242, 6 September 2014, Porter Co. (MOR)
Cain s.n., 1 September 1927, Porter Co. (BUT)

Rhexia virginica L.

Meadow beauty is known from Miller Woods, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Hoosier Prairie. It is known from Inland Marsh A and Coulter Prairie (Inland Marsh B) (Wilhelm 1990). In Inland Marsh A, Ken Klick found meadow beauty in a wet prairie along a marsh border with *Calamagrostis canadensis* and *Eupatorium perfoliatum* (see first specimen below). Lyon (1927) reported this species from Mineral Springs, which was presumably Cowles Dunes A. In 1987, Plampin said it grew by the hundreds at Little Lake (Wilhelm 1990).

This population fluctuates relative to water levels and is most abundant when mud flats are formed. It is extant in the Lupine Lane area of Cowles Dunes B, and along the bike trail east of Mineral Springs Road. Lois Howes saw meadow beauty in bloom in Lupine Lane and vicinity on 16 August 1981 (Howes 1985). Meadow beauty grows along the NIPSCO right-of-way in DSP B (Wilhelm 1990). It is occasional in an acid swale in the eastern end of the North Pitcher Prairie in the Furnessville A (Wilhelm 1990). Emma Pitcher and Plampin saw meadow beauty in *Sphagnum* on 13 August 1986 west of pylon 8435 in Keiser B. This species is occasional in moist sandy ground along the bike trail east of Kemil Road (Keiser C) and in the wetlands south of the Dunewood Campground (Keiser F), where Cristy Fox saw it on 1 February 1985. Meadow beauty was reported by Lyon (1927) from Tamarack B, where this species has most likely since been extirpated. It is frequent, however, in the moist acid sands of the Tamarack D. Meadow beauty is occasional to frequent in the moist sands of the better portions of Hoosier Prairie A and B, particularly in the areas that have received fire (Wilhelm 1990). Meadow beauty has elongate yellow stamens backdropped with rich pink petals.

Voucher Specimens:

Klick #2762, 11 August 1987, Porter Co. (MOR)
Swink s.n., 24 August 1946, Porter Co. (MOR)
Jones s.n., 17 August 1975, Porter Co. (INDU)
Hiebert #349, 27 August 1982, Lake Co. (MOR)

MENYANTHACEAE — Buckbean Family

The buckbean family consists of five genera and more than 50 species of aquatic or wetland plants. The plants have alternate simple or palmately-lobed leaves. The five petals are connate with distinctive fringes or marginal wings on the lobe edges. The ovary is superior. Well known as water garden plants are the floating heart (*Nymphoides peltata* (S.G. Gmel.) Kuntze), and water snowflake (*Nymphoides indica* (L.) Kuntze).

Menyanthes trifoliata L.

Buckbean grows at Miller Woods and Pinhook Bog and is probably extirpated from West Beach and Tamarack. Paul Labus found a patch of buckbean in Miller Woods C just north of the CSX train line in 2003. Fire monitor Mary Fisher-Dunham (NPS), on 13 September 2007, observed that this population consists of two patches of approximately 10 m^2. Buckbean was known from West Beach C, based upon an early collection by Charles Deam, and upon the following statement by Lyon (1930): "many plants along the marshy edge of Long Lake." We had never heard that buckbean grew at Cowles Bog, but the Alvah C. Armstrong specimen states "rare!" at Mineral Springs Bog. We suspect buckbean is extirpated from Cowles Bog.

Buckbean was reported from Tamarack B by Lyon (1927): "subdunal marsh, Tamarack, only a few plants at only one place," a location that may no longer exist. Buckbean is frequent in the more open portions of Pinhook Bog B east of Wozniak Road (Wilhelm 1990; Pavlovic, pers. obs., 1991–2022). While often seen vegetatively, this species flowers infrequently.

Voucher Specimens:

Deam #49826, 16 September 1930, Porter Co. (IND)
Banta s.n, 21 May 1933, La Porte Co. (IND)
Armstrong 2196, 31 May 1965, Porter Co. (KKH)

MORACEAE — Mulberry Family

Plants of the mulberry family have milky latex sap and are trees, shrubs, or rarely herbs. The leaves are simple and alternate. Flowers are unisexual on the same or different plants. Male flowers have four sepals, no petals, and four stamens. Female flowers have or lack sepals and have two pistils, one of which aborts. Fruit types are achenes, nuts, drupes, multiples (Osage orange, *Maclura pomifera* (Raf.) C. K. Schneid.) or synconia (fig, *Ficus*). Fruits include mulberry (*Morus* spp.), breadfruit (*Artocarpus altilis* (Parkinson) Fosberg), fig (*Ficus* spp.), and hops (*Humulus lupulus* L.) (Lawrence 1951).

Morus rubra L.

Red mulberry, a rare native tree, is known from the Indiana Dunes based on the report by Laughlin (1953) from DSP and Floyd Swink's 1991 collection from DSP as well. The nonnative white mulberry, *M. alba*, *M alba* var. *tartarica*, and hybrids between the white and red mulberries are common in the greater Chicago Region (Wilhelm and Rericha 2017).

Voucher Specimens:

Swink #10546, 13 May 1991, Porter Co. (MOR)

MYRICACEAE — Wax Myrtle Family

Plants in this family are aromatic trees and shrubs with bisexual, monoecious, or dioecious flowers. Leaves are alternate and simple to pinnatifid. The male flowers are subtended by a bract and usually have four to eight stamens. Female flowers are also subtended by a bract and have one pistil. The family is best known for the sweet gale (*Myrica gale* L.), from which bayberry wax is obtained.

Comptonia peregrina (L.) J.M. Coult.

Sweet fern is known from Keiser and Hoosier Prairie. Lyon (1927) recorded sweet fern from the "inland edge of subdunal woods, Keiser; rare." This pungent-smelling shrub is extant along the south side of the CSSSBR line east of Kemil Road (Keiser D) (Fishbein 1987) and from Keiser E, where it grows south of U.S. 12, east of an abandoned north-south road (Pavlovic, pers. obs., 1991), and further southeast according to Plampin and Hamilla (pers. obs.).

Sweet fern is "long known from the Hoosier Prairie" A and B (Wilhelm 1990), and this species is still represented there by healthy populations. It also occurs in the adjacent Gaylord Butterfly Tract (Hoosier Prairie B). The Keiser population may be adventive, as it was inadvertently introduced from activities of the CSSSBR.

Voucher Specimens:

Tryon #1338, 12 July 1935, Porter Co. (F)
Wilhelm #13073, 26 August 1985, Porter Co. (MOR)
Otto #55, 2 July 1982, Lake Co. (MOR)

OLEACEAE — Olive Family

Plants of the olive family are shrubs or trees with opposite simple or pinnately compound leaves. The bisexual flowers have four sepals and petals and two stamens and two carpels (fused into one pistil). Olives and oil are produced from *Olea europaea*. The family is known for ash lumber (*Fraxinus* spp.) and ornamentals such as privet (*Ligustrum* spp.),

lilac (*Syringa vulgaris*), jasmine (*Jasminum* spp.), forsythia (*Forsythia* spp.), and fringe tree (*Chionanthus virginica*) (Lawrence 1951). In North America, ash is severely threatened by the invasive emerald ash borer (*Agrilus planipennis* Fairmaire) (Wilhelm and Rericha 2017). Many ash trees in the Indiana Dunes and throughout the Chicago Region have succumbed to this insect in the last few years (2010 to the present). For this reason, we have added all ash species to the special flora. Two larval parasitoids in the Hymenoptera have been released along the U.S eastern coast to hopefully control the emerald ash borer (Quinn et al. 2022).

Fraxinus americana L.
The typical white ash occurs at Miller Woods, West Beach, Bailly, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Heron Rookery, and Pinhook Bog.

Voucher Specimens:
Deam #8793, 17 June 1911, Porter Co. (IND)
Wilhelm #7000, 17 October 1979, Porter Co. (MOR)
Kjellmark #2, 23 April 1987, Porter Co. (MOR)

Fraxinus americana L. var. *biltmoreana* (Beadle) J. Wright ex Fernald [most sources subsume under the species, but others separate it as the species *F. biltmoreana* Beadle]
Biltmore white ash is rare in Keiser C, Heron Rookery A, and Hobart Prairie Grove. There are occasional specimens of *F. americana* from throughout the Chicago Region that "have hairs along the main veins and even scattered over the lamina, but the trees at the Heron Rookery are downy pubescent over the whole lower leaflet surfaces, rachises, petioles, and twigs" (Wilhelm 1990). Deam (1940) cites records of Biltmore ash as near as Montgomery and Wells Counties in central Indiana. This variety is not recognized in ITIS (2022). Wilhelm and Rericha (2017) call this species *F. biltmoreana* Beadle.

Voucher Specimens:
Wilhelm & Ware #6997, 17 October 1979, Porter Co. (MOR)

Fraxinus nigra Marshall
Black ash is known from the East Unit of INDU as well as Heron Rookery and Pinhook Bog. It is commonly found at the edges of wetlands on the moraine and hydromesophytic forests. It has been found growing in Bailly B and D; Cowles Dunes A and D; DSP A; Furnessville B, C, and E; Keiser B, C, and E; Tamarack A; Heron Rookery B; and Pinhook Bog (Wilhelm 1990). Farther north, the loss of this species from the emerald ash borer will negatively impact Native American basket making (Kimmerer 2013).

Voucher Specimens:
Deam #8061, 4 May 1911, Porter Co. (IND)
Wilhelm #6697, 26 May 1979, Porter Co. (MOR

Fraxinus pennsylvanica Marshall
For many decades, confusion has existed as to whether red and green ash are separate species or just varieties of *Fraxinus pennsylvanica* (Campbell 2017). Specimens without seeds are difficult to identify according to Campbell, a more likely scenario with emerald ash borer disease present. While found in every unit of the park except Tolleston Dunes, green ash now is found in extensive areas of hydromesophytic forest and swamps as standing dead or recently fallen. Young trees persist, because their small diameter cambium is not available to the emerald ash borer.

Voucher Specimens:
Peattie #2098, 22 August 1925, Porter Co. (F)
Wilhelm #6859, 20 June 1979, Porter Co. (MOR)

ONAGRACEAE — Evening Primrose Family

Plants in the evening primrose family are usually herbs with alternate or opposite simple leaves. The flowers have four sepals and petals, the latter often clawed. The stamens are the same as or twice the number of petals. The inferior ovary is composed of four united carpels. A few ornamental plants exist in this family, including *Fuchsia* spp.

Circaea alpina L.

Small enchanter's nightshade was reported by Deam (1940) (see specimen below) from the vicinity of the Tamarack Bog (Tamarack A), in wet woods at Tamarack Stop on the CSSSBR, from where it was probably extirpated when the bog was drained, filled, and developed. No modern records are known from Indiana.

Voucher Specimens:

Deam #8816, 17 June 1911, Porter Co. (IND)

Chamerion angustifolium (L.) Holub [*Chamaenerion angustifolium* (L.) Scop.; *Epilobium angustifolium* L.]

Fireweed, or great willow herb, is known from Tolleston Dunes A, Hoosier Prairie, and Keiser C. Wilhelm (1990) reported this boreal herb from Tolleston Dunes A. Casey Zill found fireweed growing along the Great Marsh trail at Beverly Shores on 21 July 2014. On 25 January 2016, Casey observed that it may be lost due to debris left from undercut ashes, sumac, and bush honeysuckle from restoration work, but such disturbance may benefit the population. Fireweed is a common sight in boreal regions of the northern hemisphere after wildfires, carpeting the landscape in purple when in bloom (Apfelbaum et al. 2017). Swink noted in 1946 a population south of Miller that appeared after a fire (Mohar 2000). Wilhelm (1990) recorded fireweed from Hoosier Prairie. This species may have been more common in the landscape prior to the long period of fire suppression. There is no specimen from the Indiana Dunes present in local herbaria.

Epilobium ciliatum Raf.

Northern willow herb is reported from Miller Woods, Cowles Dunes, and Hoosier Prairie. Levi Umbach collected this willow herb at Millers on 27 July 1909. Dan Mason (NPS) and Tonkovich found it growing in Miller Woods A between 1999 and 2000. It is reported from Miller Woods D. Scott Namestnik found it growing in Cowles Bog A on 29 July 2015 (specimen below).

Voucher Specimens:

Namestnik #2631, 29 July 2015, Porter Co. (MOR)

Epilobium strictum Muhl. ex Spreng.

Downy willow herb is recorded from Cowles Dunes and Hoosier Prairie A. On 8 September 1897, E.J. Hill collected a specimen from "bogs, Miller," which may have been outside the INDU boundaries. Downy willow herb is also reported from Cowles Dunes A (Wilhelm 1990). In 1988, John Bacone listed this species from Hoosier Prairie (Wilhelm 1990).

Voucher Specimens:

Deam #42317, 22 August 1925, Porter Co. (IND)

Ludwigia sphaerocarpa Elliott [*L. sphaerocarpa* var. *deamii* Fernald & Griscom]

Round-fruited, or Deam's, loosestrife is known from Miller Woods and Cowles Dunes. This rare species may be confined to the swale in Miller Woods F near the *Glyceria borealis* population (Wilhelm 1990). It is also reported from Miller Woods E by Tom Post on 4 June 1994 . Round-fruited loosestrife is known from Little Lake, where it is common, and in the nearby NIPSCO ponds, also known as Blag Slough, in Cowles Dunes A (Wilhelm 1990, Pavlovic et al. 2009). Bowles et al. (1986) reported the following associates from Little Lake: *Calamagrostis canadensis*, *Cephalanthus occidentalis*, *Cladium mariscoides*, *Dulichium arundinaceum*, *Eleocharis palustris*, *Hypericum boreale*, *Juncus canadensis*, and *Proserpinaca palustris*.

Voucher Specimens:

Siminon #27, 2 September 1982, Lake Co. (MOR)
Deam #21191, 25 August 1916, Porter Co. (IND)
DeMauro and Bowles #1, 21 August 1985, Porter Co. (MOR)
Buchholz #7, 22 August 1985, Porter Co. (MOR)

Oenothera fruticosa L. ssp. *tetragona* (Roth) W.L. Wagner [*O. fruticosa* ssp. *glauca* (Michx.) Straley; *O. tetragona* Roth; *O. tetragona* var. *longistipata* (Pennell) Munz]
Glandular sundrops is occasional in the mesic prairie in the Howes Prairie area of Cowles Dunes B. Lois Howes saw glandular sundrops in Lupine and Howes Prairie on 19 June 1981 and 11 June 1981, respectively (Howes 1985). It is reported from Keiser F based on Myrna Newgent's observation on 29 June 1995.

Voucher Specimens:

Wilhelm #6943, 15 July 1979, Porter Co. (MOR)
Pavlovic #43, 10 August 1983, Porter Co. (INDU)

Oenothera gaura W.L. Wagner & Hoch [*Gaura biennis* L.]
Biennial gaura is reported from Hobart Prairie Grove by Sandy O'Brien (pers. comm. with Pavlovic). This is the first modern record for Lake County, Indiana. *Oenothera gaura* is not known from Porter County. We lack a specimen to vouch for the occurrence of biennial gaura at Hobart Prairie Grove, but Nathanael Pilla does have a photograph taken at Hobart Prairie Grove (Pilla, pers. comm. with Pavlovic).

Oenothera oakesiana (A. Gray) J.W. Robbins ex S. Watson & J.M. Coult.
Dunes evening-primrose is reported from Miller Woods A by Gerould Wilhelm (see specimen below). Wilhelm and Rericha (2017) only report it from Lake County in northwest Indiana. Further searching in the West Unit east of Miller Woods may identify additional reports of this species.

Voucher Specimens:

Wilhelm #5185, 3 August 1978, Lake Co. (MOR)

Oenothera perennis L.
Small sundrops grows in Cowles Dunes B (Wilhelm 1990). The Morton Arboretum (Lisle, Illinois) has specimens from Lake County, Indiana, but outside of INDU. There are no specimens of this species in the INDU herbarium.

OROBANCHACEAE — Broom-rape Family

Formerly restricted to the broom-rapes, this family now includes the hemiparasites that were formerly in the Schrophulariaceae family. Broom-rapes are annual or perennial herbaceous root parasites and hemiparasites. The root parasites often lack chlorophyll and are unable to photosynthesize. They depend upon their hosts for nutrition. The vegetative portions are various colors: red, brown, purple, or white. The scale-like leaves are alternate. The flowers are bisexual and zygomorphic. They have two to five fused sepals, five united petals, and the pistil is formed by four stamens of two lengths and two united carpels.

Agalinis auriculata (Michx.) S.F. Blake [*Tomanthera auriculata* (Michx.) Raf. or *Gerardia auriculata* Michx.]
Eared false foxglove is still reported by the Indiana Division of Nature Preserves from Hoosier Prairie A, though it is believed to be extirpated (Wilhelm 1990).) This state endangered plant has been found elsewhere in northwest Indiana (Consortium of Midwest Herbaria 2021). Mulvaney et al. (2004) demonstrated that this species is self-compatible and, therefore, able to set seed when pollinators are limited. No specimen for this species from INDU has been collected and housed in the local herbaria.

Agalinis skinneriana (Alph. Wood) Britton [*Gerardia skinneriana* Alph. Wood]
Pale false foxglove was reported from Hoosier Prairie A in 1987. Lake County specimens

from other sites outside of INDU are housed at the Morton Arboretum. This species reaches its eastern limit in Lake County, Indiana (Wilhelm and Rericha 2017).

Voucher Specimens:

Hedge and Martin # 29 August 1991, Lake Co. (MOR).

Buchnera americana L.

Blue hearts is known from the Lois Howes Prairie in Cowles Dunes B. Lois Howes found it in bloom on 23 July 1979 (Howes 1985). Wilhelm (1990) wrote,

> *One of our rarest plants, this species is known yet from three small populations in the Howes Prairie region of Survey Area B* [Cowles Dunes B]. *Ray Schulenburg found it growing with "*Andropogon gerardii, Anemone cylindrica, Aristida purpurascens, Artemisia campestris *ssp.* caudata, Comandra richardsiana, Coreopsis tripteris, Eryngium yuccifolium, Fragaria virginiana, Lechea mucronata, Lespedeza capitata, Liatris cylindracea, Lithospermum caroliniense *var.* croceum, Populus tremuloides, Pteridium aquilinum *var.* latiusculum, Quercus velutina, Rudbeckia hirta, Salix humilis, Schizachyrium scoparium, Solidago nemoralis, S. speciosa, Sorghastrum nutans, Symphyotrichum dumosum, S. ericoides, *and* S. oolentangiense.*" The following additional associates were listed by Bowles et al. (1985) during their sampling of the Howes Prairie population:* Castilleja coccinea, Coreopsis lanceolata, Hypericum kalmianum, Juncus brachycarpus, Liatris spicata, Panicum virgatum, Scleria triglomerata, Tradescantia ohiensis, *and* Viola sagittata *var.* sagittata. *Since then, Bowles (1988) sampled this population in 1986 and 1987 and found that it appeared to be declining. Alas, Plampin (1989b) was unable to find any plants in 1989.*

Blue hearts reappeared in 1990 after water levels increased (Pavlovic, pers. obs.). Pavlovic and Bowles (1996) hypothesized that populations of the species respond to groundwater fluctuations in Howes Prairie (Cowles Dunes B). Ongoing dry conditions in Howes Prairie in the late 1990s and the beginning of the 21st century did not bode well for seeing this species. Nonflowering plants were trampled around flowering plants in our monitoring plots within Howes Prairie, possibly by photographers (Pavlovic, pers. obs., 1993). No plants were seen following the abundant rainfall in 2006. On 28 July 2008, Plampin and Hamilla searched the approximately eight population sites in Howes Prairie but did not find any plants (Plampin and Hamilla 2008a, 2008b). However, on 1 August 2011, Coleman Minney found a single plant in bloom in a new location in Howes Prairie! Plampin did find a non-flowering plant in one of the known sites on the same day. Originally there were four patches of blue hearts in Howes Prairie along the north edge of the mesophytic prairie at the toe of the parabolic dune. They were all west of the main trail that descends straight downslope on the dune and east of the trail that ascends the high dune to the blowout. In October 2016, Megan Korte and Mary Fisher Dunham sowed seeds in Howes Prairie that Pavlovic received from Greg Livovitch. These seeds were from a disturbed railroad wet mesic siding in Lake County, Indiana. We have not seen any blue hearts plants in Howes Prairie since sowing.

Voucher Specimens:

Schulenberg et al., #76-989, 9 October 1976, Porter Co. (MOR)

Castilleja coccinea (L.) Spreng.

Indian paintbrush is found in Miller Woods, Calumet Prairie, Cowles Dunes, and Hoosier Prairie. Like many plants in the Orobanchaceae family, this species establishes in association with perennial roots of other plant species. Its populations can exhibit wide fluctuations (tens to hundreds) in plant numbers above ground from year to year, depending upon climatic variation. It is occasional in Miller Woods A, B, and C, but in certain years is locally abundant (Pavlovic, Stacey Leicht-Young, and Krystalynn Potts, pers. obs., 2007–2010). Indian paintbrush is occasional in Calumet Prairie C. The green and orange Indian paintbrush are occasionally in Howes Prairie (Cowles Dunes B). Lois Howes saw Indian

paintbrush in bloom in Pine Prairie (Howes Prairie) on 1 June 1979 (Howes 1985). The populations of Indian paintbrush were spectacular in density and color in 1983, when surface water levels were high in Howes Prairie (Pavlovic, pers. obs.)! Indian paint brush is locally common in the portions of Hoosier Prairie A, particularly after a fire in the wettish sands (Wilhelm 1990).

Voucher Specimens:

Hiebert & Payton #274, 14 May 1982, Lake Co. (MOR)
Jones s.n., 30 July 1976, Porter Co. (INDU)

Conopholis americana (L.) Wallr.

American cancer root grows in mesic woods in Cowles Dunes, DSP, Furnessville, Keiser, and Pinhook Bog. Pavlovic, Sarah Emeterio, and Chris Walkons observed this species in full bloom in an oak woodland in Howes Prairie (Cowles Dunes B) on 4 June 2009. American cancer root is extant in the swamp complex in the DSP and may appear along Trail 2 (Wilhelm 1990). This species is occasional in the swamp complex portions of Furnessville A, B, C, D, and G (Wilhelm 1990). In 1987, Emma Pitcher noted several colonies along the horse trail at the east end of the burn area in Furnessville A. In 1989, Plampin noted eighteen plants in Furnessville C that she had observed on 11 January 1988 (Wilhelm 1990). Plampin found this species growing in Keiser A in January 1993. This unusual plant is frequent in the red maple-wooded swamps of Keiser C and E (Wilhelm 1990). Plampin reported about ten plants up-slope in Pinhook Bog A on 23 May 1986 (Wilhelm 1990).

Voucher Specimens:

Pearsall s.n., July 1939, Porter Co. (F)
Wilhelm & Dritz #6708, 26 May 1979, Porter Co. (MOR)

Melampyrum lineare Desr.

Cow wheat is rare within Indiana Dunes, but is common in dune and swale embayments to the north, such as those at Sleeping Bear Dunes National Lakeshore (Pavlovic, pers. obs., 1998–2000 and 2003). It is known from Miller Woods, Cowles Dunes, DSP, and Tamarack. Before 1975, this species was occasional beneath the jack pines (*Pinus banksiana*) that grow around the pannes in Miller Woods A, but Gerould Wilhelm had neither seen it there in recent years nor become aware of any contemporary reports (Wihelm 1990). This species is extant in both Cowles Dunes A and B, where Plampin reports there are at least five populations. Nathanael Pilla confirmed the presence of cow wheat in Cowles Dunes A on 12 June 2016 (pers. comm. with Pavlovic). Ken Dritz found it in the same subunit in 1990 (Wilhelm 1990), growing with *Aralia nudicaulis*, *Asclepias tuberosa*, *Carex pensylvanica*, *Euphorbia corollata*, *Gaultheria procumbens*, *Hamamelis virginiana*, *Hieracium gronovii*, *Ionactis linariifolia*, *Koeleria macrantha*, *Lupinus perennis* var. *occidentalis*, *Maianthemum canadense*, *M. stellatum*, *Phlox bifida*, *Prunus virginiana*, *Quercus alba*, *Q. velutina*, *Rosa carolina*, *Sassafras albidum*, *Tephrosia virginiana*, *Vaccinium angustifolium*, and *V. pallidum*. In DSP, cow wheat is extant in at least two places in the dune complex, one near Wilson Shelter, the other near the head of Trail 2 within the park (Wilhelm 1990). Bowles et al. (1986) listed the following associates: *Acer rubrum*, *Amelanchier arborea*, *Aralia nudicaulis*, *Carex pensylvanica*, *Cornus florida*, *Hamamelis virginiana*, *Maianthemum canadense*, *M. racemosum* ssp. *racemosum*, *Mitchella repens*, *Nyssa sylvatica*, *Pinus strobus*, *Prenanthes alba*, *Pyrola americana*, *Quercus alba*, *Q. rubra*, *Trientalis borealis*, *Vaccinium angustifolium*, *V. pallidum*, and *Viburnum acerifolium*. Doug Botka has been monitoring two small colonies in DSP that he found in July of 2016. Previously unknown from the Tamarack Unit, cow wheat was documented in 1984 by Pavlovic with Marlin Bowles and Marcella DeMauro. Bowles et al. (1986) reported that it occurs in a 400-meter-square area in a level pocket in the dune complex of Tamarack C, and they listed the following associates: *Carex pensylvanica*, *Comandra umbellata*, *Hamamelis virginiana*, *Crocanthemum canadense*, *Koeleria macrantha*, *Liatris aspera*, *Quercus velutina*, *Sorghastrum nutans*, *Piptochaetium*

avenaceum, *Schizachyrium scoparium*, and *Vaccinium pallidum*. Plampin et al. (2003) discuss the presence of at least 25 populations in Tamarack C, of which 10 were not relocated. Populations of this species fluctuate among years because of its annual lifespan due to interannual climatic variation in rainfall and temperature (Pavlovic, pers. obs.).

Voucher Specimens:

Dritz #104, 13 July 1980, Porter Co. (MOR)
Hill #37.93, 20 June 1893, Lake Co. (F)
Pavlovic #99, 28 June 1984, Porter Co. (MOR)

Orobanche fasciculata Nutt.

Clustered broom-rape is known from Miller Woods and Cowles Dunes. Steve Weller (pers. comm. with Pavlovic) saw clustered broom-rape in Miller Woods A sometime in the 1980s. According to Lois Howes, this species grew until the late 1970s at one location in the savanna complex portion of Howes Prairie in Cowles Dunes B. She saw it in Pine Prairie (Howes Prairie) on 10 June 1955 (Howes 1985). Its apparent disappearance above ground may be an artifact of its parasitic autecology. Clustered broom-rape is often parasitic on *Artemisia campestris* ssp. *caudata*, a species that is frequent to common in Cowles Dunes B. If plants are persisting on wormwood roots below ground, clustered broom-rape may show up again at another location locally. See the comments by Pepoon (1927, page 471). According to Jim Bess (pers. comm. with Pavlovic, 1995), this species grows by the hundreds on the sand cap over the Midwest Steel confined disposal facility for pickling liquor east of Burns Ditch. The Morton Arboretum has several specimens of clustered broom-rape from Lake County, Indiana, but none from within the boundaries of INDU. The Field Museum of Chicago similarly has numerous specimens from Pine and nearby locations in Gary, but none from within INDU.

Orobanche uniflora L.

One-flowered broom-rape is known from Miller Woods, Cowles Dunes, DSP, and Hoosier Prairie. Tom Post reported this species from Miller B in 1993. In 1989, Plampin cited several recent reports of this species along the trail in Miller Woods C (Wilhelm 1990). In 1990, Myrna Newgent reported one-flowered broom-rape from Miller Woods G, growing with *Sassafras albidum*. Anita Ahrens (NPS) and other observers saw one plant in Miller Woods G on 19 May 1999. A small patch of the purple form was found by Stacey Leicht-Young, Krystal Potts and Pavlovic on 18 May 2006 near the Harbor Belt in Miller Woods C. In 1988, Emma Pitcher cited the following note by Lois Howes: "Tr. from Lupine to Studebaker Tr., 5/30/79" in Howes Prairie or Cowles Dunes B (Howes 1985). Swink and Wilhelm (1979) reported that they recorded this species "in a thicket of *Sassafras albidum* in Indiana Dunes State Park in Porter County." Lyon (1927) reported it from "subdunal woods, Tremont." The cream-colored form is known from along the south side of the Calumet Bike Trail in DSP B, where it was found by Plampin on 14 May 1986. According to Pavlovic's collection a few days later, it was growing with *Acer negundo*, *Sassafras albidum*, and *Solidago altissima*. Indiana Division of Nature Preserve records document one-flowered broom-rape from Hoosier Prairie A in 1990.

Voucher Specimens:

Pavlovic #158, 30 May 1986, Porter Co. (MOR)

OXALIDACEAE — Wood Sorrel Family

Wood sorrels are perennial herbs, rarely trees, with fleshy tubers or rhizomes. The leaves are alternate with pinnately or palmately compound leaflets that often have an acrid taste due to the presence of calcium oxalate. Flowers have five sepals and petals, ten stamens, and five united carpels with five distinct styles. At least one species of *Oxalis*, *O. tuberosa* (known commonly as oca), has been cultivated as food tubers for centuries in the central

and southern Andes Mountains of South America (Thayer 2010). *Averrhoa carambola* produces the edible star fruit (Lawrence 1951, Elpel 2013).

Oxalis violacea L.

Violet wood sorrel is known from Bailly, Keiser, Hobart Prairie Grove, and Hoosier Prairie. Plampin and Hamilla found it in Bailly D on 5 June 2009 just west of *Frasera caroliniensis* with *Allium canadense* var. *canadense* and *Lindera benzoin*. Nicole Kalkbrenner (student volunteer with Charlotte Wolfe, an Indiana University graduate student) found this species growing in Keiser B on 25 July 1994 . It is also known from Hobart Prairie Grove. This rare wood sorrel is occasional in the drier portions of Hoosier Prairie A, with its abundance most visible after a fire (Wilhelm 1990). Violet wood sorrel is found throughout all counties of the Chicago Wilderness region (Wilhelm and Rericha 2017).

Voucher Specimens:

Hiebert & Payton #285, 14 May 1982, Lake Co. (MOR)

PAPAVERACEAE — Poppy Family

Poppies are mostly annual or perennial herbs that often have milky or colored sap. The leaves are alternate and entire or divided. Flowers have two to five sepals, four to six or eight to twelve petals, numerous stamens, and a superior ovary of two to several united carpels. Papaver somniferum is the source of opium, morphine, and heroin. Poppy seeds whole or ground into a paste for cooking lack the high concentrations of the active alkaloids. The genus *Corydalis* has often been considered part of the family Fumariaceae (Lawrence 1951), but phylogenetic data support the Fumarioideae as a subfamily in Papaveraceae (Stevens 2023).

Corydalis sempervirens (L.) Pers.

Pink corydalis is known from Hoosier Prairie. Pink corydalis was unknown from Hoosier Prairie A until after a prescribed fire in May 1984, when it appeared along with *Geranium bicknellii* (Wilhelm 1990). Swink and Wilhelm (1979) pointed out that pink corydalis occurs in sandy soil where there recently has been a fire and where it associates with *Geranium bicknellii* and *Persicaria careyi*. Bowles et al. (1985) mapped a population (Hoosier Prairie A) and listed these associates: *Aronia* × *prunifolia*, *Erechtites hieraciifolius* var. *hieraciifolius*, *Maianthemum canadense*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, *Rhus copallinum* var. *copallinum*, and *Vaccinium angustifolium*. Bowles (1987) conducted a much-expanded sampling of the population and noted 203 plants at a linear density of 1.1 plants/meter.

Bowles described the habitat of pink corydalis as "former mesic savanna (cleared of aspen and *Quercus velutina* top-killed by fire)," and listed the following dominants and specific associates: *Apocynum androsaemifolium*, *Coreopsis tripteris*, *Geranium carolinianum*, *Erechtites hieraciifolius* var. *hieraciifolius*, *Helianthus divaricatus*, *H. mollis*, *Parthenium integrifolium*, *Persicaria careyi*, *Populus tremuloides*, *Pteridium aquilinum* var. *latiusculum*, and *Solidago altissima*. Pink corydalis is documented from Hoosier Prairie C (Wilhelm 1990). Evidently, the seeds of these annual plants have exploited nearby areas of bare sand. Wilhelm and Rericha (2017) name this species *Capnoides sempervirens* (L.) Borkh.

Voucher Specimens:

Klick & Kjellmark #2792, 7 June 1988, Lake Co. (MOR)

PHRYMACEAE — Lopseed Family

The lopseed family contains species that were often formerly placed in the Schrophulariaceae and Verbenaceae families. We have two genera within Indiana Dunes, *Mimulus* and *Phyrma*. Plants from this family are aquatic or terrestrial. They have

simple opposite leaves with petioles and serrated margins. The flowers are bisexual and zygomorphic. Both the five sepals and petals are fused at the base into a tube. The four stamens are arranged in pairs and the pistil has a single, long style with a two-lobed stigma. The fruit is a capsule or a dry achene.

Mimulus alatus Aiton

Winged monkeyflower is known from Cowles Dunes, DSP, Hobart Prairie Grove, Heron Rookery, and Hoosier Prairie. Gerould Wilhelm writes that winged monkey flower "was unknown to the Chicago Region in modern era until its discovery here by Christy Fox in 1985 at the Heron Rookery A." It is rare in the ecotone between the Great Marsh and Howes Prairie in Cowles Dunes B. According to Wilhelm (1990), this rare monkey flower grows in the Dunes State Park in "two stands found by Doug Hibshman near the [former] dam at the west end of Trail 2; two with *Myosotis laxa*, four about twenty-five yards beyond on the north side of Trail 2 in the swamp." Douglas Botka saw this species growing in the DSP in July of 2016. It has also been found at Hobart Prairie Grove (Sandy O'Brien, pers. comm. with Pavlovic) and Hoosier Prairie A in 1995 (see Hoosier Prairie chapter).

Voucher Specimens:

Fox #112, 1 August 1985, Porter Co. (MOR)

PLANTAGINACEAE — Plantain Family

Plants in the plantain family are annuals and perennials with basal and alternate leaves that have parallel venation. Flowers have four sepals, petals, and stamens, and a pistil composed of two (sometimes four) fused carpels. The mucilaginous seed coats of the European *Plantago psyllium* provide a purported laxative. The best-known plants in the family are the lawn weeds introduced from Europe. Less known is the flood disturbance-dependent *Plantago cordata*, which is extirpated from Indiana (Bowles and Apfelbaum 1989). Recently, many species formerly in the Schrophulariaceae family have been transferred to this family on the basis of genetic and phylogenetic information (Flora of North America Editorial Committee 2019).

Collinsia verna Nutt.

The annual blue-eyed Mary has been found within Indiana Dunes only at the Heron Rookery in moist depressions on both sides of the Little Calumet River. Blue-eyed Mary has been the subject of plant demography research, and populations appear from the seedbank during wetter conditions (Kalisz 1986, 1989). This species has not appeared at the Heron Rookery for several years (Plampin, pers. obs., 1990–2010), perhaps due to local drying from ongoing downcutting and bank erosion of the Little Calumet River. The blue upper petals and the white lower petals make a striking floral display.

Voucher Specimens:

Payton #4, 4 May 1982, Porter Co. (INDU)

Penstemon tubaeflorus Nutt.

White wand beardtongue was thought to be extirpated from Indiana until found by Pavlovic growing in Tolleston Dunes A in 1990. Hull (1938) had seen this species in 1938 east of Miller, which could be the site of the 1990 observation. White wand beardtongue was growing in a wet-mesic meadow just east of the sand-mined area, where the moveable rail track was used prior to 1938 (year of the first available aerial photographs). This species is possibly adventive here, like the *P. grandiflorus* found growing by Gerould Wilhelm nearby (Wilhelm and Rericha 2017). Since this species is Indiana state-endangered, we have included it in the special flora.

Voucher Specimens:

Pavlovic & Arzarian, 6 July 1990, Lake Co. (MOR)

Plantago virginica L.
Dwarf plantain has ruderal tendencies, and within Indiana Dunes is rare, found only at Hoosier Prairie A. The voucher below was collected nearby in cindery sand. This species is often considered adventive in the Chicago Region (Wilhelm and Rericha 2017). It also is listed as a native plant of North America by BONAP (2021).

Voucher Specimens:
Schulenberg & Billeter #73-216, 15 July 1973, Lake Co. (MOR)

Veronica americana Schwein. ex Benth.
Father Julius A. Nieuwland collected two specimens of American speedwell from "Mineral Springs," the first on 26 June 1916 and the second in 1917. It is not clear whether this was near the Mineral Springs stop on the CSSSBR or the seeps on the south side of the Little Calumet River south of U.S. 20 and east of Mineral Springs Road. The latter location is outside of INDU. We include this species in the flora with the qualification that it might not have occurred within Indiana Dunes.

Voucher Specimens:
Nieuwland s.n., 26 June 1916, Porter Co. (NIE)

Veronica catenata Pennell [*V. comosa* Richter; *V. connata* Raf. ssp. *glaberrima* Pennell]
Water speedwell has been found in Cowles Dunes, DSP, and Furnessville. This species may be extant somewhere within the marsh complex portions of Cowles Dunes A, and it was seen in Cowles Dunes B by Plampin on 30 July 1992 in the ditch west of Waverly Road. Water speedwell was reported from the mouth of Dunes Creek in DSP by Lyon (1927). That site has been paved over by the parking lot near the pavilion. Water speedwell is also documented by the record below from Swink. Gerould Wilhelm recorded this species along the former Buffalo and Mississippi right-of-way just south of the CSSSBR in Furnessville G on 7 June 1997. This taxon is quite variable and has been recognized by differing names depending on the botanist's perspective. Reznicek calls this *Veronica anagallis-aquatica* L., a name associated with the European introduction and includes native elements. Wilhelm and Rericha (2017) distinguish *V. anagallis-aquatica* L. from *V. catenata* Pennell var. *glandulosa* (Farw.) Pennell. We accept the ITIS (2022) name, *V. catenata* Pennell, while the Flora of North America Editorial Committee (2019) uses a new name, *V. connata* Raf. ssp. *glaberrima* Pennell. According to Wilhelm and Rericha (2017), this species has leaves longer than three times as wide, pedicels that are stipitate glandular, and sepals that are obtuse to acute. *V. anagallis-aquatica* has shorter leaves, glandular pedicels, and acuminate sepals.

Voucher Specimens:
Friesner s.n., 15 September 1945, Porter Co. (BUT)
Swink s.n., 24 August 1946, Porter, Co. (MOR)
Bennett s.n., 21 August 1960, Porter Co. (F)

POLYGALACEAE — Milkwort Family

Milkworts are herbs, shrubs, or small trees with alternate simple leaves. The zygomorphic flowers are bisexual, and each is subtended by a bract and two bracteoles. The blooms resemble pea blossoms, with which they are often confused. Flowers have five distinct sepals and three petals, with the lower often fringed. The flowers have eight stamens. The superior ovary is composed of two (sometimes five) fused carpels. Some milkworts are cultivated as ornamentals.

Polygala paucifolia Willd.
Gaywings is known from nowhere else in Indiana or the Chicago Region (an old record for Cook County, Illinois, notwithstanding) than several populations in DSP. Gaywings was reported by Lyon (1927). With the help of a map provided by Mr. Ray Grow of Gary,

Indiana, Ken Dritz collected a specimen in May 1980 (see below), which he found growing with *Amelanchier humilis*, *Arabidopsis lyrata*, *Aralia nudicaulis*, *Carex pensylvanica*, *Diervilla lonicera*, *Gaultheria procumbens*, *Hamamelis virginiana*, *Ionactis linariifolia*, *Maianthemum stellatum*, *Prunus virginiana*, *Quercus velutina*, *Sassafras albidum*, *Solidago caesia*, *Toxicodendron radicans*, *Tradescantia ohiensis*, and *Viburnum acerifolium*. Two of these sites from the Ray Grow map are mapped by Bowles et al. (1985). They recorded one population growing with *Amelanchier arborea*, *Anemone americana*, *Aralia nudicaulis*, *Campanula rotundifolia*, *Huperzia lucidula*, *Maianthemum racemosum* ssp. *racemosum*, *Pedicularis canadensis*, *Prenanthes* sp., *Prunus virginiana*, *Quercus velutina*, *Thalictrum dioicum*, and *Vaccinium pallidum*. The other population associated with *Amelanchier arborea*, *Hamamelis virginiana*, *Ionactis linariifolia*, *Krigia virginica*, *Maianthemum racemosum* ssp. *racemosum*, *M. stellatum*, *Quercus velutina*, *Sassafras albidum*, *Vaccinium pallidum*, and *Vitis* sp. Michael Homoya, on a foray of 25 May 1989, noted another population of gaywings growing with *Anemone americana*, *Aquilegia canadensis*, *Aralia nudicaulis*, *Circaea quadrisulcata* var. *canadensis*, *Eurybia macrophylla*, *Hamamelis virginiana*, *Maianthemum canadense*, *M. racemosum* ssp. *racemosum*, *M. stellatum*, *Polystichum acrostichoides*, *Trillium grandiflorum*, and *Viola pubescens*. According to Ken Dritz (pers. comm. with Pavlovic), there is a population of white-flowered plants on Mt. Jackson. Outlier populations were mapped by Fishbein under the direction of Pavlovic (Fishbein 1987). A wildfire in 1992 temporarily impacted these populations; however, reports from the Indiana Dunes BioBlitz of 2009 (a 24 hour all taxonomic survey by experts and the public) of the continued abundance of this species at the traditional site suggest earlier reports of decline were premature (Pavlovic and Stacey Leicht-Young, pers. obs.)

Voucher Specimens:

Lyon s.n., 23 July 1922, Porter Co. (BUT)
Dritz #58, 18 May 1980, Porter Co. (MOR)

POLYGONACEAE — Buckwheat Family

Buckwheats are herbs, shrubs, and, sometimes in the tropics, trees. Plants have swollen nodes, hence the name poly-gonum ("many-knees"). Leaf bases typically are expanded over the node and up the stem into a sheath called an ochrea. Flowers are bisexual in small racemes or spikes. Flowers have three to six sepals, usually arranged as five or three plus three, and lack petals. Stamens are three to six, and the pistil is composed of three fused carpels. The seeds are lens-shaped, three-sided, or tetrahedral. Buckwheat (*Fagopyrum esculentum*) and rhubarb (*Rheum rhabarbarum*) are the most important plants economically. Probably best known in the U.S. are the weedy docks (*Rumex* spp.); less known is sorrel (*Rumex acetosa*), which can be made into soup (Lawrence 1951, Elpel 2015).

Persicaria arifolia (L.) Haroldson [*Polygonum arifolium* L. var. *pubescens* (R. Keller) Fernald]

Halberd-leaved tear-thumb grows in the swamps and marshes of Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Pinhook Bog. This species is reported by Ken Dritz from Inland Marsh B (Wilhelm 1990). Halberd-leaved tear-thumb is frequent in marsh and swamp complexes of Cowles Dunes A and probably B (Wilhelm 1990). This tear-thumb is extant in marsh and swamp complexes, particularly those in the eastern portion of DSP. It is occasional in the swamp complex portion of Furnessville C, and is probably also extant within similar habitats in B and D (Wilhelm 1990). This species is frequent in the swales of the swamp complex in Keiser B, C, and E, and along the Bike Trail in Keiser D (Wilhelm 1990). Halberd-leaved tear-thumb is occasional in Tamarack B and in the pools and ditches around Pinhook Bog. This species is identified as *Tracaulon arifolium* (L.) Raf. var. *pubescens* (R. Keller) Mohlenbr., according to Wilhelm and Rericha (2017).

Voucher Specimens:

Hiebert #502, 5 September 1986, Porter Co. (MOR)
Wilcox #63, 18 August 1982, La Porte Co. (MOR)

Persicaria careyi (Olney) Greene [*Polygonum careyi* Olney]

Carey's heartsease is known only from DSP, Keiser, and Hoosier Prairie. This rare knotweed grows in moist prairie along the north side of the bike trail, opposite Hadenfeld Road, between Towers #8818 and 8819 in DSP B (Wilhelm 1990). Carey's heartsease is occasional along the bike trail east of Kemil Road (Keiser C), where it grows with *Carex folliculata*, *Eleocharis obtusa*, *Eupatorium perfoliatum*, *Euthamia graminifolia*, *Hypericum canadense*, *Juncus marginatus*, *Lycopus uniflorus*, *Osmunda regalis* var. *spectabilis*, *Prunus americana*, *Spiraea tomentosa* var. *rosea*, and *Vitis labrusca* (see the second specimen listed). It is rare in moist sandy areas at Hoosier Prairie A. Scott Namestnik (pers. comm. with Pavlovic) saw "lots" of Carey's heartsease at a mitigation property that is part of the Gaylord Tract in Hoosier Prairie. Elsewhere in Hoosier Prairie, Bowles (1987) noted three adjacent colonies covering an area of 250 square meters with a total of 82 plants. He recorded the following associates: *Apocynum androsaemifolium*, *Corydalis sempervirens*, *Erechtites hieraciifolius* var. *hieraciifolius*, *Populus tremuloides*, *Potentilla simplex*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, *Silene antirrhina*, *Solidago altissima*, *Verbena urticifolia*, and *Vitis riparia*.

Voucher Specimens:

Peattie #2075, 22 June 1925, Porter Co. (F)
Wilhelm & Dritz #16361, 27 July 1988, Porter Co. (MOR)
Swink s.n., 20 July 1968, Lake Co. (MOR)

Persicaria hydropiperoides (Michx.) Small [*Polygonum opelousanum* Riddell var. *adenocalyx* Stanford]

This coastal plain element, scaly mild water pepper, is known locally only from the Coulter Prairie in Inland Marsh B and Cowles Dunes (specimens listed below). In Cowles Dunes A, this plant grew with *Dulichium arundinaceum*, *Nuphar advena*, *Pontederia cordata*, and *Schoenoplectiella purshiana* (second specimen listed below, cited in Wilhelm (1990)). It is also known from the Howes Prairie (Cowles Dunes B), where it was collected by Ken Klick (#2752, INDU).

Voucher Specimens:

Dritz #323, 25 September 1983, Porter Co. (MOR)
Dritz #364, 25 August 1984, Porter Co. (MOR)

Persicaria robustior (Small) E.P. Bicknell

H.C. Benke collected a specimen of stout smartweed on 12 September 1932 at Port Chester. The specimen is housed at the Field Museum and Indiana University. There is no other record of this species from the Dunes. We list the species as occurring in Cowles Dunes E, the location of the former Portchester Station (see Figure 4), but the specimen could have been collected from Furnessville F.

Voucher Specimens:

Benke 5562, 12 Sept 1932, Porter Co. (F)

Polygonum articulatum L. [*Polygonella articulata* (L.) Meisn.]

Schuster et al. (2011) showed that the genus *Polygonella* represents plants that are clearly genetically within the *Polygonum* genus. This lanky, annual jointweed is found only in open, dry, sandy sites including foredunes, sand blows, and sand mines in the late summer. It has been found in Miller Woods, Tolleston Dunes, West Beach, Inland Marsh, Cowles Dunes, DSP, and Tamarack. Jointweed is known from the sand dunes of Miller Woods A and B, but it "was not seen there in recent years" (Wilhelm 1990). Peloquin reported it from Miller Woods C (Whitman et al. 1990). Bowles et al. (1986) also reported it from Miller Woods C, growing with *Arabidopsis lyrata*, *Aristida purpurascens*, *Artemisia campestris* ssp. *caudata*,

Calamovilfa longifolia, *Koeleria macrantha*, *Krigia virginica*, *Quercus velutina*, *Solidago nemoralis*, and *Tephrosia virginiana*. According to Bowles (1989), a Miller population that supported 181 plants in 1985 had fallen to one individual in 1988, a drought year. In 1985, Emma Pitcher and Plampin reported jointweed from Tolleston Dunes A (Wilhelm 1990). Bowles et al. (1986) listed the following associates for this population: *Aristida tuberculosa*, *Artemisia campestris* ssp. *caudata*, *Asclepias syriaca*, *Cyperus houghtonii*, *Dichanthelium ovale* ssp. *pseudopubescens*, *Euphorbia corollata*, *Krigia virginica*, *Monarda punctata* var. *villicaulis*, *Nuttallanthus canadensis*, and *Triplasis purpurea*. Bowles (1989) reported that the frequency within a 90-m² quadrat population dropped from 100% in 1985 to 36% in 1988. Ken Dritz found this plant growing in Tolleston Dunes B with *Aristida tuberculosa*, *Artemisia campestris* ssp. *caudata*, *Carex muehlenbergii*, *C. tonsa*, *Corispermum americanum*, *Cyperus schweinitzii*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Euphorbia corollata*, *Koeleria macrantha*, *Lespedeza capitata*, *Monarda punctata* var. *villicaulis*, *Nuttallanthus canadensis*, *Opuntia cespitosa*, *Pteridium aquilinum* var. *latiusculum*, *Quercus velutina*, *Rhus copallinum* var. *copallinum*, *Rubus flagellaris*, *Sassafras albidum*, *Schizachyrium scoparium*, *Tephrosia virginiana*, and *Triplasis purpurea* (Wilhelm 1990). At West Beach, Wilhelm (1990) found a few colonies just north of Long Lake in B and noted that there were probably colonies in West Beach A and D. Ken Dritz reported to Wilhelm (1990) that jointweed is abundant in Inland Marsh B, and it is also reported from C. Jointweed is rare but still present in Cowles Dunes A and B. Lois Howes saw jointweed in bloom north of Little Lake and in Lupine Lane Prairie on 18 September 1981 and 6 September 1981, respectively (Howes 1985). Douglas Botka told Pavlovic on 20 December 2016 that this species is "doing very well wherever open sand is located" in the DSP. Pavlovic observed this species at the top of a dune at Kansas Avenue in Tamarack C in the late 1980s, and Stacey Leicht-Young and Pavlovic reconfirmed its presence in late October 2006 after a very rainy season. The plants were still in bloom! Jointweed populations may be lower in dry years and higher in wetter years (Pavlovic, pers. obs.).

Voucher Specimens:

Lansing, Jr. #3667, 4 December 1913, Lake Co. (F)
Dritz #634, 25 September 1988, Lake Co. (MOR)
Bennett s.n., 22 September 1957, Porter Co. (F)
Deam #29794, 13 September 1919, Porter Co. (IND)

PORTULACACEAE — Purslane Family

Plants of the purslane family are annual or perennial herbs that are often succulent. The fleshy leaves are alternate or opposite. The flowers have two sepals, four to six petals, and equal, double or numerous stamens. The superior ovary is composed of two to eight fused carpels. Spring beauty (*Claytonia* spp.), moss rose (*Portulaca grandiflora*), and purslane (*Portulaca oleracea*) are well known representatives of this family. *Talinum triangulare* is reportedly used as a potherb in Africa (Taisma and Herrera 2003). Purslane can be eaten as well.

Phemeranthus rugospermus (Holz.) Kiger [*Talinum rugospermum* Holzinger]

Fame flower is known from Miller Woods, Tolleston Dunes, and Inland Marsh. Fame flower is rare. In fact, Swink and Wilhelm (1979) pointed out that it is "near extinction so far as the Chicago Region is concerned." Wilhelm (1990) recalls at least two localities in Gary, Lake County, Indiana, which were known for many years and were thought to be destroyed, but one was found again in the Indiana Dunes. A new site was found by Plampin and Emma Pitcher in 1985 in oak savanna in Tolleston Dunes A, where Bowles et al. (1985) list it as growing with *Artemisia campestris* ssp. *caudata*, *Asclepias tuberosa*, *Cyperus lupulinus* ssp. *lupulinus*, *Ionactis linariifolia*, *Koeleria macrantha*, *Liatris aspera*, *Panicum virgatum*, *Quercus velutina*, *Solidago nemoralis*, *Tephrosia virginiana*, and *Tradescantia ohiensis*. Pavlovic monitored this population annually from 1985 to 1991 (Bowles 1988) and concluded that the

population had been fairly stable in size. Recent visits (2017–2020) by Pavlovic suggest the population is declining as succession occurs at the site. Pavlovic, Roger Hedge, and Emily Stork found only three plants on 26 July 2017, a large decline in part due to successional advancement. Black oak seedlings and little bluestem have invaded its site in the former ORV trail. Pavlovic (1995) found fame flower to be a disturbance-dependent species. With the advent of fire suppression and the deposit of oak leaves, he found that populations have migrated into human-created habitats such as dirt roads, roadsides, and sand mines. Thus, despite the damage caused to individual plants from ORV activity around 30 August 1988, such activity created suitable habitat for fame flower (Pavlovic, pers. obs.). Pavlovic found several small populations in the Woodlake Savanna (former Inland Manor area) in Tolleston Dunes C north and west of the baseball diamond (1988–1990). Plampin and Terry Bonace saw these populations in about 2001. Plampin and Pavlovic investigated a population in 1990 just across the street on Gary School property that has been extirpated due to fire suppression and canopy closure. Plampin found fame flower with Tom Post, Pavlovic, Myrna Newgent and others in two places near Ellis Construction in the Gary Enterprise Zone on 30 June 1990. It is extant in Miller Woods G in disturbed sands under a power line right-of-way. Dawn Ann Wells reported seeing plants along the Inland Marsh A trail on 3 August 1995. Four days later, Plampin and Myrna Newgent saw this population growing with *Polygonum tenue* and *Rosa carolina* near *Helianthus divaricatus*, *Hieracium* spp., *Panicum* spp., *Sassafras albidum*, *Sorghastrum nutans*, and *Tephrosia virginiana*. The Tryon specimen listed below may have come from the Inland Marsh A site but the locality information is vague. The diminutive pink flowers of this species are open for only one day in the late afternoon. Pavlovic (1995) found that if cross-pollination does not occur, then the closing petals facilitate self-pollination by pushing the stamens against the pistil. Fame flower is reported to have disappeared from Willow Slough and Jasper Pulaski Fish and Game areas, which suggests new surveys might be conducted within Indiana Dunes to determine their current status (Homoya, pers. comm. with Pavlovic, 18 May 2017). In July 2020, Michael Piotrowski, Scott Namestnik, and Roger Hedge found only one colony remaining in Tolleston Dunes. On 1 August 2020, Michael Piotrowski and Sarah and Noel Pavlovic revisited this patch and searched Coulter Prairie and the adjacent NIPSCO right-of-way to no avail.

Voucher Specimens:

Swink s.n., 21 June 1946, Lake Co. (MOR)
Plampin & Pitcher #5, 21 August 1985, Lake Co. (MOR)
Tryon #13, August 1935, Porter Co. (F)

PRIMULACEAE — Primrose Family

Primroses are perennial or annual herbs. The simple leaves are opposite, whorled, or basal, and are often gland-dotted. The flower consists of five sepals, five united or separate petals, five stamens opposite the petals, and a superior or inferior ovary composed of five fused carpels. Primrose (*Primula*, now including *Dodecatheon* (Mast and Reveal 2007)) and cyclamen (*Cyclamen*) are well-known ornamentals. Primroses are well-studied because of their heterostyly: the short styles with long stamens (thrum flowers) or long styles with short stamens (pin flowers) are correlated with the genetic breeding system so that only the two-flower forms can cross-pollinate (Darwin 1888, Richards 1997).

Trientalis borealis Raf.

Starflower, a species of boreal swamps, grows in Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. Starflower is reported from Inland Marsh B (Coulter Prairie) (Wilhelm 1990). This species is extant in the swamp complex area of Cowles Dunes A. Lois Howes saw starflower in bloom in Pine Prairie (Howes) on 6 June 1979 (Howes 1985). In 1987, Plampin reported fifteen plants at the bottom of a north-facing slope in Cowles Dunes B, but these plants have not been seen since. Starflower is occasional on beech hummocks in Cowles Dunes D. It also grows in the Dune Acres cooperative

parklands unit east of Mineral Springs Road (Cowles Dunes B). This species is occasional to common in the swamp complex portions of DSP A west of Kemil Road (Wilhelm 1990). Starflower is occasional on mesophytic hummocks in the swamp complex of Furnessville D. In 1987, Emma Pitcher noted that starflower grows at the south end of the boardwalk that starts at Furnessville Road, in Furnessville B, C, and E. It has been found in Keiser B (Plampin, pers. obs., July 1991) and E (Plampin and Newgent, pers. obs., 25 May 1992). In Keiser B, it flourishes in full sun between the Calumet Bike Trail and the traction line west of NIPSCO pylon 8435, growing with *Maianthemum canadense*. This species is frequent, growing with *Mitchella repens*, *Panax trifolius*, and *Rubus pubescens* on the hummocks in the swamp complex of Keiser C (Wilhelm 1990). Plampin and Myrna Newgent found starflower growing in Tamarack B in 1995.

Voucher Specimens:

Swink s.n., 18 May 1946, Porter Co. (MOR)
Hiebert #499, 23 May 1986, Porter Co. (INDU)

RANUNCULACEAE — Buttercup Family

Plants in the buttercup family are annual or perennial herbs with alternate (opposite in *Clematis* and some *Ranunculus*), palmately compound, or simple leaves. Flowers are actinomorphic or zygomorphic. Sepals usually three to six (sometimes up to 20), distinct, often pataloid and colored, occasionally spurred. Petals may be absent or up to 26, usually distinct, variously shaped, conspicuous, or often greatly reduced, but usually with nectaries. Stamens five to many, distinct; and the unicarpellate pistils are single to many. Many species in this family are poisonous (e.g., *Hellebore*, *Delphinium*, and *Aconitum*), but are grown for their flowers.

In the eastern U.S., goldenseal (*Hydrastis canadensis*) is harvested for the pharmaceutical trade, but collection is regulated by many states (Albrecht and McCarthy 2011, Kruger et al. 2020). Like ginseng, goldenseal populations are declining due to illegal and over harvesting (Christensen and Gorchov 2010, Sanders and McGraw 2005).

Actaea rubra (Aiton) Willd.

Red baneberry grows in Cowles Dunes and Pinhook Bog. Wilhelm (1990) writes:

> *Red baneberry, which is not infrequent in nearby Illinois, is as rare as hen's teeth in Indiana, even though the habitat, as we think we understand it, seems to be common. It was unknown from the Lakeshore until it was discovered by Ursula Rowlatt in 1982 just west of Cowles Bog in Cowles Dunes A. Bowles et al. (1986) listed the associates of a single plant as:* Carex pensylvanica, Poa pratensis, Prunus serotina, Sassafras albidum, Vaccinium angustifolium, *and* V. pallidum. *Bowles (1988) noted the same genet in 1987, and seeds were collected for* ex situ *propagation. Sadly, however, Marlin Bowles and I visited this locale in August 1988, where it grew along the trail to Little Lake, but the trail had been mowed, and the plant was gone. Plampin, however, reported it reappeared in 1989 after the trail was rerouted. I do not know if this was the same plant from which Rowlatt collected.*

Pavlovic orchestrated the rerouting of the trail to Little Lake in 1988 with the INDU Maintenance Division to protect this population from trail maintenance activities and damage from recreation. In 1989, the original plant monitored by Marlin Bowles was still growing where the trail was rerouted and appeared to be spreading vegetatively. In 2003, additional patches were found to the west across the trail by Plampin. On 1 August 2007, Hamilla and Plampin counted sixteen sterile and seven fruiting plants at the original site. To the southeast of the trail, they found two fruiting plants, and west of the trail, one sterile and flowering plant (Plampin and Hamilla 2008b). On 18 May 2017, Justin Chappelle, Megan Korte, and Pavlovic relocated the original site and noted one of half a dozen stems flowering.

Red baneberry was rare at Pinhook Bog A, where it occurred on a south-facing mesophytic ravine along the north edge of the bog, growing with *Carpinus caroliniana* ssp. *virginiana*, *Carya cordiformis*, *Eutrochium purpureum*, *Fagus grandifolia*, *Hypericum punctatum*, *Lindera benzoin*, *Maianthemum canadense*, *Pinus strobus*, *Symphyotrichum cordifolium*, *Trillium grandiflorum*, *T. recurvatum*, and *Viola pubescens*. Three years of searching by Plampin and Hamilla have failed to relocate red baneberry in Pinhook Bog A (Plampin and Hamilla 2008b). The ravines where it grew have been affected by deer trampling and erosion (Plampin and Hamilla 2008b).

Voucher Specimens:

Rowlatt #1312, 6 June 1982, Porter Co. (MOR)

Coptis trifolia (L.) Salisb. [*C. groenlandica* (Oeder) Fernald]

Goldthread is a regionally rare species. It is occasional in the swamp complex area of Cowles Dunes A, DSP, Keiser B, and Tamarack B. Lyon (1927) made the following observations about this rare plant: "fairly common in Cowles' Tamarack Swamp, Mineral Springs, and in subdunal woods at Tamarack; not found elsewhere." In 1993 and 1994, Charlotte Wolfe (Indiana University) and Nicole Kalkbrenner (volunteer assistant) found goldthread at numerous locations in DSP. Plampin may have found the population observed by Marcus Lyon (1927) on 14 July 2004, then consisting of 50 individuals, in the old growth forest northeast of the Beverly Shores train stop in Keiser B. Lyon's designation of Tamarack for the population was not specific, so Gerould Wilhelm's assignment of the site to Tamarack A, may be in errror. Associates in Keiser B included *Carex folliculata*, *Fraxinus pensylvanica*, *Lindera benzoin*, *Liriodendron tulipifera*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Prunus serotina*, and *Trientalis borealis*.

Voucher Specimens:

Swink s.n., 23 May 1947, Porter Co. (MOR)
Lyon s.n., 16 August 1925, Porter Co. (BUT)

RHAMNACEAE — Buckthorn Family

Plants in this family are trees, vines, and shrubs with alternate or opposite simple leaves. The flowers have five sepals, petals, and stamens, the latter inserted below a staminal disk. The single pistil has three or two united carpels. Notable ornamentals include buckthorn (*Rhamnus*), tea bush (*Ceanothus*), jujube (*Zizyphus*), supplejack (*Berchemia*), raisin tree (*Hovenia*), and Jerusalem thorn (*Paliurus*) (Lawrence 1951). A purgative called cascara sagrata is obtained from *Rhamnus purshiana* in California (Lawrence 1951). Glossy (*Frangula alnus* Mill. (*Rhamnus frangula* L.)) and common buckthorn (*R. cathartica* L.) are identified as significant invaders of natural areas (Wilhelm and Rericha 2017).

Rhamnus alnifolia L'Her.

This native alder buckthorn, regionally rare, is occasional in Cowles Dunes A (Wilhelm 1990). It is found in fens and swamps (Swink and Wilhelm 1994).

Voucher Specimens:

Deam #20027, 3 June 1916, Porter Co. (IND)
Wilhelm & Dritz #6734, 27 May 1979, Porter Co. (MOR)

ROSACEAE — Rose Family

Plants in the rose family are trees, shrubs, and herbs with alternate, simple, or compound leaves. Flowers have five sepals and five petals, which are fused at the base to form a cup-like hypanthium. Stamens are numerous. The pistils, which can be superior or inferior to the hypanthium, consist of either a single carpel, many separate carpels, or many fused carpels. The rose family is economically important for numerous edible fruits: apple

(*Malus* spp.), pear (*Pyrus communis* L.), quince (*Cydonia oblonga* Mill.), loquat (*Eriobotrya japonica* (Thunb.) Lindl.), medlar (*Mespilus germanica* L.), peach (*Prunus persica* (L.) Batsch), apricot (*Prunus armeniaca* L.), almond (*Prunus dulcis* (Mill.) D. A. Webb); cherry (*Prunus avium* (L.) L.), plum (*Prunus domestica* L.), nectarine (*Prunus persica* (L.) Batsch), sloeberry (*Prunus* spp.), and blackberry, raspberry, dewberry, loganberry, cloudberry, and bilberry (*Rubus* spp.) (Lawrence 1951). Many genera provide important ornamentals such as spiraea (*Spiraea* spp.), ninebark (*Physocarpus opulifolius* (L.) Maxim.), cotoneaster (*Cotoneaster* spp.), firethorn (*Pyracantha* spp.), hawthorn (*Crataegus* spp.), photinia (*Photinia*), mountain ash (*Sorbus* spp.), kerria (*Kerria* spp.), rose (*Rosa* spp.), and cinquefoil (*Potentilla* spp.) (Lawrence 1951). We have retained the Swink and Wilhelm (1994) nomenclature for *Rubus* even though Wilhelm and Rericha (2017) splits *R. allegheniensis* and *R. flagellaris* into many species.

Comarum palustre L. [*Potentilla palustris* (L.) Scop.]
Marsh cinquefoil is occasional in the marshes of Miller Woods, Tolleston Dunes, Calumet Prairie, West Beach, Cowles Dunes, DSP, Tamarack, and Pinhook Bog. Marsh cinquefoil is occasional in the marsh communities of Miller Woods C, E, F, and G (Wilhelm 1990). It is occasional in the Calumet Prairie (Wilhelm 1990). Plampin found this species at Tolleston Dunes B on 29 June 1992. At West Beach C, marsh cinquefoil is apparently confined to the shores of Long Lake (Wilhelm 1990). Marsh cinquefoil is frequent in the marsh complex in Cowles Dunes A (Wilhelm 1990). This species may be extant in the marsh complex of DSP, where it was reported by Lyon (1927) but verification is needed. Once known from the Great Marsh area of Tamarack, it has not been reported in recent years (Wilhelm 1990). It is occasional to locally abundant in Pinhook Bog B east of Wozniak Road (Wihelm 1990).

Voucher Specimens:
Wilhelm #6834, 12 June 1979, Lake Co. (MOR)
Fox #70, 14 June 1984, La Porte Co. (MOR)

Crataegus chrysocarpa Ashe
Fireberry hawthorn is known from Heron Rookery B, as found by Gerould Wilhelm and Ken Dritz on 26 June 1997 (see Heron Rookery chapter). This species is common to the west in Illinois. It may have preferred river bluff savannas but is now found in disturbed pastures (Swink and Wilhelm 1994). We have no specimens or photographs to vouch for this species.

Crataegus succulenta Schrader ex Link
A state-threatened species, fleshy hawthorn is found in three of the four morainal units of INDU including Bailly, Heron Rookery, and Hobart Prairie Grove (excluding Pinhook Bog). This highly variable species in terms of morphology was reported from the morainal districts of the Chicago Region by Wilhelm and Rericha (2017). Gerould Wilhelm reported this species from Bailly on 21 July 1997. Rericha and Wilhelm collected a specimen from Heron Rookery on 15 June 2003.

Voucher Specimens:
Rericha & Wihelm, 15 June 2003, Porter Co. (MOR)

Dasiphora fruticosa (L.) Rydb. [*Potentilla fruticosa* L.]
Swink and Wilhelm (1979) reported shrubby cinquefoil from Miller Woods A under *Castilleja coccinea* "in calcareous sand flats, as in the Miller section of Gary, Lake County, Indiana, where it [*Castilleja coccinea*] associates with *Agalinis purpurea*, *Aster ptarmicoides*, *Gentiana crinita*, *Hypericum kalmianum*, *Parnassia glauca*, *Potentilla fruticosa*, and *Sabatia angularis*." Later, Swink and Wilhelm (1994) stated it occurs around interdunal ponds close to Lake Michigan, where "it grows with *Agalinis purpurea*, *Gentiana crinita*, *Lycopus americanus*, *Rhynchospora capillacea*, *Scleria verticillata*, and *Triglochin maritima*." It is unclear why this species, which is common in fens to the east of INDU, should be absent in the whole East Unit of INDU. The closest Porter County site for this species is Suman Fen on

the Valparaiso Moraine south of the Indiana Dunes region (Plampin, pers. obs.). We have no herbarium specimen to vouch for Gerould Wilhelm's record.

Drymocallis arguta (Pursh) Rydb. [*Potentilla arguta* Pursh]
Prairie cinquefoil grows at Hoosier Prairie A (Wilhelm 1990). Prairie cinquefoil grows in sand prairies near Lake Michigan in Illinois and Wisconsin, but not in Indiana. Gerould Wilhelm collected this species near the Illinois border west of U.S. 41 (MOR specimen not shown here).

Potentilla anserina L.
Silverweed is known from West Beach, DSP, and Tamarack. Deam (1940) remarks that in Indiana this species is "found only in beach pools along Lake Michigan." While silverweed is rare within Indiana Dunes, it is abundant where it occurs due to its vegetative propagation. Given the clonal spread of silverweed, it would be useful for managers to know how many genets are in each population. Silverweed grows in wet sands around the pannes of West Beach A. Bowles et al. (1985) listed the following associates of silverweed from a "disturbed marsh/panne:" *Asclepias incarnata*, *Symphyotrichum boreale*, *Carex viridula* ssp. *viridula*, *Juncus arcticus* var. *balticus*, *Liparis loeselii*, *Schoenoplectus tabernaemontani*, and *Triglochin maritima*. There are two populations in the western-most panne of West Beach A. Marlin Bowles monitored one population in A; presumably, the same population that Plampin and Emma Pitcher saw that same year. Myrna Newgent found another population to the southeast on about 8 September 1994.

According to Bowles et al. (1985), this cinquefoil also grows in a five-meter-wide zone, forming a 40-meter-long crescent-shaped band around the panne at Beach House Blowout from Trail 9 in DSP. They listed the following associates: *Carex utriculata*, *C. stricta*, *Cornus sericea*, *Equisetum hyemale* ssp. *affine*, *Euthamia graminifolia*, *Juncus arcticus* var. *balticus*, *Liparis loeselii*, *Pinus banksiana*, *Salix myricoides*, *Solidago nemoralis*, and *Typha angustifolia*. Bowles et al. (1985) also mapped a population of this species from a "disturbed lakeshore sand seep east of Mount Baldy" in Tamarack C at Crescent Dune. They listed the following associates: *Cornus sericea*, *Equisetum arvense*, *Populus deltoides*, *Salix interior*, and *Solidago altissima*. This population at Crescent Dune was reported as "doing well," growing with *Myosotis laxa* and *Phragmites australis* (Plampin et al. 2003). Beach nourishment projects might be monitored to determine whether sand deposition has reduced the population (Plampin and Hamilla 2008a). At least as recently as August 2015, Tonkovich noted silverweed was still common in several of the shallow pools adjacent to and north of the beach nourishment roadbed west of the panne. It was less common south of the roadbed and not present anywhere in the panne itself. It did occur in one drying pool to the northeast of the panne, again north of the roadbed.

Voucher Specimens:
Hess et al. #5941, 13 June 1984, Porter Co. (MOR)

Prunus pensylvanica L.
Pin cherry is a common early successional species in the northeast and Appalachian Mountains, but is occasional, though locally abundant, within Indiana Dunes. It is known from Miller Woods, Tolleston Dunes, Calumet Prairie, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Pinhook Bog. Pin cherry is rare in Miller Woods D and Calumet Prairie. This species is known from the savanna complex portions of West Beach C and E and Inland Marsh A and B (Wilhelm 1990). Pin cherry is occasional to frequent in the savanna and dune complexes in Cowles Dunes A and B and DSP (Wilhelm 1990). Pin cherry is occasional in Furnessville A, B, and D (Wilhelm 1990). Pin cherry was occasional in Keiser B, the former Great Marsh; however, recent Great Marsh restoration may have reduced its abundance due to flooding. Pin cherry's abundance may have increased following ditching and draining of the Indiana Dunes wetlands and the burning and removal of peat. It is also occasional in other areas throughout Keiser. This species is occasional in

Tamarack B, and in 1989, Plampin reported it growing along the bike trail west of pylon #8437 (Wilhelm 1990). Pin cherry also occurs occasionally elsewhere along the Calumet Bike Trail and the NIPSCO right-of-way, but its abundance may be reduced by cutting and use of herbicides The sole record for this species at Pinhook Bog is from Table 11 in Wilcox (1982). He reported one occurrence at Pinhook B in a quadrat 110 meters into a 230-meter transect across the bog. Pin cherry persists through its long-lived seed bank (Marks 1974), so it could reappear with disturbance such as after the installation of the new natural gas pipeline along the NIPSCO right-of-way.

Voucher Specimens:

Wilhelm & Dritz #6730, 27 May 1979, Porter Co. (MOR)
Otto s.n., 27 July 1983, Porter Co. (INDU)
Hiebert #242, 2 May 1982, Porter Co. (MOR)

Rubus flagellaris Willd. [*Rubus enslenii* Tratt. subsumed into *R. flagellaris*]
This account describes the portions of *Rubus flagellaris* that were formerly considered *R. enslenii*, a taxon that the state of Indiana Division of Nature Preserves still recognizes taxonomically and lists as endangered. The state-endangered one-flowered dewberry grows in Miller Woods, Inland Marsh, DSP, Furnessville, Keiser, and Tamarack. This plant has been found in Furnessville G (Wilhelm 1990). It also grows in Keiser F, east of 375 East, where it was found by Pavlovic on 25 July 1998. Laura Rericha and Gerould Wilhelm visited INDU on 20 June 2003 searching for this species east of Mineral Springs Road, but they did not find it; however, they did locate it in the DSP and Tamarack D. One-flowered dewberry is now considered *R. flagellaris* Willdenow by Flora of North America Editorial Committee (2019), ITIS (2022), and USDA Plants (2022), but Wilhelm and Rericha (2017) called it *R. baileyanus* Britton.

Voucher Specimens:

Wilhelm # 15258, 25 August 1987, La Porte Co. (MOR; now R. baileyanus*)*

Rubus pubescens Raf.
Dwarf raspberry is known from Calumet Prairie, Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Pinhook Bog and is occasional in Calumet Prairie. This raspberry was frequent in the swamp complex portions of Cowles Dunes A, B, and D (Wilhelm 1990). It is extant in the swamp complex portions of DSP and along the NIPSCO right-of-way of subunit B. It is occasional to common in the swamp complex portions of Furnessville B, C, D, and E (Wihelm 1990). Dwarf raspberry is frequent on the hummocks in the swamp complex portions of Keiser C and E. Reported by Lyon (1927) from Tamarack A, this species may now be locally extinct. This raspberry is frequent to common in the hydromesophytic forest west of Wozniak Road at Pinhook Bog A.

Voucher Specimens:

Swink s.n., 12 May 1947, Porter Co. (MOR)
Wilhelm #6580, 19 May 1979, Porter Co. (MOR)
Hiebert #254, 10 May 1982, Porter Co. (MOR)

Rubus setosus Bigelow [Wilhelm and Rericha (2017) now call this *R. plus* L.H. Bailey]
Bristly blackberry is known from Inland Marsh and Cowles Dunes. Ken Dritz observed it at Coulter Prairie (Inland Marsh B) on 3 July 1983. This plant was identified by Gerould Wilhelm on 19 August 1998, but he did not collect a specimen. Laura Rericha and Gerould Wilhelm collected two specimens (see specimen below) in July 2002 that are mislabeled, since DSP is not in La Porte County.

Voucher Specimens:

Rericha & Wilhelm #581, 11 July 2002, Porter Co. (MOR)

RUBIACEAE — Madder Family

Plants in the Madder family include trees, shrubs, and herbs with opposite simple leaves. Leaf-like stipules occur at the base of the petioles. Flowers are borne in cymes and have four to five sepals, fused petals, and stamens fused to part of the corolla tube. The pistil is composed of two fused carpels. This family is closely related to the Caprifoliaceae. The family contains important food plants and ornamentals including coffee (*Coffea arabica*), quinine (*Cichona* spp.), ipecac (*Psychotria ipecacuanha*), and gardenia (*Gardenia jasminoides*) (Lawrence 1951).

Galium trifidum L.

Small bedstraw was not recorded from Porter County, Indiana, until 1979, when Gerould Wilhelm found it growing in the open portion of the fen, just south of the tamaracks in Cowles Dunes A (see specimen below). The Indiana Division of Nature Preserves lists this species in 1995 from Hoosier Prairie A. We have not seen the specimen to verify its identification.

Voucher Specimens:

Wilhelm #7002, 8 September 1979, Porter Co. (MOR)

Galium trifidum L. ssp. *brevipes* (Fernald & Wiegand) A. Löve & D. Löve [*Galium brevipes* Fernald & Wiegand]

Short-stalked bedstraw was thought to grow in DSP based on the comments of Swink and Wilhelm (1979):

> *In our area known only from the following Porter County collection: Swampy ground near Lake Michigan, Forsythe, September, 1879, collected by E. J. Hill. Iltis (1957) pointed out that although the herbarium label says Lake County, the station is actually in Porter County, near the site of present Beverly Shores. This species is now certainly extinct in our flora.*

Iltis (1957) also points out that Levi Umbach collected *Galium* extensively in the Indiana Dunes, but never found this particular species and concluded that it was extirpated. In 1980, C. Mulrenan (CSSSBR) clarified the CSSSBR siding location described by Swink and Wilhelm (1979). Mulrenan reported that Forsythe was a railroad siding just west of the Tremont Stop on the CSSSBR in Porter County (Wilhelm 1990). This location description suggests that Hill was probably in Furnessville F subunit if not the southern DSP. If that location were the case, could this species still be growing in Furnessville F? The fallacy to all this discussion is that the CSSSBR and the Fosythe siding did not exist in 1879 when Hill made his collection; therefore, we believe that Hill collected the specimen in Lake County, as stated on his specimen. In addition, there was a Forsythe in Lake County near Wolf Lake. In communication with Ted Cochrane, curator of the University of Wisconsin Herbarium, Pavlovic learned that the Rand McNally maps from the 1940s and 1950s did not have a Porter County siding named Forsythe except in one year. This leads one to think the Forsythe in Porter County did not exist, but that this is the map that Hugh Iltis saw that led him to his conclusion. Thus, short-stalked bedstraw likely never occurred in the DSP or Furnessville, and we have removed it from the list of flora and special flora of the Indiana Dunes.

Voucher Specimens:

Hill # 1879, Porter Co. (ILLS)

Galium labradoricum (Wiegand) Wiegand

Lyon (1927) reported this rare bog, or Labrador, bedstraw from the "quaking bog" at Mineral Springs, where it is extant at Cowles Dunes A. Labrador bedstraw was growing with

Carex limosa, *Eleocharis rostellata*, *Larix laricina*, *Salix candida*, *Thelypteris palustris* var. *pubescens*, *Toxicodendron vernix*, and *Typha angustifolia*.

Voucher Specimens:
Dritz #91, 15 June 1980, Porter Co. (MOR)

Galium lanceolatum (Torr.) Torr.
Lance-leaved wild licorice is known from Bailly, DSP, Furnessville, and Pinhook Bog, but no voucher specimens exist for the Porter County sites. Wilhelm (1990) writes,

> *This floristic element remains yet undocumented from Porter County, Indiana (see Swink and Wilhelm 1979), because I failed to secure a voucher specimen during the survey. A voucher specimen in this particular case is quite important because this species is superficially similar to* Galium circaezans *var.* hypomalacum*, which is frequent in the wooded portions of the Bailly A.*

The lance-leaved wild licorice is rare in Bailly E. (Wilhelm 1990). This species is occasional on shaded slopes of the dune complex as well as in the more mesophytic phases of the swamp complex in the DSP (Wilhelm 1990). It is occasional in the swamp complex of Furnessville B and C and occasional in the mesophytic forest south of Pinhook Bog A east of Wozniak Road.

Voucher Specimens:
Steyermark #65708, 18 June 1948, La Porte Co. (F)

Mitchella repens L.
Partridge berry is known from Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, Heron Rookery, and Pinhook Bog. This plant with fused red fruits is occasional to common in the swamp complex portions of Cowles Dunes A, B, and D and the DSP (Wilhelm 1990). On 1 June 2022, Lydia Miramontes Loyd found two patches of patridge berry in Furnessville A (pers. comm. with Pavlovic). The partridge berry is occasional to frequent in the swamp complex portions of Furnessville B, D, E, and G. It is frequent on the hummocks in the swamp complex of Keiser A, B, C, and on dry sand in E. This recumbent plant is common, particularly on and around the hummocks caused by the expanded bases of the older stumps and trees (Pavlovic, pers. obs., 2009). Plampin and Myrna Newgent found it on 23 October 2002 in Tamarack C off Hyacinth Road, while Lydia Miramontes found a colony nearby on 25 June 2003 (Plampin et al. 2003). Partridge berry occurs on both sides of the Little Calumet River at the Heron Rookery. It is common in the hummocky portions of the hydromesophytic forest east and west of Wozniak Road and in the dry-mesic and mesophytic forests along the north bluff of Pinhook Bog A and B (Wilhelm 1990).

Voucher Specimens:
Hess et al. #5950, 13 June 1984, Porter Co. (MOR)
Umbach #6400, 26 October 1912, Porter Co. (MOR)
von Oettingen #393, 30 September 1982, Porter Co. (INDU)

SALICACEAE — Willow Family

Willows are trees and shrubs that have alternate, simple, and stipulate leaves. Flowers are unisexual with single sex individuals (dioecious). Flowers are borne in pendulous or erect catkins that often appear before the leaves. The flowers are subtended by hairy or fringed bracts and a cup-like disk with one or two glands. The flowers have no petals. Staminate flowers have two or more stamens with the bracts and glands. Pistillate flowers are composed of two to four carpels united with two to four stigmas. Seeds are embedded in cottony hairs.

Many species are grown as ornamentals, and others that produce long unbranched stems (osiers) are used in basket-making. Aspirin was derived from the bark of *Salix alba* and

other *Salix* species. According to George Argus (pers. comm. with Pavlovic), identification of willows is best achieved by collecting specimens in bloom, in fruit, and with mature leaves from the same plant.

Populus balsamifera L.
Balsam poplar may be extant, but specimens are more likely the hybrid *Populus* × *jackii* Sarg. Two specimens collected from Miller might have been collected within INDU. They are listed below. Wilhelm (1990) stated "Both Laughlin (1953) and Deam (1940) reported small trees of this species from Dunes State Park. Deam (1932) for many years regarded the small trees which he encountered along the lake front in low places as escapes, but later, after having conferred with Dr. Cowles, came to the conclusion that they were native." In 2009, Tom Post collected a specimen of *P. balsamifera* var. *subcordata* at the DSP. This may be the only stand of this species remaining within Indiana Dunes. *P. balsamifera* var. *subcordata* is accepted by Wilhelm and Rericha (2017) but subsumed into *P. balsamifera* by ITIS (2022), FNA (2022), and Michigan Flora Online (2019).

Populus × *jackii* Sarg., a hybrid between *P. balsamifera* and *P. deltoides*, has been reported from Miller Woods, DSP, and Keiser (Wilhelm 1990). Wilhelm (1990) writes,

> *Heretofore unknown from Keiser A until its discovery by Ken Klick. Bowles et al. (1985) described this population as "... a small colony of three or four small trees that were multiple- stemmed and approximately four to five meters tall. They were mostly on the foredunes in between Lake Michigan and Lake Front Drive in Beverly Shore." Whether or not the small trees Deam saw* [at Indiana Dunes State Park, see above] *were similar to these is conjecture. We doubt that* P. balsamifera *occurs in the Lakeshore. We include remarks here because trees that contain at least a part of the genotype are still present in the Lakeshore, even though the origin of these trees is also quite speculative.*

The Keiser population described by Wilhelm (1990) may have been eliminated by shoreline revetment work (Pavlovic, pers. obs., 1986–1987). We refer all verifiable records and specimens to *P. balsamifera*.

Voucher Specimens:
Sherff s.n., 4 September 1911, Lake Co. (F)
Duesner s.n., 1908, Lake Co. (F)
Deam #40489, 4 June 1924, Porter Co. (IND)
Swink s.n., 29 July 1951, Miller, sandy soil. (MOR)
Post #703, 12 August 2009, Porter Co. (MOR)
Pavlovic #119, 7 August 1984, Porter Co. (MOR)

Salix candida Flüggé ex Willd.
This distinctive hoary, or sage, willow occurs in Cowles Dunes and Calumet Prairie. Gerould Wilhelm (1990) noted only two or three plants in the open area around the edge of the tamaracks in Cowles Dunes A. It grows here among the cattails with *Sarracenia purpurea* (now extirpated) and *Parnassia glauca*. Rolla Tryon collected a specimen from the DSP (see specimen below), but we do not have confirmation of its existence there since the original collection. Sage willow is occasional at Calumet Prairie.

Voucher Specimens:
Klick #2838, 1989, Porter Co. (INDU)
Tryon #4586, 17 May 1936, Porter Co. (MIN)

Salix cordata Michx. [*Salix syrticola* Fernald]
Dune willow is known from Miller Woods, West Beach, and DSP. Dune willow is occasional on the dunes adjacent to pannes and marshes in Miller Woods A. There, it was found on a partly stabilized dune with *Calamovilfa longifolia*, *Populus deltoides*, *Schizachyrium scoparium*, and *Solidago simplex* var. *gillmanii*. Monitoring plots were instituted here by the

NPS in 1985 (Bowles et al. 1986). This distinctive willow is occasional on the high dunes and in and around the pannes in West Beach A and D. Dune willow is extant in the neighborhood of Big Blowout in DSP, where it was reported by Lyon (1927) and collected by Bennett. Bowles et al. (1986) indicated it occurs throughout the dune area of Beach House Blowout in DSP, where they listed it as growing with *Ammophila breviligulata*, *Calamovilfa longifolia*, and *Populus deltoides*.

Voucher Specimens:

Schulenberg & Wilhelm #74-304, 5 September 1974, Lake Co. (MOR)
Hiebert #61, 24 July 1981, Porter Co. (INDU)
Bennett #496, 20 May 1961, Porter Co. (F)

Salix lucida Muhl.

Shining willow grows at Miller Woods, Calumet Prairie, DSP, Tamarack, and Pinhook Bog. Sally Weeks (Purdue University) reports it from Miller Woods B, where George Argus (Musuem of Natural Sciences, Canada) had found it when they relocated *Cornus rugosa* in 2006. Hamilla and Plampin saw *Salix lucida* in Miller Woods B on 1 July 2010. It is occasional in the Calumet Prairie. Formerly known from the DSP based solely on the report by Laughlin (1953), in which he states that there were "several bushy specimens on the prairie just west of the east fork of Dunes Creek." Now found separately in the NIPSCO right-of-way (DSP B). This rare willow was found in Tamarack B growing with *Calamagrostis canadensis*, *Carex lacustris*, *Persicaria amphibia*, *Phragmites australis*, *Rosa palustris*, *Rumex britannica*, and *Typha latifolia*. It also occurs in the seeps below Crescent Dune in Tamarack C. Plampin showed this population to Dan Mason (NPS) on 8 February 2019, so his staff would not cut it down. Pavlovic identified a specimen as this species collected from Pinhook Bog B on 10 July 1998 while sampling vegetation for an exotic plant survey.

Voucher Specimens:

Kjellmark #137, 19 July 1988, Porter Co. (MOR)

Salix pedicellaris Pursh [*Salix pedicellaris* var. *hypoglauca* Fernald]

Bog willow is known from Miller Woods, Cowles Dunes, Tamarack, and Pinhook Bog. This shrub is extant along a swale in Miller Woods C and F. Peattie (1930) reported this species from the Mineral Springs Bog (Cowles Bog A). Distinguished by its glabrous, reticulate venation and entire leaves, this willow was once known from the Great Marsh area of Tamarack A, but it is no longer present along with its regular associate, *Comarum palustre*. This willow is rare in Pinhook Bog B east of Wozniak Road, where there are a few plants in the vicinity of *Pogonia ophioglossoides* (Wilhelm 1990).

Salix sericea Marshall

Silky willow is known from Inland Marsh, Cowles Dunes, DSP, Furnessville, Tamarack, and Pinhook Bog. The silky willow is occasional in the marsh complex portions of Inland Marsh A, Cowles Dunes A, Keiser, and Furnessville B and D. Silky willow is reported from Hiawatha Meadow, a property of the SHLT (Keiser H). It is known from DSP based solely on the report by Laughlin (1953), in which he states that it was rare. It is occasional in the partly shaded swamps of Tamarack D. Silky willow is locally frequent along the moat in the northwest portion of Pinhook Bog B.

Voucher Specimens:

Wilhelm & Dritz #6739, 27 May 1979, Porter Co. (MOR)
Wilhelm #6959, 13 September 1979, Porter Co. (MOR)
Wilhelm & Johnson #12654, 28 May 1985, La Porte Co. (MOR)

SARRACENIACEAE — Pitcher Plant Family

Pitcher plants are insectivorous perennial plants with tubular leaves. The large nodding or racemose flowers are bisexual and subtended by one or two bracteoles. Flowers have

four to five colored sepals, five free petals, twelve to fifteen stamens, and a pistil composed of five to six united carpels with a dilated stigma in the shape of an umbrella. Plants in this family are of little economic value except in the novelty horticulture trade.

Sarracenia purpurea L.

Pitcher plant is only known from Cowles Dunes and Pinhook Bog. Wilhelm (1990) writes:

> *Lyon (1927) reported that this species was in the "quaking bog" at Mineral Springs, but that it was not common there nor was it found elsewhere. We saw only a clump of Pitcher Plant in the cattail marsh area north of where the tamaracks extend eastward into the Great Marsh area; here it was associated with* Parnassia glauca *and* Salix candida*, species which are usually thought of as Fen indicators. This species is threatened by over-collection. I* [Wilhelm] *must report, for the record, that an entire clump was senselessly removed (in 1985) by a "professional" botanist for what purpose can only be imagined. I* [Wilhelm] *have been told that several seedlings remained where the parents were removed, and that about eleven mature plants now survive in the vicinity. The future of this rare species at Cowles Bog hangs on the success of this senselessly diminished population. Hendrickson & Wilcox (1979) pointed out, however, that: "while still sparsely present in a few locations in the cattail mat, Pitcher Plant is clearly threatened in Cowles Bog National Natural Landmark; cattails increasingly overtop it/shade it with each passing year."*

Lois Howes saw pitcher plant in bloom in Cowles Bog on 18 June 1958 (Howes 1985). In 2002, under the direction of Daniel Mason (NPS) and Pavlovic, Paul Labus and his TNC (The Nature Conservancy) crew removed the invasive hybrid cattails from the former graminoid fen where the pitcher plants grew. Pavlovic saw at least a half-dozen plants before the restoration work was instituted. According to Daniel Mason (pers. comm. with Pavlovic, 9 April 2013), only one individual persisted in Cowles Bog: "Charlene." (The plant was named Jolene after the Dolly Parton song, but confusion reigned.) This plant appeared to be doing well until 2012 when it disappeared (it is believed that someone may have collected it) (Dan Mason, pers. comm. with Pavlovic, 2013). Pitcher plant is frequent in Pinhook Bog B east of Wozniak Road.

Voucher Specimens:

Wilhelm & Dritz #6733, 27 May 1979, Porter Co. (MOR)
Wilhelm & Dritz #6903, 23 June 1979, La Porte Co. (MOR)

SAXIFRAGACEAE — Saxifrage Family

Plants in the saxifrage family are perennial herbs with basal leaves and flower scapes. The leaves are alternate and palmately lobed or dissected. Bisexual flowers are in racemes or cymes. There are five sepals and five often clawed petals. Stamens are five to ten in number. The ovary is either of two carpels united below, or rarely five free carpels. Many species are grown for their foliage and inflorescences: saxifrage (*Saxifraga*), mock orange (*Philadelphus* spp.), coral bells (*Heuchera* spp.), hydrangea (*Hydrangea* spp.), and astilbe (*Astilbe*) (Lawrence 1951). The genus *Ribes* was formerly in this family but has now been moved to the Grossulariaceae family (Flora of North America Editorial Committee 2019).

Chrysosplenium americanum Schwein. ex Hooker

Golden saxifrage inhabits shallow, mineral-rich seeps, only on the 600-foot contour interval, where it is emergent in the swamps that occur between the Calumet and Tolleston-aged dunes in the East Unit of Indiana Dunes (these units only: Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack). The horizontal, cup-shaped blossoms depend on rain drops to disperse the pollen to other flowers. There are a few populations in the low swales of the swamp forest of Cowles Dunes D (Wihelm 1990). Golden saxifrage is extant in the swamp

complex in DSP west of Kemil Road, although Plampin has not seen it there but further to the west, north of a beech mound. Barbara also reports it from near the boardwalk in the state park. Bowles et al. (1985) recorded that its population is nearly continuous along the seepage line, which follows the 600-foot contour, and they listed the following associates: *Alnus incana* ssp. *rugosa*, *Fraxinus nigra*, *Impatiens* sp., *Lycopus* sp., *Sambucus nigra* ssp. *canadensis*, and *Symplocarpus foetidus*. While rare, there is a colony of golden saxifrage in the swamp complex of Furnessville E. Golden saxifrage is frequent and may be locally dense (dozens of stems per square-meter) in the wooded swamps of Keiser C. Golden saxifrage grows in Keiser B east and west of Broadway (Wihelm 1990). Bowles et al. (1985) indicated that the population is nearly continuous along an 8,250-meter-long seepage line (which line includes DSP). They recorded the following associates: *Acer rubrum*, *Caltha palustris*, *Fraxinus pennsylvanica*, *Quercus bicolor*, and *Symplocarpus foetidus*. Golden saxifrage was reported from Tamarack A by Lyon (1927), where it still occurs. It is abundant across the road in Keiser. Indeed, golden saxifrage was found in Tamarack A in 1992 (Plampin and Newgent 1992), where Plampin reports it grows in a 100-m × 100-m patch near a solitary living *Juglans cinerea*.

Voucher Specimens:

Swink #779, 22 September 1951, Porter Co. (F)
Pitcher s.n., 6 May 1979, Porter Co. (F)
Swink s.n., 7 April 1946, Porter Co. (MOR)

SCROPHULARIACEAE — Figwort Family

Many genera in this family have been assigned to other families (Orobancaceae, Plantaginaceae) due to convergent evolution that hid their true origin (Flora of North America Editorial Committee 2019). Genera that were formerly in the figwort family that are now in the Orobanchaceae include *Agalinis*, *Aureolaria*, *Buchnera*, *Castilleja*, *Dasistoma*, and *Pedicularis*. Genera in the Plantaginaceae include *Callitriche*, *Chaenorhinum*, *Chelone*, *Collinsia*, *Gratiola*, *Linaria*, *Nuttallanthus*, *Penstemon*, and *Veronica*. Genera remaining in the figwort family include *Scrophularia* and *Verbascum*, but neither genera has special flora.

Figworts are mostly herbs and subshrubs with alternate, opposite, or whorled leaves. The leaves are simple or pinnately dissected. Flowers are bisexual and usually zygomorphic All the special flora formerly assigned to the Scrophulariaceae are now in the Plantaginaceae or Orobanchaceae.

ULMACEAE — Elm Family

Elms are trees and shrubs with simple alternate leaves that often have oblique bases. The flowers are bisexual (*Ulmus*) or unisexual. The calyx consists of four to eight sepals. Petals are absent, and the stamens are four to eight. The ovary is bicarpellate and superior with two styles. Elm (*Ulmus*) wood is used in furniture-making, but is used less today due to the decimation of populations from lethal fungal Dutch elm disease (*Ophiostoma ulmi*). The fragrant wood of *Planera abelica* is known as false sandalwood. The mucilaginous bark of slippery elm (*Ulmus rubra*) was used in manufacturing medicinal lozenges (Lawrence 1951).

Celtis tenuifolia Nutt.

Dwarf hackberry is rare but occurs in Miller Woods, West Beach, Cowles Dunes, DSP, and Tamarack. Plampin, Hamilla, and Mary Smits found this species in Miller Woods B on 23 September 2008. There is a “small population” in the dune complex area of West Beach D (Wilhelm 1990). Pepoon (1927) reported that this species is “common north of Long Lake, between Miller and Dune Park.” This rare shrub is common in the village of Dune Acres itself, but Gerould Wilhelm was able to find only one plant within the boundaries of Indiana

Dunes, and this was along the subdunal trail about 230 feet west of Mineral Springs Road, in Cowles Dunes A. Plampin found several shrubs in the foredunes of Cowles Dunes A, where it grows just west of Dune Acres with *Eupatorium sessilifolium* and *Tilia americana*. She also reports it from Cowles Dunes B in June 1995. Dwarf hackberry is known from the DSP from reports by Laughlin (1953) and from Plampin in 1990 (Wilhelm 1990). No other observations of this species have been reported farther east than Cowles Bog, but Laughlin's identification is most likely correct because he also pointed out that dwarf hackberry's relative, *Celtis occidentalis*, was thought to be absent from DSP. Dwarf hackberry is reported by Plampin and Newgent (1994) from Tamarack C.

Voucher Specimens:

Wilhelm & Dritz #6727, 27 May 1979, Porter Co. (MOR)
Plampin #1990-3, 20 July 1990, Porter Co. (INDU)

VALERIANACEAE — Valerian Family

See Caprifoliaceae for *Valerianella chenopodiifolia* (Pursh) DC.

VERBENACEAE — Vervain Family

Vervains are herbs, shrubs, and trees, many of which have four-sided stems. Leaves are opposite or whorled with simple blades. The flowers are bisexual with five united sepals, five united petals, four stamens of two lengths, and a superior ovary of two fused carpels. The family is best known for teak (*Tectona grandis* L. f.) and numerous ornamentals (Lawrence 1951).

Phyla lanceolata (Michx.) Greene [*Lippia lanceolata* Michx.]

Frog fruit is known only from the shores of Lake George at the Hobart Prairie Grove. Deam collected frog fruit on the "bank of river at Hobart." The Standley specimen listed below was found in a dry wetland southeast of Miller, but whether that is now Tolleston Dunes or somewhere else is not clear.

Voucher Specimens:

Standley #57474, 6 September 1930, Lake Co. (F)
Deam #2580, 8 September 1907, Lake Co. (IND)

Verbena simplex Lehm.

Narrow-leaved vervain is known only from Hoosier Prairie A. A specimen was collected in Furnessville F along the South Shore Line tracks west of Tremont Road, but the population has likely been destroyed. This species is more common to the west of Indiana Dunes (Wilhelm and Rericha 2017).

Voucher Specimens:

Bennett #7127, 28 August 1960, Porter Co. (F)

VIOLACEAE — Violet Family

Plants in the violet family are typically perennial herbs, but sometimes are annual herbs or shrubs. Leaves either in basal rosettes or alternate and simple, but sometimes deeply lobed. Flowers are often zygomorphic and bisexual. Some plants produce cleistogamous flowers that never open and then self-fertilize. Most produce chasmogamous, or open, flowers that require cross-pollination by bees. The flowers have five more- or less-separate sepals and five petals, the lowest being larger and spurred. The five stamens are fused above the ovary. The superior ovary is tricarpellate. Violets, including pansies, are often cultivated for their flowers. Many violets (*Viola*) have edible leaves and flowers high in vitamin C.

Viola blanda Willd. [*Viola incognita* Brainerd]
Hairy white violet is known from Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. This species is known from Cowles Dunes A only based on the Swink specimen below. Gerould Wilhelm found this species growing in the east Great Marsh ecotone in the DSP in August 1998. Often confused with *Viola macloskeyi* ssp. *pallens*, this violet is frequent in the hydromesophytic swamp in the DSP (Wilhelm 1990). Gerould Wilhelm recorded this white violet as frequent to common in the swamp complex portions of Furnessville B and D (Wilhelm 1990), but it is probably more widespread, certainly more common than *V. macloskeyi* ssp. *pallens* (see below). Plampin and Myrna Newgent saw this plant in Keiser E in 1991. Reported from the Tamarack A by Peattie (1930), this violet might have escaped the degradation of this area, but Gerould Wilhelm saw no sign of it during one of his visits (Wilhelm 1990). Eric Kjellmark collected a specimen from Pinhook Bog, which is a new record. Wilhelm and Rericha (2017) call this *Viola blanda* Willd. var. *palustriformis* A. Gray.

Voucher Specimens:
Bennett s.n., 4 May 1957, Porter Co. (F)
Swink s.n., 18 May 1946, Porter Co. (MOR)
Hiebert & Payton #229, 24 April 1982, Porter Co. (MOR)

Viola canadensis L.
Canada violet is known from DSP and Heron Rookery. Canada violet was reported from the DSP based on the following comment by Peattie (1930): "Rare, in beech woods from Tremont eastward." It is present along Trail 10, just northeast of the wooden bridge, north of Wilson shelter, though evidently rare. Plampin saw one plant in 1995 in Heron Rookery A while pulling garlic mustard. Canada violet is listed for Hoosier Prairie A, but because this seems an unlikely location for this northern hardwoods species, we have removed this record.

Viola macloskeyi F.E. Lloyd [*V. macloskeyi* ssp. *pallens* (Banks ex Ging.) M.S. Baker; *V. pallens* (Banks ex Ging.) Brainerd]
Smooth white violet grows in Cowles Dunes, DSP, Furnessville, Keiser, Tamarack, and Pinhook Bog. This violet, sometimes confused with *Viola blanda* (including the former *V. incognita*), is frequent in the swamp complex areas of Cowles Dunes A, B, and D (Wilhelm 1990). Smooth white violet is extant in the swamp complex portions of DSP. It is frequent in the swamp complex portions of Furnessville D, less frequent in C, and is reported from E and F (Wilhelm 1990). According to Wilhelm (1990), "The populations in Furnessville D contain individuals which have a few scattered hairs on the upper surfaces of some of the leaves, this feature suggesting that *V. incognita* var. *forbesii* may also be present." Smooth white violet is frequent among the hummocks in the swamp complex in Keiser C. Wilhelm (1990) noted that smooth white violet "might have escaped the degradation of Tamarack A, but I [Wilhelm] saw no sign of it during my visit." Smooth white violet is frequent in the hydromesophytic swamp forest west of Wozniak Road (Pinhook Bog A) and in the northwest portion of Pinhook Bog B east of Wozniak Road. Associates at the second location include *Acer rubrum*, *Pinus strobus*, *Vaccinium* sp., *Chamaedaphne calyculata*, and *Sarracenia purpurea*.

Voucher Specimens:
Wilhelm #6548, 19 May 1979, Porter Co. (MOR)
Swink s.n., 7 April 1946, Porter Co. (MOR)
Kjellmark #87, 4 May 1988, La Porte Co. (MOR)

Viola primulifolia L.
In the past, primrose violet was suggested to be a hybrid between *Viola lanceolata* and either *V. macloskeyi* or *V. blanda*, but ranges of the latter two species do not overlap with *V. primuliofolia* in its area of greatest distribution (see Flora of North America Editorial Committee 2019). Lyon (1927) reported primrose violet in the dunes, saying that it was

rare along the CSSSBR at Tamarack. On a collection from 1930, he added the phrase "the subdunal woods" as well, but it is not now known from the Tamarack Unit. *Viola primulifolia* was found by Plampin south of the DSP (B) and south of Keiser B along the Calumet Bike Trail in the NIPSCO right-of-way on 30 August 2004. Nearby were plants of *Viola lanceolata* and *V. blanda*. Associates include *Alnus rugosa*, *Thelypteris palustris* var. *pubescens*, *Eupatorium perfoliatum*, *Juncus canadensis*, *Lythrum salicaria*, *Solidago rugosa*, *Spiraea tomentosa*, and *Typha* spp. (Plampin and Hamilla 2008b).The latter location is close to the former Tamarack Station at the south boundary between Keiser and Tamarack.

Voucher Specimens:

Lyon, Jr. s.n., 25 May 1930, Porter Co. (F)
Nieuwland & Just s.n., 25 May 1930, Porter Co. (F)
Plampin s.n, 5 May 2002, Porter Co. (INDU)
Plampin s.n, 21 September 2005, Porter Co. (INDU)

Viola rostrata Pursh

Long-spurred violet was not recorded from the Indiana Dunes until it was found during the spring foray attended by Gerould Wilhelm, Ron Hiebert, Emma Pitcher, and Plampin on 28 April 1988 at the Heron Rookery. This northern violet occurs on both sides of the Little Calumet River and is found on the banks of former oxbows (Plampin, pers. obs.). There are two poor specimens at the Eastern Illinois University (EIU) herbarium that were collected by William McClain from the DSP on 29 April 1966. Pavlovic thinks these specimens may be misidentified as *V. rostrata* but the flowers are in such poor condition and the scanned sheet is of such poor resolution that it is not possible to verify the correct species without seeing the specimen in person.

Voucher Specimens:

Klick #2779, 14 May 1988, Porter Co. (MOR)

Viola sagittata Aiton var. *ovata* (Nutt.) Torr. & A. Gray [*Viola fimbriatula* Sm.]

Sand violet used to be considered a separate species by some sources, but most now agree it is just a variety of *V. sagittata*, the arrow-leaved violet. Wilhelm and Rericha (2017) stated, "In our sandy districts, distinction between the two elements are problematic to the point that we are compelled to include them here together." Sand violet, *V. sagittata* var. *ovata*, appears as a pubescent phase of the typical variety, which may cause it to be overlooked. Thus, its presence may be more frequent than observations indicate. Its leaf shape is more elliptic, and the upper leaf surface is dominated by erect hairs. According to Wilhelm (1990), this segregate is rare in INDU. Sand violet is occasional in moist sandy areas of Miller Woods F, Furnessville, Tamarack, Hobart Prairie Grove, Hoosier Prairie, and possibly other areas. Sand violet is rare in the south Pitcher Prairie of Furnessville B (Wilhelm 1990) and frequent in moist, sandy, open grounds of Tamarack D. It is reported from Hobart Prairie Grove by Sandy O'Brien. This violet is frequent in some of the more disturbed areas of Hoosier Prairie A. The Swink specimen is identified as being collected from "Beverly Shore," which is vague and includes the Keiser and Tamarack units.

Voucher Specimens:

Swink s.n., 4 May 1947, Porter Co. (IND)

VITACEAE — Grape Family

Grapes are vines or lianas (occasionally shrubby) with tendrils that spread vegetatively in large patches or in tree crowns. Leaves are alternate and simple or compound. The flowers are bisexual or unisexual (monoecious). The flowers have four to five sepals in a cuplike form and four or five petals that are fused at the tips. The petals fall when the flower opens. The four or five stamens are opposite the petals. The pistil consists of one to three fused carpels. The grape family is best known for the wine grape (*Vitis vinifera* L.),

Boston ivy (*Parthenocissus tricuspidata* (Siebold & Zucc.) Planch), and Virginia creeper (*P. quinquefolia* (L.) Planch.) (Lawrence 1951).

Vitis labrusca L.

Fox grape is known from Miller Woods, West Beach, Inland Marsh, Cowles Dunes, DSP, Furnessville, Keiser, and Tamarack. Fox grape, characteristic of the Indiana Dunes region, is occasional in Miller Woods C, E, F, and G (Wilhelm 1990). The Cowles 1897 specimen (see below) was collected from Miller. Agnes Chase, the eminent agrostologist, collected the same species at Miller on 23 May 1898, a year after Cowles. Fox grape is apparently known from West Beach C and Inland Marsh A and B (see third specimen below). It is extant, though rare, in the swamp complex portions of both Cowles Dunes A and B, and is occasional along the wooded border of the NIPSCO right-of-way in Cowles Dunes E (Wilhelm 1990). This species was reported from DSP by Laughlin (1953). It is occasional in the swamp complex west of Route 49, and in 1987, Emma Pitcher found it frequently along the Calumet Bike Trail (Wilhelm 1990). Emma Pitcher led Wilhelm to a large colony of this species that was growing in pure sand in the northern portion of Furnessville A (Wilhelm 1990). There are also reports from Furnessville C and E, and Gerould Wilhelm saw fox grape in G (Wilhelm 1990). This grape, while rare but locally abundant, is extant in the southeastern portion of the swamp complex in Keiser C, in low open ground along the bike trail, and in the wetlands south of the Dunewood Campground (Keiser F). Reported from Tamarack B, fox grape is extant in Tamarack A, C, and D (Wilhelm 1990). Fox grape has become locally abundant, especially in the southeastern portion of the swamp complex in Keiser C and in low open ground east and west of Kemil Road along the Calumet Bike Trail. Removal of most or all of the vines could be helpful in preserving populations of *Drosera rotundifolia*, *Gentianopsis crinita*, *Platanthera clavellata*, *Lobelia cardinalis*, and *Xyris torta* east and west of the Calumet Bike Trail at Kemil Road (Plampin, pers. obs.). This species has also become a problem in Keiser D, where it has shaded out *Drosera rotundifolia*, *Lobelia cardinalis*, and *Xyris torta*. Whether to control problem native species or to protect other rare species is an unfortunate dilemma in management of insular natural areas. Due to habitat destruction and fragmentation, populations are isolated and separated from each other and are not able to disperse among isolated natural areas. Reports of vigorous growth of this and other grape vine species within Indiana Dunes lead to speculation that nitrogen deposition and CO_2 enrichment in the atmosphere might be causing greater growth, as is known for poison ivy (Schnitzer et al. 2008).

Voucher Specimens:

Cowles s.n., 24 June 1897, Lake Co. (MO)
Chase #776, 23 May 1898, Lake Co. (NMC)
O'Brien #133, 22 August 1984, Lake Co. (INDU)
Wilhelm #6829, 11 June 1979, Porter Co. (MOR)

The causes of extermination within our limits varies. The phenomenal growth of Chicago and the establishment of manufactories in the suburbs, as well as the cutting of the forest growths, have largely tended to change the complexion of our native flora.
—Higley and Raddin (1891)

The Dunes are a symbol of the crisis that faces all Americans. It is as though we were standing on the last acre and were faced with a decision of how it should be used. . .In essence, it foreshadows the time not far removed when we shall in all truth be standing on that last, unused, unprotected acres and be wondering which way to go.
—Senator Paul Douglas (1958)

The following subsections highlight the flora and conservation issues for each of the 15 units of Indiana Dunes National Park. Each chapter has an introductory section highlighting the survey history and ecological context of each unit, a summary about special sites or plant communities in the unit, a special flora summary, a floristic summary, a flora table, a discussion of conservation issues, and a flora summary table broken down by subunits.

Unit 1: Miller Woods and Green Heron Pond

To the scientist the sand dune regions of Lake Michigan (and Indiana in particular) are not only famous for their desert like blowouts and beaches illustrating the forces of waves and wind on the landscape. They were first noted as refuges for many rare plant species that persisted here largely because of the great contrasts of environment factors (e.g. moisture, exposure and soil development). The dunes' fame spread to many parts of the world when ecologists used the various stages of development of plant-animal communities (from bare sand to forest) to develop and elaborate the concept of ecological succession. There were (and still are) great opportunities for studying the successional processes involving the moderation of extremes of the environmental factors, leading to a more or less stable balanced organization of plants, animals, soils, and surroundings in a complex but orderly natural system.
—Jerry Olson (1957)

The Miller Woods Unit occupies about 428 hectares (1,057 acres) north and west of Miller and west of Marquette Park (Figures 9 and 10; see Figure 1 for location context). Miller Woods includes the young foredunes near Lake Michigan and the savanna/wetland mosaic and dune and swale complex south of the former Grand Calumet River (often called the Marquette Lagoons). The whole complex is less than 2,000 years old; it formed in an embayment centered on the City of Gary where a series of recessional linear dunes formed as lake levels fluctuated (Chrzastowski and Thompson 1994). The wetlands and pannes north of the Grand Calumet River were former river mouths blocked by sand deposition from the eastward flowing littoral drift that forced the river mouth to migrate to the east. Four of these large river mouth complexes were

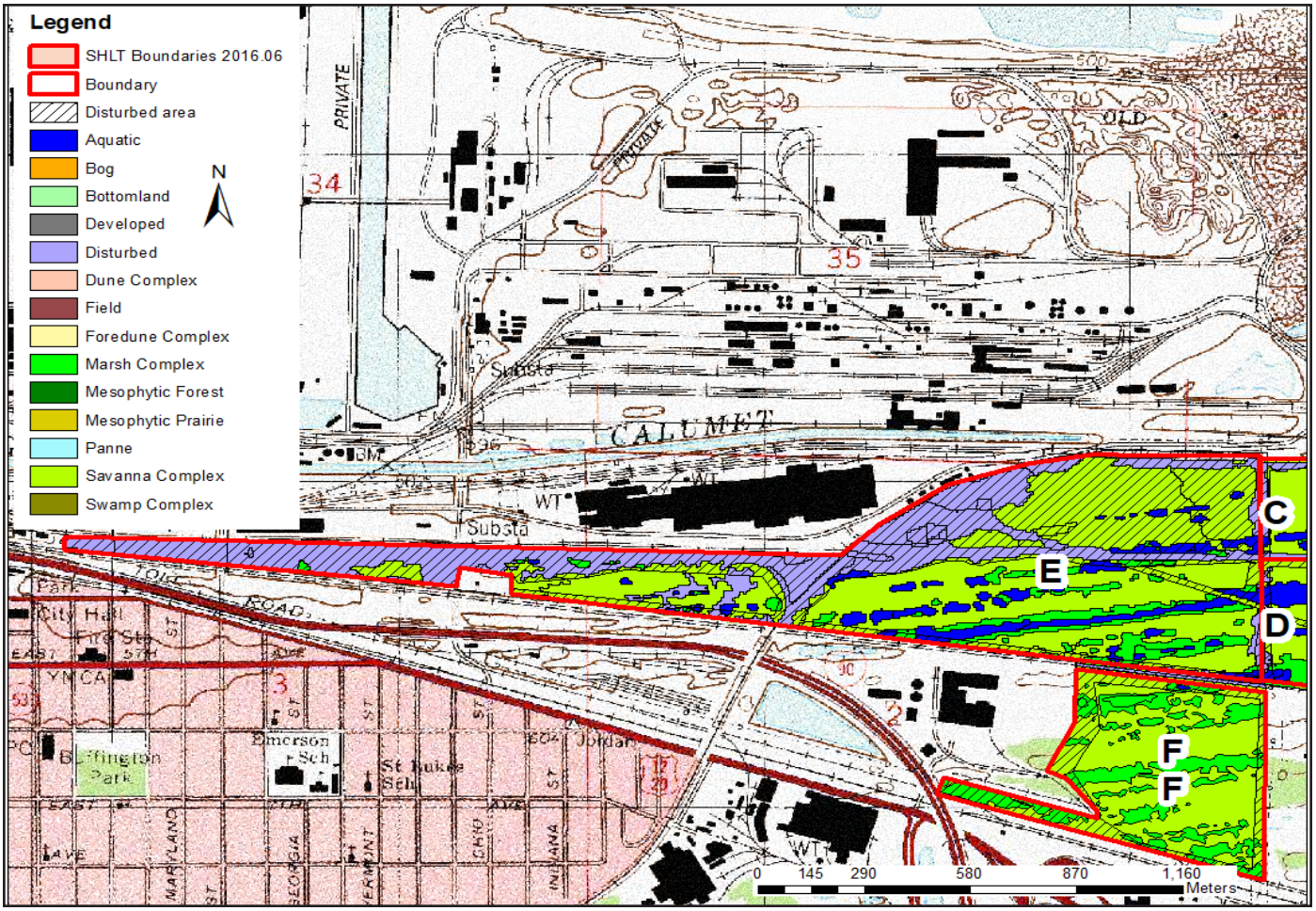


Figure 9. Vegetation of Miller Woods Unit (west side). Subunits indicated by letters. Disturbed areas are crosshatched.

filled with deposits when the USX landfill was constructed and expanded eastward (Stewart et al. 2003). Government Land Office survey records (Meyer 1952: Bacone et. al. 1979, 1980; Bowles et al. 2015b; PalEON 2021) and historic photographs (Pavlovic, pers. obs.) indicate that white and jack pine were once more abundant just south and north of the Grand Calumet River.

Miller Woods is subdivided into eight subunits. Included is Green Heron Pond (subunit H), a property of the Shirley Heinze Land Trust, east of Miller Woods proper.

Surveys prior to 1990 are listed in Wilhelm (1990). Miller Woods D was surveyed by Wilhelm on 26 June 1998. Survey Area F, the Gary Enterprise Zone, was surveyed on 28 May 1990 by Myrna Newgent, Carol and Tom Serynek, and Plampin; on 26 July 1994 by Gerould Wilhelm and Linda Masters; and on 1 September 1998 by Nicole Kalkbrenner and Dan L. Zay. Daniel Mason and Gayle Tonkovich conducted vegetation surveys around the pannes in Miller Woods A during the summers of 1999 and 2000. Gayle Tonkovich conducted surveys of the emergent vegetation in 28 ponds in Miller Woods B and C during 2002 and 2003. Robin Scribailo and Mitch Alix surveyed the submerged aquatic plant communities of 18 ponds in 2002 and 14 ponds again in 2003 to 2006. Ongoing surveys by USGS, NPS, and others have greatly contributed to the flora of Miller Woods.

Many species reported from the area of Miller Woods have herbarium specimen labels with vague location information. *Arethusa bulbosa*, for example, was collected both by Bastin and by Grassly in June of 1879 at "Millers Station," and again by Umbach in 1897 at "Millers, slough borders." *Rhynchospora recognita* was collected by Umbach on 6 August 1908 in "Swales, Millers." *Aureolaria grandiflora* var. *pulchra* was collected by Umbach in 1897 at "Millers

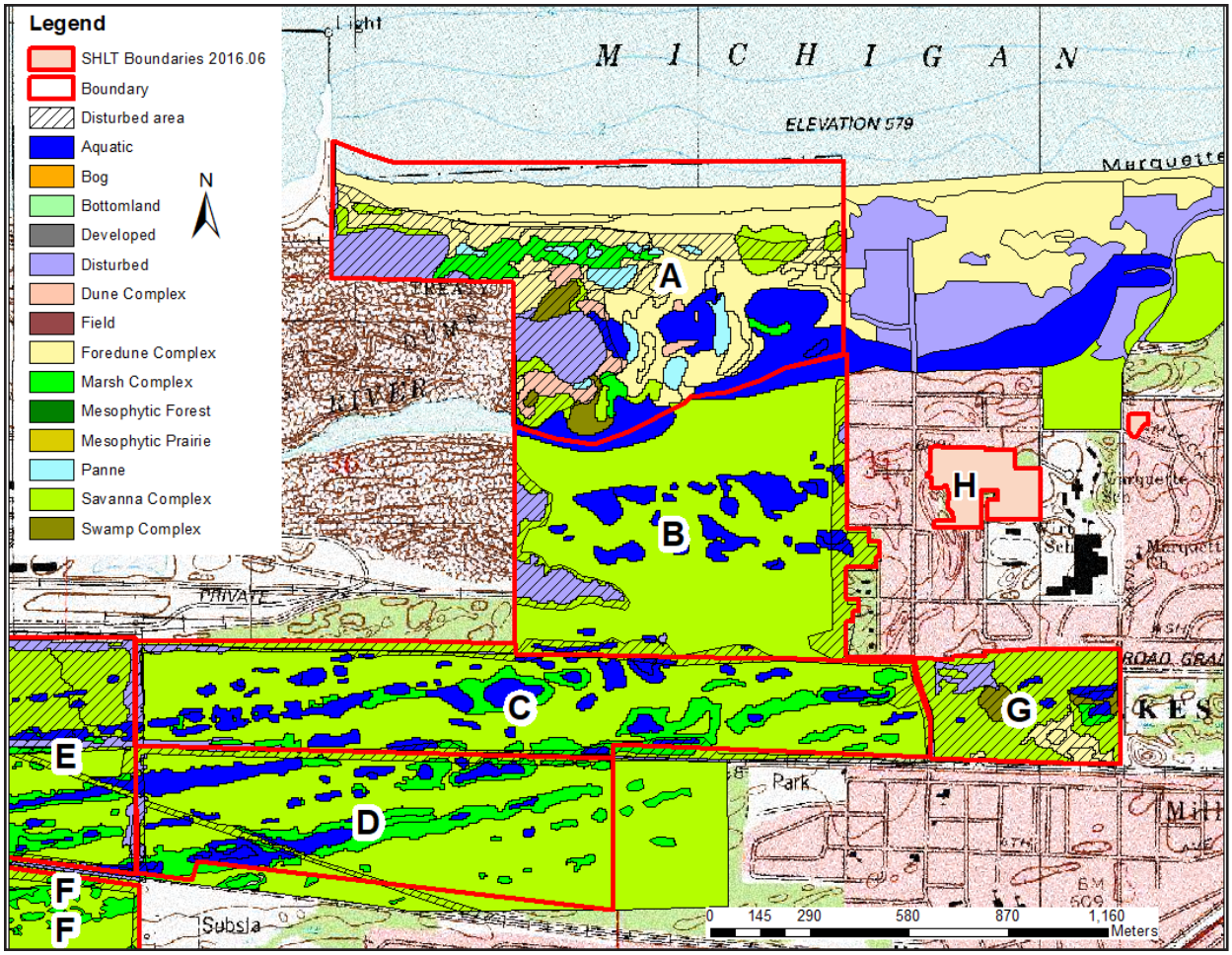


Figure 10. Vegetation of Miller Woods Unit (east side). Subunits indicated by letters. Disturbed areas are crosshatched.

woods." *Selaginella rupestris* was collected in 1878 at "Millers, sand hills" by E. J. Hill, but the habitat description suggests it still might be present in Miller Woods. Until these species are rediscovered in Miller Woods, we presume that they never grew there or have been extirpated. Umbach also collected *Celtis tenuifolia* at "Dunes, Millers" in 1899, a species that has recently been rediscovered at Miller Woods. There is a specimen of *Clintonia borealis* at the Field Museum, collected from "Swamp, Millers," which possibly could be the site south of Inland Marsh that is owned by Shirley Heinze Land Trust or, more likely, south of the now destroyed bog that was east of Grand Boulevard where there are now residences along and between Miller Avenue and East 3rd and 4th Avenues. Additional Umbach specimens at MOR, collected at "Miller" and known from elsewhere in INDU, include *Calopogon pulchellus*, *Campanula rotundifolia*, *Comptonia peregrina*, *Desmodium ciliare*, *Hudsonia tomentosa*, *Juniperus communis* var. *depressa*, and *Rhexia virginica*. Deam (1940) reported *Scleria pauciflora* var. *caroliniana* from "Miller." A report of *Eleocharis rostellata* from Miller Woods (Wilcox and Simonin 1987) probably is based either upon a misidentification or a typographical error; there is no voucher specimen at INDU.

Pannes

The pannes or dune slacks of Miller Dunes (Miller Woods A) are floristically rich and quite extensive. These have high floristic richness in comparison to those further up the Michigan coast where the vegetation is often less diverse and often dominated by twig rush (*Cladium mariscoides*) (Kost et al. 2007). The pannes are identified by The Nature Conservancy as globally threatened and globally significant elements of biodiversity in the Great Lakes Basin (Rankin and Crispin 1994). While the flora

of the Miller pannes has been explored, they have not been studied like those at West Beach (Hiebert et al. 1986, Nazareth 2008). At West Beach, the flora of each panne was quite dissimilar, but we do not know whether that is true at Miller. Representative flora of the pannes include *Agalinis purpurea*, *Juncus arcticus* var. *balticus*, *Arctostaphylos uva-ursi*, *Parnassia glauca*, *Solidago ptarmicoides*, *Pinus banksiana*, *Aletris farinosa*, *Platanthera aquilonis*, *Carex garberi*, *Pogonia ophioglossoides*, *Castilleja coccinea*, *Pycnanthemum virginianum*, *Cladium mariscoides*, *Rhynchospora capillacea*, *Clinopodium arkansanum*, *Sabatia angularis*, *Dulichium arundinaceum*, *Salix cordata*, *Eleocharis geniculata*, *Scleria verticillata*, *Gentiana andrewsii*, *Triglochin maritima*, *Gentianopsis crinita*, *Utricularia cornuta*, and *Hypericum kalmianum*.

The complete flora (Table 6), sources for new species (Table 7), and statistical summary of Miller Woods flora (Table 8) are given below.

Table 6. Summary of species verified and reported for Miller Woods Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 7. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species Name	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Abutilon theophrasti Medik.	–	–	–	–	–	–	–	–	X	*
Acalypha rhomboidea Raf.	–	–	–	–	–	x	–	–	X	0
Acer negundo L.	–	–	–	–	–	x	x	x	X	0
Acer platanoides L.	–	–	–	–	–	–	–	–	X	*
Acer rubrum L.	7	–	–	–	x	x	–	–	X	7
Acer saccharinum L.	–	–	x	–	x	x	x	–	X	0
Achillea millefolium L.	–	x	x	x	x	x	x	–	X	*
Agalinis purpurea (L.) Pennell	x	56	x	–	x	x	–	–	X	6
Agalinis purpurea (L.) Pennell var. *parviflora* (Benth.) B. Boivin	–	–	–	–	x	–	–	–	X	7
Agalinis tenuifolia (Vahl) Raf.	x	–	–	–	x	x	–	–	X	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	–	–	x	–	x	x	–	–	X	4
Agrostis gigantea Roth (*Agrostis alba* L.)	7	–	–	–	x	x	–	–	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	–	–	–	x	–	–	–	X	1
Ailanthus altissimus (Mill.) Swingle	–	–	–	–	–	x	x	x	X	*
SF***Aletris farinosa*** L.	25	22	x	x	–	–	–	–	X	10
Alisma subcordatum Raf.	x	x	x	x	x	x	–	–	X	4
Alisma triviale Pursh	–	–	x	–	x	–	–	–	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	–	–	–	–	–	–	–	–	X	*
SF***Allium cernuum*** Roth	–	–	R	–	–	–	–	–	R	7
SF***Alnus incana*** (L.) Moench ssp. ***rugosa*** (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng)	–	–	–	–	–	x	–	–	X	8
Amaranthus hybridus L.	–	–	–	–	–	–	–	–	R	ad
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	–	R	x	x	x	x	x	X	0

Table 6 (continued). Summary of species verified and reported for Miller Woods Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 7. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species Name	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Ambrosia psilostachya DC.(*Ambrosia psilostachya* DC. var. *coronopifolia* (Torr. & A. Gray) Farw.)	–	–	–	–	–	x	x	–	X	*
Ambrosia trifida L.	x	–	–	–	x	x	–	x	X	0
Amelanchier interior E. L. Nielsen	–	x	x	–	–	–	–	–	X	8
Amelanchier laevis Wiegand	–	–	–	x	–	–	–	–	X	8
Amelanchier spicata (Lam.) K. Koch	–	75	–	–	–	–	–	–	N	9
SF***Ammophila breviligulata*** Fernald	x	–	–	–	–	–	–	–	X	7
Amphicarpaea bracteata (L.) Fernald	x	x	x	x	x	x	–	x	X	4
Andropogon gerardii Vitman	x	x	x	x	x	x	–	–	X	5
Anemone canadensis L.	–	x	–	–	–	–	–	–	X	4
Anemone cylindrica A. Gray	–	x	x	x	x	x	–	x	X	6
Antennaria howellii Greene ssp. *petaloidea* (Fernald) R. J. Bayer (*A. neglecta* Greene)	–	–	–	–	–	4	–	–	N	4
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	–	31	R	x	–	x	–	–	X	3
Anthriscus caucalis M. Bieb.	–	–	–	–	–	4	–	–	X	*
Apios americana Medik.	–	x	x	x	x	x	x	–	X	7
Apocynum androsaemifolium L.	–	–	x	x	x	x	x	–	X	5
Apocynum cannabinum L. (includes former *A. sibiricum* Jacq.)	R 7	x	R 56	–	x	x	x	–	X	4
Aquilegia canadensis L.	–	x	x	x	x	x	–	x	X	6
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	x	x	x	x	x	x	x	x	X	5
Aralia nudicaulis L.	–	x	x	x	x	x	x	x	X	8
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald. & J. F.)	x	x	–	–	–	–	–	–	X	10
Arenaria serpyllifolia L.	–	–	–	–	–	–	–	–	X	*
SF***Aristida longespica*** Poir. var. ***geniculata*** (Raf.) Fernald (*Aristida intermedia* Scribn. & Ball)	x	–	–	–	–	–	–	–	X	5
Aristida oligantha Michx.	R	–	–	–	–	–	–	–	R	0
Aristida purpurascens Poir.	–	–	R	–	x	–	–	–	X	5
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	–	x	R	x	x	x	–	–	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements	x	x	x	x	x	x	x	–	X	5
Artemisia vulgaris L.	–	–	x	–	x	–	–	x	X	*
Asclepias amplexicaulis Sm.	–	x	x	x	x	x	–	–	X	7
Asclepias exaltata L.	–	–	–	–	–	4	–	–	N	9
Asclepias incarnata L.	x	x	x	x	x	x	–	–	X	4

Table 6 (continued). Summary of species verified and reported for Miller Woods Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 7. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species Name	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Asclepias syriaca L.	x	x	x	–	x	x	x	x	X	0
Asclepias tuberosa L.	x	x	x	x	x	x	x	x	X	7
Asclepias verticillata L.	–	31	x	x	x	4	–	–	X	1
SF***Asclepias viridiflora*** Raf.	–	x	–	–	–	–	–	–	X	10
Asimina triloba (L.) Dunal	–	–	–	–	–	4	–	–	N	9
Asparagus officinalis L.	7	x	x	–	x	1	x	–	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	–	–	–	–	–	–	–	x	N	5
Aureolaria flava (L.) Farw.	–	–	–	–	–	x	–	–	X	9
Aureolaria pedicularia (L.) Raf. ex Pennell (*Aureolaria pedicularia* (L.) Raf. var. *ambigens* (Fernald) Farw.)	–	x	x	x	x	4	–	–	X	7
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	–	–	–	x	–	–	–	–	X	8
Barbarea vulgaris W.T. Aiton	–	–	R	–	–	–	–	–	R	*
Berberis thunbergii DC.	7	–	–	–	–	–	–	x	N	*
Betula pendula Roth	64, 65	–	–	–	–	–	–	–	N	*
Bidens cernua L.	x	x	x	–	x	–	–	x	X	5
Bidens tripartita L. (*Bidens comosa* (A. Gray) Wiegand)	x	–	x	–	x	x	–	–	X	5
Bidens connata Muhl. ex Willd.	–	56	–	–	–	–	–	–	N	5
Bidens trichosperma (Michx.) Britton	x	–	–	–	–	–	–	–	X	9
Bidens frondosa L.	–	–	–	x	–	–	–	–	X	1
Boehmeria cylindrica (L.) Sw.	–	–	–	–	x	x	–	–	X	2
Boltonia asteroides (L.) L'Her. var. *recognita* (Fernald & Griscom) Cronquist (*Boltonia latisquama* A. Gray var. *recognita* Fernald & Griscom)	–	–	–	x	x	–	–	–	X	9
SF***Brasenia schreberi*** J. F. Gmel.	–	36	–	–	–	–	–	–	N	10
Brickellia eupatorioides (L.) Shinners var. *corymbulosa* (Torr. & A. Gray) Shinners (*Kuhnia eupatorioides* L. var. *corymbulosa* Torr. & A. Gray)	x	–	–	–	–	–	–	–	X	6
Bromus inermis Leyss.	–	–	–	–	–	–	x	–	X	*
Bromus japonicus Thunb.	–	–	–	–	x	x	–	–	X	*
Bromus squarrosus L.	39	–	–	–	–	–	–	–	N	*
Bromus tectorum L.	x	–	x	–	x	x	x	–	X	*
Bulbostylis capillaris (L.) C.B. Clarke	–	–	x	–	–	x	–	–	X	4
SF***Cakile edentula*** (Bigelow) Hook.	x	–	–	–	–	–	–	–	X	9
Calamagrostis canadensis (Michx.) P. Beauv.	x	x	x	x	x	x	x	–	X	3
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. magna Scribn. & Merr.	x	x	x	x	x	x	x	–	X	5

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Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	–	x	x	–	x	x	–	–	X	1
Camassia scilloides (Raf.) Cory	–	–	–	–	x	–	–	–	X	6
Campanula americana L.	–	–	–	–	–	–	–	x	N	3
Campanula aparinoides Pursh (including former *C. uliginosa* Rydb.)	x	x	X 38	–	x	x	x 2	–	X	9
SF***Campanula rotundifolia*** L.	–	–	R	–	–	–	–	–	R	10
Cannabis sativa L.	–	–	x 15	–	–	–	–	x	X	*
Capsella bursa-pastoris (L.) Medik.	–	–	–	–	–	–	–	–	X	*
Cardamine pensylvanica Muhl. ex Willd.	–	–	–	–	–	x	–	–	X	4
Carduus nutans L.	–	–	50	50	49	–	50	–	N	*
SF***Carex alata*** Torr.	–	–	x	x	x	x 30	–	–	X	10
Carex aquatilis Wahlenb. var. *substricta* Kukenth. (*Carex aquatilis* Wahlenb. var. *altior* (Rydb.) Fernald)	7	56	56	–	–	–	x	–	X	5
SF***Carex aurea*** Nutt.	x	–	–	–	–	–	–	–	X	9
Carex brevior (Dewey) Mackenzie ex Lunell	–	–	–	x	x	x	–	–	X	4
Carex buxbaumii Walhenb.	–	–	59	–	–	–	–	–	N	10
Carex comosa Boott	7	56	x	–	–	4	–	x	X	5
Carex emoryi Dewey	–	–	x	x	–	–	–	–	X	6
SF***Carex garberi*** Fernald	x	–	x	–	–	–	–	–	X	10
Carex haydenii Dewey	–	–	x	–	–	–	–	–	X	6
Carex hystericina Muhl. ex Willd.	7	–	–	–	–	–	–	–	N	5
Carex lacustris Willd.	–	56	56	–	–	x	x	–	X	6
Carex lasiocarpa Ehrh. ssp. *americana* (Fernald) Hulten (*Carex lasiocarpa* Ehrh. var. *americana* Fernald)	–	–	x	–	–	x	–	–	X	10
Carex longii Mack.	–	–	–	x	–	x	–	–	X	6
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergi*i Schkuhr ex Willd.)	–	x	x	x	x	x	x	x	X	5
Carex pellita Willd.	–	56	56	–	–	–	–	–	N	4
Carex pensylvanica Lam.	–	x	x	x	x	x 4	x	x	X	5
Carex sartwellii Dewey	–	x	x	–	x	–	–	–	X	6
SF***Carex siccata*** Dewey	–	–	x	–	–	–	–	–	X	10
Carex stricta Lam.	–	x	x	x	x	x	x	–	X	5
SF***Carex tonsa*** (Fernald) E.P. Bicknell	–	x	x	x	–	x	x	–	X	7
Carex tribuloides Wahlenb.	–	–	x	–	–	–	–	–	X	3
Carex umbellata Schkuhr ex Willd.	–	–	–	–	x	–	–	–	X	9
Carex viridula Michx. ssp. viridula	x	–	–	–	–	–	–	–	X	10

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Carex vulpinoidea Michx.	–	–	–	x	–	–	–	–	X	2
SF***Castilleja coccinea*** (L.) Spreng.	x	x	x	–	–	–	–	–	X	10
Catalpa speciosa Teas	–	–	–	–	–	x	x	–	X	ad
Ceanothus americanus L.	–	x	x	x	x	x	x	X	X	6
Celastrus orbiculatus Thunb.	–	14	–	–	–	–	–	X	N	*
SF***Celastrus scandens*** L.	x	x	x	x	–	x	x	X	X	4
SF***Celtis tenuifolia*** Nutt.	–	41	–	–	–	–	–	x	N	10
Cenchrus longispinus (Hack.) Fernald	x	–	x	x	–	x	–	–	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	–	–	x 32	x	x 32	–	–	–	X	*
Centaurium pulchellum (Sw.) Druce	–	–	–	–	–	x	–	–	X	*
Cephalanthus occidentalis L.	x	–	x	x	x	x	x 27	–	X	5
Ceratophyllum demersum L.	–	–	–	–	–	–	–	35	N	2
Chamaecrista fasciculata (Michx.) Greene var. *fasciculata*	–	–	x	–	–	–	–	–	X	5
SF***Chamaecrista nictitans*** (L.) Moench ssp. ***nictitans*** var. ***nictitans*** (*Cassia nictitans* L.)	–	x	–	–	–	–	–	–	X	7
Chenopodium album L.	x	–	R	x	x	–	–	–	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	–	x	–	–	–	–	–	–	X	5
Chenopodium standleyanum Aellen	x	–	–	x	x	–	–	–	X	4
Cichorium intybus L.	–	–	–	–	–	x	–	–	X	*
Cicuta bulbifera L.	x	–	–	–	–	x	–	–	X	8
Cicuta maculata L.	–	–	–	–	–	4	–	–	N	6
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	–	–	–	–	–	x	–	–	X	1
Cirsium arvense (L.) Scop.	x	56	x	–	x	x	–	–	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	x	–	–	–	x	–	–	–	X	2
Cirsium muticum Michx.	–	56	56	–	–	–	–	–	R	10
SF***Cirsium pitcheri*** (Torr. ex Eaton) Torr. & A. Gray	x	–	–	–	–	–	–	–	X	10
Cirsium vulgare (Savi) Ten.	x	–	–	–	–	x	–	x	X	*
SF***Cladium mariscoides*** (Muhl.) Torr.	x	56	R	R	–	–	–	–	X	10
Claytonia virginica L.	–	x 014	–	–	–	–	–	–	N	2
SF***Clinopodium arkansanum*** (Nutt.) House (*Satureja arkansana* (Nutt.) Briq.)	x	–	–	–	–	–	–	–	X	10
Comandra umbellata (L.) Nutt. ssp. *umbellata*	–	x	x	x	x	x	x	–	X	7
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	–	–	x	x	x	x	–	–	X	10
Commelina communis L.	–	–	–	–	–	–	–	x	N	*

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Commelina erecta L. (*Commelina erecta* L. var. *deamiana* Fernald)	–	–	x	–	–	–	–	–	X	10
Convallaria majalis L.	–	55	–	–	–	–	–	–	N	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	7	x	x	–	x	x	x	–	X	0
Convallaria majalis L.	–	–	–	–	–	–	–	x	N	*
SF***Corallorhiza maculata*** (Raf.) Raf.	–	9	–	–	–	–	–	–	N	10
Coreopsis lanceolata L.	–	x	x	x	x	x	–	–	X	5
Coreopsis palmata Nutt.	–	–	R	–	–	–	–	–	R	6
Coreopsis tripteris L.	x	x	x	x	x	x	–	–	X	5
Corispermum americanum (Nutt.) Nutt. (*Corispermum hyssopifolium* L.)	x	–	–	–	–	x	–	x	X	5
Cornus obliqua Raf.	7	56	56	x	–	x	–	–	X	6
Cornus racemosa Lam.	x	56	x	x	x	–	x	x	X	1
SF***Cornus rugosa*** Lam.	–	46	x	–	–	–	–	x	X	10
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.	x	x	x	x	–	x	–	x	X	6
Crepis capillaris (L.) Wallr.	–	–	–	–	–	–	–	–	X	*
Crepis pulchra L.	–	–	–	–	67	–	–	–	N	*
Crocanthemum canadense Britton (*Helianthemum canadense* (L.) Michx.)	–	x	x	x	x	x	x	–	X	8
Cuscuta coryli Engelm.	R	–	–	–	–	–	–	–	R	10
Cuscuta gronovii Willd. ex Schult.	–	–	–	–	x	–	–	–	X	4
SF***Cuscuta pentagona*** Engelm.	–	–	R	–	–	–	–	–	N	9
Cycloloma atriplicifolium (Spreng.) J. M. Coult.	x	–	x	–	x	x	x	–	X	7
Cynoglossum officinale L.	45	–	–	–	–	–	–	–	N	*
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	x	R	x	–	–	x	–	–	X	4
Cyperus erythrorhizos Muhl.	7	–	–	–	x	–	–	–	X	2
Cyperus esculentus L.	–	–	x	–	–	–	–	x	X	0
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus*	x	–	x	x	x	x	–	–	X	5
SF***Cyperus houghtonii*** Torr.	–	–	–	–	–	x	–	–	X	2
Cyperus odoratus L. (*Cyperus ferruginescens* Boeck.)	x	56	–	–	x	x	–	–	X	2
Cyperus squarrosus L. (*Cyperus inflexus* Muhl.)	–	–	–	–	–	x	–	–	X	4
Cyperus schweinitzii Torr.	x	x	x	x	x	x	x	x	X	5
Cyperus strigosus L.	x	–	R	–	–	x	–	–	X	1
SF***Cypripedium acaule*** Aiton	R	–	–	–	–	–	–	–	R	10
SF***Cypripedium parviflorum*** Salisb. var. ***pubescens*** (Willd.) O.W. Knight (*Cypripedium calceolus* L. var. *pubescens* (Willd.) Correll	–	–	–	–	–	1	–	–	X	10

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SF***Dasiphora fruticosa*** (L.) Rydb. (*Potentilla fruticosa* L.)	x	–	–	–	–	–	–	–	X	10
Datura stramonium L.	–	–	–	–	–	x	–	–	X	ad
Daucus carota L.	x	–	R	x	x	x	x	–	X	*
Descurainia sophia (L.) Webb ex Prantl	–	–	x	–	–	–	–	–	X	*
Desmodium canadense (L.) DC.	x	–	x	–	–	x	–	–	X	4
Desmodium paniculatum (L.) DC.	–	x	–	–	–	x	–	–	X	6
Desmodium sessilifolium (Torr.) Torr. & A. Gray	–	x 33	–	–	–	4	–	–	X	8
Dianthus armeria L.	–	71	–	–	–	–	–	–	X	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *columbianum* (Scribn.) Freckmann & Lelong (*Panicum columbianum* Scribn.)	–	–	x	–	–	–	–	–	X	7
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	x	x	x	x	–	x	–	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	x	–	x	–	–	–	–	–	X	9
SF***Dichanthelium boreale*** (Nash) Freckmann (*Panicum boreale* Nash)	–	–	–	–	–	x	–	–	X	10
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	–	x	x	–	x	–	–	–	X	7
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	–	x	x	–	–	–	–	x	X	5
SF***Dichanthelium oligosanthes*** (J.A. Schultes) Gould ssp. ***oligosanthes***	–	–	–	x	–	–	–	–	X	9
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong	x	x	x	x	x	x	x	–	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	–	x	x	x	x	–	–	–	X	8
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	x	x	x	x	x	x	–	X	7
SF***Dichanthelium perlongum*** (Nash) Freckmann	–	–	x	–	–	–	–	–	X	10
SF***Diervilla lonicera*** Mill.	–	x	x	x	x	x	x	x	X	9
Digitaria cognata (J.A. Schultes) Pilge (*Leptoloma cognatum* (Schult.) Chase)	–	–	–	–	x	–	–	–	X	3
Digitaria ischaemum (Schreb.) Muhl.	–	–	–	–	x	–	–	–	X	*
Digitaria sanguinalis (L.) Scop.	–	–	–	–	x	–	–	–	X	*
Diplotaxis muralis (L.) DC.	–	–	–	–	–	–	–	–	X	*

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Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	x	56	x	x	x	x	–	–	X	9
Draba reptans (Lam.) Fernald	–	16	–	–	–	–	–	–	N	8
SF***Drosera intermedia*** Hayne	–	–	–	–	–	–	–	–	X	10
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O. F. Müll.) Watt	–	–	–	–	x	–	–	–	X	8
Dulichium arundinaceum (L.) Britton	7	56	x	x	x	x	–	–	X	9
Echinochloa crusgalli (L.) P. Beauv.	x	–	R	–	–	x	–	–	X	0
Echinocystis lobata (Michx.) Torr. & A. Gray	–	–	x	–	–	–	–	–	X	5
Echium vulgare L.	58	–	–	x	–	–	–	–	X	*
Eleocharis acicularis (L.) Roem. & Schult.	7	56	56	x	x	–	–	–	X	2
Eleocharis compressa Sull.	7	–	–	–	–	–	–	–	X	8
Eleocharis elliptica Kunth	x	–	–	x	x	–	–	–	X	8
Eleocharis erythropoda Steud.	–	x	x	x	–	–	–	–	X	2
Eleocharis flavescens (Poir.) Urb. (*Eleocharis olivacea* Torr.)	x	–	–	–	–	–	29	–	X	9
SF***Eleocharis geniculata*** (L.) Roem. & Schult.	x	–	–	–	–	–	–	–	X	10
Eleocharis intermedia Schult.	x	–	–	–	–	–	–	–	X	8
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis smallii* Britton)	–	–	56	x	–	–	–	–	X	5
SF***Eleocharis quinqueflora*** (Hartmann) O. Schwarz (*Eleocharis pauciflora* (Lightf.) Link var. *fernaldii* Svenson)	x	–	–	–	–	–	–	–	X	9
Elodea canadensis Michx.	R	–	–	–	–	–	–	–	R	5
Elodea nuttallii (Planch.) H. St. John	–	–	x	–	–	–	–	–	X	7
Elymus canadensis L.	x	x	x	–	x	x	x	x	X	4
Elymus hystrix L. (*Hystrix patula* Moench)	–	–	x	–	–	–	–	–	X	5
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	–	–	–	–	–	x	x	X	*
Elymus trachycaulus (Link) Gould ex Shinners ssp. *subsecundus* (Link) A.& D. Löve (*Agropyron trachycaulum* (Link) Malte var. *unilaterale* (Cassidy) Malte)	–	x	x	–	–	–	–	–	X	8
SF***Epilobium ciliatum*** Raf.	7	–	R	–	–	–	–	–	N	3
Equisetum arvense L.	R	x	–	–	x	x	–	–	X	0
Equisetum × *ferrissii* Clute [*E. hyemale* × *E. laevigatum*]	7	–	–	–	–	x	x	–	X	2
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor	7	56	x	–	x	1	–	–	X	3
Equisetum laevigatum A. Braun	–	x	x	x	x	–	x	–	X	2
SF***Equisetum × nelsonii*** (A.A. Eaton) J. H. Schaffn.	72	–	–	–	–	–	–	–	N	10
SF***Equisetum variegatum*** Schleich. ex F. Weber & D. Mohr	x	–	–	–	–	–	–	–	X	9

Table 6 (continued). Summary of species verified and reported for Miller Woods Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 7. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species Name	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Eragrostis cilianensis (All.) Vignolo ex Janchen	R	–	–	–	–	–	–	–	R	*
Eragrostis pectinacea (Michx.) Nees	R	–	x 3	–	–	–	–	–	X	0
Eragrostis minor Host (*Eragrostis poaeoides* Roem. & Schult.)	–	–	–	–	–	x	–	–	X	*
Eragrostis spectabilis (Pursh) Steud.	x	–	x	–	x	x	–	–	X	3
Eragrostis trichodes (Nutt.) Alph. Wood	–	–	–	–	–	–	x	–	X	*
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	7	–	–	–	x	x	–	x	X	2
Erigeron annuus (L.) Pers.	x	x	–	–	x	–	x	–	X	0
Erigeron philadelphicus L.	R	R 18	x	x	x	1	–	–	X	4
Erigeron strigosus Muhl. ex Willd.	x	x	x	x	x	x	x	–	X	5
Eriogonum annuum Nutt.	–	–	–	–	–	4	–	–	N	*
Eupatorium altissimum L.	x	–	–	x	x	x	x	–	X	0
Eupatorium perfoliatum L.	x	x	x	x	x	x	x	x	X	4
Eupatorium serotinum Michx.	x	–	x	–	x	x	x	–	X	0
Euphorbia corollata L.	x	x	x	x	x	x	x	x	X	2
Euphorbia dentata Michx.	–	–	–	–	x	–	–	–	X	*
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	x	–	–	–	x	x	x	–	X	0
SF***Euphorbia polygonifolia*** L.	x	–	–	–	–	–	–	–	X	10
Euphorbia maculata L. (*Euphorbia supina* Raf.)	x	–	–	–	x	–	–	–	X	0
SF***Euthamia caroliniana*** (L.) Greene ex Porter & Britton (*Solidago tenuifolia* Pursh)	–	–	–	–	x	–	–	–	X	10
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb.)	x	–	–	–	x	4	–	–	X	4
Euthamia graminifolia (L.) Nutt. var. *nuttallii* (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	x	x	x	x	x	x	–	X	3
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	x	x	x	x	x	–	–	–	X	5
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	x	56	R	x	x	x	x	–	X	4
Fallopia convolvulus (L.) A. Löve (*Polygonum convolvulus* L.)	x	–	–	–	–	4	–	–	X	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	–	–	–	–	x	x	–	x	X	1
Fragaria virginiana Miller	x	x	x	x	x	x	x	x	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	7	–	–	–	–	x	–	–	X	*
SF***Fraxinus americana*** L.	x	–	–	–	–	–	–	–	X	5
Froelichia gracilis (Hook.) Moq.	–	–	–	–	–	x	–	–	X	ad
Galium aparine L.	–	–	x	–	–	1	x	x	X	1
Galium concinnum Torr. & A. Gray	–	–	–	–	x	–	–	–	X	5

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Galium obtusum Bigelow	–	56	–	–	–	x	x	–	X	5
Galium pilosum Aiton	–	x	x	–	–	–	x	x	X	10
Galium tinctorium L.	–	56	x	–	–	–	–	–	X	8
Gaylussacia baccata (Wangenh.) K. Koch	–	x	x	–	–	x	–	–	X	9
Gentiana andrewsii Griseb.	x	56	x	–	–	–	–	–	X	8
SF***Gentiana saponaria*** L.	–	–	–	60	–	–	–	–	N	10
Gentianopsis crinita (Froel.) Ma (Gen)	x	x	x	x	–	x	–	–	X	10
Geranium maculatum L.	–	–	–	x	x	–	–	–	X	4
Geum laciniatum Murray (*Geum laciniatum* Murray var. *trichocarpum* Fernald)	–	–	–	–	–	–	–	x	N	2
Glechoma hederacea L.	–	–	–	–	–	–	–	x	X	*
Gleditsia triacanthos L.	–	–	–	–	–	–	–	–	X	2
SF***Glyceria borealis*** (Nash) Batch.	–	–	x	–	x	30	–	–	X	10
Glyceria septentrionalis Hitchc.	–	x	x	x	–	–	–	–	X	8
Glyceria striata (Lam.) Hitchc.	–	x	–	–	–	–	–	–	X	4
Hackelia virginiana (L.) I. M. Johnst.	–	–	–	–	–	–	x	–	X	0
Hamamelis virginiana L.	–	–	x	–	x	x	x	x	X	8
Helianthus divaricatus L.	x	x	x	x	x	x	x	x	X	5
Helianthus giganteus L.	–	–	–	–	–	x	–	–	X	9
Helianthus grosseserratus M. Martens	x	–	–	–	x	x	–	–	X	2
Helianthus occidentalis Riddell	x	31	x	x	x	x	–	–	X	10
Helianthus pauciflorus Nutt. ssp. *pauciflorus* (*Helianthus rigidus* (Cass.) Desf.)	x	–	x	–	x	–	–	–	X	8
Helianthus petiolaris Nutt. ssp. *petiolaris*	x	–	R	–	x	x	x	–	X	ad
Helianthus strumosus L.	–	–	–	–	–	4	–	–	N	5
Hemerocallis fulva (L.) L.	–	–	–	–	–	–	x	x	X	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	–	x	x	x	x	x	x	–	X	7
SF***Heteranthera dubia*** (Jacq.) MacMill.	–	–	–	–	x	–	–	–	X	8
Heuchera richardsonii R. Br.	–	–	–	–	–	x	–	–	X	8
Hibiscus trionum L.	–	–	–	–	–	x	–	–	X	*
Hieracium caespitosum Dumort.	–	–	–	–	–	–	–	–	X	*
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	x	x	x	x	x	x	–	–	X	6
Hieracium gronovii L.	–	x	–	–	–	x	–	–	X	6
Hieracium scabrum Michx.	–	56	x	–	–	4	–	–	X	8
Hordeum jubatum L.	–	–	–	–	–	–	–	–	X	*
SF***Hypericum canadense*** L.	–	–	x	–	–	–	–	–	X	10
SF***Hypericum kalmianum*** L.	x	–	x	–	x	30	–	–	X	10
Hypericum majus (A. Gray) Britton	x	–	–	–	–	–	–	–	X	6

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Hypoxis hirsuta (L.) Coville	–	–	–	–	–	x	–	–	X	9
Ilex verticillata (L.) A. Gray	–	–	–	–	x	x	–	–	X	9
Impatiens capensis Meerb.	x	–	–	–	–	–	–	–	X	3
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	x	x	x	x	x	–	–	X	10
Ipomoea hederacea Jacq.	–	–	61	–	–	–	–	–	N	*
Iris germanica L.	–	–	–	–	–	–	–	–	X	*
Iris pseudacorus L.	–	–	–	–	–	–	–	–	X	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	7	x	x	x	x	x	x	–	X	5
Juglans nigra L.	–	–	–	–	–	–	x	–	X	5
Juncus acuminatus Michx.	x	56	56	x	x	–	–	–	X	6
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	7	–	x	x	–	–	–	–	X	7
SF***Juncus arcticus*** Willd. var. ***balticus*** (Willd.) Trautvetter (*Juncus balticus* Willd. var. *littoralis* Engelm.)	x	x	x	x	x	–	–	–	X	6
Juncus brachycephalus (Engelm.) Buchenau	x	–	x	–	–	–	–	–	X	9
Juncus canadensis J. Gay ex Laharpe	x	56	x	x	x	x	–	–	X	7
SF***Juncus diffusissimus*** Buckley	–	–	x	–	–	–	–	–	X	10
Juncus dudleyi Wiegand	–	x	x	–	–	–	–	–	X	4
Juncus effusus L.	–	R	–	–	x	x	–	–	X	7
Juncus greenei Oakes & Tuck.	–	–	x	–	x	–	–	–	X	8
Juncus interior Wiegand	–	R	–	–	x	–	–	–	X	6
Juncus marginatus Rostk.	R	–	–	–	–	–	–	–	R	9
Juncus nodosus L.	7	56	x	x	x	x	–	–	X	6
SF***Juncus pelocarpus*** E. Mey.	–	–	–	–	–	–	–	–	X	10
SF***Juncus scirpoides*** Lam.	–	x	x	x	x	30	–	–	X	9
Juncus tenuis Willd.	–	–	x	–	x	4	x	–	X	0
Juncus torreyi Coville	x	–	x	–	–	–	–	–	X	4
SF***Juniperus communis*** L.	7	–	–	–	–	–	–	–	N	10
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	x	–	–	–	–	–	–	–	X	2
Kochia scoparia (L.) Schrad.	–	–	–	–	–	x	–	–	X	*
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	–	x	x	x	x	x	x	x	X	7
Krigia biflora (Walter) S.F. Blake	–	x	x	x	x	1	x	–	X	7
Krigia virginica (L.) Willd.	–	–	x	–	–	x	–	–	X	6
Lactuca canadensis L.	x	x	x	x	x	x	x	x	X	2
Lactuca serriola L.	–	–	–	–	–	x	–	–	X	*

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
SF***Lathyrus japonicus*** Willd. var. ***maritimus*** (L.) Kartesz & Gandhi (*Lathyrus japonicus* Willd. var. *glaber* (Ser.) Fernald)	R	–	–	–	–	–	–	–	R	10
SF***Lathyrus ochroleucus*** Hook.	–	–	R	–	–	–	–	–	R	10
Lathyrus palustris L.	x	–	–	–	–	–	–	–	X	8
Lechea mucronata Raf. (*Lechea villosa* Elliott)	–	–	x	x	–	x	–	–	X	6
Leersia oryzoides (L.) Sw.	x	56	x	x	–	4	–	–	X	4
Lemna minor L.	–	–	–	–	–	–	x	–	X	5
Leonurus cardiaca L.	–	–	–	–	–	–	–	x	N	*
Lepidium virginicum L.	x	x	x	x	x	–	–	–	X	0
Lespedeza capitata Michx.	–	x	x	x	x	x	x	–	X	4
Lespedeza hirta (L.) Hornem.	–	–	–	–	–	x	–	–	X	6
Lespedeza virginica (L.) Britton	–	–	–	–	–	–	x	–	X	4
Leymus arenarius (L.) Hochst. (*Elymus arenarius* L.)	x 17	–	–	–	–	–	–	–	X	*
Liatris aspera Michx.	x	x	x	x	x	x	–	x	X	6
Liatris cylindracea Michx.	–	x	–	–	–	–	–	–	X	8
Liatris spicata (L.) Willd.	–	–	–	x	x	x	–	–	X	6
SF***Lilium philadelphicum*** L. (*Lilium philadelphicum* L. var. *andinum* (Nutt.) Ker Gawl.)	–	–	–	x	–	–	–	–	X	10
Linaria vulgaris Mill.	x	–	–	–	–	4	–	–	X	*
Linum medium (Planch.) Britton var. *texanum* (Planch.) Fernald	x	–	x	–	–	–	–	–	X	7
SF***Linum striatum*** Walter	7	–	–	–	–	–	–	–	N	10
Liparis liliifolia (L.) Rich. ex Lindl.	R	11	x	x	x	x	–	–	X	6
SF***Liparis loeselii*** (L.) Rich.	12	R	R	–	–	x	–	–	X	7
Lipocarpha micrantha (Vahl) G.C. Tucker (*Hemicarpha micrantha* (Vahl) Pax)	–	–	x 24	–	–	x	–	–	X	6
Lithospermum canescens (Michx.) Lehm.	–	–	–	–	x	x	–	–	X	8
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	x	x	x	x	x	x	x	X	8
Lobelia cardinalis L.	–	–	–	x	–	–	–	–	X	7
Lobelia kalmii L.	x	–	–	–	–	–	–	–	X	10
Lobelia siphilitica L.	x	56	x	–	–	–	–	–	X	6
Lonicera × *bella* Zabel [*L. tartarica* × *L. morrowii*]	–	–	–	–	–	x	x	–	X	*
SF***Lonicera dioica*** L.	R	57	57	–	–	x	–	–	X	10
Lonicera × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides*] (*Lonicera* × *muendeniensis* Rehder)	51	–	R	–	x	x	–	–	X	*
Lonicera tatarica L.	–	–	–	–	–	4	–	–	N	*

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Lunaria annua L.	–	–	–	–	–	–	–	x	N	*
Ludwigia alternifolia L.	–	–	x	x	x	x	–	–	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	–	56	–	x	x	–	–	x	X	5
Ludwigia polycarpa Short & R. Peter	–	–	x	R	x	x	–	–	X	6
SF***Ludwigia sphaerocarpa*** Elliott (*L. sphaerocarpa* var. *deamii* Fernald & Griscom)	–	–	–	–	x	30	–	–	X	10
Lupinus perennis L. var. *occidentalis* S. Watson	??	x	x	x	x	x	69	–	X	7
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	–	–	–	–	–	1	–	–	N	7
Lycopus americanus Muhl. ex W.P.C. Barton	x	x	x	x	x	x	x	x	X	5
Lycopus asper Greene	–	x	–	–	–	–	–	–	X	ad
Lycopus rubellus Moench	x	56	56	–	–	–	–	–	X	10
Lycopus uniflorus Michx.	x	x	56	x	–	x	x	–	X	7
Lycopus virginicus L.	–	–	x	–	x	–	–	x	X	9
Lysimachia lanceolata Walter	–	–	–	–	x	–	–	–	X	7
Lysimachia terrestris (L.) Britton	–	x	x	–	–	–	–	–	X	8
Lysimachia thyrsiflora L.	–	x	x	–	x	1	–	–	X	9
Lythrum alatum Pursh	x	x	x	x	x	x	–	–	X	7
Lythrum salicaria L.	x	31	56	–	x	x	x	x	X	*
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	x	x	x	x	x	–	x	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	x	x	x	x	x	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	x	x	x	x	x	x	x	X	5
Malus ioensis (Alph. Wood) Britton	–	–	–	–	–	–	x	–	X	3
Medicago lupulina L.	–	–	–	–	–	–	–	–	X	*
SF***Melampyrum lineare*** Desr.	R	–	–	–	–	–	–	–	R	10
Melilotus alba Medik.	x	–	x	x	x	x	x	x	X	*
Melilotus officinalis (L.) Lam.	x	–	x	x	x	–	x	–	X	*
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	x	x	x	x	–	–	x	–	X	5
Mentzelia decapetala (Pursh ex Sims) Urb. & Gilg	–	–	–	–	–	–	x 13	–	X	ad
SF***Menyanthes trifoliata*** L. (*M. trifoliata* var. *minor* Fernald)	–	–	6	–	–	–	–	–	N	10
Mimulus ringens L.	x	56	56	–	x	4	x	x	X	6
SF***Minuartia michauxii*** (Fenzl) Farw. (*Arenaria stricta* Michx.)	x 10	–	–	–	–	21	57	–	X	10
Mirabilis jalapa L.	–	–	–	–	–	–	–	x	N	*
Mirabilis nyctaginea (Michx.) MacMill.	x	x	x	–	–	x	–	–	X	ad

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Mollugo verticillata L.	x	–	–	–	x	x	–	–	X	ad
Monarda fistulosa L.	–	x	R	x	x	x	x	x	X	4
Monarda punctata L.	x	x	x	x	x	x	x	x	X	5
SF***Monotropa uniflora*** L.	–	11	11	–	–	–	–	x	X	10
Morus alba L.	–	–	R	–	x	x	x	x	X	*
Muhlenbergia mexicana (L.) Trin.	–	–	x	–	x	–	–	–	X	5
Muhlenbergia racemosa (Michx.) Britton, Sterns & Poggenburg	–	–	x	–	x	–	–	–	X	*
Myosotis scorpioides L.	R	–	–	–	–	–	–	–	R	*
Myriophyllum sibiricum Kom.(*Myriophyllum exalbescens* Fernald)	x	–	x	R	x	–	–	–	X	7
Myriophyllum spicatum L.	–	–	–	–	–	–	–	35	N	*
SF***Myriophyllum verticillatum*** L. (*M. verticillatum* var. *pectinatum* Wallr.)	–	36	x	–	–	30	–	–	X	10
Najas flexilis (Willd.) Rostk. & W.L.E. Schmidt	R 7	x	R	–	–	–	–	–	X	6
Nepeta cataria L.	–	–	–	–	–	–	–	x	X	*
Nuphar advena (Aiton) W. T. Aiton	x	x	x	x	28	x	29	35	X	7
Nuphar variegata Durand (*Nuphar variegatum* Engelm.)	R	x	R	x	–	–	–	–	X	8
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	–	–	R	–	x	x	–	–	X	6
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist (*Nymphaea tuberosa* Paine)	x	x	x	x	x	x	29	–	X	7
Nyssa sylvatica Marshall	–	–	R	x	x	x	x	–	X	8
Oenothera biennis L.	x	–	x	–	x	x	–	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	x	x	–	x	x	x	–	X	7
Oenothera glaucifolia W.L. Wagner & Hoch (*Stenosiphon linifolius* (Nutt.) Britton)	–	–	–	–	–	–	x	–	N	ad
SF***Oenothera oakesiana*** (A. Gray) J.W. Robbins ex S. Watson & J.M. Coult.	66	–	–	–	–	–	–	–	N	2
Onoclea sensibilis L.	–	56	–	–	x	x	29	–	X	8
SF***Ophioglossum pusillum*** Raf. (*O. vulgatum* L. var. *pseudopodum* (S.F. Blake) Farw.)	–	63	–	–	–	x	–	–	X	9
Opuntia cespitosa Raf. (*O. humifusa* (Raf.) Raf)	x	x	x	x	x	x	x	–	X	5
SF***Orobanche uniflora*** L.	–	31	8	–	–	x	–	–	X	10
SF***Orthilia secunda*** (L.) House (*Pyrola secunda* L.)	–	–	–	–	–	–	–	–	R	10
Osmunda claytoniana L.	–	–	–	–	–	x	–	–	X	9
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	–	56	x	x	x	x	–	–	X	8

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Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	–	–	–	x	x	x	–	–	X	7
Oxalis stricta L. (*Oxalis europaea* Jord.)	–	–	R	–	–	–	–	x	R	0
Oxypolis rigidior (L.) Raf.	–	–	x	x	–	x	–	–	X	7
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	x	x	x	x	x	x	–	–	X	6
Panicum capillare L.	–	x	x	–	x	x	–	–	X	1
Panicum dichotomiflorum Michx.	x	–	x	–	–	x	–	–	X	0
Panicum flexile (Gatt.) Scribn.	x	–	–	–	–	–	–	–	X	9
Panicum rigidulum Bosc ex Nees	–	–	x	–	–	–	–	–	X	5
Panicum virgatum L.	x	x	x	x	x	x	x	x	X	5
Parnassia glauca Raf.	x	–	–	–	–	–	–	–	X	10
Parthenocissus quinquefolia (L.) Planch.	x	–	x	–	–	x	–	–	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	–	–	–	–	x	–	–	–	X	1
Pascopyrum smithii (Rydb.) A. Löve (*Agropyron smithii* Rydb.)	–	–	–	–	–	–	–	–	X	ad
Pedicularis canadensis L.	–	x	x	x	x	x	–	–	X	9
Pedicularis lanceolata Michx.	7	–	–	–	–	4	–	–	N	9
Penthorum sedoides L.	–	x	x	x	x	4	29	–	X	5
Persicaria amphibia (L.) A. Gray (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman and *P. coccineum* Willd.)	7	x	x	x	x	x	X 29	–	X	4
Persicaria hydropiper (L.) Spach (*Polygonum hydropiper* L.)	–	–	–	–	–	–	29	–	N	2
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	7	56	x 34	x	x	x	–	x	X	7
Persicaria lapathifolia (L.) A. Gray (*Polygonum lapathifolium* L.)	x	–	–	–	x	x	–	–	X	0
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	x	–	–	–	x	–	–	–	X	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	–	–	x	–	x	–	–	–	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	56	x	–	–	4	–	x	X	6
Phalaris arundinacea L.	–	x	x	x	x	–	x	x	X	*
SF***Phemeranthus rugospermus*** (Holz.) Kiger (*Talinum rugospermum* Holz.)	–	–	–	R	–	x	–	–	X	10
Phleum pratense L. ssp. *pratense*	–	–	x	–	–	–	–	–	X	*
Phlox glaberrima L. ssp. *interior* (Wherry) Wherry (*Phlox glaberrima* L. var. *interior* Wherry)	–	x	–	x	–	–	–	–	X	8
Phlox paniculata L.	–	–	R	–	–	–	–	x	R	ad
Phlox pilosa L.	–	x	x	x	x	x	x	–	X	7

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Phlox pilosa L. ssp. *fulgida* (Wherry) Wherry (*Phlox pilosa* L. var. *fulgida* Wherry)	–	–	–	–	–	4	–	–	N	7
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	7	31	x	x	x	x	–	–	X	1
Phryma leptostachya L. var. *leptostachya*	–	–	–	–	–	1	–	–	N	4
Physalis heterophylla Nees	–	–	–	–	–	–	x	–	X	3
Physalis pubescens L.	–	–	R	–	–	–	–	–	R	*
Physalis longifolia Nutt. var. *subglabrata* (Mackenzie & Bush) Cronquist (*Physalis subglabrata* Mack. & Bush)	–	–	–	–	–	–	x	–	X	0
Physalis virginiana Mill.	–	x	–	–	–	x	–	–	X	4
Physocarpus opulifolius (L.) Maxim.	–	x	–	–	–	–	–	–	X	8
Phytolacca americana L.	–	–	R	–	x	x	–	x	X	1
SF***Pinus banksiana*** Lamb.	x	–	–	–	–	–	–	–	X	9
SF***Pinus strobus*** L.	–	–	–	–	–	–	–	x	N	9
SF***Platanthera aquilonis*** Sheviak (*Habenaria hyperborea* (L.) R. Br. var. *huronensis* (Nutt.) Farw.)	x	–	–	x	–	–	–	–	X	10
SF***Platanthera ciliaris*** (L.) Lindl. (*Habenaria ciliaris* (L.) R. Br.)	–	–	–	–	–	–	–	–	X	10
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	–	–	–	–	–	x	–	–	X	10
SF***Platanthera flava*** (L.) Lindl. var. ***herbiola*** (R. Br.) Luer (*Habenaria flava* (L.) R. Br. var. *herbiola* (R. Br.) Ames & Correll)	–	–	40	x	–	x	–	–	X	10
SF***Platanthera lacera*** (Michx.) G. Don	–	–	62	–	–	–	–	–	N	7
SF***Platanthera psycodes*** (L.) Lindl. (*Habenaria psycodes* (L.) Spreng.)	–	–	R	–	–	–	–	–	R	10
Plantago major L.	–	71	R	–	–	–	–	–	R	*
Plantago rugelii Decne.	x	–	–	–	–	–	–	–	X	0
Platanus occidentalis L.	R	–	–	–	–	–	–	–	R	9
Poa annua L.	x	–	–	–	–	–	–	–	X	*
Poa compressa L.	–	x	x	x	x	4	x	x	X	*
Poa pratensis L.	–	x	x	x	x	x	x	–	X	*
Podophyllum peltatum L.	–	–	–	–	–	–	–	x	N	4
SF***Pogonia ophioglossoides*** (L.) Ker Gawl.	x	–	–	–	–	–	–	–	X	10
Polanisia dodecandra (L.) DC. ssp. *dodecandra* (*Polanisia graveolens* Raf.)	x	–	–	–	–	–	–	–	X	0
Polygala cruciata L. var. *aquilonia* Fernald & B. G. Schub.	x	–	–	–	–	–	–	–	X	10
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Choda)	–	–	x	x	–	–	–	–	X	9
Polygala verticillata L. var. *isocycla* Fernald	46	–	47, 56	–	–	–	–	–	N	7

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Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	–	x	x	x	x	x	x	x	X	3
SF***Polygonum articulatum*** L. [*Polygonella articulata* (L.) Meisn.]	R	–	R	–	–	–	–	–	R	10
Polygonum aviculare L.	x	–	–	–	–	–	–	–	X	*
Polygonum tenue Michx.	–	–	x	–	x	–	–	–	X	7
Pontederia cordata L.	x	–	x	x	x	x	–	–	X	10
SF***Populus balsamifera*** L.	x	–	–	–	–	–	–	–	X	10
Populus deltoides W. Bartram ex Marshall	x	x	x	–	x	x	x	x	X	2
Populus grandidentata Michx.	–	–	–	–	–	x	–	–	X	6
Populus tremuloides Michx.	7	x	x	x	x	x	x	–	X	4
Potamogeton amplifolius Tuck.	–	x 37	–	–	–	–	–	–	X	10
Potamogeton foliosus Raf.	R	R	35	–	–	x	–	–	X	7
Potamogeton gramineus L.	x	–	x	R	x	–	–	–	X	8
Potamogeton illinoensis Morong	–	x 35	35	–	–	–	–	–	X	7
Potamogeton natans L.	–	x 37	R	–	x	–	–	–	X	7
Potamogeton nodosus Poir.	–	x	x	x	–	x	–	–	X	7
SF***Potamogeton pulcher*** Tuck.	–	–	x 34	x	x	x	–	–	X	10
SF***Potamogeton pusillus*** L.	–	x	x 30	–	x	30	–	–	X	7
SF***Potamogeton robbinsii*** Oakes	x	–	–	R	–	–	–	–	X	10
Potentilla recta L.	–	–	x	–	x	–	x	–	X	*
Potentilla simplex Michx.	–	x	x	x	x	x	x	–	X	4
Prenanthes alba L.	x	x	x	x	x	x	x	–	X	5
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	x	35, 36	x 35	x	x	x	29	–	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	x	–	R	–	–	–	–	–	X	0
SF***Prunus pensylvanica*** L. f.	–	–	–	–	–	–	x	x	X	5
Prunus pumila L.	x	–	x	x	x	x	–	–	X	8
Prunus serotina Ehrh.	–	x	–	x	x	x	–	x	X	1
Prunus virginiana L.	x	x	x	x	x	x	x	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	–	–	x	–	x	–	–	–	X	2
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	x	–	–	–	–	–	–	x	X	7
Ptelea trifoliata L. ssp. *trifoliata* var. *mollis* Torr. & A. Gray	x	x	–	–	–	–	–	–	X	8

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Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	–	x	x	x	x	x	x	x	X	5
Pycnanthemum tenuifolium Schrad.	–	–	–	–	–	x	–	–	X	7
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	x	x	x	x	x	x	–	–	X	5
Quercus alba L.	–	x	x	x	x	x	x	x	X	5
Quercus palustris Müenchh.	–	56	56	–	–	x	–	–	X	8
Quercus velutina Lam.	x	x	x	x	x	x	x	x	X	6
Ranunculus abortivus L.	–	–	2	–	–	–	–	–	N	0
Ranunculus aquatilis L. var. *diffusus* Withering (*Ranunculus longirostris* Godr.)	52	–	–	–	–	–	–	–	N	8
Ranunculus flabellaris Raf.	R	56	x 35	x	x	x	4	–	X	7
Ranunculus repens L.	–	–	–	5, 54	–	–	–	–	N	*
Ranunculus sceleratus L.	7	–	35	–	x	–	–	–	X	6
Ratibida pinnata (Vent.) Barnhart	–	–	56	–	–	4	–	–	N	4
SF***Rhexia virginica*** L.	–	–	–	–	–	x	–	–	X	10
Rhus aromatica Aiton	x	x	R	–	–	–	–	x	X	10
SF***Rhus aromatica*** Aiton var. ***arenaria*** (Greene) Fernald	x	–	–	–	x	–	–	–	X	9
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	–	x	x	x	x	x	x	x	X	6
Rhus typhina L.	–	–	R	–	x	x	x	x	X	1
Rhynchospora capillacea Torr.	x	R	–	–	–	–	–	–	X	10
SF***Rhynchospora macrostachya*** Torr. ex A. Gray	–	–	–	–	–	–	–	–	X	10
Ribes rubrum L. (*Ribes sativum* Syme)	–	–	–	–	–	–	–	x	N	*
Robinia pseudoacacia L.	–	x	x	–	–	–	x	x	X	ad
Rorippa palustris (L.) Besser ssp. *hispida* (Desv.) Jonsell (*Rorippa palustris* (L.) Besser var. *hispida* (Desv.) Rydb.)	–	–	x	–	–	–	–	–	X	4
Rosa blanda Aiton	x	x	–	–	–	–	–	x	X	5
Rosa carolina L.	x	x	x	x	x	x	x	x	X	5
Rosa multiflora Thunb.	–	–	–	–	x	x 4	x	–	X	*
Rosa palustris Marshall	x	56	56	x	x	x	x	x	X	7
Rotala ramosior (L.) Koehne	–	–	x	–	–	–	–	–	X	10
Rubus allegheniensis Porter	–	–	–	–	–	4	–	x	N	3
Rubus flagellaris Willd. (SF***Rubus enslenii*** Tratt.)	–	–	–	–	–	–	x	–	X	10
Rubus flagellaris Willd.	–	–	x	–	x	x	x	x	X	3
Rubus hispidus L.	–	–	x	–	x	x	x	–	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	–	–	–	–	–	1	x	–	X	3

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Rubus occidentalis L.	–	–	–	–	x	x	x	–	X	2
Rubus pensilvanicus Poir.	–	–	–	–	–	x	x	–	X	3
Rubus xavipes L.H. Bailey [*R. pensilvanicus* × *R. allegheniensis*]	–	–	68	–	–	–	–	–	N	10
Rudbeckia hirta L.	x	x	x	x	x	x	x	x	X	1
Rumex acetosella L.	–	x	–	–	x	x	–	–	X	*
Rumex altissimus Alph. Wood	–	–	R	–	x	–	–	–	X	2
Rumex britannica L. (Rumex orbiculatus A. Gray)	–	–	–	–	–	x	–	–	X	8
Rumex crispus L.	–	–	–	–	–	–	–	–	X	*
SF***Sabatia angularis*** (L.) Pursh	x	x	x	x	20	x	–	–	X	10
Sagittaria graminea Michx.	–	–	x	x	x	x	–	–	X	9
Sagittaria latifolia Willd.	x	–	x	x	x	x	x 29	–	X	4
Salix amygdaloides Andersson	R	x	x	x	x	x	–	–	X	5
Salix bebbiana Sarg.	–	–	–	–	–	x	–	–	X	8
SF***Salix cordata*** Michx. (*S. syrticola* Fernald)	x	–	–	–	–	–	–	–	X	10
Salix discolor Muhl.	–	–	x	x	x	x	x	–	X	2
Salix eriocephala Michx.	R	x	x	x	x	x	x	–	X	5
Salix humilis Marshall	–	–	x	x	x	x	–	–	X	6
Salix interior Rowlee	7	x	x	x	x	x	x	–	X	1
SF***Salix lucida*** Muhl.	–	42	–	–	–	–	–	–	N	10
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	x	x	x	x	x	x	x	–	X	7
Salix nigra Marshall	7	x	R	x	x	x	–	x	X	4
SF***Salix pedicellaris*** Pursh (*S. pedicellaris* var. *hypoglauca* Fernald)	–	–	x 19	–	x	–	–	–	X	10
Salix petiolaris Sm.	–	–	–	–	x	x	–	–	X	7
Salsola tragus L. (*Salsola kali* L. var. *tenuifolia* Tausch)	x	–	–	–	–	–	–	–	X	*
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	–	–	x	–	–	x	x	x	X	1
Sanguinaria canadensis L.	–	–	R	–	–	–	70	–	R	6
Sanicula marilandica L.	–	–	x	x	–	–	–	–	X	6
Saponaria officinalis L.	x	–	R	x	x	x	x	x	X	*
Sassafras albidum (Nutt.) Nees	–	x	x	x	x	x	x	x	X	3
SF***Sceptridium rugulosum*** W. H. Wagner	R	–	–	–	–	–	–	–	X	10
SF***Schizachyrium littorale*** (Nash) E.P. Bicknell	x	–	–	–	–	–	–	–	N	10
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	x	x	x	x	x	x	x	X	5

Table 6 (continued). Summary of species verified and reported for Miller Woods Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 7. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species Name	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
SF***Schoenoplectiella smithii*** (A. Gray) Hayak (*Schoenoplectus smithii* (A. Gray) Sojak; *Scirpus smithii* A. Gray)	–	–	747	–	–	–	–	–	N	
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	x	x	x	x	x	x 4	–	–	X	6
Schoenoplectus pungens (Vahl) Palla (*Scirpus pungens* Vahl)	x	x	–	–	–	–	–	–	X	5
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl var. *creber* Fernald)	x	56	x	–	x	x	–	–	X	5
Scirpus atrovirens Willd.	–	–	x	x	–	–	–	–	X	4
Scirpus cyperinus (L.) Kunth	7	56	x	x	x	x	x	–	X	6
Scirpus pendulus Muhl.	–	–	–	–	–	x	–	–	X	4
Scleria triglomerata Michx.	–	–	x	x	–	–	–	–	X	10
SF***Scleria verticillata*** Muhl. ex Willd.	x	–	x	–	–	–	–	–	X	10
Scrophularia lanceolata Pursh	–	–	–	–	x	–	–	–	X	5
Scrophularia marilandica L.	–	–	–	–	–	–	–	x	N	5
Scutellaria galericulata L. (*Scutellaria epilobiifolia* A. Ham.)	x	x	x	x	x	x	x 29	x	X	5
Scutellaria lateriflora L.	x	56	x	–	x	4	x 29	–	X	5
Setaria faberi R.A.W. Herrm.	–	–	–	–	x	–	–	–	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	–	–	–	–	x	–	–	–	X	*
Setaria viridis (L.) P. Beauv.	x	–	–	–	–	–	–	–	X	*
Silene antirrhina L.	x	x	x	x	x	x	x	–	X	1
Silene cserei Baumg.	x	x	x	–	x	–	–	–	X	*
Silene latifolia Poir. (*Lychnis alba* Mill.)	–	–	R	x	–	–	x	–	X	*
Silene vulgaris (Moench) Garcke (*Silene cucubalus* Wibel)	–	–	R	–	–	–	–	–	R	*
Sisymbrium altissimum L.	–	–	–	–	–	x	–	–	X	*
Sisyrinchium albidum Raf.	–	–	–	–	x	–	–	–	X	7
Sium suave Walter	x	x	x	x	x	x	x	–	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	–	–	–	–	–	–	x	–	X	5
Smilax lasioneura Hook.	–	x	x	–	–	x	x	x	X	5
Smilax rotundifolia L.	–	–	R	–	–	–	–	–	R	7
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	–	–	–	–	–	–	x	x	X	5
Solanum ptychanthum Dunal (*Solanum americanum*)	–	–	–	–	x	x	–	–	X	0
Solanum dulcamara L.	x	56	x	–	x	x	x	x	X	*
Solidago altissima L.	7	x	x	x	x	x	x	x	X	1

Table 6 (continued). Summary of species verified and reported for Miller Woods Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 7. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Solidago caesia L.	x	x	x	x	x	x	x	x	X	7
Solidago gigantea Aiton	x	x	x	x	x	–	x	x	X	4
Solidago juncea Aiton	x	–	–	x	x	4	x	–	X	5
Solidago missouriensis Nutt. (*Solidago missouriensis* Nutt. var. *fasciculata* Holz.)	x	–	–	–	–	–	–	–	X	7
Solidago nemoralis Aiton	7	x	x	x	x	x	x	–	X	4
SF***Solidago ptarmicoides*** (Torrey & A. Gray) B. Boivin (*Aster ptarmicoides* (Nees) Torr. & A. Gray; *Oligoneuron album* (Nutt.) G.L. Nesom)	x	–	–	–	–	–	–	–	X	10
SF***Solidago simplex*** Kunth var. ***gillmanii*** (A. Gray) G.S. Ringius (*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald)	x	–	–	–	–	–	–	–	X	10
Solidago rigida L.	–	–	R	–	–	–	–	–	R	4
Solidago rugosa Mill.	–	–	–	x	–	x	–	–	X	6
SF***Solidago speciosa*** Nutt.	x	x	x	x	x	x	x	x	X	7
Solidago ulmifolia Muhl. ex Willd.	–	–	–	–	–	x	–	–	X	5
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	x	–	–	–	x	–	–	–	X	*
Sorghastrum nutans (L.) Nash	x	31	x	x	x	x	–	–	X	5
Sorghum halopense (L.) Pers.	–	–	53	–	–	–	–	–	N	*
SF***Sparganium americanum*** Nutt.	–	–	–	–	x	–	–	–	X	10
Sparganium emersum Rehmann (*Sparganium chlorocarpum* Rydb.)	–	36, 37	x	x	x	x	–	x	X	10
Sparganium eurycarpum Engelm.	–	–	x	x	–	–	–	–	X	6
Spartina pectinata Link	–	–	–	x	–	–	–	–	X	4
Sphenopholis intermedia (Rydb.) Rydb.	–	–	–	x	–	–	–	–	X	4
Spiraea alba Du Roi	x	x	x	x	x	x	x	–	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	–	–	–	–	x	–	–	–	X	9
Spiranthes cernua (L.) Rich.	x	–	56	–	x	x	–	–	X	7
SF***Spiranthes magnicamporum*** Sheviak	44	–	43, 47	–	–	–	–	–	N	8
Sporobolus compositus (Poir.) Merr. var. *compositus* (*Sporobolus asper* (Michx.) Kunth)	–	–	–	–	x	–	–	–	X	ad
Sporobolus cryptandrus (Torr.) A. Gray	x	–	x	–	–	–	–	x	X	7
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	x	x	x	x	x	x	x	–	X	5
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida* (Pursh) Fernald)	–	–	–	–	x	x	–	–	X	5
Strophostyles helvola (L.) Elliott	x	x	–	–	–	–	–	–	X	7
Stuckenia pectinata (L.) Boerner (*Potamogeton pectinatus* L.)	x	x	R	–	–	–	–	–	X	5
Symphoricarpos orbiculatus Moench	–	–	–	–	x	–	–	–	X	ad
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve (*Aster borealis* Prov.)	x	x	x	x	–	–	–	–	X	10

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	x	x	x	x	x	4	–	–	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	x	x	x	–	x	x	–	–	X	5
Symphyotrichum laeve (L.) A. Löve & D. Löve var. *laeve* (*Aster laevis* L.)	–	x	–	–	–	4	–	–	X	9
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	–	56	x	–	–	–	–	–	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	x	x	x	x	x	–	x	X	8
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	x	–	x	x	x	x	–	–	X	4
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	–	–	–	–	x	x	–	x	X	0
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	–	x	x	x	–	–	–	–	X	8
Symphyotrichum urophyllum (Lindl.) Nesom (*Aster puniceus*)	–	–	–	–	–	–	x	–	X	5
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	–	x	–	–	–	–	–	–	X	2
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	7	56	x	x	x	x	–	–	X	3
Taraxacum officinale F. H. Wiggers	–	x	R	x	x	x	–	–	X	*
Tephrosia virginiana (L.) Pers.	–	x	x	x	x	x	x	–	X	8
Teucrium canadense L.	x	–	–	–	–	–	–	–	X	3
Thalictrum dioicum L.	–	–	R	–	–	–	–	–	R	7
Thelesperma megapotamicum (Spreng.) Kuntze (*Thelesperma gracile* (Torr.) A. Gray)	–	–	–	–	–	–	x	–	N	ad
SF***Thelypteris noveboracensis*** (L.) Nieuwl. (*Dryopteris noveboracensis* (L.) A. Gray)	7	–	–	–	–	–	–	–	N	10
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	x	x	x	x	x	x	x 26	–	X	6
Tilia americana L.	–	–	R	–	–	–	–	x	R	5
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	x	x	x	x	x	x	X	2
Tradescantia ohiensis Raf.	x	x	x	x	x	x	x	x	X	2
Tragopogon dubius Scop.	–	–	–	–	–	–	x	–	X	*
Tragopogon pratensis L.	x	–	–	–	–	x	–	–	X	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald)	–	56	x	x	x	x	–	–	X	8
Trifolium hybridum L.	x	–	–	–	–	–	–	–	X	*
Trifolium pratense L.	–	–	x	–	–	–	–	–	X	*
Trifolium repens L.	x	–	x	–	–	–	–	–	X	*

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Triglochin maritima L.	x	–	–	–	–	–	–	–	X	10
Trillium grandiflorum (Michx.) Salisb.	–	–	–	–	–	–	70	–	N	8
Triplasis purpurea (Walter) Chapm.	x	–	x	–	x	x	–	–	X	7
Triticum aestivum L.	–	–	–	–	–	–	–	–	X	*
Typha angustifolia L.	x	31	x	x	x	x	–	–	X	1
Typha latifolia L.	x	x	x	x	x	x	x	–	X	1
Typha × *glauca* Godr. [*T. angustifolia* × *T. latifolia*]	–	–	–	–	–	x	–	–	X	1
Ulmus americana L.	–	–	–	–	–	x	–	–	X	3
Ulmus pumila L.	7	–	–	–	x	–	x	x	X	*
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	–	–	–	–	–	x	–	–	X	2
SF***Utricularia cornuta*** Michx.	x	–	–	–	–	–	–	–	X	10
SF***Utricularia gibba*** L.	x	37	R	–	–	–	–	x	X	10
SF***Utricularia intermedia*** Hayne	–	–	48	–	–	–	–	–	N	10
SF***Utricularia minor*** L.	–	–	35, 47	–	–	–	–	–	X	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen (*Utricularia vulgaris* L.)	x	x 37	35	x	x	x	29	x	X	9
Vaccinium angustifolium Aiton	–	x	x	x	x	x	x	–	X	5
Vaccinium pallidum Alton	–	31	x	x	x	x	x	–	X	5
Vallisneria americana Michx.	x	x	35	–	x	–	–	–	X	7
Verbascum thapsus L. ssp. *thapsus*	x	x	x	–	x	x	–	–	X	*
Verbena bracteata Cav. ex Lag. & Rodr.	–	–	–	–	–	x	–	–	X	0
Verbena hastata L.	x	–	R	–	x	–	–	–	X	4
Verbena stricta Vent.	–	–	56	x	x	x	–	–	X	4
Verbena urticifolia L.	–	–	–	–	–	x	–	–	X	5
Vernonia fasciculata Michx.	–	56	–	–	–	–	–	–	N	5
Vernonia missurica Raf.	–	–	x	–	–	–	–	–	X	4
Viburnum acerifolium L.	–	x	x	x	–	–	x	x	X	9
Viburnum lentago L.	–	56	x	x	–	–	–	x	X	5
Viburnum rafinesqueanum Schult.	–	x	x	x	–	–	x	x	X	5
Viola pedata L. (*Viola pedata* L. *linearíloba* DC.)	–	31	x	x	x	x	–	–	X	9
Viola pubescens Aiton	–	x	–	–	–	–	–	–	X	5
SF***Viola sagittata*** Aiton var. ***ovata*** (Nutt.) Torr. & A. Gray (*V. fimbriatula* Sm.)	–	–	–	–	x	–	–	–	X	6
Viola sagittata Aiton var. *sagittata*	–	x	x	–	x	x	–	–	X	7
Viola tricolor L.	–	–	R	–	–	–	–	–	R	*
Vitis aestivalis Michx.	–	–	–	–	–	1	–	–	N	7
SF***Vitis labrusca*** L.	–	–	x	x	x	x	–	–	X	9
Vitis riparia Michx.	x	x	x	x	x	x	x	x	X	2

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Vitis vulpina L.	–	–	–	–	–	4	–	–	N	9
Vulpia octoflora (Walter) Rydb.	–	–	–	–	–	x	–	–	X	4
Xanthium strumarium L.	x	–	–	–	x	–	–	–	X	*
SF***Zizania aquatica*** L. var. *aquatica*	x	56	x	R	x	–	–	x	X	10
SF***Zizania palustris*** L.	–	–	73	–	–	–	–	–	N	10
Zizia aurea (L.) W. D. J. Koch	–	23	–	–	–	x	–	–	X	7

Table 7. Sources of new species verified and reported from Miller Woods.

Note	Source	Date	Species
1	A. Ahrends, M. Newgent, and B. Plampin	19 May 1999	*Asparagus officinalis*, *Cypripedium parviflorum* var. *pubescens*, *Equisetum hyemale* ssp. *affine*, *Erigeron philadelphicus*, *Galium aparine*, *Krigia biflora*, *Luzula multiflora* ssp. *multiflora*, *Lysimachia thyrsiflora*, *Phryma leptostachya* var. *leptostachya*, *Rubus idaeus* ssp. *strigosus*, *Vitis aestivalis*
2	L. Forste and L. Schelling	3 May 2002	*Campanula aparinoides*, *Ranunculus abortivus*
3	L. Forste, L. Schelling, and E. Garza	13 July 2002	*Eragrostis pectinacea*
4	N. Kalkbrenner and D. Zay	1 Sept 1998	*Antennaria howellii* ssp. *petaloidea*, *Anthriscus caucalis*, *Asclepias exaltata*, *Asclepias verticillata*, *Asimina triloba*, *Aureolaria pedicularia*, *Carex comosa*, *Carex pensylvanica*, *Cicuta maculata*, *Desmodium sessilifolium*, *Eriogonum annuum*, *Euthamia graminifolia*, *Fallopia convolvulus*, *Helianthus strumosus*, *Hieracium scabrum*, *Juncus tenuis*, *Leersia oryzoides*, *Linaria vulgaris*, *Lonicera tatarica*, *Mimulus ringens*, *Pedicularis lanceolata*, *Penthorum sedoides*, *Persicaria punctata*, *Phlox pilosa* ssp. *fulgida*, *Poa compressa*, *Ranunculus flabellaris*, *Ratibida pinnata*, *Rosa multiflora*, *Rubus allegheniensis*, *Schoenoplectus acutus* var. *acutus*, *Scutellaria lateriflora*, *Solidago juncea*, *Symphyotrichum dumosum*, *Symphyotrichum laeve* var. *laeve*, *Vitis vulpina*
5	K. Klick	16 April 1988	*Ranunculus repens*
6	P. Labus	2003	*Menyanthes trifoliata*
7	D. Mason and G. Tonkovich	June 1999–Oct 2000	*Acer rubrum*, *Agrostis gigantea*, *Apocynum cannabinum*, *Asparagus officinalis*, *Berberis thunbergii*, *Carex aquatilis*, *Carex comosa*, *Carex hystericina*, *Conyza canadensis*, *Cornus obliqua, C. sericea*, *Cyperus erythrorhizos*, *Dulichium arundinaceum*, *Eleocharis acicularis*, *Eleocharis compressa*, *Epilobium ciliatum*, *Equisetum* × *ferrissii*, *Equisetum hyemale* ssp. *affine*, *Erechtites hieraciifolius* var. *hieraciifolius*, *Frangula alnus*, *Iris virginica*, *Juncus alpinoarticulatus*, *Juncus nodosus*, *Juniperus communis*, *Linum striatum*, *Najas flexilis*, *Pedicularis lanceolata*, *Persicaria amphibia*, *Persicaria hydropiperoides*, *Phragmites australis* ssp. *australis*, *Populus tremuloides*, *Ranunculus sceleratus*, *Salix interior*, *Salix nigra*, *Scirpus cyperinus*, *Solidago altissima*, *Solidago nemoralis*, *Symphyotrichum lanceolatum* var. *lanceolatum*, *Thelypteris noveboracensis*, *Ulmus pumila*
8	M. Newgent	May 1993	*Orobanche uniflora*
9	M. Newgent	Aug 1983	*Corallorhiza maculata*
10	M. Newgent	9 June 1994	*Minuartia michauxii*
11	M. Newgent and B. Plampin	Aug 1993	*Liparis liliifolia*, *Monotropa uniflora*

Table 7 (continued). Sources of new species verified and reported from Miller Woods.

Note	Source	Date	Species
12	M. Newgent and B. Plampin	June 1994	*Liparis loeselii*
13	N.B. Pavlovic	9 Sept 1991	*Mentzelia decapetala*
14	N.B. Pavlovic	Spring 1999	*Celastrus orbiculatus*, *Claytonia virginica*
15	N.B. Pavlovic	Summer 2003	*Cannabis sativa*
16	N.B. Pavlovic and T. Poulson	13 May 1992	*Draba reptans*
17	N.B. Pavlovic and K. Quinlan	9 July 2003	*Leymus arenarius*
18	N.B. Pavlovic and J. Ring	24 May 1999	*Erigeron philadelphicus*
19	Pavlovic et al., Exotic Project	13 July 1999	*Salix pedicellaris*
20	B. Plampin	2 Aug 1990	*Sabatia angularis*
21	Pavlovic et al., Exotic Project	21 Aug 2000	*Minuartia michauxii*
22	B. Plampin	June 1993	*Aletris farinosa*
23	B. Plampin	Aug 1993	*Zizia aurea*
24	B. Plampin	Sept 1993	*Lipocarpha micrantha*
25	B. Plampin	June 1994	*Aletris farinosa*
26	B. Plampin	Aug 1995	*Thelypteris palustris* var. *pubescens*
27	B. Plampin and M. Newgent	June 1990, Aug 1995	*Cephalanthus occidentalis*
28	B. Plampin and M. Newgent	July 1990	*Nuphar advena*
29	B. Plampin and M. Newgent	Aug 1995	*Nuphar advena*, *Nymphaea odorata*, *Persicaria amphibia*, *Persicaria hydropiper*, *Proserpinaca palustris*, *Sagittaria latifolia*, *Scutellaria galericulata*, *Scutellaria lateriflora*
30	T. Post	4 June 1994	*Carex alata*, *Glyceria borealis*, *Hypericum kalmianum*, *Juncus scirpoides*, *Ludwigia sphaerocarpa*, *Myriophyllum verticillatum*, *Potamogeton pusillus*
31	T. Post	1993	*Antennaria parlinii*, *Asclepias verticillata*, *Helianthus occidentalis*, *Lythrum salicaria*, *Orobanche uniflora*, *Phragmites australis* ssp. *australis*, *Sorghastrum nutans*, *Typha angustifolia*, *Vaccinium pallidum*, *Viola pedata*
32	K. Quinlan	2003	*Centaurea stoebe* ssp. *micranthos*
33	L. Schelling	23 July 2002	*Desmodium sessilifolium*
34	R. Scribailo and M. Alex (2002b)	12 June 2002	*Persicaria hydropiperoides*, *Potamogeton pulcher*
35	R. Scribailo and M. Alex (2002b)	19 June 2002	*Myriophyllum spicatum*, *Utricularia minor*, *Utricularia vulgaris* ssp. *macrorhiza*, *Vallisneria americana*
36	R. Scribailo and M. Alex (2002b)	19 Sept 2002	*Brasenia schreberi*, *Myriophyllum verticillatum*, *Sparganium emersum*
37	R. Scribailo and M. Alex (2002b)	23 Sept 2002	*Potamogeton amplifolius*, *Potamogeton natans*, *Sparganium emersum*, *Utricularia gibba*, *Utricularia vulgaris* ssp. *macrorhiza*
38	H. Simonin	30 Aug 1982	*Campanula aparinoides*
39	S. Leicht-Young and P. Carlson	28 June 2007	*Bromus squarrosus*
40	B. Plampin	17 Sept 2008	*Platanthera flava* var. *herbiola*
41	B. Plampin	23 Sept 2008	*Celtis tenuifolia*
42	G. Argus	2006	*Salix lucida*
43	M. Newgent	2007	*Spiranthes magnicamporum*
44	M. Hacker	2010	*Spiranthes magnicamporum*
45	N.B. Pavlovic	6 June 2011	*Cynoglossum officinale*

Table 7 (continued). Sources of new species verified and reported from Miller Woods.

Note	Source	Date	Species
46	Plampin and Hamilla	30 Aug 2008	*Cornus rugosa*, *Polygala verticillata* var. *isocycla*
47	B. Plampin and D. Hamilla	4 Sept 2007	*Polygala verticillata* var. *isocycla*, *Spiranthes magnicamporum*, *Utricularia minor*
48	C. Satkoski	4 Sept 2007	*Utricularia intermedia*
49	N.B. Pavlovic	n.d.	*Carduus nutans*
50	L. Brenan	20 Dec 2013	*Carduus nutans*
51	S. Namestnik and L. Namestnik	15 May 2009	*Lonicera* × *minutiflora*
52	F. Swink	22 June 1947	*Ranunculus aquatilis* var. *diffusus*
53	K. Dritz	27 Aug 1989	*Sorghum halepense*
54	K. Klick	16 May 1988	*Ranunculus repens*
55	N.B. Pavlovic and M. Fisher-Dunham	22 May 2014	*Convallaria majalis*
56	G. Tonkovich	2002–2003	*Agalinis purpurea*, *Apocynum cannabinum*, *Bidens connata*, *Carex aquatilis* var. *substricta*, *Carex comosa*, *Carex lacustris*, *Carex pellita*, *Cirsium arvense*, *Cirsium muticum*, *Cladium mariscoides*, *Cornus obliqua*, *Cornus racemosa*, *Cyperus odoratus*, *Doellingeria umbellata* var. *umbellata*, *Dulichium arundinaceum*, *Eleocharis acicularis*, *Eleocharis palustris*, *Equisetum hyemale* ssp. *affine*, *Eutrochium maculatum*, *Galium obtusum*, *Galium tinctorium*, *Gentiana andrewsii*, *Hieracium scabrum*, *Juncus acuminatus*, *Juncus canadensis*, *Juncus nodosus*, *Leersia oryzoides*, *Lobelia siphilitica*, *Ludwigia palustris*, *Lycopus rubellus*, *Lycopus uniflorus*, *Lythrum salicaria*, *Mimulus ringens*, *Onoclea sensibilis*, *Osmunda regalis* var. *spectabilis*, *Persicaria hydropiperoides*, *Persicaria punctata*, *Polygala verticillata* var. *isocycla*, *Quercus palustris*, *Ranunculus flabellaris*, *Ratibida pinnata*, *Rosa palustris*, *Schoenoplectus tabernaemontani*, *Scirpus cyperinus*, *Scutellaria lateriflora*, *Solanum dulcamara*, *Spiranthes cernua*, *Symphyotrichum lanceolatum* var. *lanceolatum*, *Symphyotrichum lateriflorum*, *Triadenum fraseri*, *Verbena stricta*, *Vernonia fasciculata*, *Viburnum lentago*, *Zizania aquatica* var. *aquatica*
57	N.B. Pavlovic	20 May 2016	*Lonicera dioica*, *Minuartia michauxii*
58	S. Wilmore	10 June 2016	*Echium vulgare*
59	N. Pilla and T. Troche	20 May 2017	*Carex buxbaumii*
60	N. Pilla	8 Oct 2016	*Gentiana saponaria*
61	N. Pilla	7 Sept 2017	*Ipomoea hederacea*
62	N. Pilla	17 July 2016	*Platanthera lacera*
63	N. Pilla and T. Troche	20 May 2016	*Ophioglossum pusillum*
64	E. Kjellmark	31 May 1987	*Betula pendula*
65	S. Namestnik	15 May 2009	*Betula pendula*
66	G. Wilhelm	3 Aug 1978	*Oenothera oakesiana*
67	S. Namestnik and T. Troche	27 May 2010	*Crepis pulchra*
68	G. Wilhelm and L. Rericha	9 June 1979	*Rubus xavipes*
69	N.B. Pavlovic	3 June 2019	*Lupinus perennis*
70	S. Kinsman	20 May 2019	*Sanguinaria canadensis*, *Trillium grandiflorum*
71	N.B. Pavlovic	28 June 2019	*Dianthus armeria*, *Plantago major*
72	K. Dritz	26 May 1980	*Equisetum* × *nelsonii*
73	G. Wilhelm	26 Sept 1979	*Zizania palustris*
74	C. Satkoski	15 Aug 2019	*Schoenoplectiella smithii*
75	F.A. Swink	25 Apr 1954	*Amelanchier spicata*

Table 8. Summary of floristic statistics by subunit of Miller Woods. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit								Entire Unit
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	
Area (ha/acres)	87/216	73/180	69/170	54/133	91/224	30/75	18/45	6/14	428 / 1,057
Special flora total	52	27	49	22	20	28	6	11	113
Confirmed	35	13	27	17	19	21	6	11	78
New	11	13	11	1	1	7	0	0	19
Reported	4	1	10	4	0	0	0	0	8
Extirpated	2	0	1	0	0	0	0	0	8
Total taxa, FNA/ITIS	300	270	382	228	304	344	176	131	700
Total native taxa, FNA/ITIS	261	252	341	213	263	301	145	104	574
Native species, FNA/ITIS	249	245	330	207	255	291	140	104	552
Native variety, FNA/ITIS	9	6	9	5	7	7	4	0	16
Native hybrid, FNA/ITIS	3	1	2	1	1	3	1	0	6
Total adventive taxa, FNA/ITIS	3	2	7	0	6	8	8	3	23
Total adventive species,FNA/ITIS	3	2	7	0	6	8	8	3	23
Total adventive variety,FNA/ITIS	0	0	0	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0	0	0	0	0	0
Total exotic taxa, FNA/ITIS	36	16	34	15	35	35	23	24	103
Total exotic species, FNA/ITIS	35	16	33	15	34	33	22	24	101
Total exotic variety, FNA/ITIS	0	0	0	0	0	0	0	0	0
Total exotic hybrid, FNA/ITIS	1	0	1	0	1	2	1	0	2
Total Indiana-listed	37	13	26	11	12	21	4	5	73
Endangered	10	1	4	1	2	4	0	0	18
Threatened	16	6	9	5	3	7	2	3	30
Rare	0	0	0	0	0	0	0	0	0
Watch List	9	6	12	5	7	10	2	2	22
Extirpated	2	0	1	0	0	0	0	0	3
Sum CoC	1,533	1,473	2,008	1,222	1,379	1,615	665	502	3,453
Sum CoC adventive and invasive	1,495	1,455	1,970	1,206	1,340	1,575	638	476	3,337
Mean CoC	6	6	6	6	5	5	4	5	6
Mean CoC with adventive and invasive	5	5	5	5	4	5	4	4	5
FQI	94	92	108	83	84	92	54	49	144
FQI with adventive and invasive	86	88	100	79	76	84	48	41	126

Special flora summary

Miller Woods provides habitat for 113 known occurrences of Indiana Dunes special flora (see Tables 6 and 8). This represents a 58% increase from the 70 special flora recorded in 1990 (Wilhelm 1990). Of these, 78 are confirmed, 19 are new, eight are reported, and eight are believed to be extirpated. New special flora include *Aletris farinosa*, *Allium cernuum*, *Alnus incana*, *Aristida longespica*, *Sceptridium rugulosum*, *Carex siccata*, *Celastrus scandens*, *Celtis tenuifolia*, *Chamaecrista nictitans*, *Corallorhiza maculata*, *Cuscuta pentagona*, *Cyperus houghtonii*, *Cypripedium parviflorum pubescens*, *Dichanthelium boreale*, *Dichanthelium oligosanthes oligosanthes*, *Epilobium ciliatum*, *Equisetum* × *nelsonii*, *Fraxinus americana*, *Heteranthera dubia*, *Juniperus communis*, *Linum striatum*,

Menyanthes trifoliata, *Ophioglossum pusillum*, *Pinus strobus*, *Potamogeton pusillus*, *Potamogeton robbinsii*, *Prunus pensylvanica*, *Rhexia virginica*, *Rubus flagellaris* (*R. enslenii*), *Spiranthes magnicamporum*, *Thelypteris noveboracensis*, *Utricularia intermedia*, *Viola pubescens*, and *Zizania palustris*. About 7% (eight species) of the special flora known from Miller Woods are unknown from any other INDU unit: *Allium cernuum*, *Sceptridium rugulosum*, *Dasiphora fruticosa*, *Heteranthera dubia*, *Juncus diffusissimus*, *Myriophyllum verticillatum*, *Potamogeton richardsonii*, and *Potamogeton robbinsii*. The following special flora species are likely extirpated from Miller Woods: *Sceptridium rugulosum*, *Cypripedium acaule*, *Drosera intermedia*, *Juncus pelocarpus*, *Lathyrus ochroleucus*, *Orthilia secunda*, *Platanthera ciliaris*, and *Rhynchospora macrostachya*.

Floristic summary

Miller Woods is home to 700 taxa (species plus varieties plus hybrids) comprised of 677 species, 14 varieties, and eight hybrids (Table 8). Of the 574 native taxa, there are 551 native species, 16 varieties, and six hybrid taxa. Of the native species, 73 are state-listed including three extirpated, 18 endangered, 30 threatened, and 22 watch list.

Wilhelm (1990) reported a mean CoC of 6.92 and a floristic quality index of 147. Twenty-nine years later we record a mean CoC of 5.96 and a floristic quality index of 144.

Miller Woods has a total of 480 confirmed native species; 45 are confirmed new records since 1990, 19 reported new species, and seven species that are extirpated, yielding a total of 551 native species (Table 8). These represent, respectively, increases of 16% (433) and 24% (445) over 1990! Miller Woods has total of 101 exotic species, of which nine are new records; with the additional reports of eight species, the total is 112. Total native species richness is highest in subunit C (330) and lowest in subunit H (104) (C > F > E > A > D > B > G > H) and is not correlated with area. Adventive species by subunit range from nine to one. Of the 101 exotic species found in Miller Woods, by subunit, they range from 35 and 36 (A and E, respectively) to 22 (G) species. Mean CoC ranges from 4.46 to 5.81, with a value of 5.96 overall. Floristic quality index ranged from 49 to 108 and was ranked from high to low: C > A > F > B > E > D > G > H, a not quite perfect match with species richness.

The 45 new native species found in Miller Woods since 1990 (Wilhelm 1990) include: *Antennaria howellii* ssp. *petaloidea*, *Asclepias exaltata*, *Asimina triloba*, *Brasenia schreberi*, *Campanula aparinoides*, *Carex hystricina*, *Carex buxbaumii*, *Celtis tenuifolia*, *Cicuta maculata*, *Claytonia virginica*, *Corallorhiza maculata*, *Desmodium sessilifolium*, *Epilobium ciliatum*, *Gentiana saponaria*, *Helianthus strumosus*, *Juniperus communis*, *Linum striatum*, *Luzula multiflora* ssp. *multiflora*, *Menyanthes trifoliata*, *Oenothera oakesiana*, *Pedicularis lanceolata*, *Persicaria hydropiper*, *Phemeranthus rugospermus*, *Phlox pilosa* ssp. *fulgida*, *Phryma leptostachya* var. *leptostachya*, *Platanthera lacera*, *Polygala verticillata* var. *isocycla*, *Ratibida pinnata*, *Rubus allegheniensis*, *Salix lucida*, *Spiranthes magnicamporum*, *Thelypteris noveboracensis*, *Utricularia minor*, *Vitis aestivalis*, and *V. vulpina*. The three new adventive species are *Mentzelia decapetala*, *Oenothera glaucifolia*, and *Thelesperma megapotamicum*, all species that were introduced from black topsoil when the Paul Douglas Center was constructed. New exotic species include *Berberis thunbergii*, *Betula pendula*, *Bromus squarrosus*, *Cannabis sativa* (this species is often removed by NPS law enforcement), *Celastrus orbiculatus*, *Cynoglossum officinale*, *Draba reptans*, *Eriogonum annuum*, *Leymus arenarius*, *Lonicera tatarica*, and *Ranunculus abortivus*.

Conservation issues

Miller Woods encompasses 428 hectares (1,057 acres) and consists of six general community types: aquatic, dune complex, foredune complex, marsh complex, pannes, and savanna complex.

Miller Woods A

This 87-hectare (216-acre) tract, also called Miller Dunes, lying north of and including the Grand Calumet River, is largely foredune and dune complex. Its most significant community type is the pannes. Miller Woods

A harbors 249 native plant species. It has a mean CoC of 5.76 and FQI of 94. The dune complex is fronted on Lake Michigan by a narrow band of disturbed foredune complex behind the recently formed foredunes and punctuated leeward by interdunal depressions and ponds that are intergrading complexes of the panne and aquatic plant communities. This area includes some of the highest quality natural land in the Miller Woods; however, it is interspersed with disturbed and exotic infested areas. While the dune/foredune complex is locally disturbed by invasives and off-road vehicle (ORV) traffic, the interdunal ponds and lagoons are still quite intact floristically. Despite human impacts, the "Miller beach" has been one of the few sites in the Indiana Dunes where beach ridge and foredune development is occurring naturally as a result of the abundant sand supply that is accumulating east of the USX breakwater. New foredunes developed in 1990–1991 and in 2001–2002 from beach ridges that formed, respectively, in 1988 and 2000 and from germination of cottonwood seeds on the moist lower beach. However, the 31 October 2014 storm, with north winds blowing across the full fetch of Lake Michigan, destroyed all foredunes in front of the 2001–2002 foredunes. Highest water levels in 2019–2020 have partially removed the 2001–2002 dune ridge (Pavlovic, pers. obs.).

The ecological integrity of the interdunal depressions and ponds is the key to the preservation of many the special flora. Formerly, it was unclear whether the growth of jack pine trees fringing the ponds and pannes would cause the decline of the special flora by increasing the shade and litter in a process similar to that at the Grand Sable Dunes at Pictured Rocks National Lakeshore in Michigan. It is possible that the annual growth of jack pine has increased with increasing nitrogen deposition from regional pollution, but this possibility has not been researched. However, the arrival of beaver since the late 1990s has resulted in the removal of pine adjacent to some of the wetlands, thus increasing light levels favorable for herbaceous vegetation along the pond edges. Beaver have little impacted the jack pines in the western most panne that is encroached by the USX landfill. Ongoing high lake levels may kill many jack pines and allow the wetlands to reclaim the edges of the wetlands. Control of invasive exotic plants is critical for enforcing the natural stability of the Miller Dunes. The linear row of small and large pannes just north of the highest dunes and the location of a former east-west two-track have been overwhelmed by invasive shrubs, including oriental bittersweet, Asiatic bush honeysuckles, hybrid cattail, and phragmites since Pavlovic first saw them in summer of 1983 while assisting Doug Wilcox in sampling water wells. Elimination of these exotics and protection of American bittersweet (*Celastrus scandens*) should be a high priority.

Off-road vehicular activity continues to be a problem in Miller Dunes. As each new dune ridge forms lakeward, the main ORV trail moves in a position just behind it, thus abandoning the trail behind the previous foredune. Bowles (1989) documented significant declines of *Euphorbia polygonifolia* in the beach area, but this decline is not necessarily caused by human trampling because annuals such as this are subject to wide fluctuations in population size over the years as climate varies (Pavlovic and Bowles 1996). This fluctuation is demonstrated by the high population numbers observed in 2006 when there were record growing season rainfalls (Pavlovic, pers obs., 2006). Half of the large westernmost pond has been filled by a large slag pile that remains, and may be better left in place, to avoid activity that could eliminate the panne altogether and possibly release polycyclic aromatic hydrocarbons and other toxins. This extensive slag pile has been shown to be the source of many toxic contaminants found in aquatic plants and fauna in this area (Stewart et al. 2003).

As the jack pines increased in height (from 1984 to 2010), this panne was being converted into a jack pine forest. High Lake Michigan water levels since 2017 and beaver activity have reversed this trend by flooding and killing some of the trees.

Miller Dunes has been under multiple

proposed developments over the years, but each proposal was defeated by both Miller residents and environmental groups. The pannes and surrounding dunes of the Miller Dunes provide the habitat for 51 special flora, including *Carex aurea*, *Equisetum variegatum*, and *Dasiphora fruticosa*, the last of which grows nowhere else in the Indiana Dunes. Rosowski and Willey (1975) described an epibiotic euglenoid alga (*Colacium libellae*) from these pannes.

South of the Grand Calumet River lay seven large tracts (subunits B, C, D, E, F, and G) of savanna/marsh complex, the ecological integrity of which is still quite high. Each was crisscrossed with ORV tracks, prior to protection by the NPS, that are beginning to disappear with NPS protection and with successional progression. During the last two decades of the 20th century, portions of Miller Woods burned annually (except in 1997) as wildfires (Henderson and Long 1984 and unpublished NPS data). As the NPS phases into a prescribed fire management regime, after high intensity fires in 1996 and 2002 (Pavlovic, pers. obs.), regular burning may ensure continued ecological integrity.

Miller Woods B

This 73-hectare (180-acre) subunit consists of high-diversity black oak savanna/marsh complex, except for 10 acres that have been destroyed by past human activity including railroad development, land fill, and residential development. A total of 245 native species is found in this subunit. Miller Woods B has a mean CoC of 5.75 and an FQI of 92. Invasion by the nonnative common reed (*Phragmites australis* ssp. *australis*) has spread extensively and could dominate the vegetation throughout the ponds in this and all other subunits in Miller Woods. Formerly, introduced purple loosestrife (*Lythrum salicaria*) also was more common throughout the ponds, but biological control from introduced *Galcearus* beetles has reduced its extent. Periodic fire keeps the ubiquitous Asiatic bush honeysuckles (*Lonicera* spp.) in check by top-killing the stems of this resprouting shrub that takes several years to become reproductive. Oriental bittersweet (*Celastrus orbiculatus*) and garlic mustard (*Alliaria petiolaris*) are beginning to invade as well, especially near Lake Street.

Miller Woods C

The 69 hectares (170 acres) in this subunit includes some of the finest mesic black oak savanna in the Chicago region, especially the western portions. As a result, the tract harbors an incredible 330 native plants. In the last decade, wildfires have been less frequent and prescribed fires have been less frequent than the wildfires between 1982 and 2000 (Pavlovic pers. obs. and unpublished NPS fire records). The impact of girdling 50%–70% of the canopy trees by the NPS during the winter of 2014–2015 created habitat for red-headed woodpeckers and may have changed the ground layer flora from woodland to savanna type with more prevalence of C4 grasses or bracken fern. Whether the low population numbers of the Karner blue butterfly suggested too frequent burning is now moot since this endangered butterfly was extirpated from all of Indiana in 2012. Nevertheless, this historically high fire frequency contributed to the preservation of high diversity and open structure of Miller Woods C. Scars from former ORV trails are disappearing as secondary succession occurs. Prescribed fire and removal of invasive Asian honeysuckles (*Lonicera* spp.) will help maintain the compositional and structural quality of this area.

Miller Woods D

Miller Woods D, the southeastern most subunit of Miller Woods, is 54 hectares (133 acres) in area. Only 207 native species are recorded from Miller Woods D. Miller Woods D has experienced increasing canopy cover over time due primarily to the lateral growth of the black oak canopies rather than infiltration between trees by oak sprouts and regeneration. This pattern of canopy closure is the result of moderate fire frequency or moderate to low fire intensity that produces low tree mortality and regular pruning and killing of oak seedlings and sprouts. A late season wildfire on 10 August 2002 was the first to demonstrate that growing season fires under extreme conditions prune the lower

branches from the oak trees and increase the light levels at the ground surface (Pavlovic, pers. obs.). This pruning of lower branches is beneficial since the trees are not top-killed. Small mesic prairie patches are present in low mesic sands but are rare.

Miller Woods E

The 91 hectares (224 acres) in Miller Woods E have 255 native species. Mean CoC was 5.16 and the area registered an FQI of 84. Miller Woods E is bisected by the Indiana Harbor Belt railroad bed as it turns from east-west to south-north. The portion of the subunit to the west of this location is of lower vegetation diversity than the eastern portion. The contrast in canopy cover between Miller Woods C and E, the latter having high canopy cover, seems to indicate some strong difference in land history. For example, was the disturbance at the west end of the east portion of E enough of a deterrent to make fire less frequent and thus produce greater canopy cover? Or was there an intense wildfire followed by fire suppression from the above-mentioned disturbance that created the dense even-aged canopy? An intense wildfire in 2003, almost eliminated the black oak canopy in the southern portions of subunit E south of the main train line and east of the Indiana Harbor Belt, where it turns south (Pavlovic, pers. obs.). This fire may have converted an oak savanna into sand prairie except that copious oak sprouting turned the habitat into an oak thicket. This ecological alteration by intense wildfire may represent a conversion to a C4 grass-dominated prairie system that might be restored to savanna only with active tree planting or a complex and strategic burning regime.

The 42 hectares (105 acres) west of the main subunit E, extend to Broadway in the City of Gary and are mapped as an extension of this subunit. This portion of Miller Woods E experienced a growing season wildfire in 2002 that pruned the lower limbs of the trees and produced leaf scorch up to 10 m off the ground (Pavlovic, pers. obs.)! High edge to area ratio of this site combined with the absence of management has contributed to slow degradation of subunit E.

Miller Woods F

The 30 hectares (75 acres) of Miller Woods F, known as the Gary Enterprise Zone or Republic Steel property, is a new addition to the park and was restored by J. F. New (now called Cardno) prior to transfer to INDU. The area is moderate diversity savanna complex and wetlands but is home to 291 native plant species, the second highest of any Miller Woods subunit.

Miller Woods G

The 18 hectares (45 acres) of Miller Woods G, about half of which were destroyed by former Harbor Belt railroad activity, are low-diversity remnants of black oak savanna/marsh complex. The poor quality is reflected in the low species total: 140 native species, 137 verified and an additional eight added from reports. Fire suppression and railroad disturbance across the middle of the fragmented and isolated unit contributed to its poor quality (low diversity and bare sand). Threats to the area include ongoing fire suppression and invasion of tree of heaven (*Ailanthus altissimus*) and Asiatic bush honeysuckles (*Lonicera* spp.). The FQI is low (54), with a mean CoC of 4.5. There were seven special flora recorded among the 140 native taxa catalogued for this area. In 1988, smooth gaura (*Oenothera glaucifolia*), an adventive species of western prairies and undocumented from the Chicago Region, appeared along the new sidewalk east of the Paul Douglas Center for Environmental Education (Dritz #596, 1988, MOR); it disappeared before having matured fruit. In 1989, it reappeared nearby along with annual wild buckwheat (*Eriogonum annuum*) and green thread (*Thelesperma megapotamicum*), also adventive from the western states, probably brought in with some recently transported topsoil and accidentally used in the plantings along the Douglas Center sidewalks and bridge.

Miller Woods H

Green Heron Pond, 6 hectares (14 acres) owned by the Shirley Heinze Land Trust, is an island property northeast of Miller Woods that is surrounded by residential development and a public school. There are 104 species recorded for this subunit. It is

an important component of natural area in Miller.

No other unit of INDU can compare with the scenic beauty of Miller Woods, especially subunits A, B, and C, due to the dune vistas across occasional ponds. The dunes, clothed in mesic oak savanna and punctuated by wetland depressions, are idyllic in floral grandeur and scope of scene (Figure 11). This condition has been maintained by frequent wildfires set largely by train activity, although their frequency has decreased since 2000.

Miller Woods is the third-most species-rich unit of INDU and is notable for the high quality (high native plant diversity and lack of invasive plant dominance) of prairie/oak savanna complex, pannes, and wetlands despite being criss-crossed with railroads. Nevertheless, Miller Woods is threatened by the invasion of purple loosestrife, common reed, hybrid cattail, Asiatic bush honeysuckles, Japanese knotweed, garlic mustard, spotted knapweed, and oriental bittersweet. The bush honeysuckles are the most pervasive non-native species on the uplands. Garlic mustard and oriental bittersweet are the latest arrivals, and the latter could negatively impact the native flora. Invasive exotic plants are presently the greatest threat to this and all other units of INDU. Plant poaching may also be taking its toll (see Discussion and Conclusions section for documentation of plant poaching). Global climate change is expected to favor the savanna and prairie species over mesophytic fire intolerant species. The extirpation of the Karner blue butterfly from the combined effects of an early hot spring and early summer drought in 2012 at Miller Woods and all of INDU (Hällfors et al. 2016) removed one of the most common pollinators from the park.

In part, wildfire is responsible for the maintenance of the floristic richness of Miller Woods because it inhibits woody plant invasion and top-kills some invasive exotic plants like the Asiatic bush honeysuckles. Unfortunately, fire will encourage the subterranean lateral growth of oriental bittersweet rhizomes where it is already established (Pavlovic et al. 2016). While unmanaged wildfires may become less frequent in Miller Woods, managed fires that are neither too hot nor too infrequent could continue to maintain floristic



Figure 11. Scenic beauty of wild lupine at Miller Woods savanna/woodland complex. USGS PHOTO/NOEL B. PAVLOVIC.

richness. Recent initiatives for wetland and wild rice restoration by the Pokagon Band of Potawatomi in concert with INDU restoration are improving wetland habitat and helping to increase plant and animal diversity in Miller Woods (Gia Wagner, former resource management specialist, pers. comm. with Pavlovic, 2020).

Unit 2: Tolleston Dunes

Tolleston Dunes occupies about 346 hectares (967 acres) at the southeast edge of Miller (Figure 12). This unit does not include the new Tolleston Dunes Unit that was formerly called Inland Marsh because it has a separate chapter. Since 1990, two additional properties have been added to the Tolleston Dunes: a satellite property southwest of subunit A (also labeled as subunit A in Figure 12) and contiguous property of Woodlake Dune and Savanna (subunit C).

Tolleston Dunes is named for the high Tolleston beach ridge that formed approximately 3,500 to 4,000 years ago (Thompson 1987, 1994; Schoon 2006; Argyilan et al. 2018). Tolleston Dunes is divided in half physically by the east to west-tending Penn Central and CSSSBR traction lines, along with the right-of-way of U.S. Highway 12. The 8 hectares (20 acres) between the two railroads are poor in special flora. A development impact study was conducted in Tolleston A in 1984 by Christy Fox and Wanda Manek, under the supervision of Rob Hiebert, that resulted in the discovery of many special flora species (Fox and Manek 1984). Tolleston B was surveyed by Gerould Wilhelm on 6 and 14 September 1997 and 10 August 1999. Tolleston Dunes C was surveyed on 17 July 1999 by Plampin, Myrna Newgent, and others, and by Nicole Kalkbrenner on 2 July, 5 August, and 28 October 1998. According

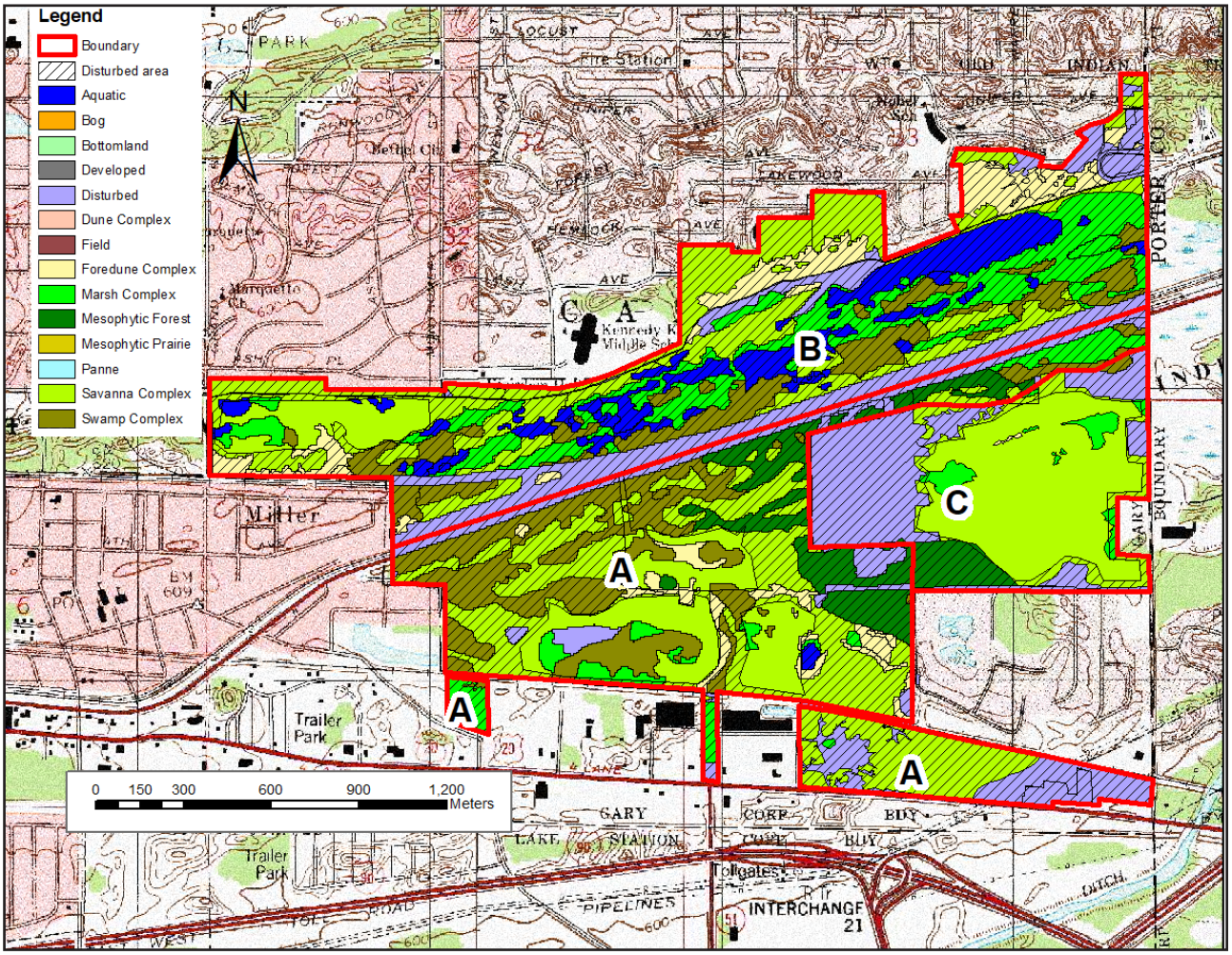


Figure 12. Vegetation of Tolleston Dunes Unit. Subunits indicated by letters. Cross-hatching indicates disturbed areas.

to Wilhelm (1990), additional surveys on Tolleston A were compiled by Emma Pitcher and Plampin in 1985. Pavlovic has made innumerable visits to this area over more than 30 years while studying fame flower (*Phemeranthus rugospermus*), Karner blue butterfly, fire effects on vegetation, deer impacts on wild lupine, and the potential oak savanna groundlayer restoration (e.g. Pavlovic 1995, Pavlovic et al. 2014). A comprehensive flora list (Table 9) and an annotated plant discovery citation list (Table 10) are presented below.

Special flora summary

Tolleston Dunes provides habitat for 58 special flora (formerly 18 in 1990), most of which are currently extant and in stable populations. This increase represents a 328% change in number of special flora.

Table 9. Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Acer negundo L.	–	x	x	X	0
Acer rubrum L.	x	x	x	X	7
Acer saccharinum L.	–	x	x 40	X	0
Achillea millefolium L.	x	x	x	X	*
Agalinis purpurea (L.) Pennell	R	x	–	X	6
Agalinis purpurea (L.) Pennell var. *parviflora* (Benth.) B. Boivin	–	x	–	X	7
Agalinis tenuifolia (Vahl) Raf.	50	–	–	N	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	–	R	x 10	X	4
Agrimonia gryposepala Wallr.	–	x 21	–	X	2
Agrostis gigantea Roth (*Agrostis alba* L.)	–	x	–	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	–	x	X	1
Ailanthus altissimus (Mill.) Swingle	R 13	x	–	X	*
Alisma subcordatum Raf.	x	x	x 10	X	4
Alisma triviale Pursh	–	x	–	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	13	–	–	N	*
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	x	x 10	X	0
Ambrosia psilostachya DC. (*Ambrosia psilostachya* DC. var. *coronopifolia*)(Torr. & A. Gray) Farw.	x	–	–	X	*
Ambrosia trifida L.	–	x	–	X	0
Amelanchier arborea (F. Michx.) Fernald	–	43	–	N	8
Amelanchier interior E. L. Nielsen	–	–	10	N	8
Amelanchier laevis Wiegand	x	x	–	X	8
Amphicarpaea bracteata (L.) Fernald	x	x	–	X	4
Andropogon gerardii Vitman	x	x	x	X	5
Anemone canadensis L.	–	–	–	X	4

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Anemone cylindrica A. Gray	x	x	x	X	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	61	–	–	N	7
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	x	x	X	3
Apios americana Medik.	x	x	x	X	7
Apocynum androsaemifolium L.	x	x	x	X	5
Apocynum cannabinum L. (includes *Apocynum sibiricum* Jacq.)	x	x	10	X	4
Apocynum cannabinum L.	x	x	x	X	2
Aquilegia canadensis L.	x	x	x	X	6
Aquilegia vulgaris L.	–	–	–	X	*
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	x	x	x	X	5
SF***Aralia hispida*** Vent.	x	–	–	X	10
Aralia nudicaulis L.	x	x	x	X	8
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald. & J. F.)	–	35	x	X	10
Arenaria serpyllifolia L.	–	x	–	X	*
SF***Aristida longespica*** Poir. var. ***geniculata*** (Raf.) Fernald	–	R	–	R	5
SF***Aristida tuberculosa*** Nutt.	x	x	4	X	9
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*]	x	x	x	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	x	x	x	X	5
Artemisia vulgaris L.	–	–	–	X	*
Asclepias amplexicaulis Sm.	x	x	x	X	7
Asclepias incarnata L.	x	x	x	X	4
Asclepias syriaca L.	x	x	x	X	0
Asclepias tuberosa L.	x	x	x	X	7
Asclepias verticillata L.	x	31	x	X	1
Asparagus officinalis L.	x	x	x	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	–	43	–	N	4
Aureolaria flava (L.) Farw.	R	–	x	X	9
Aureolaria pedicularia (L.) Raf. ex Pennell (*Aureolaria pedicularia* var. *ambigens* (Fernald) Farw.)	x	–	x	X	7
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	x	–	4	X	8
Berberis thunbergii DC.	–	–	10	N	*
SF***Betula papyrifera*** Marshall	–	24	–	N	10
Bidens bipinnata L.	–	x	–	X	ad
Bidens cernua L.	–	–	10	N	5
Bidens connata Muhlenberg ex Willdenow	–	–	10	N	3
Bidens frondosa L.	–	–	x	X	1
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	x	x	x	X	9

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Boechera canadensis (L.) Al-Shehbaz (*Arabis canadensis* L.)	–	60	10	N	10
Boehmeria cylindrica (L.) Sw.	x	x	x	X	2
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	–	x	x	X	4
Boltonia asteroides (L.) L'Her. var. *recognita* (Fernald & Griscom) Cronquist (*Boltonia latisquama* A. Gray var. *recognita* Fernald & Griscom)	x	–	–	X	9
SF***Botrychium matricariifolium*** (Döll) A. Braun ex W.D.J. Koch	–	56	–	N	10
SF***Botrychium simplex*** E. Hitchc.	–	14	–	N	10
Botrychium virginianum (L.) Sw.	–	53	x	X	6
SF***Brasenia schreberi*** J. F. Gmel.	–	29	–	N	10
Brickellia eupatorioides (L.) Shinners var. *corymbulosa* (Torr. & A. Gray) Shinners (*Kuhnia eupatorioides* L. var. *corymbulosa* Torr. & A. Gray)	32	R 31	–	N	6
Bromus inermis Leyss.	–	x	–	X	*
Bromus japonicus Thunb.	–	x	–	X	*
Bromus tectorum L.	x	x	–	X	*
Bulbostylis capillaris (L.) C.B. Clarke	x	–	–	X	4
Calamagrostis canadensis (Michx.) P. Beauv.	x	x	x	X	3
Calamagrostis stricta (Timm) Koel. ssp. *inexpansa* (A. Gray) C.W. Greene	x	–	–	X	5
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. magna Scribn. & Merr.	x	x	x	X	5
Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	x	–	–	X	1
Campanula aparinoides Pursh	–	27	x	X	8
Campanula rapunculoides L.	–	–	10	N	*
SF***Campanula rotundifolia*** L.	48	–	x	X	10
Cardamine pensylvanica Muhl. ex Willd.	x	–	–	X	4
Carduus nutans L.	–	58	–	N	*
SF***Carex alata*** Torr.	–	–	x	X	10
Carex aquatilis Wahlenb. var. *substricta* Kukenth. (*Carex aquatilis* Wahlenb. var. *altior* (Rydb.) Fernald)	–	–	x	X	5
Carex brevior (Dewey) Mackenzie ex Lunell	x	–	x	X	4
Carex comosa Boott	–	x	x 10	X	5
Carex cristatella Britton	–	x	–	X	4
Carex grayi J. Carey	–	–	10	N	7
Carex haydenii Dewey	–	–	–	X	6
Carex hystericina Muhl. ex Willd.	–	–	4	N	5
Carex lacustris Willd.	x	x	x	X	6
Carex lasiocarpa Ehrh. ssp. *americana* (Fernald) Hulten (*Carex lasiocarpa* Ehrh. var. *americana* Fernald)	–	x	–	X	10
Carex longii Mack.	–	x	x	X	6

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.)	x	x	x	X	5
Carex normalis Mack.	–	x 19	–	X	5
SF***Carex oligosperma*** Michx.	x	–	–	X	10
Carex pellita Willd.	x	–	x	X	4
Carex pensylvanica Lam.	x	x	x	X	5
Carex scoparia Schkuhr ex Willd. var. *scoparia*	–	x	x	X	7
Carex stricta Lam.	x	x	x	X	5
SF***Carex tonsa*** (Fernald) E.P. Bicknell	x	x	x	X	7
Carex viridula Michx. ssp. *viridula* (*Carex viridula* Michx.)	x	–	–	X	10
Carex vulpinoidea Michx.	–	–	x	X	2
Catalpa speciosa Teas	46	x	x	X	ad
Ceanothus americanus L.	x	x	x	X	6
Celastrus orbiculatus Thunb.	13	x	46	X	*
SF***Celastrus scandens*** L.	R	x	10	X	4
Celtis occidentalis L.	–	x	–	X	3
Cenchrus longispinus (Hack.) Fernald	R	x	–	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	44	x	–	X	*
Cephalanthus occidentalis L.	x	x	x	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L.)	x	–	–	X	*
SF***Chamerion angustifolium*** (L.) Holub (*Epilobium angustifolium* L.)	x	–	–	X	9
Chenopodium album L.	–	x	–	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	x	x	x	X	5
Cicuta maculata L.	–	x	10	X	6
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	–	x	X	1
Cirsium arvense (L.) Scop.	x	x	x	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	x	x	x	X	2
Cirsium vulgare (Savi) Ten.	R	–	x	R	*
Cladium mariscoides (Muhl.) Torr.	x	–	–	X	10
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	x	x	X	7
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	–	29	–	N	10
Commelina communis L.	13	–	–	N	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	R	x	10	X	0
Conyza ramosissima Cronquist (*Erigeron divaricatus* Michx.)	–	x	–	X	1
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	–	–	10	N	9

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Coreopsis lanceolata L.	x	x	x	X	5
Coreopsis palmata Nutt.	x	–	–	X	6
Coreopsis tripteris L.	x	x	x	X	5
Corispermum americanum (Nutt.) Nutt. (*Corispermum hyssopifolium* L.)	–	x	–	X	5
Cornus florida L.	–	43	x	X	8
Cornus obliqua Raf.	–	x	x	X	6
Cornus racemosa Lam.	x	x	10	X	1
Crepis tectorum L.	R	–	–	R	*
Crocanthemum canadense Britton (*Helianthemum canadense* (L.) Michx.)	x	x	x	X	8
Croton glandulosus L. var. *septentrionalis* Müell. Arg.	–	x 32	–	X	ad
SF***Cuscuta polygonorum*** Engelm.	–	–	10	N	8
Cycloloma atriplicifolium (Spreng.) J. M. Coult.	x	x	–	X	7
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* (*Cyperus filiculmis* Vahl)	x	x	x	X	5
SF***Cyperus houghtonii*** Torr.	x	x	–	X	2
Cyperus × *mesochorus* Geise [*C. lupulinus* × *C. schweinitzii*]	–	x	x	X	5
Cyperus schweinitzii Torr.	x	x	10	X	5
Cyperus strigosus L.	–	x	–	X	1
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	x	–	–	X	3
Datura stramonium L.	13	–	–	N	ad
Daucus carota L.	R	x	x	X	*
Desmodium canadense (L.) DC.	–	x	x	X	4
Desmodium glabellum (Michx.) DC.	–	x	–	X	5
Desmodium illinoense A. Gray	–	–	10	N	6
Desmodium paniculatum (L.) DC.	–	–	x	X	6
Desmodium sessilifolium (Torr.) Torr. & A. Gray	x	–	x	X	8
Dianthus armeria L.	–	–	x	X	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	–	x	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	x	–	–	X	9
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	x	x	–	X	7
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	x	–	–	X	5
SF***Dichanthelium oligosanthes*** (J.A. Schultes) Gould ssp. ***oligosanthes*** (*Panicum oligosanthes* Schult.)	–	–	x	X	9

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	x	x	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	x	x	X	7
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	x	–	x	X	8
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	–	x	–	X	8
SF***Diervilla lonicera*** Mill.	x	x	x	X	9
Digitaria ischaemum (Schreb.) Muhl.	–	x	–	X	*
Digitaria sanguinalis (L.) Scop.	–	x	–	X	*
Dioscorea villosa L.	x	–	–	X	7
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	x	x	x	X	9
Dulichium arundinaceum (L.) Britton	–	R 42	x	X	9
Echinocystis lobata (Michx.) Torr. & A. Gray	–	x	–	X	5
Echium vulgare L.	R	–	–	R	*
Elaeagnus angustifolia L.	–	–	10	N	*
Elaeagnus umbellata Thunb.	–	x	–	X	*
Eleocharis elliptica Kunth	x	–	–	X	8
Eleocharis erythropoda Steud.	x	x	x	X	2
Eleocharis flavescens (Poir.) Urb. var. *olivacea* (Torr.) Gleason (*Eleocharis olivacea* Torr.)	x	–	–	X	9
Eleocharis obtusa (Willd.) Schult.	–	x 20	–	X	3
Elymus canadensis L.	x	x	4	X	4
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	x	x	–	X	*
Elymus virginicus L.	–	x	–	X	4
Epilobium coloratum Biehler	–	x	–	X	3
Epilobium leptophyllum Raf.	R	–	–	R	10
Epipactis helleborine (L.) Crantz	–	54	–	N	*
Equisetum arvense L.	x	x	–	X	0
Equisetum × *ferrissii* Clute [*E. hyemale* × *E. laevigatum*]	–	x	x	X	2
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	R	x	–	X	3
Equisetum laevigatum A. Braun	x	x	x	X	2
Eragrostis pectinacea (Michx.) Nees	–	x	–	X	0
Eragrostis minor Host (*Eragrostis poaeoides* Roem. & Schult.)	–	x	–	X	*
Eragrostis spectabilis (Pursh) Steud.	x	x	10	X	3

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	–	x	x	X	2
Erigeron annuus (L.) Pers.	–	x	10	X	0
Erigeron philadelphicus L.	x	–	4	X	4
Erigeron strigosus Muhl. ex Willd.	x	x	x	X	5
Eryngium yuccifolium Michx.	–	–	–	X	9
Eupatorium altissimum L.	x	x	x	X	0
Eupatorium perfoliatum L.	x	x	x	X	4
Eupatorium serotinum Michx.	x	x	x	X	0
Euphorbia corollata L.	x	x	x	X	2
Euphorbia cyparissias L.	x	–	–	X	*
Euphorbia dentata Michx.	–	x	–	X	*
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	–	x	10	X	0
SF***Euphorbia polygonifolia*** L.	–	x	–	X	10
Euphorbia maculata L. (*Euphorbia supina* Raf.)	–	x	–	X	0
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb.)	x	x	10	X	4
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	x	x	X	3
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	–	x	x	X	5
Eutrochium fistulosum (Barratt) E.E. Lamont (*Eupatorium fistulosum* Barratt)	–	–	10	N	10
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	x	x	x	X	4
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	31	31	–	N	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	R	x	x	X	1
Festuca rubra L.	–	x	–	X	*
Fimbristylis autumnalis (L.) Roem. & Schult.	x	–	–	X	5
Fragaria virginiana Miller	x	x	x	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	–	54	10	N	*
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	–	x	–	X	1
Froelichia gracilis (Hook.) Moq.	–	x	–	X	ad
Galium aparine L.	x	–	4	X	1
Galium asprellum Michx.	–	–	–	X	10
Galium boreale L.	–	–	10	N	7
Galium circaezans Michx. var. *hypomalacum* Fernald	–	–	x	X	7
Galium obtusum Bigelow	x	x	x	X	5
Galium pilosum Aiton	x	x	x	X	10
Gaylussacia baccata (Wangenh.) K. Koch	x	x	x	X	9
Gentiana andrewsii Griseb.	–	–	10	X	8

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Gentianopsis crinita (Froel.) Ma (*Gentiana crinita* Froel.)	–	–	–	X	10
SF***Gentiana saponaria*** L.	x	–	–	X	8
Geranium maculatum L.	x	–	4	X	4
Geum canadense Jacq.	–	x	x	X	1
Glechoma hederacea L.	–	–	10	N	*
Gleditsia triacanthos L.	–	–	46	N	2
Glyceria striata (Lam.) Hitchc.	–	–	10	N	4
Gratiola virginiana L.	x	–	–	X	10
Gypsophila scorzonerifolia Ser.	–	x 45	–	X	*
Hackelia virginiana (L.) I. M. Johnst.	x	x	x	X	0
Hamamelis virginiana L.	–	x	x 10	X	8
Helenium autumnale L.	–	–	–	X	5
Helianthus annuus L.	–	–	–	X	ad
Helianthus divaricatus L.	x	x	x	X	5
Helianthus giganteus L.	–	–	–	X	9
Helianthus grosseserratus M. Martens	x	x	10	X	2
SF***Helianthus hirsutus*** Raf.	–	–	x	X	5
Helianthus mollis Lam.	x	–	–	X	9
Helianthus occidentalis Riddell	x	31	x	X	10
Helianthus pauciflorus Nutt. ssp. *pauciflorus*	–	57	–	N	8
Helianthus petiolaris Nutt. ssp. *petiolaris*	x	x	–	X	ad
Helianthus tuberosus L.	–	x	–	X	3
Hesperis matronalis L.	x	–	–	X	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	x	x	x	X	7
Heuchera richardsonii R. Br.	x	–	x	X	8
Hieracium caespitosum Dumort.	–	33	30	N	*
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	x	x	x	X	6
Hieracium gronovii L.	x	–	x	X	6
Hieracium scabrum Michx.	–	x	–	X	8
Hordeum jubatum L.	x	–	–	X	*
Houstonia caerulea L.	–	–	–	X	9
SF***Hudsonia tomentosa*** Nutt.	x	x	x	X	10
SF***Hypericum boreale*** (Britton) E.P. Bicknell	–	x	–	X	10
SF***Hypericum canadense*** L.	x	–	–	X	10

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
SF***Hypericum kalmianum*** L.	50	–	x	X	10
Hypericum mutilum L.	–	x	10	X	8
Hypericum perforatum L.	x	x	x	X	*
Hypericum punctatum Lam.	–	–	10	N	4
Impatiens capensis Meerb.	–	x	x	X	3
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	x	x	X	10
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	x	x 4	X	5
Juglans nigra L.	–	x	–	X	5
Juncus acuminatus Michx.	x	–	x	X	6
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	x	–	–	X	7
Juncus canadensis J. Gay ex Laharpe	50	x	–	X	7
Juncus dudleyi Wiegand	x	x	x 10	X	4
Juncus effusus L.	x	x	x	X	7
Juncus greenei Oakes & Tuck.	x	–	–	X	8
Juncus nodosus L.	x	–	–	X	6
SF***Juncus scirpoides*** Lam.	x	–	–	X	9
Juncus tenuis Willd.	x	x 26	x	X	0
Juncus torreyi Coville	x	–	x	X	4
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	–	x	–	X	2
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	x	x	x	X	7
Krigia biflora (Walter) S.F. Blake	x	x 26	x	X	7
Krigia virginica (L.) Willd.	R	–	x	X	6
Lactuca canadensis L.	x	x	x 10	X	2
Lactuca serriola L.	x	x	–	X	*
Lechea mucronata Raf. (*Lechea villosa* Elliott)	–	x	x	X	6
Lechea pulchella Raf. var. *moniliformis* (E.P. Bicknell ex Britton) Mohlenbrock	x	–	–	X	7
Leersia oryzoides (L.) Sw.	–	x	x 10	X	4
Leersia virginica Willd.	–	–	10	N	7
Lemna minor L.	x	–	–	X	5
Lemna minuta Kunth (*Lemna minuscula* Hertel)	–	–	x	X	5
Lepidium virginicum L.	x	x	x	X	0

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Lespedeza capitata Michx.	x	x	x	X	4
Lespedeza frutescens (L.) Hornem. (*Lespedeza intermedia* (S. Watson)) Britton)	–	–	10	N	8
Lespedeza hirta (L.) Hornem.	x	38	x	X	6
Lespedeza virginica (L.) Britton	28, 51	–	–	N	4
Liatris aspera Michx.	x	x	x	X	6
Liatris cylindracea Michx.	–	x	x	X	8
SF***Liatris scariosa*** (L.) Willd. var. ***nieuwlandii*** (Lunell) E. G. Voss	–	–	10	N	5
Liatris spicata (L.) Willd.	x	–	x 10	X	6
Ligustrum vulgare L.	13	–		N	*
Lilium michiganense Farw.	–	–	x	X	6
Linaria vulgaris Mill.	R	x	x 4	X	*
Liparis liliifolia (L.) Rich. ex Lindl.	–	52	31	N	6
SF***Liparis loeselii*** (L.) Rich.	–	15	x	X	7
Lithospermum canescens (Michx.) Lehm.	x	x	x	X	8
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	x	x	X	8
Lobelia siphilitica L.	–	x	x 4	X	6
Lolium perenne L.	–	–	10	N	*
SF***Lonicera dioica*** L.	x	2	–	X	10
Lonicera maackii (Rupr.) Maxim.	–	x	–	X	*
Lonicera reticulata Raf. (*Lonicera prolifera* (Kirchn.) Rehder)	–	x	–	X	7
Lonicera tatarica L.	–	–	4	N	*
Lonicera × *bella* Zabel [*L. tartarica* × *L. morrowii*]	–	x	–	X	*
Lonicera × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides*] (*Lonicera* × *muendeniensis* Rehder)	–	x	x	X	*
Lotus corniculatus L.	–	–	10	N	*
Ludwigia alternifolia L.	x	x	x	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	x	–	–	X	5
Lupinus perennis L. var. *occidentalis* S. Watson	x	x	x	X	7
Lycopus americanus Muhl. ex W.P.C. Barton	x	x	x	X	5
Lycopus rubellus Moench	–	–	x	X	10
Lycopus uniflorus Michx.	x	x	x	X	7
Lycopus virginicus L.	–	x	–	X	9

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Lysimachia thyrsiflora L.	–	x	x	X	9
Lythrum alatum Pursh	x	25	x	X	7
Lythrum salicaria L.	x	x	x	X	*
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	x	x	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	x	x	X	5
Marrubium vulgare L.	R	–	–	R	*
Medicago lupulina L.	x	–	–	X	*
Melilotus alba Medik.	x	x	x	X	*
Melilotus officinalis (L.) Lam.	x	x	10	X	*
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	–	x	x 10	X	5
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	–	–	–	X	10
Mimulus ringens L.	–	x	–	X	6
Mirabilis jalapa L.	–	3	–	N	*
Mirabilis nyctaginea (Michx.) MacMill.	–	x	–	X	ad
Moehringia lateriflora (L.) Fenzl (*Arenaria lateriflora* L.)	–	x	–	X	8
Mollugo verticillata L.	–	32	–	X	ad
Monarda fistulosa L.	x	x	x	X	4
Monarda punctata L.	x	x	x	X	5
SF***Monotropa uniflora*** L.	6	x	–	X	10
Morus alba L.	11	x	x 46	X	*
Muhlenbergia frondosa (Poir.) Fernald	–	x	–	X	3
Muhlenbergia mexicana (L.) Trin.	x	x	x	X	5
Muhlenbergia racemosa (Michx.) Britton, Sterns & Poggenburg	–	x	–	X	*
Muhlenbergia schreberi J. F. Gmel.	–	x	–	X	0
Nepeta cataria L.	–	–	–	X	*
Nuphar advena (Aiton) W. T. Aiton	–	37	–	N	7
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	R	x 18	x	X	6
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist (*Nymphaea tuberosa* Paine)	–	x	–	X	7
Nyssa sylvatica Marshall	x	x	x	X	8
Oenothera biennis L.	x	x	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	x	x	X	7
Oenothera laciniata Hill	–	x	–	X	3
Onoclea sensibilis L.	x	x	x	X	8

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Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
SF***Ophioglossum pusillum*** Raf. (*O. vulgatum* L. var. *pseudopodum* (S.F. Blake) Farw.)	–	–	x	X	9
Opuntia cespitosa Raf. (*O. humifusa* (Raf.) Raf.)	x	x	x	X	5
Osmorhiza longistylis (Torr.) DC.	–	–	10	N	3
Osmunda claytoniana L.	–	–	4	N	9
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	–	x	4	X	8
Osmundastrum cinnamomeum (L. .) C. Presl (*Osmunda cinnanomea* L.)	–	x	x	X	7
Oxalis stricta L. (*Oxalis europaea* Jord.)	–	–	x	X	0
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	x	–	–	X	0
Oxypolis rigidior (L.) Raf.	–	–	–	X	7
Panicum capillare L.	–	x	–	X	1
Panicum virgatum L.	x	x	x	X	5
Parietaria pensylvanica Muhl. ex Willd.	–	–	x	X	3
Parthenocissus quinquefolia (L.) Planch.	–	x	4	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	x	x	x	X	1
Paspalum setaceum Michx. var. *stramineum* (Nash) D.J. Banks (*Paspalum ciliatifolium* Michx. var. *stramineum* (Nash) Fernald)	–	x	–	X	4
Pedicularis canadensis L.	x	x	x	X	9
Pedicularis lanceolata Michx.	–	–	4	N	9
Penstemon grandiflorus Nutt.	59	–	–	N	ad
SF***Penstemon tubaeflorus*** Nutt.	55	–	–	N	10
Penthorum sedoides L.	–	52	10	N	5
Persicaria amphibia (L.) A. Gray (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman and *P. coccineum* Willd.)	x	x	x	X	4
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	–	x	x	X	7
Persicaria lapathifolia (L.) A. Gray (*Polygonum lapathifolium* L.)	R	–	10	N	0
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	–	x	–	X	*
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	x	10	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	–	x	x	X	8
Phalaris arundinacea L.	x	x	x 10	X	*
SF***Phemeranthus rugospermus*** (Holz.) Kiger (*Talinum rugospermum* Holz.)	x	–	4	X	10
Phlox bifida L.C. Beck	–	x	–	X	8
Phlox glaberrima L. ssp. *interior* (Wherry) Wherry	x	–	30	X	8
Phlox pilosa L.	x	x	x	X	7

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	A	*B*	*C*		
Phlox pilosa L. ssp. *fulgida* (Wherry) Wherry (*Phlox pilosa* L. var. *fulgida* Wherry)	–	–	10	N	7
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis*	x 7	x	x	X	1
Phragmites australis ssp. *americanus* Saltonstall, Peterson & Soreng	x	–	x	N	3
Phryma leptostachya L. var. *leptostachya*	–	–	–	N	4
Physalis virginiana Mill.	–	x	10	X	4
Physocarpus opulifolius (L.) Maxim.	x	–	x	X	8
Physostegia virginiana (L.) Benth.	–	–	x	X	6
Phytolacca americana L.	x	–	4	X	1
Pilea pumila (L.) A. Gray	–	–	10	N	5
SF***Pinus banksiana*** Lamb.	x	–	4	X	9
Plantago lanceolata L.	–	–	4	N	*
Plantago rugelii Decne.	x	x	x	X	0
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	–	39	–	N	10
SF***Platanthera flava*** (L.) Lindl. var. ***herbiola*** (R. Br.) Luer (*Habenaria flava* (L.) R. Br. var. *herbiola* (R. Br.) Ames & Correll)	–	23	–	N	10
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* (Michx.) Lodd.)	–	3	x 16	X	10
Poa compressa L.	x	x	x	X	*
Poa pratensis L.	x	x	x	X	*
Polanisia dodecandra (L.) DC. ssp. *dodecandra* (*Polanisia graveolens* Raf.)	x	–	–	X	0
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	x	x	x	X	9
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	x	4	X	3
Polygonatum pubescens (Willd.) Pursh	x	–	–	X	7
SF***Polygonum articulatum*** L. (SF***Polygonella articulate*** (L.) Meisn.)	x	x	x	X	10
Pontederia cordata L.	–	x	x	X	10
Populus alba L.	–	–	10	N	*
Populus deltoides W. Bartram ex Marshall	x	x	x	X	2
Populus grandidentata Michx.	–	x	x	X	6
Populus tremuloides Michx.	x	x	x	X	4
Potamogeton gramineus L.	–	x 20	–	X	8
Potamogeton nodosus Poir.	31	–	–	N	7
Potentilla norvegica L.	–	x	x	X	0
Potentilla recta L.	x	x	x	X	*
Potentilla simplex Michx.	x	35	x	X	4

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Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Prenanthes alba L.	x	x	x 10	X	5
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	32	x	x 10	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten	–	–	x	X	0
SF***Prunus pensylvanica*** L. f.	1	x	x	X	5
Prunus pumila L.	x	–	–	X	8
Prunus serotina Ehrh.	x	x	x	X	1
Prunus virginiana L.	x	x	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	–	x	–	X	2
Ptelea trifoliata L. ssp. *trifoliata*	–	x	x	X	7
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	x	x	X	5
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	–	27	10	X	5
Pyrus communis L.	–	–	–	X	*
Quercus alba L.	x	x	x	X	5
Quercus coccinea Muenchh.	–	x	–	X	4
Quercus palustris Muenchh.	x	x	x	X	8
Quercus velutina Lam.	x	x	x	X	6
Ranunculus abortivus L.	–	–	x 4	X	0
Ranunculus flabellaris Raf.	–	x	–	X	7
Ranunculus pensylvanicus L. f.	R	–	x	X	6
Rhamnus cathartica L.	–	43	–	N	*
SF***Rhus aromatica*** Aiton var. ***arenaria*** (Greene) Fernald	–	x	–	X	9
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	x	x	x	X	6
Rhus glabra L.	R	–	–	R	1
Rhus typhina L.	x	x	x 10	X	1
Rhynchospora capitellata (Michx.) Vahl	50	–	–	N	8
Robinia pseudoacacia L.	13	–	–	X	ad
Rorippa palustris (L.) Besser ssp. *hispida* (Desv.) Jonsell (*Rorippa palustris* (L.) Besser var. *hispida* (Desv.) Rydb.)	x	x	x	X	4
Rosa carolina L.	x	x	x	X	5
Rosa multiflora Thunb.	R	x	4	X	*
Rosa palustris Marshall	–	x	x	X	7
Rotala ramosior (L.) Koehne	x	–	–	X	10
Rubus allegheniensis Porter	–	–	10	N	3
Rubus flagellaris Willd.	x	x	x	X	3
Rubus hispidus L.	x	–	x	X	9

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	x	x	x	X	3
Rubus occidentalis L.	x	x	x	X	2
Rubus pensilvanicus Poir.	x	x	x	X	3
Rudbeckia hirta L.	x	x	x	X	1
Rudbeckia triloba L.	–	–	10	N	3
Rumex acetosella L.	x	x	x	X	*
Rumex altissimus Alph. Wood	–	–	x	X	2
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	–	x	10	X	8
Rumex crispus L.	–	–	x	X	*
Rumex obtusifolius L.	–	–	x	X	*
Rumex verticillatus L.	–	x	10	X	6
SF***Sabatia angularis*** (L.) Pursh	50	x	–	X	10
Sagittaria graminea Michx.	–	x	x	X	9
Sagittaria latifolia Willd.	–	x	x 10	X	4
Salix alba L.	–	–	10	N	*
Salix amygdaloides Andersson	–	x	x	X	5
Salix babylonica L.	8	–	–	N	*
Salix discolor Muhl.	x	x	x	X	2
Salix eriocephala Michx.	x	x	x	X	5
Salix humilis Marshall	x	x	x	X	6
Salix interior Rowlee	x	x	x	X	1
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	x	x	x	X	7
Salix nigra Marshall	–	x	4	X	4
Salix petiolaris Sm.	x	x	x	X	7
Salix × *glatfelteri* C. K. Schneid. [*S. amygdaloides* × *S. nigra*]	–	–	x	X	5
Salsola tragus L. (*Salsola kali* L. var. *tenuifolia* Tausch)	R	–	–	R	*
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	x	x 10	X	1
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P.) Bicknell	–	–	9	N	2
Saponaria officinalis L.	x	x	x	X	*
Sassafras albidum (Nutt.) Nees	x	x	x	X	3
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	x	x	x	X	*
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	x	x	X	5
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	–	x	x	X	6
SF***Schoenoplectiella hallii*** (A. Gray) Lye (*Schoenoplectus hallii* (A. Gray) S.G. Sm.; *Scirpus hallii* A. Gray	x	–	–	X	10
Schoenoplectus pungens (Vahl) Palla (*Scirpus pungens* Vahl)	x	–	–	X	5

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl) var. *creber* Fernald)	–	x	–	X	5
Scirpus atrovirens Willd.	–	x	–	X	4
Scirpus cyperinus (L.) Kunth	x	x	x	X	6
Scirpus pendulus Muhl.	–	–	–	X	4
Scutellaria galericulata L. (*Scutellaria epilobiifolia* A. Ham.)	–	x	x	X	5
Scutellaria laterifolia L.	–	x	x	X	5
SF***Selaginella rupestris*** (L.) Spring	R	–	x	X	10
Setaria faberi R.A.W. Herrm.	–	–	–	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	–	–	10	N	*
Setaria viridis (L.) P. Beauv.	–	x	–	X	*
Sicyos angulatus L.	–	x	–	X	5
Silene antirrhina L.	x	x	x	X	1
Silene cserei Baumg.	–	x	–	X	*
Silene latifolia Poir. (*Lychnis alba* Mill.)	x	x	–	X	*
Silphium laciniatum L.	x	–	–	X	5
Sisyrinchium albidum Raf.	–	x	–	X	7
Sium suave Walter	32	x	x 10	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	–	–	x	X	5
Smilax lasioneura Hook.	x	x	x 10	X	5
Smilax rotundifolia L.	–	x	–	X	7
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	–	x	–	X	5
Solanum ptychanthum Dunal (*Solanum americanum* Mill)	x	x	10	X	0
Solanum carolinense L.	–	–	–	X	ad
Solanum dulcamara L.	x	x	x	X	*
Solidago altissima L.	x	x	x 10	X	1
Solidago caesia L.	x	x	x	X	7
Solidago flexicaulis L.	–	–	10	N	7
Solidago gigantea Aiton	x	x	x	X	4
Solidago juncea Aiton	x	–	x	X	5
Solidago missouriensis Nutt. (*Solidago missouriensis* Nutt. var. *fasciculata* Holz.)	x	–	–	X	7
Solidago nemoralis Aiton	x	x	x	X	4
Solidago patula Muhl. ex Willd	–	–	–	X	9
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	–	–	x	X	6
SF***Solidago speciosa*** Nutt.	x	x	x	X	7

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	–	–	–	X	*
Sonchus oleraceus L.	–	–	–	X	*
Sorghastrum nutans (L.) Nash	x	x	x	X	5
Sparganium emersum Rehmann (*Sparganium chlorocarpum* Rydb.)	–	17	–	N	10
Spartina pectinata Link	–	x	x	X	4
Sphenopholis intermedia (Rydb.) Rydb.	x	–	–	X	4
Spiraea alba Du Roi	x	x	x	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	x	x 40	x	X	9
Spiranthes cernua (L.) Rich.	50	x	5	X	7
Sporobolus compositus (Poir.) Merr. var. *compositus* (*Sporobolus asper* (Michx.) Kunth)	–	x	–	X	ad
Sporobolus clandestinus (Biehler) Hitchc.	–	x	–	X	9
Sporobolus cryptandrus (Torr.) A. Gray	–	x	–	X	7
Sporobolus vaginiflorus (Torr.) Alph. Wood	–	x	–	X	0
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	–	x	x	X	5
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida*) (Pursh) Fernald)	–	x	10	X	5
Symphoricarpos orbiculatus Moench	–	–	46	N	ad
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve (*Aster junciformis* Rydb.)	x	–	–	X	10
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	x	–	x	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	x	–	x	X	5
Symphyotrichum laeve (L.) A. Löve & D. Löve var. *laeve* (*Aster laevis* L.)	–	–	10	N	9
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	–	–	10	N	4
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	–	x	–	X	3
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	–	x	x 4	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	x	x	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	x	x	–	X	0
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	x	–	–	X	7
SF***Symphyotrichum sericeum*** (Vent.) G.L. Nesom (*Aster sericeus* Vent.)	–	–	x	X	10
Symphyotrichum urophyllum (Lindl.) Nesom (*Aster sagittifolius* Willd.)	–	–	10	N	5
Symplocarpus foetidus (L.) Salisb. ex W.P.C. Barton	61	–	4	N	8
Syringa vulgaris L.	13	–	46	N	*
Taraxacum officinale F. H. Wiggers	x	x	x 4	X	*
Tephrosia virginiana (L.) Pers.	x	x	x	X	8

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Teucrium canadense L. var. occidentale (A. Gray) E.M. McClintock & Epling (*Teucrium occidentale* A. Gray)	–	x	–	X	3
Thalictrum amphibolum Greene (*Thalictrum revolutum* DC.)	x	–	–	X	6
Thalictrum dasycarpum Fisch. & Avé-Lall.	x 22	–	–	X	5
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	–	–	10	N	7
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	x	x	x	X	6
Tilia americana L.	–	43	–	N	5
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	x	X	2
Tradescantia ohiensis Raf.	x	x	x	X	2
Tragopogon dubius Scop.	x	x	x	X	*
Tragopogon pratensis L.	R	–	10	N	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald)	x	x	x	X	8
SF***Trichostema dichotomum*** L.	x	–	–	X	5
Trifolium hybridum L.	x	–	4	X	*
Trifolium pratense L.	–	–	4	N	*
Trifolium repens L.	x	x	–	X	*
Tridens flavus (L.) Hitchc. (*Triodia flava* (L.) Smyth)	–	x	–	X	ad
Triplasis purpurea (Walter) Chapm.	R	x	–	X	7
Typha angustifolia L.	x	x	–	X	1
Typha latifolia L.	x	x	x	X	1
Typha × *glauca* Godr. [*T. angustifolia* × *T. latifolia*]	–	x	x	X	1
Ulmus americana L.	–	x	x	X	3
Ulmus pumila L.	46	x 32	47	X	*
Urtica dioica L.	–	–	10	N	*
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	x	x	x	X	2
SF***Utricularia gibba*** L.	–	41	–	N	10
SF***Utricularia purpurea*** Walter	–	47	–	N	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen (*Utricularia vulgaris* L.)	–	27	–	N	9
Vaccinium angustifolium Aiton	x	x	x	X	5
Vaccinium corymbosum L.	–	–	10	N	8
Vaccinium pallidum Alton	–	x	x	X	5
Verbascum blattaria L.	R	–	–	R	*
Verbascum thapsus L. ssp. *thapsus*	x	x	x	X	*
Verbena hastata L.	x	x	x	X	4
Verbena stricta Vent.	x	x 34	x	X	4

Table 9 (continued). Summary of species verified and reported for Tolleston Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 10. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit			Unit-wide Species Status	CoC
	A	*B*	*C*		
Vernonia fasciculata Michx.	R	–	–	R	5
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt. var. *taeniotricha* S.F. Blake)	x	–	10	X	3
Vernonia missurica Raf.	–	–	10	N	4
Veronica peregrina L.	x	–	–	X	0
Veronicastrum virginicum (L.) Farw.	–	–	–	X	7
Viburnum acerifolium L.	–	–	x	X	9
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* Fernald)	–	x	–	X	ad
Viburnum lentago L.	–	–	–	X	5
Viburnum opulus L. var. *opulus*	–	–	10	N	*
Viola lanceolata L.	x	–	x	X	7
Viola pedata L. (*Viola pedata* L. *linearilobа* DC.)	x	x	x	X	9
Viola sagittata Aiton var. *sagittata*	x	36	x	X	7
Vitis aestivalis Michx.	–	–	10	N	7
SF***Vitis labrusca*** L.	–	43	–	N	9
Vitis riparia Michx.	x	x	x	X	2
Vulpia octoflora (Walter) Rydb.	x	x	4	X	4
SF***Xyris torta*** Sm.	49	–	–	N	10
Zea mays L.	12	–	–	N	*
SF***Zizania palustris*** L.	–	62	–	N	10
Zizia aurea (L.) W. D. J. Koch	x	–	4	X	7

Table 10. Sources of new species verified and reported from Tolleston Dunes.

Note	Discoverer	Date	Species
1	P. Benjamin	3 July 1990	*Prunus pensylvanica*
2	P. Benjamin, B. Plampin, M. Newgent	30 June 1994	*Lonicera dioica*
3	K. Board	29 June 1990	*Mirabilis jalapa*, *Platanthera lacera*
4	K. Board	4 June 1994	*Aristida tuberculosa*, *Baptisia lactea*, *Carex hystricina*, *Elymus canadensis*, *Erigeron philadelphicus*, *Galium aparine*, *Geranium maculatum*, *Iris virginica*, *Linaria vulgaris*, *Lobelia siphilitica*, *Lonicera tatarica*, *Osmunda claytoniana*, *Osmunda regalis* var. *spectabilis*, *Parthenocissus quinquefolia*, *Pedicularis lanceolata*, *Phemeranthus rugospermus*, *Phytolacca americana*, *Pinus banksiana*, *Plantago lanceolata*, *Polygonatum biflorum*, *Pycnanthemum virginianum*, *Ranunculus abortivus*, *Symphyotrichum novae-angliae*, *Symplocarpus foetidus*, *Taraxacum officinale*, *Trifolium hybridum*, *Trifolium pretense*, *Vulpia octoflora*, *Zizia aurea*
5	K. Board	14 Nov 1994	*Spiranthes cernua*

Table 10 (continued). Sources of new species verified and reported from from Tolleston Dunes.

Note	Discoverer	Date	Species
6	J. Drake and R. Grass	11 Sept 2003	*Monotropa uniflora*
7	E. Greiner and K. Quinlan	Sept 2003	*Phragmites australis* ssp. *australis,*
8	IN DNP	1987	*Salix babylonica*
9	N. Kalkbrenner	24 Oct 1995	*Sanicula odorata*
10	N. Kalkbrenner	Fall 1998	*Ageratina altissima* var. *altissima*, *Alisma subcordatum*, *Ambrosia artemisiifolia*, *Amelanchier interior*, *Apocynum cannabinum*, *Berberis thunbergii*, *Bidens cernua*, *Boechera canadensis*, *Campanula rapunculoides*, *Carex comosa*, *Carex grayi*, *Celastrus scandens*, *Cicuta maculata*, *Conyza canadensis*, *Corallorhiza odontorhiza*, *Cornus racemosa*, *Cuscuta polygonorum*, *Cyperus schweinitzii*, *Desmodium illinoense*, *Elaeagnus angustifolia*, *Eragrostis spectabilis*, *Erigeron annuus*, *Erigeron philadelphicus*, *Euphorbia nutans*, *Euthamia graminifolia*, *Eutrochium fistulosum*, *Galium boreale*, *Gentiana andrewsii*, *Glechoma hederacea*, *Glyceria striata*, *Hamamelis virginiana*, *Helianthus grosseserratus*, *Hypericum mutilum*, *Hypericum punctatum*, *Juncus dudleyi*, *Lactuca canadensis*, *Leersia oryzoides*, *Leersia virginica*, *Lespedeza frutescens*, *Liatris scariosa* var. *nieuwlandii*, *Liatris spicata*, *Lolium perenne*, *Lotus corniculatus*, *Melilotus officinalis*, *Mentha arvensis*, *Osmorhiza longistylis*, *Penthorum sedoides*, *Persicaria lapathifolia*, *Persicaria punctata*, *Phalaris arundinacea*, *Phlox pilosa* L. ssp. *fulgida*, *Physalis virginiana*, *Pilea pumila*, *Populus alba*, *Prenanthes alba*, *Proserpinaca palustris*, *Pycnanthemum virginianum*, *Rhamnus frangula*, *Rhus typhina*, *Rubus allegheniensis*, *Rudbeckia triloba*, *Rumex britannica*, *Rumex verticillatus*, *Sagittaria latifolia*, *Salix alba*, *Sambucus nigra* ssp. *canadensis*, *Setaria pumila* ssp. *pumila*, *Sium suave*, *Smilax lasioneura*, *Solanum ptychanthum*, *Solidago altissima*, *S. flexicaulis*, *Stachys hispida*, *Symphyotrichum laeve* var. *laeve*, *Symphyotrichum lateriflorum*, *Symphyotrichum urophyllum*, *Thalictrum thalictroides*, *Tragopogon pratensis*, *Urtica dioica*, *Vaccinium corymbosum*, *Vernonia gigantea*, *Vernonia missurica*, *Viburnum dentatum* var. *lucidum*, *Vitis aestivalis*
11	D. Mickey	10 Sept 2003	*Morus alba*
12	D. Mickey	11 Sept 2003	*Zea mays* L.
13	D. Mickey	Fall 2003	*Ailanthus altissimus*, *Alliaria petiolate*, *Celastrus orbiculatus*, *Commelina communis*, *Datura stramonium*, *Ligustrum vulgare*, *Robinia pseudoacacia*, *Syringa vulgaris*
14	M. Newgent	30 May 1990	*Botrychium simplex*
15	M. Newgent	7 June 1990	*Liparis loeselii*
16	M. Newgent	27 June 1994	*Platanthera lacera*
17	M. Newgent and B. Plampin	29 June 1992	*Sparganium emersum*
18	N.B. Pavlovic et al.	7 June 1990	*Nuttallanthus canadensis*
19	Pavlovic et al., Exotic Project	7 Sept 1999	*Carex normalis*
20	Pavlovic et al., Exotic Project	2 Aug 2000	*Eleocharis obtusa*, *Potamogeton gramineus*
21	Pavlovic et al., Exotic Project	21 Aug 2000	*Agrimonia gryposepala*
22	Pavlovic et al., Exotic Project	23 Aug 2000	*Thalictrum dasycarpum*
23	B. Plampin	6 June 1990	*Platanthera flava* var. *herbiola*
24	B. Plampin	11 June 1990	*Betula papyrifera*
25	B. Plampin	29 June 1990	*Lythrum alatum*

Table 10 (continued). Sources of new species verified and reported from Tolleston Dunes.

Note	Discoverer	Date	Species
26	B. Plampin	June 1990	*Juncus tenuis*, *Krigia biflora*
27	B. Plampin	11 July 1990	*Campanula aparinoides*, *Pycnanthemum virginianum*, *Utricularia vulgaris* L. ssp. *macrorhiza*
28	B. Plampin	21 Aug 1991	*Lespedeza virginica*
29	B. Plampin	29 June 1992	*Brasenia schreberi*, *Comarum palustre*
30	B. Plampin	4 June 1994	*Hieracium caespitosum*, *Phlox glaberrima* ssp. *interior*
31	B. Plampin and C. Wolfe	28 Aug 1996	*Asclepias verticillata*, *Brickellia eupatorioides* var. *corymbulosa*, *Fallopia japonica*, *Helianthus occidentalis*, *Liparis liliifolia*, *Potamogeton nodosus*
32	B. Plampin and C. Wolfe	Aug 1996	*Brickellia eupatorioides* var. *corymbulosa*, *Croton glandulosus* L. var. *septentrionalis*, *Mollugo verticillata*, *Proserpinaca palustris*, *Sium suave*, *Ulmus pumila*
33	B. Plampin and M. Newgent	30 May 1990	*Hieracium caespitosum*
34	B. Plampin and M. Newgent	June 1990	*Verbena stricta*
35	B. Plampin and M. Newgent	7 June 1990	*Arctostaphylos uva-ursi*, *Potentilla simplex*
36	B. Plampin and M. Newgent	11 June 1990	*Viola sagittata* var. *sagittata*
37	B. Plampin and M. Newgent	29 June 1990	*Nuphar advena*
38	B. Plampin and M. Newgent	July 1990	*Lespedeza hirta*
39	B. Plampin and M. Newgent	11 July 1990	*Platanthera clavellata*
40	B. Plampin and M. Newgent	July 1990	*Acer saccharinum*, *Spiraea tomentosa* var. *rosea*
41	B. Plampin and M. Newgent	30 June 1991	*Utricularia gibba*
42	B. Plampin and M. Newgent	29 June 1992	*Dulichium arundinaceum*
43	B. Plampin and M. Newgent	10 June 1995	*Amelanchier arborea*, *Asplenium platyneuron*, *Cornus florida*, *Rhamnus cathartica*, *Tilia americana*, *Vitis labrusca*
44	K. Quinlan	Summer 2003	*Centaurea stoebe* L. ssp. *micranthos*
45	K. Quinlan	2 Sept 2003	*Gypsophila scorzonerifolia*
46	K. Quinlan	7 Nov 2003	*Catalpa speciosa*, *Celastrus orbiculatus*, *Gleditsia triacanthos*, *Morus alba*, *Symphoricarpos orbiculatus*, *Syringa vulgaris*, *Ulmus pumila*
47	R. Scribailo	No Date	*Ulmus pumila*, *Utricularia purpurea*
48	G. Tonkovich	June 1999	*Campanula rotundifolia*
49	B. Plampin et al.	25 Aug 2008	*Xyris torta*
50	B. Plampin	2 Sept 2008	*Agalinis tenuifolia*, *Hypericum kalmianum*, *Juncus canadensis*, *Rhynchospora capitellata*, *Sabatia angularis*, *Spiranthes cernua*
51	B. Plampin and D. Hamilla	2 Sept 2008	*Lespedeza virginica*
52	B. Plampin	29 July 2008	*Liparis liliifolia*, *Penthorum sedoides*
53	D. Hamilla	29 July 2008	*Botrychium virginianum*
54	B. Plampin and D. Hamilla	29 July 2008	*Epipactis helleborine*, *Frangula alnus*
55	N.B. Pavlovic and K. Arzarian	6 July 1990	*Penstemon tubaeflorus*
56	M. Newgent and B. Plampin	June 1995	*Botrychium matricariifolium*
57	C. Hoiland and N. Pavlovic	11 June 2012	*Helianthus pauciflorus*
58	L. Brenan (pers. comm.)	20 Dec 2013	*Carduus nutans*
59	G. Wilhelm and E. Shimp	30 July 1987	*Penstemon grandiflorus*
60	J. Chappelle, B. Struecker, and N.B. Pavlovic	23 Aug 2017	*Boechera canadensis*
61	N.B. Pavlovic and J. Nifosi	11 May 2018	*Symplocarpus foetidus*
62	C. Deam	16 Sept 1930, 13 Sept 1934	*Zizania palustris*

Of these 58 special flora, 37 are confirmed (includes some of the new species), 18 are new, one is reported, and two (*Aralia hispida* and *Chamerion angustifolium*) are believed to be extirpated. In spite of recent attention by botanists, Tolleston remains an orphan in the sense that the three natural areas that surround it (Miller Woods, West Beach, and Inland Marsh) have the majority of the West Unit's special flora; however, in spite of only three special floristic elements thirty nine years ago (Wilhelm 1980), we now know of more than nineteen times that number! New special flora species include *Arctostaphylos uva-ursi*, *Betula papyrifera*, *Botrychium matricariifolium*, *B. simplex*, *Brasenia schreberi*, *Campanula rotundifolia*, *Carex alata*, *Celastrus scandens*, *Chamerion angustifolium*, *Comarum palustre*, *Corallorhiza odontorhiza*, *Cuscuta polygonorum*, *Cyperus houghtonii*, *Dichanthelium oligosanthes oligosanthes*, *Eleocharis flavescens*, *Eutrochium fistulosum*, *Fraxinus pennsylvanica*, *Helianthus hirsutus*, *Hypericum kalmianum*, *Liatris scariosa* var. *nieuwlandii*, *Liparis loeselii*, *Monotropa uniflora*, *Ophioglossum pusillum*, *Penstemon grandiflora*, *P. tubaeflorus*, *Platanthera clavellata*, *P. flava*, *P. lacera*, *Prunus pensylvanica*, *Rhus aromatica arenaria*, *Sabatia angularis*, *Symphyotrichum sericeum*, *Utricularia gibba*, *U. purpurea*, *Vitis labrusca*, *Xyris torta*, and *Zizania palustris*. Special flora unique to Tolleston Dunes include *Botrychium simplex*, *Chamerion angustifolium*, *Liatris scariosa* var. *nieuwlandii*, and *Penstemon tubaeflorus*.

Floristic summary

Tolleston Dunes has a total taxa count of 602, with 485 native taxa, 21 adventive taxa, and 96 exotic taxa. Of the 486 native taxa, Tolleston Dunes has a total of 466 native plant species, 14 varieties, and five hybrids. Of the 466 native species, 397 are confirmed, 63 are new, four are reported, and two are extirpated (Table 11). Of the 35 state-listed species, eight are endangered, 16 are threatened, and 11 are watch listed. Ninety-six exotic species (24 new records) are recorded from Tolleston Dunes, with an additional four reported (Table 11). Mean CoC of Tolleston Dunes is 5.46 and the FQI is 121, ranking it 10th out of the fifteen park units. New species found since 1990 include *Agalinis tenuifolia*, *Amelanchier arborea*, *A. interior*, *Apocynum cannabinum*, *Asplenium platyneuron*, *Betula papyrifera*, *Bidens cernua*, *B. connata*, *Boechera canadensis*, *Botrychium matricariifolium*, *B. simplex*, *Brasenia schreberi*, *Brickellia eupatorioides* var. *corymbulosa*, *Carex grayi*, *C. hystericina*, *Comarum palustre*, *Corallorhiza odontorhiza*, *Cuscuta polygonorum*, *Desmodium illinoense*, *Eutrochium fistulosum*, *Galium boreale*, *Glyceria striata*, *Hypericum punctatum*, *Leersia virginica*, *Lespedeza frutescens*, *L. virginica*, *Liatris scariosa* var. *nieuwlandii*, *Liparis lilifolia*, *Nuphar advena*, *Osmorhiza longistylis*, *Osmunda claytoniana*, *Pedicularis lanceolata*, *Penstemon tubaeflorus*, *Penthorum sedoides*, *Persicaria lapathifolia*, *Phlox pilosa* ssp. *fulgida*, *Phryma leptostachya* var. *leptostachya* (needs additional verification), *Pilea pumila*, *Platanthera clavellata*, *P. flava* var. *herbiola*, *Potamogeton nodosus*, *Rhynchospora capitellata*, *Rubus allegheniensis*, *Rudbeckia triloba*, *Sanicula odorata*, *Solidago flexicaulis*, *Sparganium emersum*, *Symphoricarpos orbiculatus*, *Symphyotrichum lateriflorum*, *S. laeve* var. *laeve*, *S. urophyllum*, *Symplocarpus foetidus*, *Thalictrum thalictroides* (needs further investigation), *Tilia americana*, *Utricularia gibba*, *U. purpurea*, *U. vulgaris*, *Vaccinium corymbosum*, *Vernonia gigantea*, *V. missurica*, *Vitis aestivalis*, *V. labrusca*, *Xyris torta*, and *Zizania palustris*. Only two adventive species have been found in Tolleston Dunes since 1990: *Datura stramonium* and *Gleditsia triacanthos*. Exotic species new to Tolleston Dunes since 1990 are *Alliaria petiolata*, *Berberis thunbergii*, *Campanula rapunculoides*, *Commelina communis*, *Elaeagnus angustifolia*, *Epipactis helleborine*, *Fallopia japonica*, *Frangula alnus*, *Glechoma hederacea*, *Hieracium caespitosum*, *Ligustrum vulgare*, *Lolium perenne*, *Lonicera tatarica*, *Lotus corniculatus*, *Mirabilis jalapa*, *Plantago lanceolata*, *Populus alba*, *Rhamnus cathartica*, *Salix alba*, *S. babylonica*, *Setaria pumila* ssp. *pumila*, *Syringa vulgaris*, *Tragopogon pratensis*, *Trifolium pratense*, *Urtica dioica*, *Viburnum opulus* var. *opulus*, and *Zea mays*.

Tolleston B and C have comparable native

Table 11. Summary of floristic statistics by subunit of Tolleston Dunes. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit			Entire Unit
	A	*B*	*C*	
Area (ha/acres)	155/384	166/410	70/173	346/967
Special flora total	31	31	25	58
Confirmed	19	15	17	37
New	8	12	8	18
Reported	2	2	0	1
Extirpated	2	2	0	2
Total taxa, FNA/ITIS	336	386	378	602
Total native taxa, FNA/ITIS	277	320	327	485
Native species, FNA/ITIS	269	307	313	466
Native variety, FNA/ITIS	7	9	9	14
Native hybrid, FNA/ITIS	1	4	5	5
Total adventive taxa, FNA/ITIS	7	13	2	21
Total adventive species,FNA/ITIS	7	13	2	21
Total adventive variety,FNA/ITIS	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0
Total exotic taxa, FNA/ITIS	52	53	49	96
Total exotic species, FNA/ITIS	52	51	47	93
Total exotic variety, FNA/ITIS	0	0	1	1
Total exotic hybrid, FNA/ITIS	0	2	1	2
Total Indiana-listed	20	20	17	35
Endangered	7	2	2	8
Threatened	9	10	9	16
Rare	0	0	0	0
Watch List	4	8	6	11
Extirpated	0	0	0	0
Sum CC	1,491	1,647	1,703	2,673
Sum CC adventive & invasive	1,436	1,586	1,653	2,566
Mean CoC	5	5	5	5
Mean CoC with adventive and invasive	4	4	4	4
FQI	89	90	94	121
FQI with adventive and invasive	78	80	85	104

species richness of 307 and 313, respectively, whereas A has 269. Exotic richness is comparable among the subunits, with species numbers in the low 50s. In contrast, the FQI is highest in C (94), intermediate in B (91), and lowest in A (89).

Conservation issues

Tolleston Dunes A (155 ha/384 acres)

This subunit has extensive areas, such as Fidall Dune, that have been sand mined throughout and damaged from chronic ORV use. Yet the sand mining activity created conditions favorable for the growth of *Aralia hispida*, *Hudsonia tomentosa*, and

Phemeranthus rugospermus, among others. The central portion of this subunit contains areas of high-quality black oak savanna and wet meadows, those that have high diversity of native vegetation, the absence of invasive species, and structure of presettlement communities. The north section just south of U.S. Highway 12 is highly degraded because the major drainage ditch has lowered the water table and allowed the invasion of aspen, cottonwood, and other woody species. This northern portion of the subunit A was formerly wet to mesic prairie/savanna on the old Tolleston foredune ridges, similar to the mesic savanna to the east in the West Beach Unit, subunit C, south of Long Lake.

INDU has been conducting controlled burns in Tolleston A and prior to 2012 was restoring savanna by cutting and applying herbicides to undergrowth as part of a project to improve habitat for the federally endangered Karner Blue butterfly (KBB, *Lycaeides melissa samuelis*). The KBB has been extirpated since 2012. Some of the wetlands are of high quality due to the expected native species composition and minimal invasion by plants such as purple loosestrife (*Lythrum salicaria*) and *Typha* × *glauca*. Purple loosestrife populations are present but not expanding. In 2003, native genotypes of the common reed (*Phragmites australis* ssp. *americanus*) were found in Tolleston A despite the extensive populations of the invasive genotype (*Phragmites australis* ssp. *australis*) in surrounding units (Pavlovic et al. 2005). Continued fire management of these patches would be useful to maintain the wet prairies, marshes, and oak savannas. Western portions of the subunit could benefit from oak sprout thinning.

Despite the continued improvement of habitat, the succession in former sand mined areas in Tolleston Dunes A (and in Tolleston B as well) could result in the decline of disturbance-dependent species such as fame flower (*Phemeranthus rugospermus*), jointweed (*Polygonum articulatum*), and false heather (*Hudsonia tomentosa*). As the sand mined areas undergo succession, monitoring of the state threatened *Hudsonia tomentosa* could help understand its persistence in relation to increased litter and canopy cover. Currently, this species persists in flat sand-mined areas that lack the sand movement of their former sand-blown habitats on southwest-facing dune slopes. Questions that remain regarding the persistence of these disturbance-dependent species include whether herbivore grazing in addition to fire is the missing process, which could aid in removal of competitors and disturbing the soil (Pavlovic 1994), and did elk and other herbivores help maintain open sand blows in the dunes besides wind? The reason for disappearance of bristly sarsaparilla (*Aralia hispida*) is the most difficult to explain although Marlin Bowles feared competition from *Rubus* spp. was the cause of its demise (Bowles 1988, 1989). This dominance by *Rubus* appeared to be complete by 2008 (Plampin and Hamilla 2008b) when bristly sarsaparilla had disappeared. Other areas lacking *Hudsonia* might best be managed by introducing a greater diversity of oak savanna species than grows in them at present. Fires on the order of every three to five years could aid in maintaining these species.

Tolleston Dunes B (166 ha/410 acres)

This subunit has also been sand mined north of Long Lake. The west Long Lake wetland complex has been drained as well, and all areas except the wettest portion and the zone to the north below the dunes, have been choked with *Typha* × *glauca* and with some purple loosestrife. Ironically, the deepest portions of the wetland, on the north side, still harbor great diversity because the water fluctuations prevent the invasion of hybrid cattail, *Phragmites*, and purple loosestrife. Similarly, important special flora exists in west Long Lake and the interdunal ponds and meadows, but large areas have been degraded from the invasion chiefly of hybrid cattail (*Typha* × *glauca*). Plampin and Hamilla (2008b) discuss the many changes in habitat and failure to find *Botrychium simplex* where it was found in 1990. Tree cover altered the landscape, and the marsh near the *B. simplex* was covered in cattail and *Phragmites*. Prior to the construction of the Marquette Bike Trail, there was a ski trail between the dune and the wetland, where *B. simplex* grew. Abandonment of the ski trail led to the invasion of dense trees and shrubs

that may have contributed to its decline. It is also possible that this species was more easily noticed and recorded on the trail.

Tolleston B has been burned numerous times by wildfires from 1983 to present (Pavlovic, pers. obs.). Portions contain extensive areas of oak savanna complex with high native plant diversity and open structure, but fire suppression, canopy closure, and exotic invasion (Asiatic bush honeysuckles, *Lonicera* spp.) have lowered the native plant richness of other portions. Removal of honeysuckles by mechanical and chemical methods and by fire could benefit the native flora.

The best savanna portions are to the north of Long Lake, often referred to as Marquette Trail, where the bike trail veers north for a short distance, but extensive areas to the east and west have dense thickets of oak sprouts as fire suppression continues. A fire in 2003 dramatically burned the portions between U.S. Highway 12 and the Marquette Bike Trail. Invasion of oriental bittersweet (*Celastrus orbiculatus*) has expanded into the fire suppressed oak savanna north of the bike trail from the adjacent residential areas and is continuing to invade the oak savanna (Pavlovic, per. obs.). The narrow east portion of the bike trail north of Long Lake was cleared of invasive shrubs in 2010 by INDU resource management, which may allow native species to flourish again. There is an eight-hectare (20-acre) tract between the Conrail lines and the CSSSBR line and the low dunes just north of the Conrail tracks that has not been botanically explored.

Tolleston Dunes C (70 ha/173 acres)
Known locally as Woodlake Dune and Savanna, Tolleston Dunes C was added to the national park in 1998 and is a moderate quality complex of oak savanna and wetlands. We mean moderate quality because it has been degraded by fire suppression and intense wildfires that produced dense oak sprouts and closed canopy. These, in concert with invasive plants, lowered the diversity of native plants. This property was restored and managed by J. F. New (now Cardno) prior to its transfer to the park. Portions of the oak savannas have dense canopy cover and are shading out *Phemeranthus rugospermus* and *Symphyotrichum sericeum*. This subunit provides a critical habitat connection between the rest of Tolleston Dunes and Inland Marsh to the east. County Line Road does create a significant barrier to dispersal between these two sites. Periodic burning of Tolleston C could maintain the declining fire-dependent native plants of this site.

Restoration of the Tolleston Dunes Unit is hampered by the major sewer line that bisects the A subunit, by the drainage of A and B into the ditch along U.S. 12, and the bisection of the whole unit by the major transportation corridor (U.S. 12, CSSBR, and Conrail tracks). These three barriers to ecosystem connectivity are unlikely to be removed, but restoration of the other degraded portions of Tolleston to appropriate plant communities, irrespective of what was there before, could benefit native plant population viability. Removal of barriers to connectivity by restoring homesites of the Inland Manor and connecting subunit C to subunit A could be beneficial for preservation of this endangered savanna ecosystem. Once accomplished this would allow burning of the entire unit at one time.

Unit 3: Calumet Prairie State Nature Preserve

Calumet Prairie State Nature Preserve contains 125 hectares (308 acres) of land south of Tolleston Dunes and north of the Little Calumet River, from which its name derives. The unit is divided into two sections by Old Hobart Road in the northeast part of the unit, which extends southeast from the Indiana Toll Road and terminates at Indiana 51/Ripley Street (Figure 13). The unit has been undergoing restoration under the management of the Indiana Department of Natural Resources, Division of Nature Preserves, since 2011 (Tom Post, formerly Indiana Division of Nature Preserves, pers. comm. with Pavlovic). In the early 2000s, this unit was to be given to NPS in exchange for transferring the Gaylord Butterfly Tract to the Indiana Division of Nature Preserves; however, this transfer did not happen (Gia Wagner, former INDU Resource

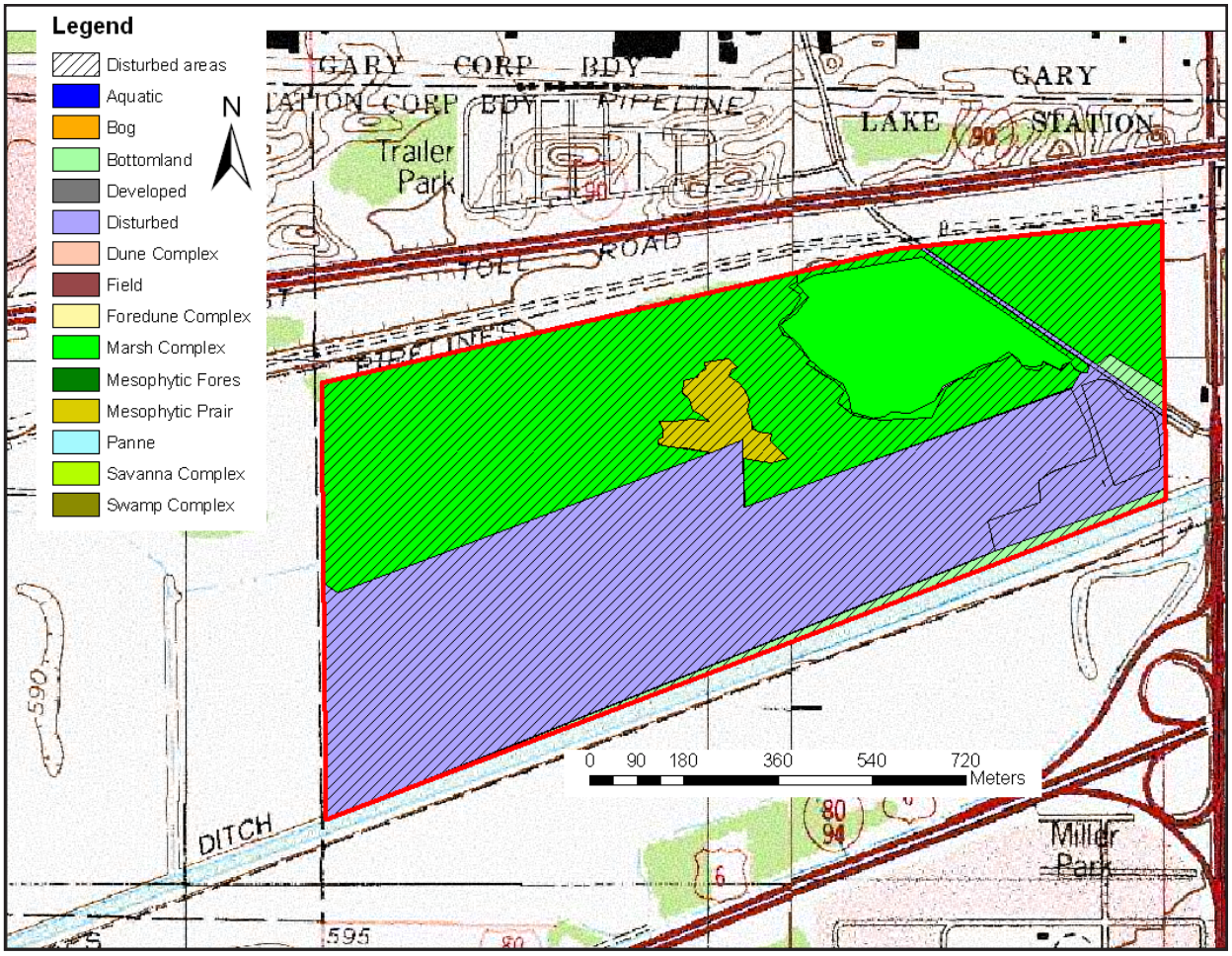


Figure 13. Vegetation of Calumet Prairie Unit. Cross-hatching indicates disturbed areas.

Management Specialist, pers. comm. with Pavlovic, 2017).

Calumet Prairie was surveyed by Gerould Wilhelm on 6 August 1993 with Tom Post, on 3 June 1998 with Barbara Johnson, 5 July and 8 August 1998 with Barbara Johnson, and 3 August 1999 with Tom Post, Barbara Johnson, and Ken Klick. Pavlovic has only visited this site twice since 1983. Since 2012, the Northwest Indiana Restoration Monitoring Inventory (NIRMI; www.nirmi.org) has had four permanent plots set up in various areas of the unit that are used for long-term monitoring of the vegetation (Tonkovich, Indiana University Northwest, pers. comm. with Pavlovic, 2016).

Calumet Prairie was modified in the past by agriculture and the channelization of the Little Calumet River. Development to the north and east has greatly fragmented and altered this site. Disturbance from road and powerline maintenance has occurred along Old Hobart Road and the NIPSCO power line right-of-way. The highest quality in terms of vegetation composition and structure is the central sedge meadow southwest of Old Hobart Road. Here follows a complete flora list (Table 12) and annotations concerning new rare plant finds (Table 13).

Special flora summary

Twenty-one special floristic elements were found at Calumet Prairie and none of them is unique to Calumet Prairie: *Acorus americanus*, *Alnus incana*, *Asclepias purpurascens*, *Carex alata*, *Castilleja coccinea*, *Comarum palustre*, *Dichanthelium boreale*, *Diervilla lonicera*, *Helianthus hirsutus*, *Hypericum kalmianum*, *Liparis loeselii*, *Myosotis laxa*, *Platanthera lacera*, *Platanthera psycodes*, *Prunus pensylvanica*, *Rubus pubescens*, *Rubus setosus*, *Salix candida*, *Salix lucida*, *Solidago speciosa*, and *Toxicodendron vernix*.

Table 12. Summary of species verified and reported for Calumet Prairie Unit of INDU. Species status codes: X = verified, N = new for this edition, and numbers indicated new finds (Table 13). Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status Code	CoC
Abutilon theophrasti Medik	3	*
Acer negundo L.	X	0
Acer rubrum L.	X	7
Acer saccharinum L.	X	0
Achillea millefolium L.	X	*
SF***Acorus americanus*** (Raf.) Raf. (*Acorus americanus* L.)	X	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	X	4
Agrimonia gryposepala Wallr.	3	2
Agrimonia parviflora Aiton	4	7
Agrostis gigantea Roth (*Agrostis alba* L.)	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	X	1
Ailanthus altissimus (Mill.) Swingle	3	*
Alisma subcordatum Raf.	X	4
Allium canadense L.	X	2
Alnus glutinosa (L.) Gaertner	4	0
SF***Alnus incana*** (L.) Moench ssp. *rugosa* (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng.)	X	8
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	X	0
Ambrosia trifida L.	3	0
Andropogon gerardii Vitman	X	5
Anemone canadensis L.	X	4
Anemone cylindrica A. Gray	X	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	X	7
Angelica atropurpurea L.	X	7
Apios americana Medik.	X	7
Apocynum androsaemifolium L.	X	5
Apocynum cannabinum L. (*Apocynum sibiricum* Jacq.)	X	2
Arctium minus (Hill) Bernhardi (*Arctium minus* Bernh.)	3	*
Aristida oligantha Michx.	X	0
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	X	5
Asclepias incarnata L.	X	4
SF***Asclepias purpurascens*** L.	X 4	8
Asclepias syriaca L.	X	0
Asclepias tuberosa L.	X	7
Atriplex prostrata Boucher ex DC.	3	
Barbarea vulgaris R. Br.	X	*
Bidens connata Muhl. ex Willd.	3	5

Table 12 (continued). Summary of species verified and reported for Calumet Prairie Unit of INDU. Species status codes: X = verified, N = new for this edition, and numbers indicated new finds (Table 13). Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status Code	CoC
Bidens frondosa L.	X	1
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	X	9
Boehmeria cylindrica (L.) Sw.	X	2
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	X	4
Botrychium virginianum (L.) Sw.	X	6
Bulbostylis capillaris (L.) C.B. Clarke	X	4
Calamagrostis canadensis (Michx.) P. Beauv.	X	3
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. *magna* Scribn. & Merr.	X	5
Caltha palustris L.	X	5
Calystegia sepium (L.) R. Br. (*Convolvulus sepium* L.)	X	1
Campanula aparinoides Pursh	X	8
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg	X	6
Cardamine pensylvanica Muhl. ex Willd.	1	4
SF***Carex alata*** Torr.	X	10
Carex aquatilis Wahlenb. var. *substricta* Kukenth. (*Carex aquatilis* Wahlenb. var. *altior* (Rydb.) Fernald	X	5
Carex brevior (Dewey) Mack. ex Lunell	X	4
Carex buxbaumii Wahlenb.	X	9
Carex comosa Boott	X	5
Carex cristatella Britton	X	4
Carex haydenii Dewey	X	6
Carex lacustris Willd.	X	6
Carex lasiocarpa Ehrh. ssp. *americana* (Fernald) Hulten (*Carex lasiocarpa* Ehrh. var. *americana* Fernald)	X	10
Carex longii Mack.	X	6
Carex muehlenbergii Schkuhr ex Willd.	X	5
Carex pellita Willd.	X	4
Carex pensylvanica Lam.	X	5
Carex scoparia Schkuhr ex Willd.	X	7
Carex stricta Lam.	X	5
SF***Castilleja coccinea*** (L.) Spreng.	X	10
Catalpa speciosa Teas	X	ad
Ceanothus americanus L.	X	6
Celastrus orbiculatus Thunb.	3	*
Cephalanthus occidentalis L.	X	5
Chelone glabra L.	X	8
Chenopodium album L.	3	*
Chenopodium simplex (Torr.) Raf. (*Chenopodium hybridum* L. var. *gigantospermum* (Aellen) Rouleau)	3	3
Cicuta bulbifera L.	X	8
Cicuta maculata L.	X	6
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. ssp. *canadensis* (L.) Asch. & Magnus)	3	1

Table 12 (continued). Summary of species verified and reported for Calumet Prairie Unit of INDU. Species status codes: X = verified, N = new for this edition, and numbers indicated new finds (Table 13). Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status Code	CoC
Cirsium arvense (L.) Scop.	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	X	2
Cirsium muticum Michx.	X	10
Cirsium vulgare (Savi) Ten.	X	*
Comandra umbellata (L.) Nutt.	X	7
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	X	10
Convolvulus arvensis L.	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	3	0
Coreopsis tripteris L.	X	5
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	X	6
Cornus racemosa Lam.	X	1
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	X	6
Corylus americana Walter	X	5
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* (*Cyperus filiculmis* Vahl)	X	5
Cyperus × *mesochorus* Geise	X	5
Datura stramonium L.	3	ad
Daucus carota L.	3	*
Desmodium canadense (L.) DC.	X	4
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	X	2
SF***Dichanthelium boreale*** (Nash) Freckmann (*Panicum boreale* Nash)	X	10
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	X	4
SF***Diervilla lonicera*** Mill.	X	9
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	X	9
Dulichium arundinaceum (L.) Britton	X	9
Eleocharis erythropoda Steud.	X	2
Elymus canadensis L.	X	4
Elymus riparius Wiegand	X	5
Elymus virginicus L.	X	4
Epilobium coloratum Biehler	X	3
Epilobium leptophyllum Raf.	X	10
Equisetum arvense L.	X	0
Equisetum laevigatum A. Braun	X	2
Eragrostis spectabilis (Pursh) Steud.	X	3
Erechtites hieraciifolius (L.) Raf. var. *hieraciifolius*	X	2
Erigeron philadelphicus L.	X	4
Erigeron strigosus Muhl. ex Willd.	X	5
Eryngium yuccifolium Michx.	X	9

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Species	Species Status Code	CoC
Eupatorium altissimum L.	X	0
Eupatorium perfoliatum L.	X	4
Eupatorium serotinum Michx.	X	0
Euphorbia corollata L.	X	2
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	X	3
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	X	5
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	X	4
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	X	1
Fragaria virginiana Miller	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	4	*
Galium aparine L.	X	1
Galium asprellum Michx.	X	10
Galium boreale L.	X	7
Galium obtusum Bigelow	X	5
Galium pilosum Aiton	X	10
Galium tinctorium L.	3	8
Galium triflorum Michx.	3	5
Gaylussacia baccata (Wangenh.) K. Koch	X	9
Gentiana andrewsii Griseb.	X	8
Gentianopsis crinita (Froel.) Ma (*Gentiana crinita* Froel.)	X	10
Geranium maculatum L.	X	4
Geum aleppicum Jacq. (*Geum aleppicum* Jacq. var. *strictum* (Aiton) Fernald)	X	7
Geum canadense Jacq.	X	1
Glyceria striata (Lam.) Hitchc.	X	4
Hackelia virginiana (L.) I.M. Johnst.	3	0
Hamamelis virginiana L.	X	8
Helenium autumnale L.	X	5
Helianthus divaricatus L.	X	5
Helianthus giganteus L.	X	9
Helianthus grosseserratus M. Martens	X	2
SF***Helianthus hirsutus*** Raf.	X	5
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	X	7
Heuchera richardsonii R. Br.	X	8
Hibiscus moscheutos L. ssp. *moscheutos* (*Hibiscus palustris* L.)	2	9
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	X	6
Houstonia caerulea L.	X	9
SF***Hypericum kalmianum*** L.	X	10
Hypericum perforatum L.	(X)	*

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Species	Species Status Code	CoC
Hypoxis hirsuta (L.) Coville	X	9
Impatiens capensis Meerb.	X	3
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	X	5
Juncus acuminatus Michx.	X	6
Juncus canadensis J. Gay ex Laharpe	X	7
Juncus dudleyi Wiegand	X	4
Juncus effusus L.	X	7
Juncus greenei Oakes & Tuck.	X	8
Juncus tenuis Willd.	X	0
Juncus torreyi Coville	X	4
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	X	7
Krigia biflora (Walter) S.F. Blake	X	7
Lactuca canadensis L.	X	2
Lactuca serriola L.	X	*
Lathyrus palustris L.	X	8
Lathyrus palustris L. (*Lathyrus palustris* L. var. *myrtifolius* (Willd.) A. Gray)	X	6
Lechea mucronata Raf. (*Lechea villosa* Elliott)	X	6
Leersia oryzoides (L.) Sw.	X	4
Lemna minor L.	X	5
Lemna minuta Kunth (*Lemna minuscula* Hertel)	X	5
Leonurus cardiaca L.	3	*
Lepidium virginicum L.	X	0
Lespedeza capitata Michx.	X	4
Lespedeza hirta (L.) Hornem.	X	6
Liatris aspera Michx.	X	6
Liatris spicata (L.) Willd.	X	6
Lilium michiganense Farw.	X	6
Linaria vulgaris Hill	X	*
SF***Liparis loeselii*** (L.) Rich.	X	7
Lobelia siphilitica L.	X	6
Lonicera × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides*] (*Lonicera* × *muendeniensis* Rehder)	X	*
Ludwigia alternifolia L.	X	6
Ludwigia palustris (L.) Elliott	3	5
Lupinus perennis L. var. *occidentalis* S. Watson	X	7
Luzula multiflora (Ehrh.) Lej.	X	7
Lycopus americanus Muhl. ex W.P.C. Barton	X	5
Lycopus uniflorus Michx.	X	7
Lysimachia quadriflora Sims	X	9
Lysimachia terrestris (L.) Britton, Sterns & Poggenburg	X	8

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Species	Species Status Code	CoC
Lysimachia thyrsiflora L.	X	9
Lythrum alatum Pursh	X	7
Lythrum salicaria L.	X	*
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	X	5
Melilotus alba Medik.	X	*
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	X	5
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	X	10
Mimulus ringens L.	X	6
Monarda fistulosa L.	X	4
Monarda punctata L.	X	5
Morus alba L.	X	*
Muhlenbergia mexicana (L.) Trin.	X	5
SF***Myosotis laxa*** Lehm.	X	10
Myosoton aquaticum (L.) Moench	3	*
Nepeta cataria L.	3	*
Nyssa sylvatica Marshall	X	8
Oenothera biennis L.	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	X	7
Oenothera pilosella Raf.	X	10
Onoclea sensibilis L.	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	X	7
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	X	8
Oxalis stricta L.	3	0
Oxypolis rigidior (L.) Raf.	X	7
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	X	7
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	X	6
Panicum capillare L.	3	1
Panicum virgatum L.	X	5
Parietaria pensylvanica Muhl. ex Willd.	X	3
Parthenocissus quinquefolia (L.) Planch.	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	X	1
Pastinaca sativa L.	3	*
Pedicularis canadensis L.	X	9
Pedicularis lanceolata Michx.	X	9
Penstemon digitalis Nuttall ex Sims	X	4
Penthorum sedoides L.	3	5
Persicaria amphibia (L.) A. Delarbre (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman)	X	4

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Species	Species Status Code	CoC
Persicaria amphibia (L.) A. Delarbre (*Polygonum coccineum* Willd.)	X	4
Persicaria lapathifolia (L.) A. Delarbre (*Polygonum lapathifolium*)	3	0
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	3	*
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	X	8
Phalaris arundinacea L.	X	*
Phlox glaberrima L. ssp. *interior* (Wherry) Wherry (*Phlox glaberrima* L. var. *interior* Wherry)	X	8
Phlox pilosa L.	X	7
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	X	1
Physalis heterophylla Nees	X	3
Physalis longifolia Nutt. var. *subglabrata* (Mackenzie & Bush) Cronquist (*Physalis subglabrata* Mack. & Bush)	X	0
Physostegia virginiana (L.) Benth.	X	6
Phytolacca americana L.	X	1
Pilea fontana (Lunell) Rydb.	3	7
Pilea pumila (L.) A. Gray	X	5
Plantago rugelii Decne.	X	0
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* (Michx.) Lodd.)	X	10
SF***Platanthera psycodes*** (L.) Lindl. (*Habenaria psycodes* (L.) Spreng.)	X	10
Poa compressa L.	X	*
Poa palustris L.	X	9
Poa pratensis L.	X	*
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	X	9
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	X	3
Pontederia cordata L.	X	10
Populus deltoides W. Bartram ex Marshall	X	2
Populus tremuloides Michx.	X	4
Portulaca oleracea L.	3	*
Potentilla norvegica L.	X	0
Potentilla simplex Michx.	X	4
Prenanthes alba L.	X	5
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	X	6
SF***Prunus pensylvanica*** L.f.	X	5
Prunus serotina Ehrh.	X	1
Prunus virginiana L.	X	3
Ptelea trifoliata ssp. *trifoliata* var. *mollis* (*P. trifoliata* L. var. *mollis* T. & G.)	X	8
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	X	5
Pycnanthemum tenuifolium Schrad.	X	7
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	X	5

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Species	Species Status Code	CoC
Quercus alba L.	X	5
Quercus palustris Münchh.	X	8
Quercus velutina Lam.	X	6
Ranunculus abortivus L.	X	0
Ranunculus pensylvanicus L.f.	X	6
Ranunculus sceleratus L.	3	6
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	X	6
Rhus typhina L.	X	1
Ribes americanum Mill.	3	7
Rorippa palustris (L.) Besser	3	4
Rosa carolina L.	X	5
Rosa multiflora Thunb.	X	*
Rosa palustris Marshall	X	7
Rubus allegheniensis Porter	X	3
Rubus flagellaris Willd.	X	3
Rubus hispidus L.	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	X	3
Rubus occidentalis L.	X	2
Rubus pensilvanicus Poir.	X	3
SF***Rubus pubescens*** Raf.	X	10
SF***Rubus setosus*** Bigelow	X	10
Rudbeckia hirta L.	X	1
Rumex acetosella L.	X	*
Rumex altissimus Alph. Wood	X	2
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	X	8
Rumex crispus L.	X	*
Rumex obtusifolius L.	X	*
Sagittaria graminea Michx.	X	9
Sagittaria latifolia Willd.	X	4
Salix amygdaloides Andersson	X	5
Salix bebbiana Sarg.	X	8
SF***Salix candida*** Flüeggé ex Willd.	X	10
Salix discolor Muhl.	X	2
Salix eriocephala Michx.	X	5
Salix humilis Marshall	X	6
Salix interior Rowlee	X	1
SF***Salix lucida*** Muhl.	X	10
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	X	7

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Species	Species Status Code	CoC
Salix nigra Marshall	X	4
Salix petiolaris Sm.	X	7
Salix × *glatfelteri* C. K. Schneid.	X	5
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	X	1
Sanicula canadensis L.	3	7
Saponaria officinalis L.	X	*
Sassafras albidum (Nutt.) Nees	X	3
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	X	*
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	X	5
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	X	6
Scirpus atrovirens Willd.	X	4
Scirpus cyperinus (L.) Kunth	X	6
Scirpus pendulus Muhl.	X	4
Scutellaria galericulata L. (*Scutellaria epilobiifolia* A. Ham.)	X	5
Scutellaria lateriflora L.	3	5
Secale cereale L.	3	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila*	3	*
Sicyos angulatus L.	3	5
Silene antirrhina L.	X	1
Silene latifolia Poir. (*Lychnis alba* Mill.)	3	*
Sium suave Walter	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	X	5
Smilax lasioneura Hook.	X	5
Solanum carolinense L.	X	ad
Solanum dulcamara L.	X	*
Solanum ptychanthum Dunal (*S. americanum* Mill.)	3	0
Solidago altissima L.	X	1
Solidago gigantea Aiton	X	4
Solidago juncea Aiton	X	5
Solidago nemoralis Aiton	X	4
Solidago patula Muhl. ex Willd.	X	9
Solidago riddellii Frank	3	7
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	X	6
SF***Solidago speciosa*** Nutt.	X	7
Solidago uliginosa Nutt.	X	10
Sonchus asper (L.) Hill	3	*
Spartina pectinata Link	X	4
Spiraea alba Du Roi	X	7

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Species	Species Status Code	CoC
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida* (Pursh) Fernald)	X	5
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	X	5
Stellaria longifolia Muhl. ex Willd.	X	8
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	X	5
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	X	3
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	X	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)	X	9
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	X	8
Taraxacum officinale F.H. Wigg.	X	*
Tephrosia virginiana (L.) Pers.	X	8
Teucrium canadense L. var. *occidentale* (A. Gray) E.M. McClint. & Epling (*Teucrium occidentale* A. Gray)	X	3
Thalictrum amphibolum Greene (*Thalictrum revolutum* DC.)	X	6
Thalictrum dasycarpum Fisch. & Avé-Lall.	X	5
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	X	6
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	X	2
SF***Toxicodendron vernix*** (L.) Kuntze (*Rhus vernix* L.)	X	10
Tradescantia ohiensis Raf.	X	2
Tragopogon dubius Scop.	X	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald)	X	8
Trifolium hybridum L.	3	*
Typha angustifolia L.	X	1
Typha latifolia L.	X	1
Typha × *glauca* Godr.	X	1
Ulmus rubra Muhl.	3	4
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	X	2
Vaccinium angustifolium Aiton	X	5
Vaccinium pallidum Alton	X	5
Verbascum blattaria L.	X	*
Verbascum thapsus L.	X	*
Verbena hastata L.	X	4
Verbena stricta Vent.	X	4
Verbena urticifolia L.	X	5
Vernonia fasciculata Michx.	X	5
Veronicastrum virginicum (L.) Farw.	X	7

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Species	Species Status Code	CoC
Viburnum acerifolium L.	X	9
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* Fernald)	X	ad
Viburnum lentago L.	X	5
Viola lanceolata L.	X	7
Viola sagittata Aiton	X	7
Viola sororia Willd.	3	3
Vitis riparia Michx.	X	2
Zizia aurea (L.) W. D. J. Koch	X	7

Table 13. Sources of new species verified and reported from Calumet Prairie.

Note	Source	Date	Species
1	T. Bonace, M. Newgent, and S. O'Brien	20 May 2000	*Cardamine pensylvanica*
2	M. Newgent	No date	*Hibiscus moscheutos* L. ssp. *moscheutos*
3	G. Tonkovich for Northwest Indiana Restoration Monitoring Inventory (NIRMI)	2012	*Abutilon theophrasti*, *Agrimonia gryposepala*, *Ailanthus altissimus*, *Ambrosia trifida*, *Arctium minus*, *Atriplex prostrata*, *Bidens connata*, *Celastrus orbiculatus*, *Chenopodium album*, *Chenopodium simplex*, *Circaea canadensis* ssp. *canadensis*, *Conyza canadensis*, *Cyperus strigosus*, *Datura stramonium*, *Daucus carota*, *Galium tinctorium*, *Galium triflorum*, *Hackelia virginiana*, *Leonurus cardiaca*, *Ludwigia palustris*, *Ludwigia polycarpa*, *Myosoton aquaticum*, *Nepeta cataria*, *Oxalis stricta*, *Panicum capillare*, *Pastinaca sativa*, *Penthorum sedoides*, *Persicaria lapathifolia*, *Persicaria maculosa*, *Pilea fontana*, *Portulaca oleracea*, *Ranunculus sceleratus*, *Ribes americanum*, *Rorippa palustris*, *Rumex verticillatus*, *Sanicula canadensis*, *Scutellaria lateriflora*, *Secale cereale*, *Setaria pumila* ssp. *pumila*, *Sicyos angulatus*, *Silene latifolia*, *Solanum ptychanthum*, *Solidago riddellii*, *Sonchus asper*, *Stachys tenuifolia*, *Stellaria media*, *Trifolium hybridum*, *Ulmus rubra*, and *Viola sororia*
4	G. Wilhelm	6 Aug 1993, 3 June 1998	*Alnus glutinosa*, *Asclepias purpurascens*, *Frangula alnus*

Floristic summary

Calumet Prairie has a total of 383 taxa, with 331 native taxa, six adventive taxa, and 47 exotic taxa (Table 14). Calumet Prairie has 321 native species, five adventive, and 47 that are exotic. There are 14 state-listed plants recorded from Calumet Prairie: one endangered species, five threatened species, and eight watch list species. Mean CoC is 5.1 and declines to 4.48 if we include adventive and exotic species. The FQI is 94, ranking this unit 13th among the park units.

Conservation issues

The least disturbed portion of Calumet Prairie to the west of Old Hobart Road is dominated by a high-quality sedge meadow with typical sedge hummocks. Similar hummocks also exist to the east of the road, but that side includes large stands of the invasive hybrid cattail covering much of the area. In other areas, Canada thistle (*Cirsium*

Table 14. Summary of floristic statistics for Calumet Prairie. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Entire Unit
Area (ha/acres)	125/308
Special flora total	21
Confirmed	21
New	0
Reported	0
Extirpated	0
Total taxa, FNA/ITIS	383
Total native taxa, FNA/ITIS	331
Native species, FNA/ITIS	321
Native variety, FNA/ITIS	6
Native hybrid, FNA/ITIS	4
Total adventive taxa, FNA/ITIS	5
Total adventive species, FNA/ITIS	5
Total adventive variety, FNA/ITIS	0
Total adventive hybrid, FNA/ITIS	0
Total exotic taxa, FNA/ITIS	47
Total exotic species, FNA/ITIS	46
Total exotic variety, FNA/ITIS	0
Total exotic hybrid, FNA/ITIS	1
Total Indiana-listed	14
Endangered	1
Threatened	5
Rare	0
Watch List	8
Extirpated	0
Sum CC	1,714
Sum CC adventive & invasive	1,664
Mean CoC	5
Mean CoC with adventive and invasive	4
FQI	94
FQI with adventive and invasive	84

arvense (L.) Scop.) is beginning to dominate and woody encroachment is a problem as well. Restoration work in this unit was begun in 2011 by the Indiana Division of Nature Preserves (Tom Post, Indiana Division of Nature Preserves, pers. comm. with Pavlovic) and was ongoing into at least 2013. Additional floristic investigation could be conducted in Calumet Prairie and further management could help maintain the high-quality wet prairies and restore disturbed portions adjacent to the roads and along the power line right-of-way.

Unit 4: West Beach

The dry plant, or Xerophyte, regions are found chiefly in the northern parts of the State. The only continuous area is a relatively narrow fringe along the shores of Lake Michigan, where desert plants and those showing alpine or arctic characters, struggle as best they may for a precarious livelihood along the beaches, or gain a firmer footing upon some captured dune somewhat further back from the shores.

—Stanley Coulter (1899)

West Beach occupies about 576 hectares (1,423 acres) east of the neighborhood of the town of Miller and west, south, and east around the town of Ogden Dunes (Figure 14). It is divided into six subunits. West Beach extends northwards from the Tolleston foredunes at the south side of Long Lake to Lake Michigan on the north. It is bounded by Lake/Porter County Road on the west and the Burns Ditch on the east. The central portion of West Beach north of Long Lake was sand mined in the late 1800s (Schoon 2015). West Beach contains foredunes, secondary dunes, blowouts, pannes, dune complexes, savanna complexes, ponds, marshes, and sedge meadows. In the former editions of the "Special Flora," West Beach included the unit called Inland Marsh. We are treating Inland Marsh (now called Tolleston Dunes by the NPS) in the following section separate from West Beach. The Karner blue butterfly (KBB) tract located southeast of Ogden Dunes and north of the South Shore train line was added to Indiana Dunes in 1995 and was surveyed by Wilhelm on 3 June 1998. Pavlovic has visited West Beach at least once a year since 1993.

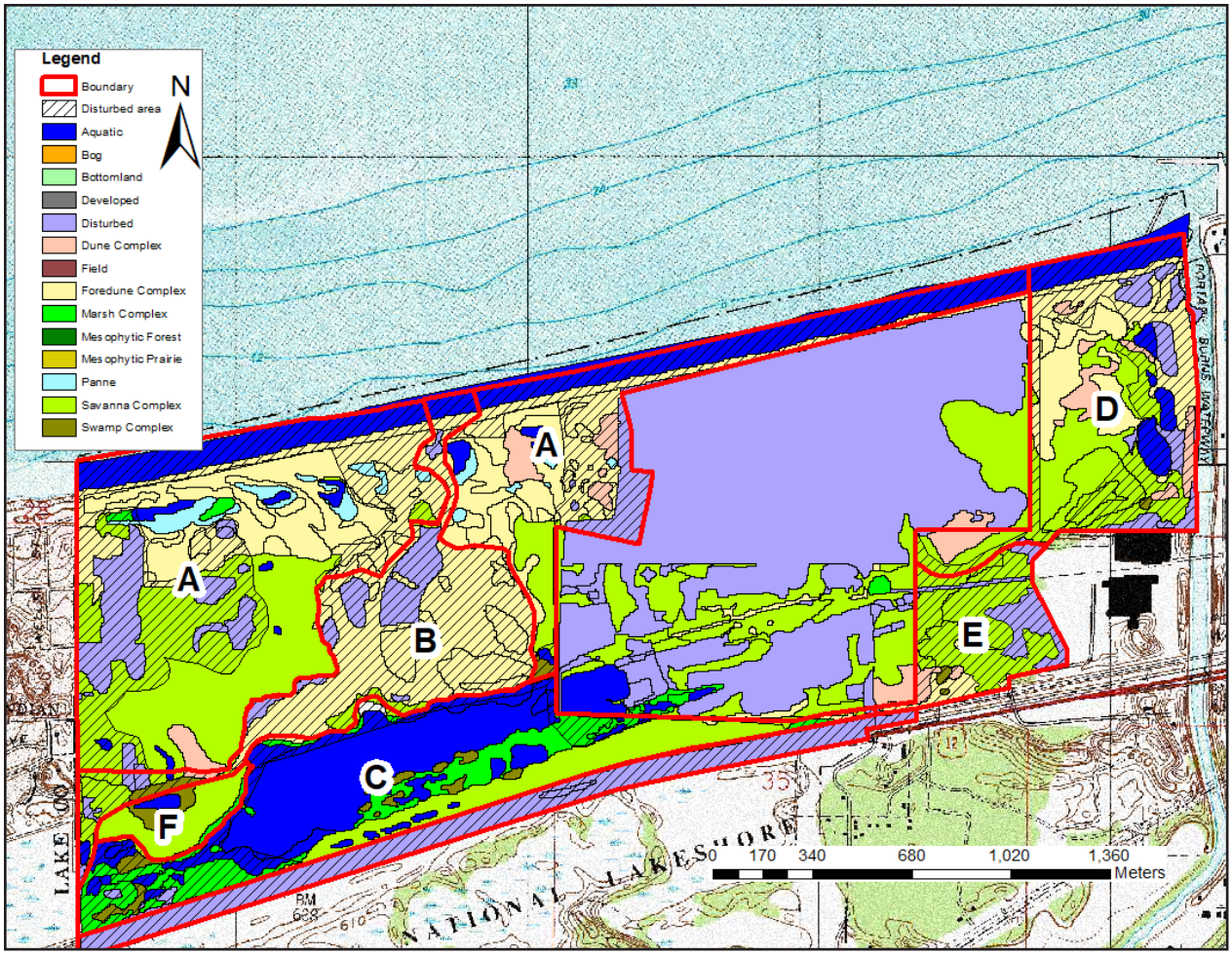


Figure 14. Vegetation of West Beach Unit. Subunits indicated by letters. Cross-hatching indicates disturbed areas.

Ron Hiebert and Doug Wilcox (Hiebert et al. 1986) took a close look at the pannes within this unit, those floristically fascinating dune slack ponds that are surrounded by groves of jack pine in the lee of the foredunes. In their study, they found 54 panne species, of which eight are listed as endangered or threatened in Indiana. Eight of the 54 species are restricted to the panne systems in the Chicago Region, nine have known affinities to Atlantic coastal plains, and five are considered boreal relicts. The latter are plants typical of the boreal or northern hardwood regions to the north that persisted in the dunes despite changing climate after the Wisonsinin glacier receded northward.

Clearly, the pannes are floristically unique and special areas, different from those in Miller Dunes and even more so from those around Clarke Junction (a railroad junction with a switching tower) and the Pine Nature Preserve. Of all the species Hiebert et al. (1986) encountered around the five pannes, only 17% were common to each panne. This statistic suggests that, even among the pannes at West Beach, no two are floristically identical. Presented below is the complete flora of West Beach (Table 15) and new plant citations (Table 16).

Special flora summary

West Beach provides habitat for 97 special flora in INDU (see Table 15), representing a 50% increase (65 species) since 1990. Of these, 67 (70%) were seen in the last twenty-five years. Fourteen special flora (16%) have likely been locally extirpated whether or not they are listed as state extirpated: *Chimaphila maculata*, *C. umbellata* ssp. *umbellata*, *Cornus canadensis*, *Drosera intermedia*, *Hydrocotyle umbellata*, *Linnaea borealis* var. *longiflora*, *Maianthemum canadense*, *Menyanthes trifoliata*, *Minuartia michauxii*, *Orthilia secunda*, *Sagittaria rigida*, *Vaccinium macrocarpon*, *Zizania aquatica*,

Table 15. Summary of species verified and reported at West Beach Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 16. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Abutilon theophrasti Medik.	–	–	–	–	–	–	X	*
Acer rubrum L.	x	–	x	–	–	–	X	7
Acer saccharinum L.	–	–	x	–	–	–	X	0
Acer saccharum Marshall	x	–	–	x	–	–	X	3
Achillea millefolium L.	x	x	x	x	x	x	X	*
SF***Adiantum pedatum*** L.	x	–	–	–	–	–	X	10
Agalinis purpurea (L.) Pennell	x	–	–	–	–	–	X	6
Agalinis purpurea (L.) Pennell var. *parviflora* (Benth.) B. Boivin	x	–	–	–	–	–	X	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	–	–	–	x	x	–	X	4
Agropyron cristatum (L.) Gaertn.	–	x	R	–	–	–	X	*
Agropyron cristatum (L.) Gaertn. (*Agropyron desertorum* (Fisch.) Schult.)	–	x	–	–	–	–	X	*
Agrostis gigantea Roth (*Agrostis alba* L.)	–	x	–	–	–	–	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	–	–	–	x	–	X	1
Ailanthus altissimus (Mill.) Swingle	3	–	–	–	x	–	X	*
Alisma subcordatum Raf.	–	–	x	–	–	–	X	4
Alisma triviale Pursh	–	–	x	–	–	–	X	4
SF***Alnus incana*** (L.) Moench ssp. ***rugosa*** (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng.)	–	–	x	–	–	–	X	8
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	x	x	x	x	x	X	0
Amelanchier arborea (F. Michx.) Fernald	x	–	–	x	–	–	X	8
Amelanchier laevis Wiegand	–	–	x	–	–	–	X	8
SF***Ammophila breviligulata*** Fernald	x	–	–	x	–	–	X	7
Amphicarpaea bracteata (L.) Fernald	–	–	–	–	x	–	X	4
Andropogon gerardii Vitman	–	x	x	–	x	–	X	5
Anemone cylindrica A. Gray	x	x	x	x	x	–	X	6
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	–	x	–	x	x	X	3
Anthemis cotula L.	–	–	–	–	–	–	X	*
Apios americana Medik.	–	–	x	–	–	x	X	7
Apocynum androsaemifolium L.	x	–	–	–	x	x	X	5
Apocynum cannabinum L. (*Apocynum sibiricum* Jacq.)	–	–	x	–	–	x	X	2
Aquilegia canadensis L.	x	–	x	x	x	–	X	6
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	x	x	x	x	–	x	X	5
Aralia nudicaulis L.	x	–	x	x	–	x	X	8
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald. & J. F.)	x	x	–	x	–	–	X	10
SF***Aristida longespica*** Poir. var. ***geniculata*** (Raf.) Fernald (*Aristida intermedia* Scribn. & Ball)	x	–	–	–	–	–	X	5
Aristida purpurascens Poir.	3	–	–	–	–	–	N	5

Table 15 (continued). Summary of species verified and reported at West Beach Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 16. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
SF***Aristida tuberculosa*** Nutt.	3	11	–	–	–	–	X	9
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	–	–	x	–	x	x	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	x	x	x	x	x	x	X	5
Artemisia vulgaris L.	–	x	–	–	–	x	X	*
Asclepias amplexicaulis Sm.	x	–	–	–	x	x	X	7
Arnoglossum atriplicifolium (L.) H. Rob. (*Cacalia atriplicifolia* L.)	x	–	–	x	–	–	X	8
Asclepias incarnata L.	x	–	x	–	–	–	X	4
Asclepias syriaca L.	x	x	x	x	x	x	X	0
Asclepias tuberosa L.	x	–	x	x	x	x	X	7
Asclepias verticillata L.	x	x	–	–	–	–	X	1
SF***Asclepias viridiflora*** Raf.	x	–	–	–	–	–	X	10
Asparagus officinalis L.	–	–	x	x	–	–	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	x	–	–	x	–	–	X	4
Aureolaria flava (L.) Farw.	–	–	x	–	–	–	X	9
Barbarea vulgaris W.T. Aiton	–	–	–	–	–	–	X	*
Berberis repens Lindl. (*Mahonia repens* (Lindl.) G. Don)	2	–	–	–	–	–	N	*
Berberis thunbergii DC.	x	–	–	x	–	–	X	*
Bidens cernua L.	–	–	x	–	–	–	X	5
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	–	–	x	–	–	–	X	9
Bidens tripartita L. (*Bidens comosa* (A. Gray) Wiegand)	–	–	x	–	–	–	X	5
Boechera canadensis (L.) Al-Shehbaz (*Arabis canadensis* L.)	x	–	–	–	–	x	X	10
SF***Brasenia schreberi*** J. F. Gmel.	–	–	x	–	–	–	X	10
Brickellia eupatorioides (L.) Shinners var. *corymbulosa* (Torr. & A. Gray) Shinners (*Kuhnia eupatorioides* L. var. *corymbulosa* Torr. & A. Gray)	x	–	–	x	–	–	X	6
Bromus inermis Leyss.	–	x	–	–	–	x	X	*
Bromus japonicus Thunb.	–	–	–	–	x	–	X	*
Bromus pubescens Spreng.	–	–	–	x	–	–	X	5
Bromus squarrosus L.	30	–	–	–	–	–	N	*
Bromus tectorum L.	–	x	–	–	x	–	X	*
SF***Cakile edentula*** (Bigelow) Hook. ssp. ***edentula*** var. ***lacustris*** Fernald	x	–	–	x	–	–	X	9
Calamagrostis canadensis (Michx.) P. Beauv.	x	–	x	–	–	x	X	3
Calamagrostis stricta (Timm) Koeler ssp. *inexpansa* (A. Gray) C.W. Greene (*Calamagrostis inexpansa* A. Gray var. *brevior* (Vasey) Stebbins)	–	–	–	–	–	x	X	5
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. *magna* Scribn. & Merr.	x	x	–	x	x	–	X	5
Campanula aparinoides Pursh	–	–	–	x	–	–	X	8
SF***Campanula rotundifolia*** L.	R	–	10	–	–	–	X	10

Table 15 (continued). Summary of species verified and reported at West Beach Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 16. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Capsella bursa-pastoris (L.) Medik.	–	–	–	–	–	–	X	*
Cardamine impatiens L.	–	–	29	–	–	–	N	*
Carduus nutans L.	34	–	–	–	34	–	N	*
SF***Carex alata*** Torr.	x	–	–	–	–	–	X	10
Carex albicans Willd. ex Spreng. var. *albicans*	–	–	–	X 50	–	–	X	8
Carex albolutescens Schwein.	–	–	–	–	–	x	X	8
Carex aquatilis Wahlenb. var. *substricta* Kukenth. (*Carex aquatilis* Wahlenb. var. *altior* (Rydb.) Fernald)	–	–	–	x	–	x	X	5
SF***Carex aurea*** Nutt.	x	–	–	–	–	–	X	9
Carex brevior (Dewey) Mackenzie ex Lunell	–	–	–	–	x	–	X	4
Carex buxbaumii Wahlenb.	–	–	–	x	–	–	X	9
Carex comosa Boott	–	–	x	–	–	x	X	5
Carex cristatella Britton	–	–	x	–	–	x	X	4
SF***Carex eburnea*** Boott	x	–	–	x	–	–	X	10
SF***Carex garberi*** Fernald	x	–	–	39	–	–	X	10
Carex lacustris Willd.	–	–	x	–	–	x	X	6
Carex laxiflora Lam.	x	–	–	–	–	–	X	10
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.)	x	–	x	x	x	x	X	5
Carex pellita Willd.	–	–	–	–	x	–	X	4
Carex pensylvanica Lam.	x	–	x	x	x	x	X	5
Carex scoparia Schkuhr ex Willd. var. *scoparia*	–	–	–	–	–	x	X	7
SF***Carex siccata*** Dewey	–	–	–	–	x	–	X	10
Carex stricta Lam.	x	–	x	–	–	–	X	5
SF***Carex tonsa*** (Fernald) E.P. Bicknell	–	–	–	–	x	–	X	7
Carex tribuloides Wahlenb.	x	–	x	–	–	–	X	3
Carex viridula Michx. ssp. *viridula* (*Carex viridula* Michx.)	x	–	–	x	–	–	X	10
Ceanothus americanus L.	x	–	x	x	x	x	X	6
Celastrus orbiculatus Thunb.	3	–	–	17	–	–	N	*
SF***Celastrus scandens*** L.	x	–	x	x	x	x	X	4
Celtis occidentalis L.	–	–	–	x	–	–	X	3
SF***Celtis tenuifolia*** Nutt.	–	–	–	x	–	–	X	10
Cenchrus longispinus (Hack.) Fernald	x	x	–	–	x	–	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	3	14	14	–	–	–	N	*
Cephalanthus occidentalis L.	x	–	x	–	x	–	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L.)	–	–	x	–	–	–	X	*
Ceratophyllum demersum L.	–	–	x	–	–	–	X	5

Table 15 (continued). Summary of species verified and reported at West Beach Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 16. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Chaenorhinum minus (L.) Lange	–	–	–	–	–	–	X	*
Chenopodium album L.	–	x	–	–	x	–	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	–	–	18	–	–	x	X	5
SF***Chimaphila maculata*** (L.) Pursh	R	–	–	–	–	–	R	10
SF***Chimaphila umbellata*** (L.) W.P.C. Barton ssp. ***umbellata*** (*Chimaphila umbellata* (L.) Barton var. *cisatlantica* S.F. Blake)	R	–	–	–	–	–	R	10
Cirsium arvense (L.) Scop.	x	–	x	–	–	x	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	x	–	x	x	x	x	X	2
SF***Cirsium pitcheri*** (Torr. ex Eaton) Torr. & A. Gray	x	–	–	x	–	–	X	10
Cirsium vulgare (Savi) Ten.	3	x	–	–	–	–	X	*
SF***Cladium mariscoides*** (Muhl.) Torr.	x	–	–	17	–	–	X	10
Comandra umbellata (L.) Nutt. ssp. *umbellata*	–	–	x	x	x	–	X	7
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	–	–	x	–	–	–	X	10
Commelina erecta L. (*Commelina erecta* L. var. *deamiana* Fernald)	–	–	x	–	–	–	X	10
Convolvulus arvensis L.	–	–	–	–	–	–	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	x	x	x	x	x	–	X	0
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	–	–	–	19	–	–	N	9
Coreopsis lanceolata L.	–	–	–	–	x	–	X	5
Coreopsis palmata Nutt.	–	–	x	–	x	–	X	6
Coreopsis tripteris L.	x	–	x	x	–	x	X	5
Corispermum americanum (Nutt.) Nutt. (*Corispermum hyssopifolium* L.)	x	–	–	x	–	–	X	5
SF***Cornus canadensis*** L.	R	–	–	–	–	–	R	10
Cornus florida L.	x	–	–	–	–	–	X	8
Cornus obliqua Raf.	3	–	–	–	–	–	N	6
Cornus racemosa Lam.	x	–	x	–	–	x	X	1
SF***Cornus rugosa*** Lam.	x	–	–	x	–	–	X	10
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	x	–	x	x	–	–	X	6
Cotoneaster lucidus Schltdl.	35	–	–	–	–	–	N	*
Crocanthemum canadense (L.) Britton (*Helianthemum canadense* (L.) Michx.)	x	–	x	x	x	x	X	8
Croton glandulosus L. var. *septentrionalis* Müell. Arg.	–	–	10	–	–	–	N	ad
Cycloloma atriplicifolium (Spreng.) J. M. Coult.	x	x	–	x	–	x	X	7
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	x	–	x	17	–	–	X	4
SF***Cyperus diandrus*** Torr.	–	–	x	–	–	–	X	10
Cyperus erythrorhizos Muhl.	3	–	R	–	–	–	X	2
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus*. (*Cyperus filiculmis* Vahl)	x	x	–	–	–	–	X	5
SF***Cyperus odoratus*** L. (*Cyperus engelmanii* Steud.)	–	–	x	–	–	x	X	6
Cyperus odoratus L. (*Cyperus ferruginescens* Boeck.)	3	–	x	–	–	–	X	2
Cyperus schweinitzii Torr.	x	x	–	–	–	x	X	5
Dactylis glomerata L.	–	x	–	–	–	–	X	*

Table 15 (continued). Summary of species verified and reported at West Beach Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 16. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	–	–	–	x	–	–	X	3
Daucus carota L.	3	–	–	–	–	x	X	*
Desmodium sessilifolium (Torr.) Torr. & A. Gray	–	–	18	–	–	–	N	8
Dianthus armeria L.	–	–	–	–	x	–	X	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	–	x	x	–	–	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	x	–	–	–	–	–	X	9
SF***Dichanthelium boreale*** (Nash) Freckmann (*Panicum boreale* Nash)	–	–	x	–	–	–	X	10
Dichanthelium clandestinum (L.) Gould (*Panicum clandestinum* L.)	–	–	–	–	x	–	X	6
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	x	–	x	x	x	–	X	7
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	x	–	x	x	–	x	X	5
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	x	x	x	x	x	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	–	x	x	x	x	X	7
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	–	–	x	x	–	–	X	8
SF***Dichanthelium perlongum*** (Nash) Freckmann (*Panicum perlongum* Nash)	–	–	–	–	x	–	X	10
SF***Diervilla lonicera*** Mill.	x	–	x	x	x	x	X	9
Digitaria sanguinalis (L.) Scop.	–	x	–	–	–	–	X	*
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	–	–	x	–	–	–	X	9
Dulichium arundinaceum (L.) Britton	–	–	x	–	–	–	X	9
Echinochloa crusgalli (L.) P. Beauv.	3	–	–	–	–	–	N	0
Eleocharis acicularis (L.) Roem. & Schult.	–	–	x	–	–	–	X	2
Eleocharis compressa Sull.	x	–	–	–	–	–	X	8
Eleocharis elliptica Kunth	x	–	–	17	–	–	X	8
Eleocharis erythropoda Steud.	–	–	x	–	–	–	X	2
Eleocharis flavescens (Poir.) Urb. var. *olivacea* (Torr.) Gleason (*Eleocharis olivacea* Torr.)	–	–	X 37	–	–	–	X	9
SF***Eleocharis geniculata*** (L.) Roem. & Schult.	x	–	–	x	–	–	X	10
Eleocharis intermedia Schult.	–	–	x	–	–	x	X	8
SF***Eleocharis quinqueflora*** (Hartmann) O. Schwarz (*Eleocharis pauciflora* (Lightf.) Link var. *fernaldii* Svenson)	x	–	–	–	–	–	X	9
Ellisia nyctelea (L.) L.	48	–	–	–	48	–	N	ad
Elodea nuttallii (Planch.) St. John	–	–	44	–	–	–	N	3
Elymus canadensis L.	x	x	–	x	–	x	X	4
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	x	–	–	x	–	X	*

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Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Elymus trachycaulus (Link) Gould ex Shinners ssp. *subsecundus* (Link) A. Löve & D. Löve (*Agropyron trachycaulum* (Link) Malte var. *unilaterale* (Cassidy) Malte)	–	–	–	x	–	–	X	8
Epilobium coloratum Biehler	3	–	x	–	–	–	X	3
Epilobium hirsutum L.	x	–	–	–	–	–	X	*
Equisetum arvense L.	x	–	–	–	–	–	X	0
Equisetum fluviatile L.	x	–	–	–	–	–	X	7
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	x	–	–	x	–	–	X	3
Equisetum laevigatum A. Braun	–	–	–	–	x	x	X	2
SF***Equisetum variegatum*** Schleich. ex F. Weber & D. Mohr	3	–	–	17	–	–	N	9
Equisetum × *ferrissii* Clute *[E. hyem*ale × *E. la*evigatum]	3	–	–	17	–	–	N	2
SF***Equisetum* × *nelsonii*** (A.A. Eaton) J.H. Schaffner [*E. laevigatum* × *E. variegatum*]	16	–	–	–	–	–	N	10
Eragrostis minor Host (*Eragrostis poaeoide*s Roem. & Schult.)	–	–	–	–	–	–	X	*
Eragrostis pectinacea (Michx.) Nees	–	–	x	–	–	–	X	0
Eragrostis spectabilis (Pursh) Steud.	x	x	x	x	–	x	X	3
Eragrostis trichodes (Nutt.) Alph. Wood	–	–	–	–	–	–	X	*
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	3	–	x	–	–	–	X	2
Erigeron annuus (L.) Pers.	–	–	x	–	x	–	X	0
Erigeron philadelphicus L.	x	–	–	–	–	–	X	4
SF***Erigeron pulchellus*** Michx.	–	–	42	–	x	–	X	10
Erigeron strigosus Muhl. ex Willd.	x	x	x	x	x	–	X	5
Eryngium yuccifolium Michx.	–	–	x	–	–	–	X	9
Erysimum repandum L.	–	–	–	–	–	–	X	*
Euonymus atropurpureus Jacq.	–	6	–	x	–	–	X	8
Euonymus europeaus L.	–	–	–	26	–	–	N	*
Euonymus fortunei (Turcz.) Hand.-Mazz.	x	–	–	20	–	–	X	*
Euonymus hamiltonianus Wall.	–	–	x	–	–	–	X	*
Eupatorium altissimum L.	x	–	–	–	x	–	X	0
Eupatorium perfoliatum L.	x	–	x	x	–	x	X	4
Eupatorium serotinum Michx.	3	–	–	x	x	–	X	0
Euphorbia corollata L.	x	x	x	x	x	x	X	2
Euphorbia dentata Michx.	–	–	10	–	–	–	N	*
Euphorbia maculata L. (*Euphorbia supina* Raf.)	–	x	–	–	–	–	X	0
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	–	x	–	–	–	–	X	0
SF***Euphorbia polygonifolia*** L.	x	–	–	x	–	–	X	10
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	x	x	x	–	x	X	3

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Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	–	–	x	x	–	x	X	5
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	3	–	x	–	–	–	X	4
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	–	–	–	–	x	–	X	1
Festuca ovina L.	–	x	–	–	–	–	X	*
Fimbristylis autumnalis (L.) Roem. & Schult.	–	–	x	17	–	–	X	5
Fragaria virginiana Miller	x	x	x	x	x	–	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	3	–	–	–	–	–	N	*
SF***Fraxinus americana*** L.	x	–	–	x	–	–	X	5
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	–	–	x	–	–	–	X	1
Galium aparine L.	–	x	x	–	x	–	X	1
Galium circaezans Michx. var. *hypomalacum* Fernald	x	–	–	x	x	–	X	7
Galium concinnum Torr. & A. Gray	x	–	–	–	–	–	X	5
Galium obtusum Bigelow	–	–	x	x	–	–	X	5
Galium pilosum Aiton	3	–	–	x	x	–	X	10
Gaylussacia baccata (Wangenh.) K. Koch	x	–	x	x	x	–	X	9
SF***Gentiana puberulenta*** J.S. Pringle	–	–	–	x	–	–	X	10
Gentianopsis crinita (Froel.) Ma (*Gentiana crinita* Froel.)	x	–	–	–	–	–	X	10
Glechoma hederacea L.	15	–	–	–	–	–	N	*
Gleditsia triacanthos L.	5	–	–	–	–	–	N	2
Glyceria septentrionalis Hitchc.	–	–	x	–	–	–	X	8
Hamamelis virginiana L.	x	–	–	x	–	–	X	8
Helianthus divaricatus L.	x	–	x	x	x	x	X	5
Helianthus grosseserratus M. Martens	–	–	x	–	–	–	X	2
Helianthus occidentalis Riddell	–	–	–	–	x	x	X	10
Helianthus petiolaris Nutt. ssp. *petiolaris*	x	x	–	17	x	x	X	ad
Helianthus strumosus L.	–	–	–	–	x	–	X	5
Hemerocallis fulva (L.) L.	–	–	–	–	x	–	X	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	x	–	x	–	x	x	X	7
Heterotheca subaxillaris (Lam.) Britton & Rusby ssp. *latifolia* (Buckley) Semple	–	21	–	–	–	–	N	ad
Heuchera richardsonii R. Br.	x	–	x	–	x	–	X	8
Hieracium gronovii L.	–	–	x	–	x	–	X	6
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	–	–	–	–	–	x	X	6
SF***Hudsonia tomentosa*** Nutt.	–	–	–	x	–	–	X	10
SF***Huperzia lucidula*** (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	x	–	–	–	–	–	X	10
SF***Hydrocotyle umbellata*** L.	–	–	R	–	–	–	R	10
Hylotelephium telephium (L.) H. Ohba (*Sedum purpureum* (L.) Schult.)	–	–	–	–	x	–	X	*

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	A	*B*	*C*	*D*	*E*	*F*		
SF***Hypericum canadense*** L.	–	–	x	x	–	–	X	10
SF***Hypericum kalmianum*** L.	x	–	x	x	–	–	X	10
Impatiens capensis Meerb.	–	–	x	–	–	–	X	3
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	–	x	x	x	x	X	10
Iris germanica L.	–	–	–	–	–	–	X	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	–	x	–	–	x	X	5
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	3	–	–	17	–	–	N	7
SF***Juncus arcticus*** Willd. var. ***balticus*** (Willd.) Trautvetter (*Juncus balticus* Willd. var. *littoralis* Engelm.)	x	12	–	x	–	–	X	6
Juncus brachycarpus Engelm.	R	–	x	–	–	–	X	9
Juncus brachycephalus (Engelm.) Buchenau	x	–	–	–	–	–	X	9
Juncus canadensis J. Gay ex Laharpe	3	–	x	–	–	–	X	7
Juncus effusus L.	–	–	x	–	–	–	X	7
Juncus greenei Oakes & Tuck.	–	–	x	–	–	–	X	8
Juncus nodosus L.	x	–	x	17	–	–	X	6
SF***Juncus pelocarpus*** E. Mey.	–	–	x	–	–	–	X	10
SF***Juncus scirpoides*** Lam.	–	–	–	23	–	–	N	9
Juncus tenuis Willd.	–	–	x	–	–	–	X	0
Juncus torreyi Coville	x	–	–	x	–	–	X	4
SF***Juniperus communis*** L.	x	–	–	x	–	–	X	10
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	3	–	–	x	–	–	X	2
Kochia scoparia (L.) Schrad.	–	–	–	–	–	–	X	*
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	x	x	x	x	x	x	X	7
Krigia biflora (Walter) S.F. Blake	x	–	x	x	x	–	X	7
Krigia virginica (L.) Willd.	–	–	–	–	x	–	X	6
Lactuca biennis (Moench) Fernald	–	–	x	x	–	–	X	4
SF***Lactuca floridana*** (L.) Gaertn.	–	–	–	–	x	–	X	5
Lactuca serriola L.	–	–	x	–	–	–	X	*
Lathyrus palustris L. (*Lathyrus palustris* L. var. *myrtifolius* (Willd.) A. Gray)	–	–	x	–	–	–	X	6
Lechea minor L.	–	–	x	–	–	–	X	7
Lechea mucronata Raf. (*Lechea villosa* Elliott)	–	–	–	–	X	–	X	6
Leersia oryzoides (L.) Sw.	3	–	x	–	–	–	X	4
Lemna minor L.	x	–	x	17	–	–	X	5
Leonurus cardiaca L.	–	–	–	–	–	–	X	*
Lepidium campestre (L.) W.T. Aiton	–	–	x	–	–	–	X	*
Lepidium densiflorum Schrad.	–	–	–	–	X	–	X	*
Lepidium virginicum L.	x	x	x	–	X	x	X	0
Lespedeza capitata Michx.	x	x	x	x	X	x	X	4

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Lespedeza hirta (L.) Hornem.	–	–	18	–	–	x	X	6
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte)	–	x	–	–	–	x	X	*
Leymus arenarius (L.) Hochst. (*Elymus arenarius* L.)	8	–	–	–	–	–	N	*
Liatris aspera Michx.	x	x	x	x	x	x	X	6
Liatris cylindracea Michx.	x	–	–	x	–	x	X	8
Liatris spicata (L.) Willd.	–	–	18	–	–	–	N	6
Linaria vulgaris Mill.	x	x	x	–	x	–	X	*
SF***Linnaea borealis*** L. var. ***longiflora*** Torr. (*Linnaea borealis* L. var. *americana* (Forbes) Rehder)	R	–	–	–	–	–	R	10
Linum medium (Planch.) Britton var. *texanum* (Planch.) Fernald	3	–	–	–	–	–	N	7
SF***Linum striatum*** Walter	x	–	–	–	–	–	X	10
SF***Liparis loeselii*** (L.) Rich.	x	12	–	–	–	–	X	7
Lipocarpha micrantha (Vahl) G.C. Tucker (*Hemicarpha micrantha* (Vahl) Pax)	–	–	37	17	–	–	X	6
Lithospermum canescens (Michx.) Lehm.	–	–	–	–	x	–	X	8
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	x	x	x	x	x	X	8
Lobelia kalmii L.	x	–	–	x	–	–	X	10
SF***Lonicera dioica*** L.	x	–	x	x	–	–	X	10
Lonicera reticulata Raf. (*Lonicera prolifera* (Kirchn.) Rehder)	R	–	–	–	–	–	R	7
Lonicera × *bella* Zabel [*L. tartari*ca × *L. m*orrowii]	–	–	–	–	x	–	X	*
Lupinus perennis L. var. *occidentalis* S. Watson	x	–	x	x	x	x	X	7
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	–	–	x	–	–	–	X	7
Lycopus americanus Muhl. ex W.P.C. Barton	x	–	x	–	–	–	X	5
Lycopus uniflorus Michx.	x	–	x	–	–	–	X	7
Lysimachia lanceolata Walter	–	–	–	–	x	–	X	7
Lythrum salicaria L.	x	–	x	–	–	x	X	*
SF***Maianthemum canadense*** Desf.	R	–	–	–	–	–	R	10
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	–	x	x	x	–	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	–	x	x	x	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	x	x	x	x	x	X	5
Malus ioensis (Alph. Wood) Britton	–	–	x	–	–	–	X	3
Medicago sativa L.	–	–	x	–	–	x	X	*
Melilotus alba Medik.	x	x	x	–	–	x	X	*
Melilotus officinalis (L.) Lam.	x	x	–	–	–	x	X	*
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	–	–	x	–	–	x	X	5
SF***Menyanthes trifoliata*** L. (*Menyanthes trifoliata* L. var. *minor* Fernald)	–	–	R	–	–	–	R	10
SF***Minuartia michauxii*** (Fenzl) Farw. (*Arenaria stricta* Michx.)	R	–	–	–	–	–	R	10

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	A	*B*	*C*	*D*	*E*	*F*		
Mirabilis nyctaginea (Michx.) MacMill.	–	–	x	–	x	–	X	ad
Monarda fistulosa L.	–	–	x	x	x	x	X	4
Monarda punctata L.	x	x	x	x	x	x	X	5
SF***Monotropa uniflora*** L.	–	–	–	51	–	–	N	10
Morus alba L.	3	–	–	17	x	–	X	*
Muhlenbergia mexicana (L.) Trin.	3	–	–	–	–	–	N	5
Myriophyllum sibiricum Kom. (*Myriophyllum exalbescens* Fernald)	–	–	x	–	–	–	X	7
Myriophyllum spicatum L.	–	–	47	–	–	–	N	*
Najas flexilis (Willd.) Rostk. & W.L.E. Schmidt	3	–	x	–	–	–	X	6
SF***Najas guadalupensis*** (Spreng.) Magnus	–	–	36	–	–	–	N	8
Nepeta cataria L.	3	–	–	–	–	–	X	*
Nuphar advena (Aiton) W. T. Aiton	–	–	x	–	–	–	X	7
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	–	–	x	–	–	–	X	6
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist (*Nymphaea tuberosa* Paine)	–	–	x	–	–	–	X	7
Nyssa sylvatica Marshall	x	–	x	–	–	–	X	8
Oenothera biennis L.	x	x	x	x	–	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	–	–	x	–	x	X	7
Onoclea sensibilis L.	–	–	x	–	–	–	X	8
Opuntia cespitosa Raf. (*O. humifusa* (Raf.) Raf.)	x	x	x	x	x	–	X	5
SF***Orthilia secunda*** (L.) House (*Pyrola secunda* L.)	R	–	–	–	–	–	R	10
Osmorhiza claytonii (Michx.) C.B. Clarke	–	–	–	x	–	–	X	3
Osmunda claytoniana L.	x	–	–	–	x	–	X	9
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	x	–	x	–	–	–	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	x	–	x	–	–	–	X	7
Ostrya virginiana (Mill.) K. Koch	x	–	–	x	–	–	X	5
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	–	x	–	–	x	–	X	0
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	x	–	–	–	–	–	X	7
Packera glabella (Poir.) C. Jeffrey (*Senecio glabellus* Poir.)	–	–	31	–	–	–	N	ad
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	x	–	–	17	–	–	X	6
Packera plattensis (Nutt.) W.A. Weber & A. Löve (*Senecio plattensis* Nutt.)	–	–	–	–	x	–	X	6
SF***Panax quinquefolius*** L.	–	–	–	x	–	–	X	9
Panicum capillare L.	3	x	–	–	–	–	X	1
Panicum virgatum L.	x	x	x	x	x	x	X	5
Parietaria pensylvanica Muhl. ex Willd.	–	–	–	–	x	–	X	3
Parthenocissus quinquefolia (L.) Planch.	x	–	–	x	–	–	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	–	x	–	–	x	x	X	1

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Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Paspalum setaceum Michx. var. *muhlenbergii* (Nash) D.J. Banks (*Paspalum ciliatifolium* Michx. var. *muhlenbergii* (Nash) Fernald)	R	–	–	–	–	–	R	6
Pastinaca sativa L.	–	–	x	–	–	–	X	*
SF***Patis racemosa*** (Sm.) Romasch., P.M. Peterson & Soreng (*Piptatherum racemosum* (Sm.) Eaton (*Oryzopsis racemosa* (Sm.) Ricker))	20	–	–	x	–	–	X	10
Pedicularis canadensis L.	x	–	x	x	x	–	X	9
Persicaria amphibia (L.) Delarbre (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman; *P. coccineum* Muhl. ex Willd.)	3	–	x	–	–	x	X	4
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	3	–	–	–	–	–	N	7
Persicaria lapathifolia (L.) Delarbre (*Polygonum lapathifolium* L.)	3	–	–	–	–	–	N	0
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	3	–	–	–	–	–	N	*
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	3	–	x	–	–	–	X	6
Phalaris arundinacea L.	3	–	–	–	–	x	X	*
Phleum pratense L. ssp. *pratense*	–	x	–	–	–	x	X	*
Phlox glaberrima L. ssp. *interior* (Wherry) Wherry (*Phlox glaberrima* L. var. *interior* Wherry)	–	–	x	–	x	–	X	8
Phlox paniculata L.	–	–	–	–	–	–	X	ad
Phlox pilosa L.	x	–	x	x	x	x	X	7
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	x	–	x	–	–	–	X	1
Physalis virginiana Mill.	–	–	x	–	–	x	X	4
Physocarpus opulifolius (L.) Maxim.	–	–	x	–	–	–	X	8
Phytolacca americana L.	–	–	–	–	x	x	X	1
SF***Pinus banksiana*** Lamb.	x	12	–	x	–	–	X	9
SF***Pinus strobus*** L.	x	–	–	x	–	–	X	9
Pinus sylvestris L.	–	–	–	–	–	–	X	*
Plantago lanceolata L.	–	x	–	–	–	–	X	*
Plantago major L.	–	–	–	–	–	–	X	*
Plantago rugelii Decne.	3	x	–	–	x	–	X	0
SF***Platanthera aquilonis*** Sheviak (*Habenaria hyperborea* (L.) R. Br. var. *huronensis* (Nutt.) Farw.)	3	–	–	–	–	–	N	10
SF***Platanthera psycodes*** (L.) Lindl. (*Habenaria psycodes* (L.) Spreng.)	–	–	43	–	–	–	N	10
Poa compressa L.	x	x	x	x	x	x	X	*
Poa pratensis L.	x	x	x	x	x	x	X	*
Podophyllum peltatum L.	x	–	x	–	–	–	X	4
SF***Pogonia ophioglossoides*** (L.) Ker Gawl.	3	12	–	–	–	–	N	10
Polanisia dodecandra (L.) DC. ssp. *dodecandra* (*Polanisia graveolens* Raf.)	–	–	–	–	–	–	X	0
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	–	–	x	–	–	–	X	9
Polygala sanguinea L.	45	–	–	–	–	–	N	4
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	–	x	x	x	x	X	3

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Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Polygonatum pubescens (Willd.) Pursh	–	–	–	x	–	–	X	7
SF***Polygonum articulatum*** L. (*Polygonella articulata* (L.) Meisn.)	–	x	–	–	–	–	X	10
Polygonum tenue Michx.	–	1	–	13	–	–	N	7
Pontederia cordata L.	–	–	x	–	–	–	X	10
Populus deltoides W. Bartram ex Marshall	x	x	x	x	–	x	X	2
Populus tremuloides Michx.	x	–	x	x	x	x	X	4
Potamogeton amplifolius Tuck.	–	–	x	–	–	–	X	10
Potamogeton crispus L.	–	–	1	–	–	–	N	*
SF***Potamogeton diversifolius*** Raf.	x	–	–	–	–	–	X	9
Potamogeton gramineus L.	x	–	x	–	–	–	X	8
Potamogeton illinoensis Morong	–	–	x	–	–	–	X	7
Potamogeton natans L.	x	–	x	–	–	–	X	7
SF***Potamogeton pusillus*** L.	–	–	x	–	–	–	X	7
SF***Potamogeton strictifolius*** A. Benn.	–	–	33	–	–	–	N	10
SF***Potamogeton zosteriformis*** Fernald	–	–	x	–	–	–	X	8
SF***Potentilla anserina*** L.	x	–	–	–	–	–	X	6
Potentilla norvegica L.	–	x	–	–	–	–	X	0
Potentilla recta L.	x	x	–	–	–	x	X	*
Potentilla simplex Michx.	x	–	x	x	x	–	X	4
Prenanthes alba L.	x	–	x	x	x	–	X	5
Prenanthes altissima L.	46	–	–	–	–	–	N	7
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	3	–	–	–	–	–	N	6
SF***Prunus pensylvanica*** L. f.	–	–	x	–	x	–	X	5
Prunus pumila L.	x	x	–	x	–	–	X	8
Prunus serotina Ehrh.	x	x	x	x	x	x	X	1
Prunus virginiana L.	x	x	x	x	x	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	–	–	x	x	–	–	X	2
Ptelea trifoliata L. ssp. *trifoliata* var. *mollis* Torr. & A. Gray.	x	–	R	x	–	–	X	8
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	x	–	–	–	–	–	X	7
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	x	x	x	x	x	X	5
Pycnanthemum tenuifolium Schrad.	–	–	–	–	–	x	X	7
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	–	–	x	x	–	–	X	5
SF***Pyrola americana*** Sweet (*Pyrola rotundifolia* L. *americana* (Sweet) Fernald)	x	–	–	–	–	–	X	10
Quercus alba L.	x	–	x	x	x	–	X	5
Quercus rubra L.	x	–	–	x	–	–	X	7
Quercus velutina Lam.	x	x	x	x	x	x	X	6
Rhodotypos scandens (Thunb.) Makino	22	–	–	–	–	–	N	*

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	A	*B*	*C*	*D*	*E*	*F*		
Rhus aromatica Aiton	x	x	–	–	–	–	X	10
SF***Rhus aromatica*** Aiton var. ***arenaria*** (Greene) Fernald	x	11	–	x	x	–	X	9
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	x	–	x	–	x	x	X	6
Rhus typhina L.	x	x	x	x	–	x	X	1
Rhynchospora capillacea Torr.	x	12	–	x	–	–	X	10
Rhynchospora capitellata (Michx.) Vahl	x	–	–	–	–	–	X	8
Ribes cynosbati L.	x	–	–	x	–	–	X	5
Robinia pseudoacacia L.	x	–	–	–	x	x	X	ad
Rosa blanda Aiton	–	–	–	x	–	–	X	5
Rosa carolina L.	x	x	x	x	x	x	X	5
Rosa multiflora Thunb.	x	x	–	–	–	–	X	*
Rosa palustris Marshall	x	–	x	–	–	–	X	7
Rubus flagellaris Willd.	x	–	x	x	x	–	X	3
Rubus hispidus L.	–	–	x	–	–	–	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	–	–	x	–	–	–	X	3
Rubus occidentalis L.	–	–	–	–	x	–	X	2
Rubus pensilvanicus Poir.	x	–	x	–	x	x	X	3
Rudbeckia hirta L.	x	–	x	–	x	x	X	1
Rumex acetosella L.	–	x	x	–	x	–	X	*
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	–	–	x	–	–	–	X	8
Rumex crispus L.	–	–	–	–	–	x	X	*
SF***Sabatia angularis*** (L.) Pursh	x	–	–	–	–	–	X	10
Sagittaria graminea Michx.	–	–	x	–	–	–	X	9
Sagittaria latifolia Willd.	x	–	x	–	–	–	X	4
SF***Sagittaria rigida*** Pursh	–	–	R	–	–	–	R	10
SF***Salix cordata*** Michx. (*Salix syrticola* Fernald)	x	–	–	x	–	–	X	10
Salix discolor Muhl.	3	–	x	–	–	–	X	2
Salix eriocephala Michx.	x	–	x	–	–	–	X	5
Salix euxina J. Belyaeva (*Salix fragilis* L.)	3	–	–	–	–	–	N	*
Salix humilis Marshall	–	–	x	–	x	–	X	6
Salix interior Rowlee	x	x	x	–	–	x	X	1
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	x	–	x	x	–	x	X	7
Salix nigra Marshall	–	–	x	–	–	–	X	4
Salix petiolaris Sm.	x	–	x	–	–	x	X	7
Salsola tragus L. (*Salsola kali* L. var. *tenuifolia* Tausch)	x	x	–	17	–	–	X	*
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	–	x	–	–	–	X	1
Sanicula marilandica L.	x	–	–	–	–	–	X	6

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	A	*B*	*C*	*D*	*E*	*F*		
Saponaria officinalis L.	x	x	x	x	x	x	X	*
Sassafras albidum (Nutt.) Nees	x	x	x	x	x	x	X	3
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	–	–	–	–	x	x	X	*
SF***Schizachyrium littorale*** (Nash) E.P. Bicknell	x	x	–	x	–	–	N	10
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	x	x	x	x	x	X	5
SF***Schoenoplectiella purshianus*** (Fernald) Lye (*Schoenoplectus purshianus* (Fernald) M.T. Strong; *Scirpus purshianus* Fernald	–	–	x	–	–	–	X	9
SF***Schoenoplectiella smithii*** (A. Gray) Hayasaka (*Schoenoplectus smithii* (A. Gray) Sojak; *Scirpus smithii* A. Gray)	–	–	37	–	–	–	N	10
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	x	–	x	–	–	–	X	6
Schoenoplectus pungens (Vahl) Palla (*Scirpus pungens* Vahl)	x	–	x	–	–	–	X	5
SF***Schoenoplectus subterminalis*** (Torr.) SojA.k	–	–	49	–	–	–	N	10
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl var. *creber* Fernald)	x	–	x	–	–	–	X	5
Scirpus atrovirens Willd.	–	–	–	–	–	x	X	4
Scirpus cyperinus (L.) Kunth	–	–	x	–	–	–	X	6
SF***Scleria verticillata*** Muhl. ex Willd.	x	–	–	x	–	–	X	10
Scrophularia marilandica L.	–	–	x	–	–	–	X	4
Scutellaria lateriflora L.	3	–	–	–	–	–	N	5
Sedum rupestre L. (*Sedum reflexum* L.)	–	–	–	9	–	–	N	*
Setaria faberi R.A.W. Herrm.	–	–	–	–	–	–	X	*
Setaria italica (L.) P. Beauv.	–	–	–	–	–	–	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	–	–	–	–	–	–	X	*
Setaria viridis (L.) P. Beauv.	–	x	–	–	–	–	X	*
Silene antirrhina L.	–	–	x	–	–	–	X	1
Silene csereii Baumg.	x	–	x	–	–	–	X	*
Silene latifolia Poir. (*Lychnis alba* Mill.)	–	x	–	–	–	–	X	*
Silene stellata (L.) W. T. Aiton	–	–	–	–	–	x	X	6
Sisymbrium altissimum L.	–	–	x	–	–	–	X	*
Sium suave Walter	–	–	x	–	–	–	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	x	–	x	x	x	–	X	5
Smilax lasioneura Hook.	x	–	x	–	x	x	X	5
Smilax rotundifolia L.	–	–	x	x	x	x	X	7
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	x	–	–	x	x	–	X	5
Solanum carolinense L.	–	–	–	–	x	–	X	ad
Solanum dulcamara L.	3	–	x	17	–	x	X	*
Solanum ptychanthum Dunal	–	–	–	–	x	x	X	0
Solidago altissima L.	x	x	x	x	x	x	X	1

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	A	*B*	*C*	*D*	*E*	*F*		
Solidago caesia L.	x	x	x	x	x	x	X	7
Solidago gigantea Aiton	3	–	x	17	x	x	X	4
Solidago juncea Aiton	–	–	x	–	–	–	X	5
Solidago missouriensis Nutt. (*Solidago missouriensis* Nutt. var. *fasciculata* Holz.)	x	x	–	x	–	–	X	7
Solidago nemoralis Aiton	x	x	x	x	x	x	X	4
Solidago nemoralis ssp. *decemflora* (DC.) Brammall ex Semple	–	38	–	–	–	–	N	4
SF***Solidago ptarmicoides*** (Torrey & A. Gray) B. Boivin (*Aster ptarmicoides* (Nees) Torr. & A. Gray)	x	12	R	17	–	–	X	10
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	3	–	x	–	–	x	X	6
SF***Solidago simplex*** Kunth var. ***gillmanii*** (A. Gray) G.S. Ringius (*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald)	x	–	–	x	–	–	X	10
SF***Solidago speciosa*** Nutt.	x	x	x	x	x	x	X	7
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	3	–	–	–	–	–	N	*
Sonchus oleraceus L.	–	–	–	–	–	–	X	*
Sorghastrum nutans (L.) Nash	–	–	x	x	–	x	X	5
Spartina pectinata Link	–	–	–	–	–	x	X	4
Spiraea alba Du Roi	–	–	x	x	x	x	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	–	–	x	–	–	–	X	9
Spiranthes cernua (L.) Rich.	x	12	–	x	–	–	X	7
Sporobolus cryptandrus (Torr.) A. Gray	–	x	–	–	–	–	X	7
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	x	–	x	–	–	x	X	5
Stuckenia pectinata (L.) Boerner (*Potamogeton pectinatus* L.)	–	–	x	–	–	–	X	5
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve (*Aster borealis* Prov.)	x	–	–	x	–	–	X	10
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	x	–	–	–	–	–	X	7
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	x	–	x	–	–	–	X	2
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	x	–	–	x	–	–	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	–	x	–	–	–	–	X	5
SF***Symphyotrichum lanceolatum*** (Willd.) G.L. Nesom var. ***interior*** (Wiegand) G.L. Nesom (*Aster simplex* Willd. var. *interior* (Weigand) Cronquist)	40	–	–	–	–	–	N	3
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	3	–	–	–	–	–	N	3
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	3	–	x	x	–	–	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	–	x	x	x	x	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	x	x	–	–	–	–	X	0
SF***Symphyotrichum sericeum*** (Vent.) G.L. Nesom (*Aster sericeus* Vent.)	–	–	x	x	x	–	X	10
Syringa vulgaris L.	–	–	–	–	–	–	X	*
Taraxacum officinale F. H. Wiggers	x	x	x	–	x	x	X	*

Table 15 (continued). Summary of species verified and reported at West Beach Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 16. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Taxus cuspidata Siebold & Zucc.	4	–	–	–	–	–	N	*
Tephrosia virginiana (L.) Pers.	x	–	x	x	x	x	X	8
Thalictrum dioicum L.	–	–	–	24	–	–	N	7
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	41	–	42	–	–	–	N	7
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	x	–	x	–	–	x	X	6
Thymus pulegioides L. Gayle	51	–	–	–	–	–	N	*
Tilia americana L.	x	–	–	x	x	–	X	5
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	x	x	x	x	X	2
Tradescantia ohiensis Raf.	x	x	x	x	x	x	X	2
Tragopogon dubius Scop.	–	x	–	–	x	x	X	*
Tragopogon pratensis L.	–	–	–	–	–	–	X	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald)	x	–	x	–	–	–	X	8
Trifolium pratense L.	–	–	–	–	–	–	X	*
Trifolium repens L.	–	–	–	–	–	x	X	*
Triglochin maritima L.	x	–	–	–	–	–	X	10
Triodanis perfoliata (L.) Nieuwl. (*Specularia perfoliata* (L.) DC.)	–	–	–	–	x	–	X	4
Triplasis purpurea (Walter) Chapm.	x	x	x	x	–	–	X	7
Typha angustifolia L.	x	–	x	x	–	–	X	1
Typha latifolia L.	x	–	x	–	–	x	X	1
Ulmus pumila L.	–	–	–	–	–	–	X	*
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	–	–	x	–	–	–	X	2
SF***Utricularia cornuta*** Michx.	x	12	–	–	–	–	X	10
SF***Utricularia gibba*** L.	–	–	x	–	–	–	X	10
SF***Utricularia purpurea*** Walter	–	–	R	–	–	–	R	10
SF***Utricularia subulata*** L.	x	7	25	–	–	–	X	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen (*Utricularia vulgaris* L.)	x	–	x	–	–	–	X	9
Vaccinium angustifolium Aiton	x	–	x	x	x	x	X	5
SF***Vaccinium macrocarpon*** Aiton	R	–	–	–	–	–	R	10
Vaccinium pallidum Alton	R	–	x	–	x	x	X	5
Vallisneria americana Michx.	–	–	x	–	–	–	X	7
Verbascum thapsus L. ssp. *thapsus*	3	x	x	–	–	–	X	*
Verbena hastata L.	3	–	–	–	–	x	X	4
Verbena stricta Vent.	–	–	–	–	x	–	X	4
Vernonia missurica Raf.	x	–	–	–	–	–	X	4
Veronica arvensis L.	–	–	–	–	x	–	X	*
Viburnum acerifolium L.	x	–	x	x	x	–	X	9

Table 15 (continued). Summary of species verified and reported at West Beach Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 16. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit						Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*		
Viburnum lentago L.	x	–	x	–	–	–	X	5
Viburnum opulus L. var. *opulus*	3	–	–	–	–	–	N	*
Viburnum rafinesqueanum Schult.	x	–	–	x	–	–	X	5
Vinca minor L.	–	–	4	–	–	–	N	*
Vincetoxicum nigrum (L.) Moench (=*Vincetoxicum rossicum* (Kleopow) Barbar.) (*Cynanchum louiseae* Kartesz & Gandhi)	–	–	32	–	–	–	N	*
Viola pedata L. (*Viola pedata* var. *linariloba* DC.)	–	–	x	–	–	–	X	9
Viola pubescens Aiton	x	–	–	–	–	–	X	5
Viola sagittata Aiton var. *sagittata*	–	–	–	x	–	–	X	7
Vitis aestivalis Michx.	–	–	–	x	–	–	X	7
SF***Vitis labrusca*** L.	–	–	x	–	–	–	X	9
Vitis riparia Michx.	x	x	x	x	x	x	X	2
Vulpia octoflora (Walter) Rydb.	–	–	–	–	x	–	X	4
Xanthium strumarium L.	–	–	–	–	–	–	X	*
SF***Xyris torta*** Sm.	–	–	R	–	–	–	R	10
Yucca flaccida Haworth (*Yucca smalliana* Fernald)	3	–	–	–	–	–	N	ad
SF***Zizania aquatica*** L. var. *aquatica*	–	–	R	–	–	–	R	10
SF***Zizania palustris*** L. var. ***palustris***	–	–	0	–	–	–	N	10
Zizia aurea (L.) W. D. J. Koch	–	–	x	–	–	–	X	7

Table 16. Sources of new species verified and reported from West Beach.

Note	Source	Date	Species
1	K. Board	Sept 1991	*Polygonum tenue*, *Potamogeton crispus*
2	E. Kjellmark	2 Dec 1988	*Berberis repens*
3	D. Mason and G. Tonkovich	July 1999, Oct 2000	*Ailanthus altissimus*, *Aristida purpurascens*, *A. tuberculosa*, *Carex aurea, C. garberi, Celastrus orbiculatus*, *Centaurea stoebe* ssp. *micranthos*, *Cirsium vulgare*, *Cornus obliqua*, *Cyperus erythrorhizos*, *Cyperus odoratus*, *Daucus carota*, *Echinochloa crusgalli*, *Eleocharis geniculata, E. quinqueflora, Epilobium coloratum*, *Equisetum variegatum*, *Equisetum* × *ferrissii*, *Erechtites hieraciifolius*, *Eupatorium serotinum*, *Eutrochium maculatum*, *Galium pilosum*, *Juncus alpinoarticulatus*, *Juncus canadensis*, *Juniperus virginiana* var. *virginiana*, *Leersia oryzoides*, *Linum medium* var. *texanum*, *Morus alba*, *Muhlenbergia mexicana*, *Najas flexilis*, *Nepeta cataria*, *Panicum capillare*, *Persicaria amphibia*, *Persicaria hydropiperoides*, *Persicaria lapathifolia*, *Persicaria maculosa*, *Persicaria punctata*, *Phalaris arundinacea*, *Plantago rugelii*, *Platanthera aquilonis*, *Pogonia ophioglossoides*, *Proserpinaca palustris*, *Rhamnus frangula*, *Salix discolor*, *Salix euxina*, *Scutellaria lateriflora*, *Solanum dulcamara*, *Solidago gigantea*, *Solidago rugosa*, *Sonchus arvensis* ssp. *uliginosus*, *Symphyotrichum lanceolatum* var. *lanceolatum*, *Symphyotrichum novae-angliae*, *Utricularia cornuta, U. subulata, Verbascum thapsus* ssp. *thapsus*, *Verbena hastata*, *Viburnum opulus* var. *opulus*, *Yucca flaccida*
4	D. Mickey	Fall 2003	*Taxus cuspidata*, *Vinca minor*
5	D. Mickey and K. Quinlan	13 Nov 2003	*Gleditsia triacanthos*
6	P. Mohar	Oct 1998	*Euonymus atropurpureus*
7	M. Newgent	Sept 1994	*Utricularia subulata*
8	N.B. Pavlovic and K. Quinlan	9 July 2003	*Leymus arenarius*
9	N.B. Pavlovic and J. Stumpf	26 June 2000	*Sedum rupestre*
10	B. Plampin	Aug 1990	*Campanula rotundifolia*, *Croton glandulosus* var. *septentrionalis*, *Euphorbia dentata*
11	B.Plampin	Oct 1994	*Aristida tuberculosa*, *Rhus aromatica* var. *arenaria*
12	B. Plampin and M. Newgent	Sept 1994	*Juncus arcticus*, *Liparis loeselii*, *Pinus banksiana*, *Pogonia ophioglossoides*, *Rhynchospora capillacea*, *Solidago ptarmicoides Spiranthes cernua*, *Utricularia cornuta*
13	B. Plampin and M. Newgent	Sept 1995	*Polygonum tenue*
14	K. Quinlan	Summer 2003	*Centaurea stoebe* ssp. *micranthos*
15	K. Quinlan	6 Nov 2003	*Glechoma hederacea*
16	H. Simonin	23 July 1982	*Equisetum* × *nelsonii*
17	G. Tonkovich	Aug–Oct 2000	*Celastrus orbiculatus*, *Cladium mariscoides*, *Cyperus bipartitus*, *Eleocharis elliptica*, *E. geniculata*, *Equisetum variegatum*, *Equisetum* × *ferrissii*, *Fimbristylis autumnalis*, *Helianthus petiolaris* ssp. *petiolaris*, *Juncus alpinoarticulatus*, *Juncus nodosus*, *Lemna minor*, *Lipocarpha micrantha*, *Morus alba*, *Packera paupercula*, *Salsola tragus*, *Solanum dulcamara*, *Solidago gigantea*, *Solidago ptarmicoides*
18	S. Leicht-Young and N. B. Pavlovic	6 Aug 2007	*Chenopodium pratericola*, *Desmodium sessilifolium*, *Lespedeza hirta*, *Liatris spicata*
19	S. Leicht-Young and K. Frohnapple	28 Aug 2008	*Corallorhiza odontorhiza*
20	N.B. Pavlovic and S. Leicht-Young	5 Sept 2008	*Euonymus fortunei*, *Patis racemosa*
21	N.B. Pavlovic, S. Leicht-Young, and K. Frohnapple	11 Sept 2008	*Heterotheca subaxillaris* ssp. *latifolia*
22	S. Leicht-Young and N. B. Pavlovic	2010	*Rhodotypos scandens*
23	S. Namestnik and B. Plampin	21 Aug 2006	*Juncus scirpoides*

Table 16 (continued). Sources of new species verified and reported from West Beach.

Note	Source	Date	Species
24	S. Leicht-Young, K. Frohnapple, and N.B. Pavlovic	5 May 2009	*Thalictrum dioicum*
25	B. Plampin	20 Sept 2004	*Utricularia subulata*
26	S. Leicht-Young and K. Potts	30 Oct 2006	*Euonymus europeaus*
29	S. Namestnik	25 May 2010	*Cardamine impatiens*
30	C. Hoiland and M. Fortelka	6 June 2012	*Bromus squarrosus*
31	M. Huft	18 May 2013	*Packera glabella*
32	N.B. Pavlovic and M. Korte	14 Aug 2013	*Vincetoxicum nigrum*
33	R. Scribailo and M. Alix		*Potamogeton strictifolius*
34	L. Brenan, pers. comm.	20 Dec 2013	*Carduus nutans*
35	G. Wilhelm	14 June 1979	*Cotoneaster lucidus*
36	G. Wilhelm and N. Henderson	13 Sept 1979	*Najas guadalupensis*
37	S. Namestnik (MOR)	6 Oct 2012	*Eleocharis flavescens*, *Eleocharis flavescens* var. *flavescens*, *Lipocarpha micrantha*, *Schoenoplectiella smithii*
38	R. Hiebert	28 Aug 1981	*Solidago nemoralis* ssp. *decemflora*
39	G. Tonkovich	2000	*Carex garberi*
40	A. Manke and J. Stumpf	31 Aug 1999	*Symphyotrichum lanceolatum* var. *interior*
41	T. Patterson and L. Pasternack	6 May 2015	*Thalictrum thalictroides*
42	N.B. Pavlovic and M. Korte	25 May 2016	*Erigeron pulchellus*, *Thalictrum thalictroides*
43	M. Conley	21 May 2017	*Platanthera psycodes*
44	G. Wilhelm and L. Wetstein	11 Sept 1990	*Elodea nuttallii*
45	N. Pilla	18 Sept 2015	*Polygala sanguinea*
46	N. Pilla	24 Sept 2016	*Prenanthes altissima*
47	G. Wilhelm	11 Sept 1990	*Myriophyllum spicatum* #18533 (MOR)
48	N. Pilla	8 May 2017	*Ellisia nyctelea*
49	C. Deam (IU)	16 Sept 1930	*Schoenoplectus subterminalis*
50	G. Wilhelm and E. Shimp	7 May 1987	*Carex albicans* var *albicans*

and *Z. palustris*. Of the special flora, 67 are confirmed, 15 are new, 11 are reported, and four are extirpated. New special flora are *Bidens aristosa*, *Carex siccata*, *Celastrus scandens*, *Corallorhiza odontorhiza*, *Cyperus diandrus*, *Dichanthelium perlongum*, *Equisetum variegatum*, *E.* × *nelsonii*, *Erigeron pulchellus*, *Fraxinus americana*, *F. pennsylvanica*, *Juncus scirpoides*, *Lactuca floridana*, *Lathyrus japonicus maritimus*, *Najas guadalupensis*, *Platanthera aquilonis*, *P. psycodes*, *Pogonia ophioglossoides*, *Potamogeton pusillus*, *P. strictifolius*, *P. zosteriformis*, *Schoenoplectus smithii*, *S. subterminalis*, *Schizachyrium littoralis*, *Utricularia purpurea*, *Viola pubescens*, and *Zizania palustris*.

About 9% of the special flora species from West Beach are unknown from any other Indiana Dunes unit. These include: *Carex eburnea*, *Ceratophyllum demersum*, *Cyperus diandrus*, *Eleocharis microcarpa* var. *filiculmis*, *Lactuca floridana*, *Patis racemosa*, *Potamogeton strictifolius*, and *Potamogeton zosteriformis*.

Floristic summary

West Beach has a total of 572 taxa, with 458 native taxa, 13 adventive taxa, and 101 exotic taxa (Table 17). Of the native taxa, 444 are species, 11 are varieties, and three are hybrids. Of the 63 Indiana-listed species from West Beach, nine are endangered, 34 are threatened, 18 are on the watch list, and two are extirpated. The present 444 native species represent a 9% increase since 1990. West Beach surveys indicate a total of 499 verified native plant species. This rises to 572 with the addition of reported/ new/possibly extirpated species (see Table 15). These represent, respectively, a 13% (383) and 12%

Table 17. Summary of floristic statistics by subunit of West Beach. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit						Entire Unit
	A	*B*	*C*	*D*	*E*	*F*	
Area (ha/acres)	142/320	63/155	67/165	73/180	21/51	8/20	576/1,423
Special flora total	57	13	34	37	11	4	97
Confirmed	40	3	20	29	11	4	67
New	4	10	6	8	0	0	15
Reported	10	0	7	0	0	0	11
Extirpated	3	0	1	0	0	0	4
Total taxa, FNA/ITIS	320	110	284	196	156	137	572
Total native taxa, FNA/ITIS	277	78	252	182	130	113	458
Native species, FNA/ITIS	265	75	244	175	125	109	444
Native variety, FNA/ITIS	10	3	7	6	4	3	11
Native hybrid, FNA/ITIS	2	0	1	1	1	1	3
Total adventive taxa, FNA/ITIS	4	3	5	1	4	2	13
Total adventive species, FNA/ITIS	4	3	5	1	4	2	13
Total adventive variety, FNA/ITIS	0	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0	0	0	0
Total exotic taxa, FNA/ITIS	39	29	27	13	22	22	101
Total exotic species, FNA/ITIS	38	29	27	13	21	22	99
Total exotic variety, FNA/ITIS	1	0	0	0	0	0	1
Total exotic hybrid, FNA/ITIS	0	0	0	0	1	0	1
Total Indiana Listed	44	12	18	28	5	2	63
Endangered	7	1	1	4	0	0	9
Threatened	22	8	10	17	3	0	34
Rare	0	0	0	0	0	0	0
Watch List	13	3	7	7	2	2	18
Extirpated	2	0	0	0	0	0	2
Sum CC	1,636	361	1,441	1,121	632	548	2,766
Sum CC adventive & invasive	1,593	330	1,410	1,108	608	525	2,666
Mean CoC	6	5	6	6	5	5	6
Mean CoC with adventive and invasive	5	3	5	6	4	4	5
FQI	98	41	90	82	55	51	128
FQI with adventive and invasive	89	31	83	79	49	45	111

(402) increase from 1990. The 24 new species discovered since 1990 include *Aristida purpurascens*, *Corallorhiza odontorhiza*, *Cornus obliqua*, *Desmodium sessilifolium*, *Equisetum variegatum*, *E.* × *ferrissii*, *E.* × *nelsonii*, *Juncus alpinoarticulatus*, *Liatris spicata*, *Linum medium texanum*, *Muhlenbergia mexicana*, *Packera glabella*, *Persicaria hydropiperoides*, *P. lapathifolia*, *Platanthera aquilonis*, *Platanthera psycodes*, *Pogonia ophioglossoides*, *Polygonum tenue*, *Potamogeton crispus*, *Proserpinaca palustris*, *Scutellaria laterifolia*, *Symphyotrichum lanceolatum* var. *interior*, *S. lanceolatum* var. *lanceolatum*, and *Thalictrum dioicum*. New adventive species include *Berberis repens*, *Croton glandulosus septentrionalis*, *Gleditsia triacanthos*, *Heterotheca subaxillaris*, and *Yucca flaccida*. New exotic species include *Celastrus orbiculatus*, *Centaurea stoebe* ssp.

micranthos, *Echinochloa crusgalli*, *Euphorbia dentata*, *Frangula alnus*, *Glechoma hederacea*, *Leymus arenarius*, *Persicaria maculosa*, *Rhodotypos scandens*, *Salix euxina*, *Sedum rupestre*, *Sonchus arvensis* ssp. *uliginosus*, *Taxus cuspidata*, *Viburnum opulus* var. *opulus*, *Vincetoxicum nigrum*, and *Vinca minor*.

Floyd Swink collected a specimen of the adventive *Diodia teres* Walter in railroad ballast south of Ogden Dunes that we have not included in the flora because the locality may not be in the protected dunes (#1749, 9 August 1952, MOR). See the listing for this species in the Inland Marsh chapter.

Conservation issues

West Beach consists of six general community types: aquatic, dune complex, foredune complex, marsh complex, pannes, and savanna complex. About 20% of West Beach was mined for sand in the 1890s, with much of the destruction having occurred in the area once known as "Long Lake Dunes" (Moore 1959). Vegetation recovery has been slow, especially at greater distances from the intact dunes that are the source of native seed. Indeed, Dr. Young Choi (Purdue University Northwest) and his students have been studying the vegetation recovery and have proposed restoration to diverse sand savanna and prairie complex (Wilcox and Choi 2005). The portions to the west side of West Beach A and east side of Ogden Dunes D (West Beach D, Portage Lakefront) have been degraded by fire suppression and activities associated with former homesite occupation (Pavlovic, pers. obs.). Despite these disturbances, small patches of special flora are still present.

The foredunes of West Beach A and D, especially the latter, are chronically destabilized by foot traffic from visitors and local residents. This activity can lead to trampling of vegetation and unstable areas difficult for plant growth, impacting the federally threatened Pitcher's thistle (Pavlovic and Bowles 1996). The dune succession trail construction after 1985 and recent fencing on the west side in West Beach A has reduced visitor use and erosion of the dunes. While sand erosion and movement may be beyond what foredune complexes have naturally experienced episodically in the geological past, great quantities of sand moved inland depending upon prevailing winds and fluctuations in the level of Lake Michigan (Cowles 1899a, Thompson 1987, McEachern 1992, Poulson 1993b, Anderton and Loope 1995, Poulson 1995, Pavlovic and Bowles 1996, Lichter 1998, Arbogast and Loope 1999, Loope and Siterlet 2000, Thompson et al. 2011). Increases in Lake Michigan lake level since 2014 (high stand in 2020) have eliminated the foredunes that had developed after 1999–2000 and cut further into the foredune ridge. This caused the cottonwoods that were there in 1983, when Pavlovic began working at INDU, to fall onto the beach (Pavlovic, pers. obs.; U.S. Army Corps of Engineers 2021). With a shorter growing season due to anthropogenic climate change, storms are eroding the shoreline similar to in 1986 and 1987 when Lake Michigan had reached its then-highest elevation in modern times. In the 21st century, erosional bluffing of the sand dunes at West Beach is most severe. In Pavlovic's experience, this is exacerbated by the lack of sand from the adjacent hardened east shoreline, and because storms have become more intense and frequent while the growing season has lengthened, making it more likely the sand will not be frozen. In 2020, the panne to the southwest of the Portage Lakefront Pavilion was breached by the waves and now contains a sand flat in its western half.

It is possible to observe that the secondary dune vegetation, dominated by little bluestem (*Schizachyrium scoparium*), differs in the pattern of grass patches compared to areas with human trampling. Protection of the sand dunes to the east of the road used to access the West Beach Bath House has restored the natural secondary dunes vegetation and structure in this unit while protecting and enhancing the Pitcher's thistle (*Cirsium pitcheri*) populations (Pavlovic and Bowles 1996). Nevertheless, lest we think that the dune systems within INDU are protected and natural, the processes that create and destroy dune vegetation were greatly altered by shoreline erosion and human trampling before the

creation of the park in 1966 (Wood 1987, Wood and Davis 1987, Chrzastowski 1990). For instance, these impacts help to explain the loss of Pitcher's thistle and beach pea (*Lathyrus japonicus maritimus*) from the Indiana Dunes foredunes (Peattie 1930). Species restoration and control of human trampling could be beneficial. However, shoreline erosion may continue, as ports and harbors jut into Lake Michigan, capturing sand on their east sides and eroding sand on their west sides due to east to west littoral drift sand along the shoreline (Wood and Davis 1987). Ironically, the open dunes of this unit are undergoing natural vegetation succession such that potential and occupied habitat for Pitcher's thistle has been receding towards Lake Michigan.

West Beach A

West Beach A includes all the 142 hectares (320 acres) north of Long Lake that lie between County Line Road and Ogden Dunes, exclusive of the contiguous disturbed and sand-mined area that is mapped as West Beach B. The area mapped as foredune complex in this subunit is heavily trampled, especially near the West Beach Bath House, but less so at the Wells Street Beach, where access is now restricted by private property. Such activity has caused sand to spill into portions of the pannes. This foredune complex is mapped as natural area despite the frequent human trails because the dunes generally retain their geomorphological character and still provide habitat for many special flora including *Ammophila breviligulata*, *Cirsium pitcheri*, *Euphorbia polygonifolia*, *Salix cordata*, and *Solidago simplex* var. *gillmanii*. The portion of the east side of the unit continues to be invaded by Oregon grape (*Berberis repens*), especially under the jack pine stand surrounding the southern portions of the panne. The only known occurrence of the nonnative jetbead (*Rhodotypos scandens*) was found by Stacey Leicht-Young and Pavlovic in the forested dune complex adjacent to the Dune Succession Trail (Table 16). Invasive species on abandoned homesites on the west side of West Beach A could be removed and replaced with native savanna and woodland forbs. Those high elevation areas in the dune complex are relatively free of invasive plants and could be restored with the addition of native forbs. On the bluff produced by sand mining, where the dune complex and trail end, bare sand was dominant in the past when visitors could run down the bare dune. Around 2014, a snow fence was erected by INDU Resource Management staff to prevent visitors from running off trail and down slope. Since then, a typical mosaic of little bluestem grass has reinvaded the bare sand, providing an example of what relaxation from disturbance can do.

The dune complex in West Beach A is still largely intact, though logging and fire suppression have disturbed most portions and greatly reduced richness on a square-meter scale. Overall, the natural area portion (probably 101 hectares/250 acres) stands as enormously significant from a floristic standpoint, with 265 native species (234 in 1990), a mean CoC of 5.86 and an FQI of 98!

West Beach B

The 63 hectares (155 acres) of West Beach B includes the old sand mine area in addition to the parking area and West Beach Bathhouse impacted by sand mining and heavy human use. We recorded 78 native taxa in addition to 29 exotic and three adventive taxa. The mean CoC was 4.57, with an FQI of 41, a fairly high value despite the habitat disturbance.

West Beach C

The marsh/savanna complex in West Beach C (old Tolleston foredunes), D, and E could be restored with active management, including regular prescribed fire, thinning of rank dog-hair growth from resprouting after the 1986 wildfire, and removal of invasive species including *Phragmites*, oriental bittersweet, spotted knapweed, and baby's breath. As restoration proceeds, reintroduction of the rich savanna flora could be required to maintain some heterogeneous density of sprouts as habitat for migrating neotropical migrants (Grundel and Pavlovic 2007a, 2007c, 2008).

West Beach C occupies about 67 hectares (165 acres), including Long Lake along the adjacent marsh/savanna complexes north of the railroads and U.S. Highway

12. In this subunit, 252 native taxa have been documented (247 in 1990). The mean CoC is 5.56, resulting in an FQI of 90. The Tolleston-age foredunes on the south portion of Long Lake are of high quality due to the absence of dog-hair oak sprouts, high native plant diversity, and open canopy structure, especially on the east end near Ogden Dunes. At the east end, the town of Ogden Dunes burned nearly annually from 1987 to 1991 (Bill Gabbert, former INDU Fire Management Officer, pers. comm. with Pavlovic, 1993). The full intensity of the 1986 wildfire burned this area and produced the thickets of oak sprouts and reduction in understory diversity in the western portion (Pavlovic, pers. obs.). Nevertheless, the Tolleston Beach just south of Long Lake has a strip of white oak flat woods that did not experience as much oak regrowth as the black oak portions at higher elevations. The eastern area is home to the most viable population of silky aster (*Symphyotrichum sericeus*) at INDU and has mesic sand savanna understory vegetation like Miller Woods (Pavlovic et al. 2006). Recent mechanical removal of woody material and frequent burning by INDU Resource Management has restored portions of the middle and western portions of West Beach C.

West Beach D

West Beach D occupies the 73 hectares (180 acres) lying east of Ogden Dunes that is now called Portage Lakefront Park. The Portage Lakefront Park was opened in October 2008 as a cooperative agreement with the town of Portage and the NPS as part of the forner congressman Pete Visclosky's Marquette Plan (Northwest Indiana Regional Planning Commission 2021). The eastern half of this subunit was sand-mined and depressions were created by Inland Steel to deposit industrial pickling liquor (acidic waste that contains metals from cleaning steel slabs). There were originally approximately two pannes in this subunit, but one was lost to beach erosion, one remains but is dry, and three others were artificially created panne-like depressions further south at the north end of the pickling liquor site. Now there are 175 native flora (172 in 1990), with a mean CoC of 6.04 and an FQI of 82.

The mesophytic pocket community in the western portion of the subunit, mapped as dune complex, is quite singular in character, as is the jack pine cove portion of the old blowout in the southeastern portion of the area mapped as foredune complex. The steep north slope of this high dune, harbors hop hornbeam (*Ostrya virginiana*) and ivory sedge (*Carex eburnea*). One large hop hornbeam that grew on the top of the northeast slope has been overrun by surface sand and now appears on the southwest blowout slope (Pavlovic, pers. obs.). Ivory sedge is also found on flat locations below the steep dune. There is an exceptional stand of white pine reproduction on a northeast-facing dune above the former pickling liquor site. This is one of the few spots where white pine are regenerating (Armentano et al. 1984, Armentano and Menges 1986). Wilhelm (1990) reported the lichen *Peltigera lepidophora* (Nyl.) Vain. in a sandy interdunal prairie south of the main blowout that grows nowhere else in Indiana or the region. It grows primarily to the far west and north of the Chicago region.

Further burning would favor the savanna remnant in this subunit. With the removal of the Inland Steel "pickling liquor" from the depressions on the east side of this property in the 1990s, restoration of natural vegetation and consolidation of the vegetation are ongoing, although direct human impacts could result from the recent opening of the Portage Lakefront Park. Widening of the single lane road to two lanes in creating the lakefront park eliminated patches of bearberry (*Arctostaphylos uva-ursi*) and dune goldenrod (*Solidago simplex* var. *gillmanii*). Asiatic bittersweet (*Celastrus orbiculatus*) invasion is extensive and will continue to outcompete native vegetation (Leicht-Young et al. 2010b, 2013). This is the site of research by Pavlovic, Stacey Leicht-Young, and David Zaya on the invasion of oriental bittersweet. From that work, removal of this species from the foredunes and secondary dunes, where American bittersweet (*Celastrus scandens*) still persists, could prevent genetic swamping of the native vine (Zaya et al. 2015).

Ongoing herbicide application by INDU staff has eliminated spotted knapweed from the central blowout and area adjacent to the "Riverwalk" trail and road. The area, parallel to Burns Ditch, surveyed in 2004 and 2006, contained large expanses of *Arctostaphylos uva-ursi* and a panne south of the Portage Lakefront Pavilion. In 2008, large numbers of bearberry were destroyed by the construction of the Riverwalk. The land between the road and eastern portion of the Riverwalk along Burns Ditch is dominated by invasive species that could be removed to avoid providing a continuous source for exotic seeds.

West Beach E

West Beach E (21 ha/51 acres) was added to the national park in 1995 as part of the Karner blue butterfly (KBB) mitigation. The butterfly was observed on the original proposed RICRA landfill on Inland Steel property in July of 1993. Contractors (under the direction of the Environmental Protection Agency) moved lupine plants with tree spades from the landfill site to this location and managed and improved the site for KBB habitat improvement (Larry Brewer, formerly 3D Environmental, pers. comm. with Pavlovic, 1995). While this mitigation was occurring, a new landfill was constructed just north of the CSSSBR tracks. This landfill is visible from U.S. Highway 12. Once the KBB mitigation was complete, the second landfill was constructed at the original site behind the first. Restoration actions by park staff in subunit E included increasing herbaceous diversity and burning portions to reduce the woody cover. This subunit had formerly experienced lengthy fire suppression and had dense woody oak and sassafras growth (Pavlovic, pers. obs.). While 125 native plants are recorded from this subunit (131 in 1990), only eleven are special flora. Mean CoC is 4.82 and the FQI is 55. The railroad corridor south of West Beach has been added to the map, but this subunit has not been explicitly inventoried or listed in the flora table.

West Beach F

West Beach F is an 8-hectare (20-acre) tract of savanna and marsh complex that lies south of the entrance road in the vicinity of the admission gate. The subunit, although different in vegetation compared to subunit C, is directly adjacent to the marsh and Long Lake. Subunit F has a total of 109 native species (115 in 1990), with a mean CoC of 4.77 and an FQI of 51. Intense fires have caused the loss of canopy trees and proliferation of oak sprouts in portions of this subunit, and ongoing invasion of the understory by oriental bittersweet is of great concern.

West Beach has a total of 444 native species (452 in 1990), 99 exotic species, and 13 adventive species (see Table 17). Mean CoC is 5.95 and the FQI is 128. From the perspective of floristic richness and FQI within the West Beach subunit, rank order from highest to lowest is A > C > D > E > F > B. West Beach, with 444 native species, is the tenth richest unit in flora diversity in the Indiana Dunes.

Unit 5: Inland Marsh (Tolleston Dunes East), Coulter Prairie, and Yellow Birch Fen

The marsh on a muggy morning in summer with the fog rolling in looks Paleozoic—a ferny jungle time warp from the tropical paradise of the prehistoric Midwest. Like the rest of the region's landscape, though, this 400-acre complex was shaped by a much more recent series of events—the Ice Age and its aftermath.

The east-west ridges were bare sand dunes at the water's edge during the Tolleston stage of Lake Chicago . . ., and the tongues of high ground that extend south from those ridges were blown into their present configuration by wind before the beach ridges were stabilized by vegetation.

—Glenda Daniel (1984)

Inland Marsh occupies about 274 hectares (675 acres) east of Tolleston Dunes (original unit of that name across from County Line Road) and south of West Beach (Figure 15). As of 17 November 2011, the NPS confusingly renamed Inland Marsh as Tolleston Dunes, combining it with the Tolleston Dunes Unit to the west, as defined here, and as mapped south of U.S. Highway 12. We retain the use of the old name because it is widely recognized, because many projects use the old name including the published work of Henderson (Henderson 1982, Henderson and Long 1984) and KBB research, and because, in the Indiana Dunes landscape, this unit is fragmented from Tolleston Dunes, Inland Manor, and Woodlake Dunes and Savanna (Unit 2) and thus is easily defined as a separate management unit. It could be called Tolleston Dunes East to distinguish it from the original Tolleston Dunes to the west. The impact of County Line Road on the species populations that span across Tolleston West and East is illustrated by the discovery that the genetic differences in the KBB populations between the Tolleston Dunes and Inland Marsh are equivalent in magnitude to the genetic differences found between its western and eastern extents of distribution (from Minnesota to New Hampshire) (Ralph Grundel, USGS, pers. comm. with Pavlovic, 2018).

Inland Marsh, though inland from Lake Michigan, is named for Inland Steel, the company that owned the property prior to acquisition by INDU; however, the name seems apt since most of it is marshland inland from Lake Michigan. Inland Marsh is the finest example of the Tolleston, 4,000-year-old dune system between the Little Calumet River to the south and Long Lake to the north. It contains the 4,000-year-old linear foredunes backed to the south by west-facing parabolic dunes. The latter dunes abutted to the south on the floodplain of the Little Calumet River. Inland Marsh is a high-quality parcel of the Indiana Dunes that has oak savanna, woodland and forest, white oak flatwoods, sedge meadows, marshes, mesic prairies, swamps (dominated by aspen), and ponds. Former 4,000 ybp pannes that are south of the foredunes are now wetland complexes (Ken Klick, NPS, pers. comm. with Pavlovic, 1988).

Inland Marsh is divided into four subunits:

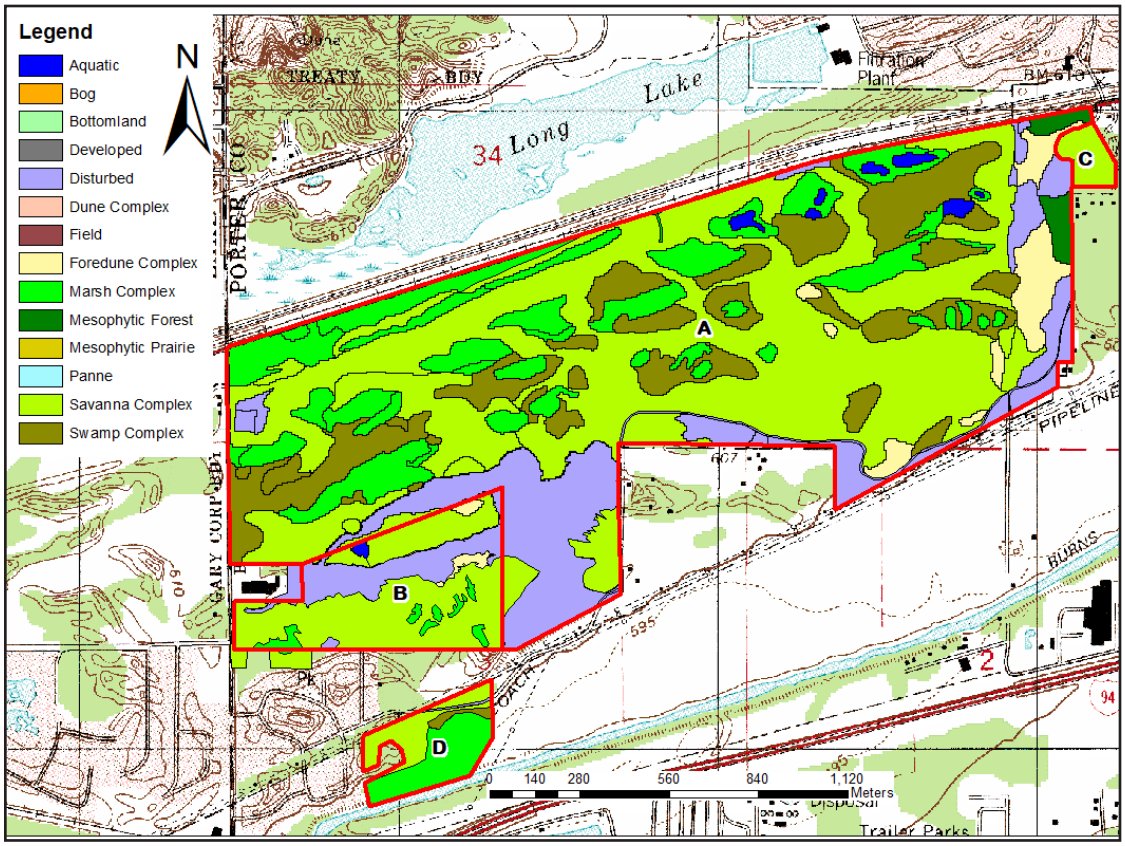


Figure 15. Vegetation of Inland Marsh Unit. Subunits indicated by letters. Cross-hatching indicates disturbed areas. Yellow Birch Fen is the large tract south of Coulter Prairie (B).

the main Inland Marsh, the adjacent Coulter Prairie, the Chicago Addition, and the adjacent Yellow Birch Fen south of Stagecoach Road. The main subunit (A) was surveyed by Gerould Wilhelm on 26 July 1994, 6 July and 26 June 1998, and 17 July and 10 August 1999 (Chicago Addition). Surveys before 1990 are mentioned in Wilhelm (1990). The Coulter Prairie (formerly the Dritz Pits), owned by the Shirley Heinze Land Trust (SHLT), is adjacent to INDU and is designated herein as Inland Marsh B. It was surveyed on 27 September 1994 by Paul Labus (formerly of The Nature Conservancy) and others, on 24 June 1998 by Tom Post and Plampin, and during numerous hikes sponsored by SHLT. Additional land east of Coulter Prairie was added to INDU as part of the Midwest Steel Karner blue butterfly (KBB) mitigation in 1996. That land is contiguous with and is included in Inland Marsh A. Inland Marsh C is the former University of Chicago property northeast of Inland Marsh A, which has experienced fire suppression because it is surrounded by roads. Subunit D is the Yellow Birch Fen site purchased and owned by the SHLT. It extends south from the Tolleston Dunes into the floodplain of the Little Calumet River.

Since 1984, the eastern half of Inland Marsh A has been of higher quality than the western half because of the lower density of oak sprouts. Inland Marsh was impacted by a large and intense wildfire on 15 April 1986 in the southwest and northwest portions (see Chapter 12 in Cockrell 1988; Pavlovic pers. obs.). Kenneth Cole and Pavlovic were in the last vehicle driving west to reach County Line Road before U.S. 12 was closed. This wildfire burned through the northwest portion of Inland Marsh A, jumped U.S. Highway 12 and the railroad tracks, and raced towards Ogden Dunes, burning through the southeast portion of West Beach C; however, the conflagration was prevented in part of Ogden Dunes by a backing fire lit by INDU personnel (Leon Konz, NPS Fire Management Officer, pers. comm. with Pavlovic, 1986). Control of the fire in Inland Marsh was executed by back-burning the northeast, east, and south perimeters of the subunit. In 1987, a prescribed research burn was lit throughout the eastern two-thirds of Inland Marsh. This burn was low intensity because of moderate litter moisture and increasing clouds as the day progressed; the area was burned from east to west (Pavlovic, pers. obs., 1987). The west half of Inland Marsh remained unburned until after 1993, when the first KBB management burn took place (Pavlovic, pers. obs.). There is a previously sand-mined flat area at the far west end of Inland Marsh where there is a pull-off along County Line Road. This was formerly the paint test area for Inland Steel, where paints were tested on strips of steel placed on metal frames. All that remains are slag and the posts from the research of Dr. Young Choi (Pudue University Northwest) (Pavlovic, personal observation, 2019)

Considerable thinning has occurred in Inland Marsh for Karner blue butterfly habitat improvement. One of the first clearings resulted in copious fuel on the ground (Randy Knutson, INDU Resource Management, pers. comm. with Pavlovic). The subsequent fire killed the trees meant to be preserved and mostly burned away the litter and E horizon. Thus, a dense sward of mullein (*Verbascum thapsus*) that germinated had to be removed to prevent millions of seed degrading the habitat (Pavlovic, pers. obs., 2007). In 2008, on the south side of a marsh, trees were cut and felled into the water where purple bladderwort grows (*Utricularia purpurea*) (Plampin and Hamilla 2008a). This site could be checked to see if the bladderworts survived.

The south and east sides of Inland Marsh along Stagecoach Road were fenced soon after the the area was acquired in 1978 to prevent the continued ORV incursion that had created numerous trails throughout the whole unit (Cockrell 1988). Today many of these two-track roads are experiencing secondary succession. An abandoned car at the base of a high dune in the middle of the east half might be removed, perhaps only with a helicopter.

In 1996, Pavlovic discovered numerous insular and small mesic prairie remnants (Inland Marsh A) comparable to Howes Prairie (Cowles Dunes B). These remnants

were once larger in area, but during years of fire suppression, the flat topographic benches where the prairies occur were invaded by aspen (*Populus tremuloides*). The remnants along with Howes Prairie (Cowles Dunes B) represent the most significant mesic prairies within INDU. Brush cutting by park staff in a few of these prairies in 2015 may have helped restore the groundlayer vegetation.

Extensive populations of the nitrogen-fixing black locust (*Robinia* spp.) were removed by INDU RM staff in the late 1990s for KBB restoration. It is now hard to believe that the main Inland Marsh parking lot was surrounded by black locust in the 1980s. This removal was also beneficial because black locust was known to enrich the soil with nitrogen and change the groundlayer vegetation (Babcock 1987; Peloquin 1989, 1996; Peloquin and Hiebert 1999). As a priority, other invasive exotic plants (Asiatic bush honeysuckles and autumn olive) have been cut and herbicided to restore Inland Marsh. Restoration of the large areas that were sand-mined in the early 20th century to prairie and savanna complex will benefit the diverse vegetation, flora, and fauna of Inland Marsh.

In 1994, Ralph Grundel and Pavlovic embarked on studies of the ecology and the habitat and plant use of the KBB (Grundel et al. 1998a, 1998b, 2000, 2020; Grundel and Pavlovic 2007b). From their research, KBB conservation management was understood to provide a welter of canopy cover with a mosaic of wild lupine and nectar plants in proximity to foster population growth and viability of this low vagility butterfly. After researching the KBB, the authors recognized that ecosystem management requires more than single species management. Consequently, they initiated a series of studies that included Inland Marsh to understand the effects of oak structure and fire history on the diversity of numerous groups of organisms that inhabit parcels that were formerly oak savanna. Since presettlement times, these have remained prairie, oak savanna, scrub, and woodland or have been converted to "prairie" subsequent to sand mining, to forest by fire suppression, or to oak scrub by intense wildfires. To date, these researchers have studied birds, reptiles, amphibians, bees, ground layer vegetation, butterflies, and ground dwelling beetles (Pavlovic et al. 2006; Grundel and Pavlovic 2007a, 2008; Grundel et al. 2020). Sadly, in 2012 extreme weather events in March and June/July created two phenological mismatches between the KKB and wild lupine that caused the Karner blue butterfly to be extirpated from Indiana (Patterson et al. 2019).

Inland Marsh B (Coulter Prairie) was reported on by Ken Dritz in the early 1980s. Formerly called the Dritz Pits, it is now called John Merle Coulter Sand Prairie by the Shirley Heinze Land Trust, the property owner. Portions were sand-mined, but wet meadow depressions remain that harbor unusual flora. The portions of flat sandscape that were invaded by black oak have been thinned to a density more typical of oak savanna.

Inland Marsh C—the University of Chicago property—is a neglected dune island that is invaded in the understory by Asiatic bush honeysuckles and other exotics. Most of the canopy has grown in and become a mosaic of woodland and forest. While restoration is sorely needed here, the area might serve as a permanent control area without burning. In 2018, Lars Brudvig and Pavlovic installed a permanent plot to characterize the vegetation without frequent and recent burning.

Inland Marsh D—Yellow Birch Fen—was purchased by the Shirley Heinze Land Trust to protect the population of blue bead (*Clintonia borealis*) that Marlin Bowles found there in 1989. This tract is across the road from the NIPSCO powerline right-of-way and Coulter Prairie. The adjacent floodplain of the Little Calumet River has been restored hydrologically and some unusual plants have appeared. Many of the plants assigned to Yellow Birch Fen may be from Coulter Prairie (subunit B) since the Shirley Heinze Land Trust Plant List lumps these two units together.

Special flora summary

Inland Marsh provides habitat for 73 special flora of INDU (Table 18). Of these, 55 (73%) were seen during this survey. However, 44 of these (59%) are confined to Coulter Prairie (Inland Marsh B). All the special flora taxa are still extant. Fifty-three special flora are confirmed and 19 are new. New special flora to Inland Marsh and associated natural areas include *Betula alleghaniensis*, *Brachyelytrum erectum*, *Celastrus scandens*, *Clintonia borealis*, *Corallorhiza odontorhiza*, *Dichanthelium oligosanthes oligosanthes*, *Eleocharis atropurpurea*, *Glyceria grandis*, *Liatris scariosa nieuwlandii*, *Maianthemum canadense*, *Panicum dichotomiflorum*, *Platanthera flava herbiola*, *Rubus setosus*, *Sceptridium dissectum*, *Sphenopholis obtusata*, *Spiranthes lacera*, *S. magnicamporum*, *S. ovalis erostellata*, *Symphyotrichum sericeum*, *Trientalis borealis*, *Utricularia gibba*, *Viola blanda*, and *V. pubescens*. About 4% of the Inland Marsh special flora are unknown from any other Indiana Dunes unit. These include *Clintonia borealis*, *Dichanthelium acuminatum* ssp. *implicatum*, *Eleocharis atropurpurea*, *Eleocharis microcarpa* var. *filiculmis*, *Glyceria grandis*, *Lipocarpha drummondii*, and *Sphenopholis obtusata*.

Table 18. Summary of species verified and reported for Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Abutilon theophrasti Medik.	–	x	–	34	X	*
Acer negundo L.	–	x	–	x	X	0
Acer rubrum L.	x	x	x	x	X	7
Acer saccharinum L.	x	x	–	x	X	0
Achillea millefolium L.	x	x	x	–	X	*
Acmispon americanus (Nutt.) Rydb. (*Lotus americanus* (Nutt.) Bisch.	–	44	–	–	N	ad
Agalinis purpurea (L.) Pennell	x	x	x	x	X	6
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	x	x	–	x	X	4
Agrimonia parviflora Aiton	–	–	–	–	X	7
Agrostis gigantea Roth (*Agrostis alba* L.)	–	–	x	–	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	x	–	–	X	1
Agrostis perennans (Walter) Tuck.	x	–	–	–	X	3
Ailanthus altissimus (Mill.) Swingle	x	x	–	–	X	*
SF***Aletris farinosa*** L.	x	x	–	–	X	10
Alisma subcordatum Raf.	x	x	–	–	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	5	x	–	X	X	*
Allium canadense L.	–	–	–	x	X	
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	x	–	–	X	0
Ambrosia psilostachya DC. (*Ambrosia psilostachya* DC. var. *coronopifolia* (Torr. & A. Gray) Farw.)	–	x	–	–	X	*
Ambrosia trifida L.	–	–	–	X	X	0
Amelanchier arborea (F. Michx.) Fernald	x	x	–	–	X	8

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Amelanchier interior E. L. Nielson	–	–	–	x	N	
Amelanchier laevis Wiegand	–	–	–	x	N	
Amphicarpaea bracteata (L.) Fernald	x	–	–	X	X	5
Andropogon gerardii Vitman	x	x	–	–	X	5
Anemone cylindrica A. Gray	x	x	–	X	X	6
Anemone quinquefolia L. var. *quinquefolia* (*A. quinquefolia* L.)	–	–	–	x	N	
Anemone virginiana L. var. *virginiana* (*Anemone virginiana* L.)	–	–	x	–	X	5
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	x	–	X	X	3
Anthemis cotula L.	–	–	–	–	X	*
Apera interrupta (L.) P. Beauv.	–	3	–	–	N	*
Apios americana Medik.	x	–	x	X	X	7
Apocynum androsaemifolium L.	x	x	–	–	X	5
Apocynum cannabinum L. (*Apocynum sibiricum* Jacq.)	x	–	–	–	X	2
Aquilegia canadensis L.	x	x	–	X	X	6
Arabidopsis thaliana (L.) Heynh.	–	x	–	–	X	*
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	x	x	x	x	X	5
SF***Aralia hispida*** Vent.	–	x 48	–	–	X	10
Aralia nudicaulis L.	x	x	–	x	X	8
Aralia racemosa L.	–	–	–	x	N	
Arctium minus (Hill) Bernhardi (*Arctium minus* Bernh.)	–	–	–	x	X	*
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald. & J. F.)	–	x	–	–	X	10
Arenaria serpyllifolia L.	x	x	x	–	X	*
SF***Aristida longespica*** Poir. var. ***geniculata*** (Raf.) Fernald (*Aristida intermedia* Scribn. & Ball)	–	x	–	–	X	5
Aristida oligantha Michx.	–	28	–	–	N	0
Aristida purpurascens Poir.	x	x	–	–	X	5
SF***Aristida tuberculosa*** Nutt.	–	x	–	–	X	9
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder	x	x	–	–	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	x	x	x	X	X	5
Artemisia vulgaris L.	–	20	–	–	N	*
Asclepias amplexicaulis Sm.	x 4	x	x	–	X	7
Asclepias exaltata L.	–	x	–	–	N	9
Asclepias incarnata L.	–	x	–	–	X	4
Asclepias syriaca L.	x	x	x	–	X	0
Asclepias tuberosa L.	x	x	x	–	X	7

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Asclepias verticillata L.	x	28	–	–	X	1
Asparagus officinalis L.	x	–	–	X	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	–	22	–	X	N	4
Aureolaria flava (L.) Farw.	x	–	–	–	X	9
Aureolaria pedicularia (L.) Raf. ex Pennell (*Aureolaria pedicularia* (L.) Raf. var. *ambigens* (Fernald) Farw.)	x	x	–	–	X	7
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	x	7	–	34	X	8
Barbarea vulgaris W.T. Aiton	–	–	–	X	X	*
Berberis repens Lindl. G. Don (*Mahonia repens* (Lindl.) G. Don.)	–	–	–	x	X	ad
Berberis thunbergii DC.	x	–	–	–	X	*
SF***Betula alleghaniensis*** Britton	–	–	–	X	N	10
Bidens bipinnata L.	33	–	–	–	N	ad
Bidens cernua L.	x	–	–	–	X	5
Bidens frondosa L.	–	x	–	X	X	1
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	x	x	–	–	X	9
Bidens tripartita L. (*Bidens comosa* (A. Gray) Wiegand)	x	–	–	–	X	5
Boechera canadensis (L.) Al-Shehbaz (*Arabis canadensis* L.)	–	24	–	–	N	10
Boehmeria cylindrica (L.) Sw.	–	–	–	34	X	2
Botrychium virginianum (L.) Sw.	–	22	–	–	N	6
SF***Brachyelytrum erectum*** (Schreb.) P. Beauv.	–	–	–	x	N	10
Bromus inermis Leyss.	x	–	–	–	X	*
Bromus japonicus Thunb.	–	x	x	–	X	*
Bromus latiglumis (Scribn. ex Shear) Hitchc.	–	–	–	x	N	*
Bromus sterilis L.	–	–	–	x	X	*
Bromus tectorum L.	x	x	–	x	X	*
Bulbostylis capillaris (L.) C.B. Clarke	–	x	–	–	X	4
Calamagrostis canadensis (Michx.) P. Beauv.	x	x	–	–	X	3
Calamagrostis stricta (Timm) Koeler ssp. *inexpansa* (A. Gray) C.W. Greene (*Calamagrostis inexpansa* A. Gray var. *brevior* (Vasey) Stebbins)	x	x	–	x	X	5
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. *magna* Scribn. & Merr.	x	x	x	–	X	5
Caltha palustris L.	–	–	–	x	N	5
SF***Campanula rotundifolia*** L.	x	x	–	–	X	10
Capsella bursa-pastoris (L.) Medik.	–	25	–	–	X	*
Cardamine hirsuta L.	–	–	–	x	N	*
Cardamine pensylvanica Muhl. ex Willd.	–	11	–	x	N	4
Carduus nutans L.	36	–	–	–	N	*
SF***Carex alata*** Torr.	x	–	–	–	X	10

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Carex annectens (E.P. Bicknell) E.P. Bicknell (*Carex annectens* E.P. Bicknell var. *xanthocarpa* (E.P. Bicknell) Wiegand)	–	x	–	–	X	7
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	–	–	x	–	X	6
Carex blanda Dewey	–	x	–	–	X	1
Carex brevior (Dewey) Mackenzie ex Lunell	–	x	–	–	X	4
Carex buxbaumii Wahlenb.	–	x	–	–	X	9
Carex comosa Boott	–	x	–	–	X	5
Carex hystericina Muhl. ex Willd.	–	x	–	–	X	5
Carex lacustris Willd.	–	x	–	–	X	6
Carex longii Mack.	–	x	–	–	X	6
Carex molesta Mack. ex Bright	–	x	–	–	X	2
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergi*i Schkuhr ex Willd.)	x	x	x	–	X	5
SF***Carex oligosperma*** Michx.	x	x	–	–	X	10
Carex pellita Willd.	–	x	–	–	X	4
Carex pensylvanica Lam.	x	x	x	X	X	5
Carex scoparia Schkuhr ex Willd. var. *scoparia*	–	x	–	–	X	7
Carex stipata Muhl. ex Willd.	–	–	–	x	N	4
Carex stricta Lam.	x	–	–	X	X	5
Carex suberecta (Olney) Britton	–	x	–	–	X	8
Carex swanii (Fernald) Mack.	–	x	–	–	X	8
SF***Carex tonsa*** (Fernald) E.P. Bicknell	x	x	x	–	X	7
Carex tribuloides Wahlenb.	–	x	–	–	X	3
Carex umbellata Schkuhr ex Willd.	–	x	x	–	X	9
Carex vulpinoidea Michx.	–	x	x	X	X	2
Catalpa speciosa Teas	–	x	–	X	N	ad
Ceanothus americanus L.	x	x	–	–	X	6
Celastrus orbiculatus Thunb.	–	x	–	X	X	*
SF***Celastrus scandens*** L.	x	x	–	–	X	4
Cenchrus longispinus (Hack.) Fernald	x	x	–	X	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	x	x	–	–	X	*
Centaurium pulchellum (Sw.) Druce	–	x	–	–	X	*
Cephalanthus occidentalis L.	x	x	–	–	X	5
Chaennorhinum minus (L.) Lange	–	–	–	–	X	*
Chelone glabra L.	–	–	–	x	N	8
Chamaecrista fasciculata (Michx.) Greene var. *fasciculata* (*Cassia fasciculata* Michx.)	–	x	–	–	X	5
Chenopodium album L.	–	–	x	–	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	x	x	x	–	X	5

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Chenopodium subglabrum (S. Watson) A. Nelson	–	–	–	46	N	ad
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	x	–	x	X	1
Cinna arundinacea	–	–	–	x	N	5
Cirsium arvense (L.) Scop.	–	–	–	X	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	–	–	x	–	X	2
Cirsium muticum Michx.	–	–	–	x	N	9
SF***Cladium mariscoides*** (Muhl.) Torr.	x	x	–	–	X	10
Claytonia virginica L.	39	25	–	–	N	2
SF***Clintonia borealis*** (Aiton) Raf.	–	–	–	x	N	10
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	x	x	X	X	7
Commelina communis L.	9	–	–	–	N	*
Commelina erecta L. (*Commelina erecta* L. var. *deamiana* Fernald)	x	–	–	–	X	10
Conoclinium coelestinum (L.) DC. (*Eupatorium coelestinum* L.)	42	–	–	–	N	ad
Convolvulus arvensis L.	–	x	–	X	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	x	–	x	–	X	0
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	45	–	–	–	N	9
Coreopsis lanceolata L.	x	x	–	–	X	5
Coreopsis palmata Nutt.	x	x	–	–	X	6
Coreopsis tripteris L.	x	x	–	–	X	5
Corispermum americanum (Nutt.) Nutt. (*Corispermum hyssopifolium* L.)	–	x	x	–	X	5
Cornus florida L.	x	28	–	–	X	8
Cornus racemosa Lam.	x	–	–	X	X	1
Crocanthemum canadense (L.) Britton (*Helianthemum canadense* (L.) Michx.)	x	x	x	–	X	8
Croton glandulosus L. var. *septentrionalis* Müell. Arg.	–	x	–	–	X	ad
Cycloloma atriplicifolium (Spreng.) J. M. Coult.	x	x	x	–	X	7
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	x	x	–	–	X	4
Cyperus erythrorhizos Muhl.	x	–	–	–	X	2
SF***Cyperus houghtonii*** Torr.	x	x	–	–	X	2
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* (*Cyperus filiculmis* Vahl)	x	x	x	–	X	5
Cyperus odoratus L. (*Cyperus ferruginescens* Boeck.)	x	–	–	–	X	2
Cyperus schweinitzii Torr.	x	x	x	–	X	5
Cyperus squarrosus L. (*Cyperus inflexus* Muhl.)	–	–	x	–	X	4
Cyperus strigosus L.	x	x	–	–	X	1
Cyperus × *mesochorus* Geise [*C. lupulinus* × *C. schweinitzii*]	x	x	x	–	X	5
Dactylis glomerata L.	x	–	–	–	X	*
Daucus carota L.	–	x	x	–	X	*
Desmodium sessilifolium (Torr.) Torr. & A. Gray	–	x	–	–	X	8

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Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *columbianum* (Scribn.) Freckmann & Lelong (*Panicum columbianum* Scribn.)	R	x	–	–	X	7
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	x	–	–	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *implicatum* (Scribn.) Freckmann & Lelong (*Panicum auburne* Ashe)	–	x	–	–	X	8
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	–	x	–	–	X.	9
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *spretum* (Schultes) Freckmann & Lelong (*Panicum spretum* Schult.)	–	x	–	–	X	9
SF***Dichanthelium boreale*** (Nash) Freckmann (*Panicum boreale* Nash)	x	–	–	–	X	10
Dichanthelium clandestinum (L.) Gould (*Panicum clandestinum* L.)	–	–	x	x	X	6
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	x	x	–	–	X	7
SF***Dichanthelium oligosanthes*** (J.A. Schultes) Gould ssp. ***oligosanthes*** (*Panicum oligosanthes* Schult.	–	29	–	–	N	9
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	x	–	–	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	x	x	–	X	7
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	x	x	–	x	X	8
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	R	x	x	–	X	8
SF***Diervilla lonicera*** Mill.	x	x	–	x	X	9
Digitaria cognata (J.A. Schultes) Pilger (*Leptoloma cognatum* (Schult.) Chase)	–	R	x	–	X	3
Digitaria sanguinalis (L.) Scop.	x	x	–	–	X	*
Diodia teres Walter	–	47	–	–	N	ad
Dioscorea villosa L.	–	–	–	x	N	5
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	x	x	–	–	X	9
Dracocephalum parviflorum Nutt.	–	–	37	–	N	ad
SF***Drosera intermedia*** Hayne	R	21	–	–	X	10
Dulichium arundinaceum (L.) Britton	x	x	–	–	X	9
Echinochloa crusgalli (L.) P. Beauv.	x	–	–	–	X	0
Echinocystis lobata (Michx.) Torr. & A. Gray	–	19	–	–	N	5
Elaeagnus umbellata Thunb.	x	x	–	x	X	*
Eleocharis acicularis (L.) Roem. & Schult.	–	R	–	–	N	2
SF***Eleocharis atropurpurea*** (Retz) J. Presl & C. Presl	–	49	–	–	N	10
Eleocharis elliptica Kunth	–	x	–	–	X	8
Eleocharis engelmannii Steud.	–	x	–	–	X	9

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	A	*B*	*C*	*D*		
Eleocharis erythropoda Steud.	x	x	–	–	X	2
SF***Eleocharis microcarpa*** Torr. var. ***filiculmis*** Torr.	–	x	–	–	X	10
Eleocharis obtusa (Willd.) Schult.	x	x	–	–	X	3
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis smallii* Britton)	x	x	–	–	X	5
Elymus canadensis L.	x	x	x	–	X	4
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	x	x	–	X	*
Elymus trachycaulus (Link) Gould ex Shinners (*Agropyron trachycaulum* (Link) Malte)	x	–	–	–	X	8
Elymus virginicus L.	–	–	–	x	N	3
Epilobium coloratum Biehler	–	x	–	–	X	3
Epilobium leptophyllum Raf.	x	–	–	–	X	10
Epipactis helleborine (L.) Crantz	–	8	–	x	N	*
Equisetum arvense L.	–	–	x	x	X	0
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	–	R	–	–	N	3
Equisetum laevigatum A. Braun	–	x	x	x	X	2
Equisetum × *ferrissii* Clute *[E. hyem*ale × *E. la*evigatum]	–	x	–	–	X	2
Eragrostis minor Host (*Eragrostis poaeoides* Roem. & Schult.)	–	–	–	–	X	*
Eragrostis pectinacea (Michx.) Nees	x	x	–	–	X	0
Eragrostis spectabilis (Pursh) Steud.	x	x	–	–	X	3
Eragrostis trichodes (Nutt.) Alph. Wood	41	–	–	–	X	*
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	–	x	–	–	X	2
Erigeron annuus (L.) Pers.	x	x	–	–	X	0
Erigeron philadelphicus L.	–	6	–	–	N	4
Erigeron strigosus Muhl. ex Willd.	x	x	x	–	X	5
Eryngium yuccifolium Michx.	–	–	–	34	N	9
Erysimum repandum L.	–	–	–	–	X	*
Euonymus alatus (Thunb.) Siebold	x	–	–	–	X	*
Eupatorium altissimum L.	x	x	–	–	X	0
Eupatorium perfoliatum L.	x	x	x	x	X	4
Eupatorium serotinum Michx.	x	x	–	–	X	0
Euphorbia corollata L.	x	x	–	–	X	2
Euphorbia dentata Michx.	–	x	–	–	X	*
Euphorbia maculata L. (*Euphorbia supina* Raf.)	–	x	x	–	X	0
SF***Euthamia caroliniana*** (L.) Greene ex Porter & Britton (*Solidago tenuifolia* Pursh)	x	x	–	–	X	10
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb.)	–	–	–	x	N	4
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	x	x	–	X	3

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	A	*B*	*C*	*D*		
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	x	x	–	–	X	5
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	–	x	x	51	X	4
Fallopia convolvulus (L.) A. Löve (*Polygonum convolvulus* L.)	–	x	–	–	X	*
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	16	–	–	–	N	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	x	x	–	–	X	1
Fimbristylis autumnalis (L.) Roem. & Schult.	x	x	–	–	X	5
Fragaria virginiana Miller	x	x	x	x	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	–	x	–	–	X	*
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	–	x	–	–	X	1
Galium aparine L.	–	–	–	x	N	0
Galium circaezans Michx. var. *hypomalacum* Fernald	x	x	–	–	X	7
Galium obtusum Bigelow	–	–	x	–	X	5
Galium pilosum Aiton	x	x	x	–	X	10
Galium triflorum Michx.	x	x	–	–	X	5
Gaylussacia baccata (Wangenh.) K. Koch	x	x	x	–	X	9
Gentiana andrewsii Griseb.	–	13	–	–	N	8
SF***Gentiana saponaria*** L.	x	–	–	–	X	8
Gentianopsis crinita (Froel.) Ma (*Gentiana crinita* Froel.)	x	–	–	–	X	10
Geranium maculatum L.	–	–	x	x	X	4
Geum canadense Jacq.	x	x	x	–	X	1
Glechoma hederacea L.	x	x	x	x	X	*
Gleditsia triacanthos L.	–	22	–	–	N	2
SF***Glyceria grandis*** S. Watson	–	–	–	33	N	10
Hackelia virginiana (L.) I. M. Johnst.	x	28	x	x	X	0
Hamamelis virginiana L.	–	25	–	–	N	8
Helenium autumnale L.	–	–	–	34	N	5
Helianthus decapetalus L.	R	–	–	–	R	5
Helianthus divaricatus L.	x	x	x	x	X	5
Helianthus grosseserratus M. Martens	x	–	–	–	X	2
Helianthus mollis Lam.	–	–	–	x	N	9
Helianthus occidentalis Riddell	–	x	–	–	X	10
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	–	x	x	–	X	7
Heterotheca camporum (Greene) Shinners (*Chrysopsis camporum* Greene)	31	–	–	–	N	ad
Heterotheca subaxillaris (Lam.) Britton & Rusby ssp. *latifolia* (Buckley) Semple	32	–	–	–	N	ad
Heuchera richardsonii R. Br.	x	x	–	–	X	8

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Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Hieracium caespitosum Dumort.	–	x	–	–	X	*
Hieracium gronovii L.	x	x	–	x	X	6
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	–	x	–	–	X	6
SF***Hudsonia tomentosa*** Nutt.	x	x	–	–	X	10
SF***Hypericum boreale*** (Britton) E.P. Bicknell	–	x	–	–	X	10
SF***Hypericum canadense*** L.	–	x	–	–	X	10
Hypericum gentianoides (L.) Britton, Sterns & Poggenburg	–	x	–	–	X	7
SF***Hypericum kalmianum*** L.	x	x	–	–	X	10
Hypericum majus (A. Gray) Britton	–	x	–	–	X	6
Hypericum perforatum L.	–	x	–	–	X	*
Hypoxis hirsuta (L.) Coville	x	–	–	–	X	9
Ilex verticillata (L.) A. Gray	–	x	–	–	X	9
Impatiens capensis Meerb.	–	–	–	x	N	4
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	x	x	–	X	10
Iris germanica L.	–	–	–	–	X	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	x	–	x	X	5
Juglans nigra L.	x	x	–	–	X	5
Juncus acuminatus Michx.	–	x	–	–	X	6
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	–	x	–	–	X	7
SF***Juncus arcticus*** Willd. var. ***balticus*** (Willd.) Trautvetter (*Juncus balticus* Willd. var. *littoralis* Engelm.)	x	x	–	–	X	6
Juncus brachycarpus Engelm.	–	x	–	–	X	9
Juncus brachycephalus (Engelm.) Buchenau	–	x	–	–	X	9
Juncus bufonius L.	–	x	–	–	X	5
Juncus canadensis J. Gay ex Laharpe	x	x	–	–	X	7
Juncus dudleyi Wiegand	x	x	–	–	X	4
Juncus effusus L.	–	x	x	x	X	7
Juncus greenei Oakes & Tuck.	x	x	–	–	X	8
Juncus interior Wiegand	–	x	–	–	X	6
Juncus marginatus Rostk.	–	x	–	–	X	9
SF***Juncus scirpoides*** Lam.	–	x	–	–	X	9
Juncus tenuis Willd.	x	x	–	–	X	0
Juncus torreyi Coville	x	x	–	–	X	4
Juniperus virginiana L.	–	30	–	x	N	0
Kochia scoparia (L.) Schrad.	–	–	–	–	X	*
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	x	x	x	–	X	7
Krigia biflora (Walter) S.F. Blake	x	x	–	–	X	7
Krigia virginica (L.) Willd.	x	x	x	–	X	6

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Lactuca biennis (Moench) Fernald	x	–	–	x	X	4
Lamium purpureum L.	–	x	–	x	N	*
Lechea mucronata Raf. (*Lechea villosa* Elliott)	x	x	x	–	X	6
Lechea pulchella Raf. var. *moniliformis* (E.P. Bicknell ex Britton) Mohlenbr. (*Lechea pulchella* Raf.)	x	12	–	–	X	7
Lechea tenuifolia Michx.	–	–	x	–	X	8
Leersia oryzoides (L.) Sw.	x	–	–	x	X	4
Leonurus cardiaca L.	–	25	–	x	X	*
Lepidium virginicum L.	x	x	x	–	X	0
Lespedeza capitata Michx.	x	x	x	–	X	4
Lespedeza hirta (L.) Hornem.	x	x	x	–	X	6
Lespedeza virginica (L.) Britton	–	x	–	–	X	4
Liatris aspera Michx.	x	x	x	–	X	6
Liatris cylindracea Michx.	–	x	–	–	X	8
SF***Liatris scariosa*** (L.) Willd. var. ***nieuwlandii*** (Lunell) E. G. Voss	–	26	–	–	N	5
Liatris spicata (L.) Willd.	x	x	–	–	X	6
Ligustrum vulgare L.	–	7	–	–	N	*
Lilium michiganense Farw.	–	–	–	x	N	8
Linaria vulgaris Mill.	–	25	–	–	N	*
Lindernia dubia (L.) Pennell (*Lindernia anagallidea* (Michx.) Pennell)	x	x	–	–	X	6
SF***Lipocarpha drummondii*** (Nees) G.C. Tucker (*Hemicarpha drummondii* Nees)	–	x	–	–	X	10
Lipocarpha micrantha (Vahl) G.C. Tucker (*Hemicarpha micrantha*)	x	x	–	–	X	6
Lithospermum canescens (Michx.) Lehm.	x	–	–	x	X	8
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	x	x	x	X	8
Lobelia kalmii L.	x	–	–	–	X	10
Lobelia siphilitica L.	–	R	–	34	N	6
SF***Lonicera dioica*** L.	–	–	–	x	N	10
Lonicera maackii (Rupr.) Maxim.	x	x	–	x	X	*
Lonicera tatarica L.	–	x	–	–	X	*
Lonicera × *bella* Zabel [*L. tartarica* × *L. morrowii*]	x	x	–	–	X	*
Lonicera × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides] (Lonicera* × *muendeniensis* Rehder))	x	–	–	–	X	*
Ludwigia alternifolia L.	x	x	–	–	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	x	–	–	–	X	5
Ludwigia polycarpa Short & R. Peter	x	x	–	–	X	6
Lupinus perennis L. var. occidentalis S. Watson	x	x	x	x	X	7

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	x	–	–	–	X	7
Lycopus americanus Muhl. ex W.P.C. Barton	x	x	x	–	X	5
Lycopus uniflorus Michx.	–	x	–	–	X	7
Lysimachia lanceolata Walter	x	–	–	–	X	7
Lysimachia × *producta* (A. Gray) Fernald	48	–	–	–	N	8
Lysimachia terrestris (L.) Britton	x	x	–	–	X	8
Lythrum salicaria L.	x	x	–	–	X	*
SF***Maianthemum canadense*** Desf.	–	–	–	x	N	10
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	x	–	x	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	–	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	x	x	x	X	5
Malus coronaria (L.) Mill.	–	–	x	–	X	4
Malus ioensis (Alph. Wood) Britton	x	–	–	–	X	3
Medeola virginiana L.	–	–	–	x	N	10
Medicago lupulina L.	–	x	–	–	X	*
Melilotus alba Medik.	x	x	–	–	X	*
Melilotus officinalis (L.) Lam.	x	x	–	–	X	*
Menispermum canadense L.	–	–	–	x	X	5
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	x	–	–	–	X	5
Mimulus ringens L.	x	–	–	–	X	6
Mirabilis nyctaginea (Michx.) MacMill.	x	22	–	–	X	ad
SF***Mitchella repens*** L.	–	–	–	x	N	10
Mollugo verticillata L.	–	x	–	–	X	ad
Monarda fistulosa L.	x	x	x	34	X	4
Monarda punctata L.	x	x	x	x	X	5
Morus alba L.	x	R	–	–	X	*
Muhlenbergia mexicana (L.) Trin.	x	–	–	–	X	5
Nepeta cataria L.	–	25	–	–	N	*
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	x	x	x	–	X	6
Nyssa sylvatica Marshall	x	x	x	x	X	8
Oenothera biennis L.	x	x	x	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	x	x	–	X	7
Oenothera laciniata Hill	x	–	–	–	X	3
Onoclea sensibilis L.	x	x	x	x	X	8
Opuntia cespitosa Raf. (*O. humifusa* (Raf.) Raf.)	x	x	x	–	X	5
Osmorhiza claytonii (Michx.) C.B. Clarke	x	–	–	x	X	3

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Osmunda claytoniana L.	–	x	–	–	X	9
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	x	x	x	x	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	x	x	–	x	X	7
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	x	x	–	–	X	6
SF***Panax trifolius*** L.	–	–	–	x	N	10
Panicum dichotomiflorum Michx.	–	–	–	51	N	0
Panicum rigidulum Bosc ex Nees	–	x	–	–	X	5
Panicum virgatum L.	x	x	x	x	X	5
Parietaria pensylvanica Muhl. ex Willd.	–	x	–	–	X	3
Parthenocissus quinquefolia (L.) Planch.	x	x	–	x	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	x	x	x	–	X	1
Pascopyrum smithii (Rydb.) A. Löve (*Agropyron smithii* Rydb.)	x	–	–	–	X	ad
Paspalum setaceum Michx. var. *muhlenbergii* (Nash) D.J. Banks (*Paspalum ciliatifolium* Michx. var. *muhlenbergii* (Nash) Fernald)	–	x	–	–	X	6
Paspalum setaceum Michx. var. *stramineum* (Nash) D.J. Banks (*Paspalum ciliatifolium* Michx. var. *stramineum* (Nash) Fernald)	–	x	–	–	X	4
Pedicularis canadensis L.	x	22	–	–	X	9
Penthorum sedoides L.	x	–	–	–	X	5
Persicaria amphibia (L.) Delarbe (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman and P. coccineum Willd.)	x	x	–	–	X	4
SF***Persicaria arifolia*** (L.) Haroldson (*Polygonum arifolium* L. var. *pubescens* (Keller) Fernald)	–	x	–	x	X	9
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	x	–	–	–	X	7
SF***Persicaria hydropiperoides*** (Michx.) Small (*Polygonum opelousanum* Riddell var. *adenocalyx* Stanford)	–	x	–	–	X	9
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	x	–	–	–	X	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	–	x 2	–	x	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	x	x	–	–	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	–	R	–	x	N	8
Phalaris arundinacea L.	–	25	–	x	N	*
SF***Phemeranthus rugospermus*** (Holz.) Kiger (*Talinum rugospermum* Holz.)	X 27	–	–	–	X	10
Phlox bifida L.C. Beck	17	–	–	–	N	8
Phlox glaberrima L. ssp. *interior* (Wherry) Wherry (*Phlox glaberrima* L. var. *interior* Wherry)	x	x	–	–	X	8
Phlox paniculata L.	–	–	–	–	X	ad
Phlox pilosa L.	x	x	x	x	X	7
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	x	x	–	–	X	1

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Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Phryma leptostachya L.	–	–	–	x	N	6
Physalis virginiana Mill.	x	x	–	–	X	4
Phytolacca americana L.	x	x	x	x	X	1
Pilea pumila (L.) A. Gray	–	x	–	–	X	5
SF***Pinus banksiana*** Lamb.	–	x	–	–	X	9
Pinus sylvestris L.	–	–	–	–	X	*
Plantago lanceolata L.	–	x	–	–	X	*
Plantago major L.	–	–	–	–	X	*
Plantago rugelii Decne.	x	–	–	–	X	0
SF***Platanthera flava*** (L.) Lindl. var. ***herbiola*** (R. Br.) Luer (*Habenaria flava* (L.) R. Br. var. *herbiola* (R. Br.) Ames & Correll)	15	–	–	–	N	10
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* (Michx.) Lodd.)	–	x	–	–	X	10
Platanus occidentalis L.	–	–	–	51	N	5
Poa compressa L.	x	x	x	x	X	*
Poa pratensis L.	x	x	x	x	X	*
Podophyllum peltatum L.	–	–	–	x	X	4
Polanisia dodecandra (L.) DC. ssp. *dodecandra* (*Polanisia graveolens* Raf.)	–	25	–	–	X	0
Polygala cruciata L. var. *aquilonia* Fernald & B. G. Schub.	x	x	–	–	X	10
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	–	x	–	–	X	9
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	x	–	–	X	3
Polygonatum pubescens (Willd.) Pursh	–	–	–	x	N	7
SF***Polygonum articulatum*** L. (*Polygonella artciulata* (L.) Meisn.)	–	x	x	–	X	10
Polygonum tenue Michx.	–	x	–	–	X	7
Polystichum acrostichoides (Michx.) Schott	–	–	–	x	N	9
Populus alba L.	–	x	–	x	X	*
Populus deltoides W. Bartram ex Marshall	x	x	x	x	X	2
Populus grandidentata Michx.	–	x	–	–	X	6
Populus tremuloides Michx.	x	x	x	x	X	4
Potentilla simplex Michx.	x	x	x	x	X	4
Prenanthes alba L.	x	–	–	x	X	5
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	x	R	–	–	X	6
SF***Prunus pensylvanica*** L. f.	x	x	–	x	X	5
Prunus pumila L.	x	–	–	–	X	8
Prunus serotina Ehrh.	x	x	x	x	X	1
Prunus virginiana L.	x	x	x	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	–	x	–	–	X	2
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	x	x	x	X	5

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	x	–	–	–	X	5
Quercus alba L.	x	x	x	x	X	5
Quercus bicolor Willd.	–	R	–	–	N	6
Quercus palustris Munchh.	x	x	–	–	X	8
Quercus rubra L.	R	–	–	–	R	7
Quercus velutina Lam.	x	x	x	x	X	6
Ranunculus abortivus L.	–	–	–	x	N	0
Ranunculus sceleratus L.	–	–	–	x	N	6
Rhamnus cathartica L.	23	22	–	x	N	*
SF***Rhexia virginica*** L.	x	x	–	–	X	10
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	x	x	x	–	X	6
Rhus typhina L.	x	x	–	–	X	1
Rhynchospora capitellata (Michx.) Vahl	–	x	–	–	X	8
SF***Rhynchospora macrostachya*** Torr. ex A. Gray	x	x	–	–	X	10
SF***Rhynchospora scirpoides*** (Torr.) Grisebach (*Psilocarya scirpoides* Torr.)	–	x	–	–	X	10
Robinia hispida L. var. *fertilis* (Ashe) R. T. Clausen	x	–	–	–	X	ad
Robinia pseudoacacia L.	x	x	–	–	X	ad
Rosa carolina L.	x	x	x	x	X	5
Rosa multiflora Thunb.	–	x	–	x	X	*
Rosa palustris Marshall	x	x	–	–	X	7
Rotala ramosior (L.) Koehne	–	x	–	–	X	10
Rubus allegheniensis Porter	x	–	–	–	X	3
Rubus flagellaris Willd.	x	x	x	x	X	3
Rubus flagellaris Willd. (SF***Rubus enslenii*** Tratt.)	–	x	–	–	X	10
Rubus hispidus L.	x	x	–	–	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	x	x	–	–	X	3
Rubus occidentalis L.	x	x	x	x	X	2
Rubus pensilvanicus Poir.	–	x	–	x	X	3
SF***Rubus setosus*** Bigelow (*Rubus wheeleri* L.H. Bailey in W&R)	–	50	–	–	N	10
Rudbeckia hirta L.	x	x	–	–	X	1
Rudbeckia laciniata L.	–	–	–	x	N	5
Rumex acetosella L.	x	x	x	–	X	*
Rumex obtusifolius L.	–	–	–	x	N	0
Sagittaria graminea Michx.	x	–	–	–	X	9
Sagittaria latifolia Willd.	x	–	–	–	X	4
Salix amygdaloides Andersson	–	x	–	–	X	5
Salix bebbiana Sarg.	–	x	–	–	X	8

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*	*C*	*D*		
Salix discolor Muhl.	x	x	–	–	X	2
Salix eriocephala Michx.	x	x	x	x	X	5
Salix humilis Marshall	x	x	x	–	X	6
Salix interior Rowlee	x	x	x	x	X	1
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	x	x	x	–	X	7
Salix nigra Marshall	x	x	–	x	X	4
Salix petiolaris Sm.	x	–	–	–	X	7
SF***Salix sericea*** Marshall	x	–	–	–	X	10
Salsola tragus L. (*Salsola kali* L. var. *tenuifolia* Tausch)	–	x	–	–	X	*
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	–	–	x	X	1
Sanicula canadensis L.	x	x	–	–	X	7
Sanicula marilandica L.	–	22	–	–	N	6
Saponaria officinalis L.	x	x	x	x	X	*
Sassafras albidum (Nutt.) Nees	x	x	x	x	X	3
SF***Sceptridium dissectum*** (Spreng.) Lyon (*Botrychium dissectum* Spreng.)	–	R	–	–	N	6
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	x	x	X	X	5
SF***Schoenoplectiella hallii*** (A. Gray) Lye (*Schoenoplectus hallii* (A. Gray) S.G. Sm.; *Scirpus hallii* A. Gray)	–	x	–	–	X	10
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	x	–	–	–	X	6
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl var. *creber* Fernald)	–	x	–	–	X	5
Scirpus atrovirens Willd.	–	–	x	x	X	4
Scirpus cyperinus (L.) Kunth	x	x	x	x	X	6
Scirpus pendulus Muhl.	–	x	–	–	X	4
SF***Scleria pauciflora*** Muhl. ex Willd. var. ***caroliniana*** (Willd.) Alph. Wood	–	x	–	–	X	10
SF***Scleria reticularis*** Michx.	x	x	–	–	X	10
Scleria triglomerata Michx.	x	x	–	–	X	10
Scrophularia lanceolata Pursh	x	x	–	x	X	5
Scrophularia marilandica L.	x	x	–	–	X	4
Scutellaria galericulata L. (*Scutellaria epilobiifolia* A. Ham.)	x	–	–	–	X	5
Sedum album L.	R	–	–	–	R	*
SF***Selaginella rupestris*** (L.) Spring	x	–	–	–	X	10
Setaria faberi R.A.W. Herrm.	–	–	–	–	X	*
Setaria italica (L.) P. Beauv.	–	–	–	–	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	–	–	–	–	X	*
Silene antirrhina L.	x	x	x	–	X	1
Silene latifolia Poir. (*Lychnis alba* Mill.)	–	x	–	–	X	*

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	A	*B*	*C*	*D*		
Silene stellata (L.) W. T. Aiton	–	35	x	–	X	6
Silphium perfoliatum L. var. *perfoliatum*	–	–	–	34	N	5
Sisyrinchium albidum Raf.	–	10	–	x	N	7
SF***Sisyrinchium angustifolium*** Mill.	–	x	–	–	X	10
SF***Sisyrinchium atlanticum*** E.P. Bicknell	x	–	–	–	X	10
Sium suave Walter	–	R	–	–	N	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson	x	–	–	x	X	5
Smilax rotundifolia L.	x	–	–	x	X	7
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	x	x	–	–	X	5
Solanum dulcamara L.	x	–	–	x	X	*
Solanum ptychanthum Dunal	x	x	–	–	X	0
Solidago altissima L.	x	–	x	x	X	1
Solidago caesia L.	x	x	–	x	X	7
Solidago gigantea Aiton	x	–	x	x	X	4
Solidago juncea Aiton	x	x	–	–	X	5
Solidago nemoralis Aiton	x	x	x	–	X	4
Solidago patula Muhl. ex Willd	–	–	–	x	X	9
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	x	x	–	–	X	6
SF***Solidago speciosa*** Nutt.	x	x	x	–	X	7
Solidago uliginosa Nutt.	–	x	–	–	X	10
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	–	–	–	–	X	*
Sonchus oleraceus L.	–	–	–	–	X	*
Sorghastrum nutans (L.) Nash	x	x	–	x	X	5
Spartina pectinata Link	x	28	x	–	X	4
Sphenopholis intermedia (Rydb.) Rydb.	x	x	–	–	X	4
SF***Sphenopholis obtusata*** (Michx.) Scribn.	–	x	–	–	X	7
Spiraea alba Du Roi	x	x	–	–	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	x	x	–	–	X	9
Spiranthes cernua (L.) Rich.	x	x	–	–	X	7
SF***Spiranthes lacera*** (Raf.) Raf.	–	25	–	–	N	10
SF***Spiranthes magnicamporum*** Sheviak	–	1	–	–	N	8
Sporobolus cryptandrus (Torr.) A. Gray	x	–	–	–	X	7
Sporobolus vaginiflorus (Torr. ex A. Gray) Alph. Wood	–	x	–	–	X	0
SF***Stachys hyssopifolia*** Michx.	x	–	–	–	X	9
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	x	x	–	–	X	5
Stellaria media (L.) Vill.	–	x	–	x	N	*

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve (*Aster borealis* Prov.)	x	–	–	–	X	10
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	x	x	x	–	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	x	–	–	–	X	5
Symphyotrichum laeve (L.) A. Löve & D. Löve var. *laeve* (*Aster laevis* L.)	–	24	–	–	N	9
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	x	x	–	X	X	3
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	x	x	–	–	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	x	x	–	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	x	x	x	–	X	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)	x	–	–	–	X	9
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	x	–	–	x	X	7
SF***Symphyotrichum sericeum*** (Vent.) G.L. Nesom (*Aster sericeus* Vent.)	–	18	–	–	N	10
Symplocarpus foetidus (L.) W. Salisb.	–	–	–	x	N	8
Syringa vulgaris L.	–	–	–	–	X	*
Taraxacum erythrospermum Andrz. ex Besser	–	x	–	x	X	*
Taraxacum officinale F. H. Wiggers	–	x	–	x	X	*
Tephrosia virginiana (L.) Pers.	x	x	–	–	X	8
Teucrium canadense L.	–	–	x	x	X	3
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	x	–	–	–	X	7
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai	x	x	–	x	X	6
Tilia americana L.	–	–	–	22	N	5
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	–	x	X	2
Tradescantia ohiensis Raf.	x	x	x	x	X	2
Tragopogon dubius Scop.	x	x	x	–	X	*
Tragopogon pratensis L.	–	–	–	–	X	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald	x	x	–	–	X	8
SF***Trichostema dichotomum*** L.	–	x 14	–	–	X	5
SF***Trientalis borealis*** Raf.	–	–	–	x	X	10
Trifolium pratense L.	–	–	–	–	X	*
Trifolium repens L.	x	x	–	–	X	*
Triplasis purpurea (Walter) Chapm.	x	x	x	–	X	7
Typha angustifolia L.	x	22	–	x	X	1
Typha latifolia L.	x	x	–	x	X	1
Ulmus americana L.	–	x	–	–	X	3
Ulmus pumila L.	–	22	–	–	X	*

Table 18 (continued). Summary of species verified and reported at Inland Marsh Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 19. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit				Unit-wide Species Status	CoC
	A	*B*	*C*	*D*		
Urtica dioica L.	–	–	–	x		*
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	–	–	–	x	N	2
SF***Utricularia gibba*** L.	40	–	–	–	N	10
SF***Utricularia purpurea*** Walter	x	–	–	–	X	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen (*Utricularia vulgaris* L.)	x	–	–	–	X	9
Vaccinium angustifolium Aiton	x	x	–	–	X	5
Vaccinium corymbosum L.	–	x	–	–	N	8
Vaccinium pallidum Alton	x	x	–	x	X	5
Verbascum thapsus L. ssp. *thapsus*	–	x	x	x	X	*
Verbena bracteata Cav. ex Lag. & Rodr.	–	x	–	–	X	0
Verbena hastata L.	x	x	–	x	X	4
Verbena stricta Vent.	x	–	–	–	X	4
Verbena urticifolia L.	x	–	–	–	X	5
Verbena urticifolia var. *leiocarpa* L.M. Perry & Fernald	–	–	–	–	N	10
Veronica arvensis L.	–	x	–	–	X	*
Veronicastrum virginicum (L.) Farw.	–	–	–	34	N	8
Viburnum acerifolium L.	x	34	–	x	X	9
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* Fernald)	–	x	–	34	N	ad
Viburnum lentago L.	–	–	–	x	N	4
Viburnum opulus L. var. *opulus*	–	25	–	–	N	*
Viola affinis Leconte	–	–	–	x	N	5
SF***Viola blanda*** Willd. (*Viola incognita* var. *forbesii* Brainerd)	–	–	–	x	N	10
Viola cucullata Aiton	–	25	–	–	N	9
Viola lanceolata L.	x	x	–	–	X	7
Viola pedata L. (*Viola pedata* L. *linearíloba* DC.)	x	x	–	x	X	9
Viola pubescens Aiton	43	–	–	–	N	5
Viola sagittata Aiton var. *sagittata*	–	x	–	x	X	7
Viola sororia Willd.	–	25	–	x	N	3
Vitis aestivalis Michx.	–	x	–	–	X	7
SF***Vitis labrusca*** L.	x	x	–	x	X	9
Vitis riparia Michx.	x	x	x	x	X	2
Vulpia octoflora (Walter) Rydb.	x	x	–	–	X	4
SF***Woodwardia virginica*** (L.) Sm.	–	x	–	–	X	10
Xanthium strumarium L.	–	–	–	–	X	*
SF***Xyris torta*** Sm.	–	x	–	–	X	10

Table 19. Sources of new species verified and reported from Inland Marsh.

Notes	Source	Date	Species
1	K. Board and K. Dritz	29 Sept 1996	*Spiranthes magnicamporum*
2	K. Dritz	16 Aug 1992	*Persicaria pensylvanica*
3	K. Dritz (MOR)	10 Sept 1992	*Apera interrupta*
4	L. Forste and L. Schelling	16 June 2003	*Asclepias amplexicaulis*
5	E. Greiner and K. Quinlan	15 May 2003	*Alliaria petiolata*
6	J. Hunter and B. Plampin	1 May 2001	*Erigeron philadelphicus*
7	J. Hunter and J. Bess	20–21 July 2001	*Baptisia lactea*, *Ligustrum vulgare*
8	J. Hunter	16 July 2002	*Epipactis helleborine*
9	D. Mickey	Fall 2003	*Commelina communis*
10	M. Newgent and B. Plampin	11 May 1999	*Sisyrinchium albidum*
11	M. Newgent	11 May 1999	*Cardamine pensylvanica*
12	M. Newgent	Aug 1992	*Lechea pulchella* var. *moniliformis*
13	M. Newgent	27 Sept 1994	*Gentiana andrewsii*
14	M. Newgent and K. Board	Aug 1992	*Trichostema dichotomum*
15	N.B. Pavlovic	1994	*Platanthera flava* var. herbiola
16	N.B. Pavlovic	Sept 2000	*Fallopia japonica*
17	N.B. Pavlovic and L. Forste	30 Apr 2002	*Phlox bifida*
18	B. Plampin	1992	*Symphyotrichum sericeum*
19	B. Plampin	3 June 2004	*Echinocystis lobata*
20	B. Plampin	6 June 1998	*Artemisia vulgaris*
21	B. Plampin	27 Sept 1994	*Drosera intermedia*
22	T. Post, B. Plampin, et al.	24 June 1998	*Asplenium platyneuron*, *Botrychium virginianum*, *Gleditsia triacanthos*, *Mirabilis nyctaginea*, *Pedicularis canadensis*, *Rhamnus cathartica*, *Sanicula marilandica*, *Tilia americana*, *Typha angustifolia*, *Ulmus pumila*
23	K. Quinlan	12 Sept 2003	*Rhamnus cathartica*
24	Shirley Heinze Land Trust Hike	18 Oct 2000	*Boechera canadensis*, *Symphyotrichum laeve*
25	Shirley Heinze Land Trust Hike	6 June 2002	*Capsella bursa-pastoris*, *Claytonia virginica*, *Hamamelis virginiana*, *Leonurus cardiaca*, *Linaria vulgaris*, *Nepeta cataria*, *Phalaris arundinacea*, *Polanisia dodecandra*, *Spiranthes lacera*, *Viburnum opulus* var. *opulus*, *Viola cucullata*, *Viola sororia*
26	Shirley Heinze Land Trust List	June 2001	*Liatris scariosa* var. *nieuwlandii*
27	D.A. Wells	3 Sept 1995	*Phemeranthus rugospermus*
28	Shirley Heinze Land Trust List	2005	*Aristida oligantha*, *Asclepias verticillata*, *Cornus florida*, *Hackelia virginiana*, *Spartina pectinata*
29	Wilhelm	26 Jul 1994	*Dichanthelium oligosanthes* ssp. *oligosanthes*
30	M. Newgent	9 Sept 2005	*Juniperus virginiana*
31	B. Plampin and D. Hamilla	2009	*Heterotheca camporum*
32	N.B. Pavlovic, C. Weiskerger, C.J. Hoiland, and K. Pitstick	14 Aug 2012	*Heterotheca subaxillaris* ssp. *latifolia*
33	T. Troche and M. Huft	12 July 2012, 18 Aug 2012	*Bidens bipinnata*, *Glyceria grandis*
34	Shirley Heinze Land Trust List	18 Sept 2012	*Baptisia leucantha*, *Boehmeria cylindrica*, *Eryngium yuccifolium*, *Helenium autumnale*, *Lobelia siphilitica*, *Monarda fistulosa*, *Silphium perfoliatum*, *Veronicastrum virginicum*, *Viburnum dentatum*
35	B. Plampin	22 Sept 2012	*Silene stellata*
36	L. Brenan (pers. comm.)	20 Dec 2013	*Carduus nutans*

Table 19 (continued). Sources of new species verified and reported from Inland Marsh.

Notes	Source	Date	Species
37	F. Swink, K. Johnson, and E. Rossi	17 July 1990	*Dracocephalum parviflorum*
38	L. Rericha and G. Wilhelm	12 Sept 2006	*Aralia hispida*
39	N.B. Pavlovic	29 Apr 2014	*Claytonia virginica*
40	Plampin and Hamilla	13 Aug 2007	*Utricularia gibba*
41	R. Hawksworth, D. Mason, and G. Tonkovich	June 2016	*Eragrostis trichodes*
42	Huff	24 Sept 2016	*Conoclinium coelestinum*
43	N.B. Pavlovic	18 May 2018	*Viola pubescens*
44	C. Deam and F. Swink	1935	*Acmispon americanus*
45	B. Plampin and D. Hamilla	13 Aug 2007	*Corallorhiza odontorhiza*
46	F. Swink	31 Aug 1986	*Chenopodium subglabrum*
47	K. Dritz	3 Sept 1989	*Diodia teres*
48	S. von Oettingen (MOR)	27 July 1982	*Lysimachia* × *producta*
49	N. Pilla and D. Botka	10 July 2020	*Eleocharis atropurpurea*
50	K. Dritz	3 July 1983	*Rubus setosus*
51	Shirley Heinze Land Trust List	Apr 2016	*Eutrochium maculatum*, *Panicum dichotomiflorum*, *Platanus occidentalis*

Floristic summary

Inland Marsh has a total of 603 taxa divided into 486 native taxa, 20 adventive taxa, and 96 exotic taxa (Table 20). Of the native taxa, 467 are species, 16 are varieties, and four are hybrids. Of the 466 native species, 387 are confirmed, 78 are new, two are reported (*Helianthus decapetalus* and *Quercus rubra*), and none are extirpated. Of the 41 state-listed species, 11 are endangered, 17 are threatened, and 13 are watch list. Besides the native species, Inland Marsh has a total of 20 adventive and 93 exotic species. Inland Marsh has a mean CoC of 5.66 with an FQI of 126.3, ranking it 11th of the 15 park units.

The 83 new species recorded for Inland Marsh since 1990 include *Amelanchier interior*, *A. laevis*, *Anemone quinquefolia*, *Aralia racemosa*, *Aristida oligantha*, *Asclepias exaltata*, *Asplenium platyneuron*, *Betula alleghaniensis*, *Boechera canadensis*, *Botrychium virginianum*, *Cardamine pensylvanica*, *Claytonia virginica*, *Clintonia borealis*, *Echinocystis lobata*, *Eleocharis acicularis*, *Eleocharis atropurpurea*, *Equisetum hyemale* ssp. *affine*, *Erigeron philadelphicus*, *Gentiana andrewsii*, *Hamamelis virginiana*, *Liatris scariosa* var. *nieuwlandii*, *Lobelia siphilitica*, *Persicaria sagittata*, *Phlox bifida*, *Platanthera flava* var. *herbiola*, *Quercus bicolor*, *Sanicula marilandica*, *Sisyrinchium albidum*, *Sium suave*, *Spiranthes lacera*, *S. magnicamporum*, *Symphyotrichum laeve* var. *laeve*, *S. sericeum*, *Tilia americana*, *Viola cucullata*, and *Viola sororia*. *Rubus plus* L.H. Bailey (*Rubus hispidus* L.), per Wilhelm and Rericha (2017), has been documented from Coulter Prairie. New adventive species include *Bidens bipinnata*, *Heterotheca camporum*, *Gleditsia triacanthos*, and *Heterotheca subaxillaris*. New invasive species include *Apera interrupta*, *Artemisia vulgaris*, *Commelina communis*, *Epipactis helleborine*, *Fallopia japonica*, *Ligustrum vulgare*, *Linaria vulgaris*, *Nepeta cataria*, *Phalaris arundinacea*, *Rhamnus cathartica*, and *Viburnum opulus* var. *opulus*. In terms of state-listed species, growth forms, and confirmation status, Coulter Prairie (Inland Marsh B) stands out above Inland Marsh A and C. Inland Marsh A does, however, have a floristic quality (cc = 93) comparable to that of Inland Marsh C (Coulter Prairie) (105). If wetland and savanna restoration of Inland Marsh A is done in a manner comparable to SHLT's management at Coulter Prairie, floristic quality of Inland Marsh A could be expected to increase.

Table 20. Summary of floristic statistics by subunit of Inland Marsh. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

	Subunit				
Category	*A*	*B*	*C*	*D*	Entire Unit
Area (ha/acres)	232 / 575	28/68	3/6	11/26	274 / 675
Special flora total	32	49	4	16	73
Confirmed	27	42	4	1	53
New	4	6	0	15	19
Reported	0	1	0	0	1
Extirpated	0	0	0	0	0
Total taxa, FNA/ITIS	333	426	125	193	603
Total native taxa, FNA/ITIS	292	356	110	158	486
Native species, FNA/ITIS	281	342	106	156	466
Native variety, FNA/ITIS	10	12	3	2	16
Native hybrid, FNA/ITIS	3	3	1	0	4
Total adventive taxa, FNA/ITIS	8	11	1	4	21
Total adventive species, FNA/ITIS	7	11	1	4	20
Total adventive variety, FNA/ITIS	1	0	0	0	1
Total adventive hybrid, FNA/ITIS	0	0	0	0	0
Total exotic taxa, FNA/ITIS	33	59	14	31	96
Total exotic species, FNA/ITIS	31	57	14	31	93
Total exotic variety, FNA/ITIS	0	1	0	0	1
Total exotic hybrid, FNA/ITIS	2	1	0	0	2
Total Indiana-listed	18	29	3	7	41
Endangered	4	7	0	2	11
Threatened	7	13	2	2	17
Rare	0	0	0	0	0
Watch List	7	9	1	3	13
Extirpated	0	0	0	0	0
Sum CC	1,604	2,000	530	819	2,810
Sum CC adventive & invasive	1,567	1,935	516	786	2703
Mean CoC	5	5	5	5	5
Mean CoC with adventive and invasive	5	4	4	4	4
FQI	93	105	50	65	126
FQI with adventive and invasive	85	93	46	56	109

Conservation issues

Inland Marsh consists of four community types: aquatic, dune complex, marsh complex, and savanna complex (see Figure 15). Most of the disturbed areas were sand-mined except those south of Stagecoach Road that were, or are, agricultural land. Inland Marsh proper features a mosaic of terrestrial community types within close proximity. Thus, we have prairie openings, sand blows, oak scrub of the black and white oak variety, oak savanna, oak woodland, and forest. Multiple studies have found that this diversity of structural types promotes floristic and faunal diversity within the unit (Pavlovic et al. 2006; Grundel and Pavlovic 2007a, 2007c; Grundel et al. 2010, 2011).

Inland Marsh A

In Inland Marsh A, 280 native plants and 31 exotic species have been found. Mean CoC is 5.38 and FQI is 93. Inland Marsh A was the focus of KBB habitat management from 1992 until 2012 when the butterfly was extirpated by extreme weather and phenological mismatch (Patterson et al. 2019). Two phenological mismatches occurred that year: 1) high temperatures in March between 60°F and 80°F maximums caused KBB eggs to hatch prior to emergence of its larval food plant, wild lupine; and 2) drought in June killed lupines, creating an absence of food for the second brood of KBB.

Prescribed burns by park staff have become a regular feature of the management regime. Since the KBB was already listed as an endangered species, Inland Marsh was divided into four subunits for burning with the stipulations that burns did not occur in adjacent units consecutively. In 1997, Inland Marsh A was changed from four to three burn units to allow a more frequent burn rotation. In the U.S. Fish and Wildlife Service opinion, burning for KBB management was contingent on maintaining a certain base population size. Prior to extirpation, populations had been low in the first decade of the 21st century resulting in the decision to not burn so that the KBB populations could recover. In the absence of fire, a resurgence of oak sprout growth and build-up of leaf litter had degraded the habitat for lupine and the KBB. Thus, burn unit 2 was burned in 2010 because it had not been burned since 2003, a fire interval that is too long to maintain oak savanna floral diversity and wild lupine. The deposition of leaf litter from increasing canopy in the absence of fire will not maintain the groundlayer flora. Mechanical woody removal and use of herbicides on woody species in 2015 may improve this area. It is certain that the KBB is no longer in northwest Indiana after nine years without reported observations (Pavlovic, pers. obs., 2021; Randy Knutson, INDU Wildlife Biologist, pers. comm. with Pavlovic, 2021).

During the period of 2005 to 2013, cutting and use of herbicides on oak sprouts and saplings occurred for KBB habitat improvement. This was important to reduce oak and sassafras dominance and allow understory recovery. Initial management approaches were to cut down smaller saplings and trees, retaining a few remnant trees to create future canopy. While this made sense in hoping to create a mosaic of canopy cover, the subsequent burning during the fall or spring created a highly intense burn with flame heights up to 4 to 6 feet in places because of the abundant fuel lying on the ground. This fire top-killed many of the retained smaller "canopy trees" that were intended to be preserved, and heat was intense enough to kill much of the groundlayer vegetation. The site has converted to a more open prairie dominated by C4 grasses, to the detriment of the forbs and wild lupine that are vital for the KBB. In addition, many of the areas have a few species in the ground flora from the former fire suppression, and the high intensity burns that resulted may have killed isolated forbs that were already sparse under the former dense canopy (Pavlovic, pers. obs., 1995). As of 2015, the groundlayer vegetation is becoming more diverse (Pavlovic, pers. obs., 2005). In 2009, the INDNP conducted a similar restoration at the Dunes Prairie Nature Preserve, but removed all the cut debris prior to reintroducing fire. Removal of woody debris prior to burning resulted in less intense prescribed burns and recovery of the ground layer flora (Pavlovic, pers. obs., 2020). Several adaptive management experiments have documented the effects of woody debris on increasing fire intensity and negatively impacting the ground flora (Brudvig and Asbjornsen 2005, 2007; Brudvig 2010).

Inland Marsh B (Coulter Prairie)

The Coulter Prairie (Inland Marsh B) is owned and managed by the SHLT. It has an astounding 341 native species, 11 adventive species and 57 exotic species (Table 20). Mean CoC is 5.49 and the FQI is 105, the latter being greater than for subunit A, This subunit was formerly called the Dritz Pits because Ken Dritz discovered it in modern times.

This area contains high diversity prairie and wet meadows in a matrix of oak savanna and woodland. Two east-west strips of sand-

mined land separate subunits A and B, and to some extent may prevent the dispersal of plants and animals between them. Since these sand-mined strips harbor numerous special flora, such as *Aralia hispida*, *Juncus scirpoides*, *Hudsonia tomentosa*, *Hypericum gentianoides*, *H. kalmianum*, *Polygonum articulatum*, and *Trichostema dichotoma*, restoration could be initiated by burning to prevent canopy closure and to allow the creation of disturbance patches to promote the rare plants. Thus, besides the regular burning of Coulter Prairie and sprout cutting actively conducted by SHLT, restoration of the sand-mined areas could be an ecologically beneficial goal.

Legally allowed but ecologically destructive re-digging of the ditch along the west side of Inland Marsh A and B on the east side of County Line Road in 2010 may have negatively impacted the wetlands in Inland Marsh and Coulter Prairie. The clearance of the ditch was conducted under pressure from the town of Ogden Dunes due to flooding in basements in low-lying homes. It is unclear whether this action relieved basement flooding because the ditch and homes are separated by Long Lake for more than a mile. The Coulter Prairie site could benefit from a hydrological study to determine whether home wells are drawing down the water table in the preserve. A lower water table may explain the absence of hydrological variation that drives the dynamics of interdunal ponds and creates conditions that allow coastal plain disjunct species to persist in the system. Without such dynamics, the coastal plain species will persist in the soil seed bank until the seeds lose viability. Higher water levels in 2020 slightly reduces these concerns.

Inland Marsh C (University of Chicago property)

Inland Marsh C (3 ha/6 acres) is very forested and has been little studied. The low diversity (106 native, one adventive, and 14 exotic species) indicates a site that has experienced a long period of fire suppression. Mean CoC is 4.77 and the FQI is 50. As far as we are aware, this subunit has not burned since before the 1980s. The authors have spent only a brief time in this tiny unit but installed an oak savanna plot in 2018 as part of a lower Great Lakes region oak savanna project.

Inland Marsh D (Yellow Birch Fen)

Yellow Birch Fen, owned by the SHLT, is just south of Coulter Prairie across the NIPSCO right-of-way and Stagecoach Road. This unit has been undergoing significant restoration by SHLT staff since its acquisition. It has a total of 156 native species, four adventive, and 31 exotic species. The mean CoC and FQI are 5.1 and 65, respectively.

Inland Marsh is a giant of floristic diversity that could improve in quality as park management continues. Continued removal of exotic invasive and problematic native species could be helpful. Reintroduction of silky aster (*Symphyotrichum sericeum*) to the high dune northeast of the former "paint test" area, a known historic location for the species, could enhance the viability of this rare species in the national park. Reintroduction of prairie and savanna plants to the uplands could consolidate the diversity of Inland Marsh.

Unit 6: Bailly

A variety of useful plants as well as animals characterized the Bailly area. In the early nineteenth century, Indians from the far end of Lake Michigan came here to "the home of the Indiana Drug trust" to gather herbs, roots, and bark for dyes and medicine. Their harvest included food and medicine (spice wood, wild pepper, sassafras, tag alder, bone set, yarrow, calamus root, and mints), poisons (poison sumac, poison ivy, briony vine, monk's hood, deadly night shade, and "other horrid spotted plants"), and dyes (fernroots, blood root, and gold thread).

—From Howe (1907), cited in Cook and Jackson (1978)

The Bailly Unit occupies approximately 534 hectares (1,320 acres), principally along the Little Calumet River and its adjacent ravines and uplands northwest of Chesterton and north and northeast of Burns Harbor (Figures 16 and 17). Wilhelm divided this unit into six subunits; however, we have divided subunit F, west of the 149 corridor, into five additional subunits (G to K), in part due to separation of these subunits by the Little Calumet River. Insular subunits I, J, and K have not been surveyed separately, so they are not included in the flora table.

Bailly was surveyed by Wilhelm on 4 August 1994, 21 July 1997, and 5 September 1997. In the 1990s Pam Benjamin (former INDU botanist) added numerous species to Bailly D while researching the restoration of what is now known as Mnoke Prairie.

Bailly is one of four INDU units with bottomland forest: the three other areas are Furnessville along the headwaters of Dunes Creek (Munson Ditch) (Unit 9), Dunes State Park (Unit 8) along Dunes Creek, and Heron Rookery (Unit 12). For a detailed discussion of the Bailly area, especially about the effects of post-settlement anthropogenic disturbances, see Cook and Jackson (1978). Most of the natural plant communities of the Bailly area have been destroyed or damaged by farming, grazing, and other human activities as a result of the agricultural practices on the abundant rich moraine soils. The Marquette Plan bike trail from west of Burns Harbor town center to the east side of Mnoke Prairie could pave over species in its path and could fragment the narrow riverine habitat if it traverses along the Little Calumet River and through the prairie, although it will also connect the east and west subunits.

Before European settlement, Bailly consisted of five general community types: the mesophytic forest and bottomland floodplain, oak hickory forest, pin oak flatwoods, and mesophytic prairie on the uplands (see Figure 12). Nearly all the upland areas in Bailly (about 50% of the unit) and much of the floodplain area itself have been greatly altered from agriculture and associated activities. Much of the area that remains is mapped as natural area only because Bailly is the only INDU unit in which a riparian community with forested mesophytic bluffs is intact.

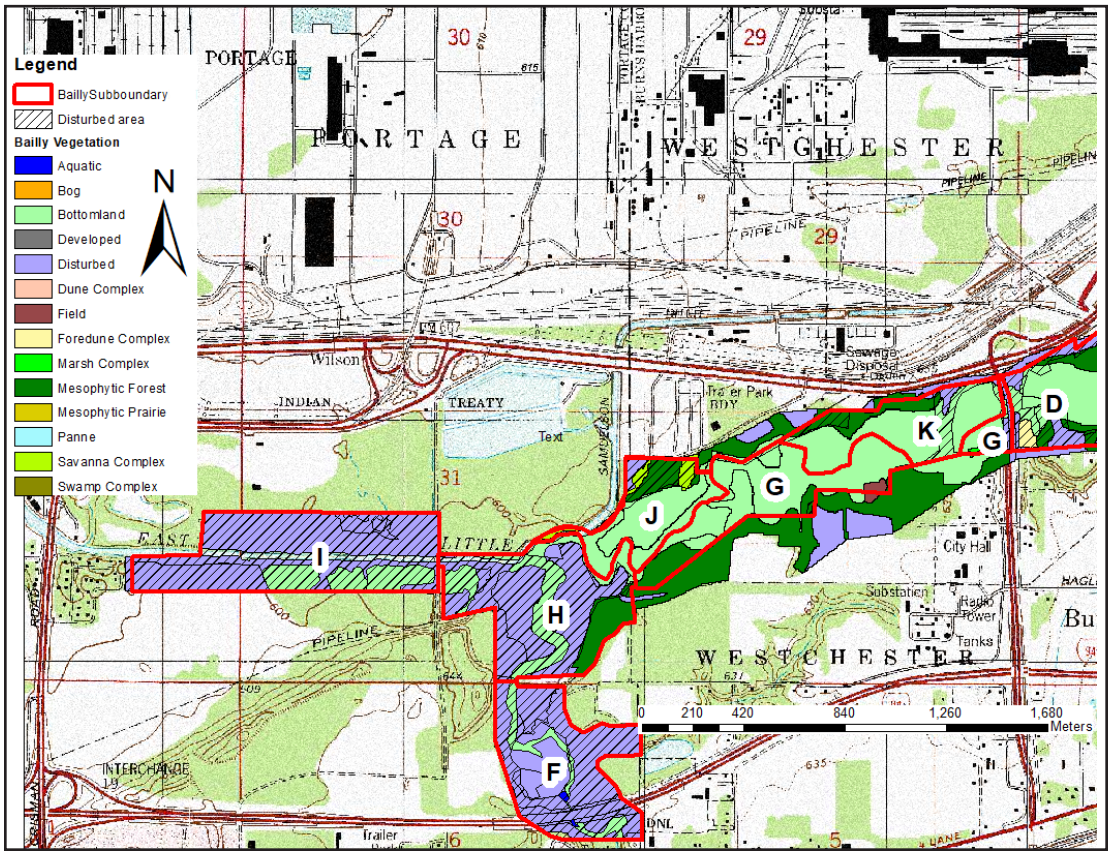


Figure 16. Vegetation of Bailly Unit (west side). Subunits indicated by letters. Cross-hatching indicates disturbed areas.

The areas mapped in Figure 12 as mesophytic forest have strong floristic affinities to the more mesophytic phases of savanna. These forests have been logged and contain abundant invasive species in comparison to pre-European settlement, though they are nevertheless floristically important in comparison to the rest of the Chicago Region today. Currently, these forested communities in the Chicago Region are restricted to the steep slopes of ravines and bluffs, the bulk of the upland forests having been logged before the 1850s. In this regard, Cook and Jackson (1978) pointed out:

> *Further west, in inland Porter and Lake Counties, Oak was predominant. Oak forest originally crowned the hills around the Bailly Homestead, interspersed with elm, ash, and walnut. The road north of the homestead was "Oak Hill Road." Solon Robinson wanted to name Indiana west of LaPorte County and north of the Kankakee "Oakland County" in honor of the principal timber on it. . . . Lumbering was one cause of permanent change to the inland landscape in the nineteenth century. In only a few decades, lumbering changed thick forests into open fields and second growth trees.*

It can be inferred from the original land survey notes for this unit that much of what is now mapped as bottomland was at that time (ca. 1830) prairie marsh and more open floodplain forest (Cole, NPS INDU plant ecologist, pers. comm. with Pavlovic, 1989), particularly in the western portion of subunit D (Bacone et al. 1980, Bowles et al. 2015b). As a consequence of fire suppression, the bottomland areas are now more or less forested, with the possible exceptions of some of those in Bailly subunit D. Fire suppression, sedimentation, stream channelization, and upland agriculture have had a negative impact on the vegetation in most of this unit. In Bailly D, the bottomland, while not having a high diversity of flora, nevertheless represents some of the finer bottomland communities of this type remaining in the Chicago Region today (Wilhelm 1990).

Reports of *Aesculus glabra* (adventive), *Pinus sylvestris* (exotic), *Pyrus malus* (exotic), and *Taxus cuspidata* (exotic) in this unit

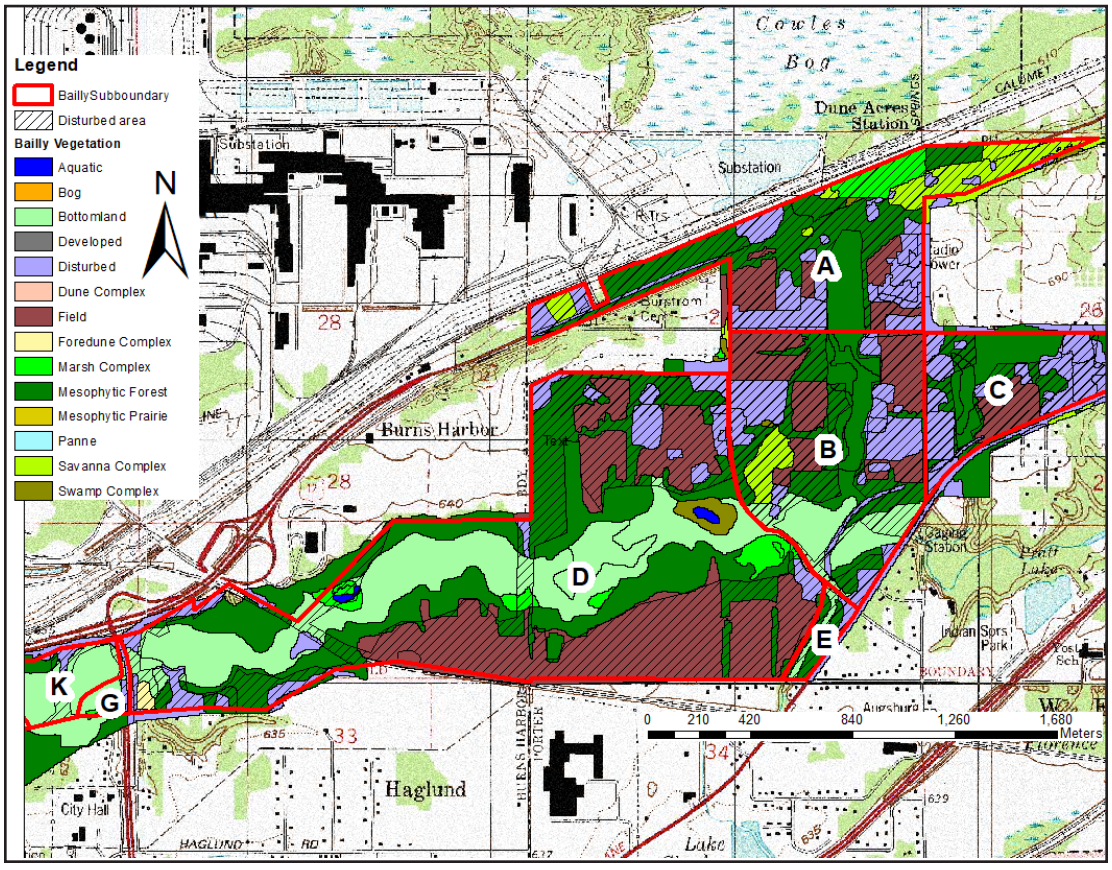


Figure 17. Vegetation of Bailly Unit (east side). Subunits indicated by letters. Cross-hatching indicates disturbed areas.

appear to have been based upon planted specimens (Wilhelm 1990; Pavlovic, pers. obs.). Both *Pinus banksiana* and *P. strobus* are known from Bailly as either planted trees or adventive populations in old fields. The trees of these species are naturalized and not autochthonous to the Bailly Unit (Wilhelm 1990).

Mnoke Prairie and Fen

Mnoke Prairie, in subunit D (see Figure 17, the brown area designated as "Field" in southern part of subunit D), formerly called Beam Street Prairie, was first recognized by Kenneth Cole, Ken Klick, and Pavlovic, who conducted the informal survey in 1986. The NPS biological survey team first recognized the prairie element at the terminus of Beam Street and remnant patches along the train line and further west. Through the old fields, they discovered scattered mesic prairie species among the European pasture weeds, and Pavlovic discovered a higher quality remnant in the west half that still retained the dominant silt loam prairie grass *Sporobolus heterolepis*! In the early 1990s, Plampin, Myrna Newgent, and Donna and Alan Resetar (former Field Musuem herbpetologist) explored Mnoke Prairie. In the mid-1990s, Pam Benjamin (INDU botanist) conducted the first surveys of this former prairie, and since then restoration has been conducted by John Kwilosz (INDU resource management, pers. comm. with Pavlovic).

In 2002, David Beamer and Pavlovic identified a forested and graminoid fen to the north of Mnoke Prairie on the south side of the Little Calumet River. Here, rivulets of groundwater seep from the Lake Border Moraine into a several-acre fen. While seeming to have high native plant diversity and being without *Phragmites* and hybrid *Typha*, no quantitative sampling of vegetation or complete floristic survey has been conducted here. A comprehensive flora for this site would be important in documenting this high quality and rare riverine plant community. The flora of the Bailly Unit is presented in Table 21 with annotations in Table 22.

Table 21. Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Abutilon theophrasti Medik.	x	R	–	x	–	–	–	–	X	*
Acalypha rhomboidea Raf.	–	–	–	x	–	–	–	x	X	0
Acer negundo L.	x	x	–	x	x	x	X	x	X	0
Acer rubrum L.	x	x	x	x	x	–	–	–	X	7
Acer saccharinum L.	x	x	–	x	–	x	–	x	X	0
Acer saccharum Marshall	x	x	x	x	x	–	–	–	X	3
Achillea millefolium L.	–	–	x	x 1	x	–	–	x	X	*
SF***Acorus americanus*** (Raf.) Raf. (*Acorus americanus* L.)	–	–	–	x	–	–	–	–	X	7
Actaea pachypoda Elliott	–	–	–	x	–	–	X	–	X	7
SF***Adiantum pedatum*** L. (*Adiantum pedatum* L.)	47	–	–	–	–	–	–	–	N	10
Agastache scrophulariifolia (Willd.) Kuntze	–	–	–	26	–	x	X	–	X	5
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	–	x	x	x	27	–	x	x	X	4
Agrimonia gryposepala Wallr.	x	x	–	x	x	x	X	x	X	2

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Agrimonia parviflora Aiton	–	x	–	x 1	–	–	–	–	X	7
Agrimonia pubescens Wallr.	–	–	–	x	–	–	–	–	X	5
Agropyron cristatum (L.) Gaertn. (*Agropyron desertorum* (Fisch.) Schult.)	–	–	–	1	–	–	–	–	N	*
Agrostis gigantea Roth (*Agrostis alba* L.)	R	R	–	x 1	–	–	X	x	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	–	–	1	–	–	–	–	N	1
Agrostis perennans (Walter) Tuck.	–	–	–	–	25	–	–	–	N	3
Ailanthus altissimus (Mill.) Swingle	–	3	–	27	–	–	X	x	X	*
Ajuga reptans L.	–	–	–	–	–	–	–	–	X	*
Alisma subcordatum Raf.	–	–	–	x	27	–	–	–	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	–	3	–	x 28	–	x	X	x	X	*
Allium canadense L. var. *canadense* (*Allium canadense* L.)	x	x	–	x	x	x	X	x	X	2
Allium tricoccum Aiton var. *burdickii* Hanes	x	x	–	x	–	–	–	–	X	6
Allium vineale L.	–	–	–	–	–	x	–	–	X	*
Amaranthus powellii S. Watson	x	–	–	–	–	–	–	–	X	*
Amaranthus retroflexus L.	–	R	–	–	–	–	–	–	R	*
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	–	–	–	x 17	–	–	–	x	X	0
Ambrosia trifida L.	x	x	–	x 1	–	–	–	–	X	0
Amelanchier arborea (F. Michx.) Fernald	x	x	–	x	x	–	–	–	X	8
Amelanchier laevis Wiegand	–	x	–	–	–	–	–	–	X	8
Amelanchier × *grandiflora* Rehder	–	53	–	–	–	–	–	–	N	hv
Amphicarpaea bracteata (L.) Fernald	–	x	15	x	–	–	X	x	X	4
Andropogon gerardii Vitman	–	–	x	1	–	–	X	–	X	5
Andropogon virginicus L.	x	–	–	–	–	–	–	–	X	ad
Anemone acutiloba (DC.) G. Lawson (*Hepatica acutiloba* DC.)	x	x	–	x	x	–	–	–	X	6
Anemone americana (DC.) H. Hara (*Hepatica americana* (DC.) Ker Gawl.)	–	–	15	x	27	–	–	–	X	9
Anemone cylindrica A. Gray	–	–	–	17	–	–	–	–	N	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	x	x	15	x	–	–	–	–	X	7
Anemone virginiana L. var. *virginiana* (*Anemone virginiana* L.)	–	–	–	1	–	–	–	–	N	5
Angelica atropurpurea L.	–	–	–	x	–	–	–	–	X	7
Antennaria howellii Greene ssp. *petaloidea* (Fernald) R. J. Bayer	–	54	–	x	–	–	–	–	N	4

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	–	x	–	X 54	x	–	–	–	X	3
Anthoxanthum odoratum L.	–	–	–	x	–	–	–	–	X	*
Anthriscus caucalis M. Bieb.	x	–	–	–	–	–	–	–	X	*
Apios americana Medik.	–	–	–	–	x	–	–	x	X	7
Apocynum androsaemifolium L.	–	–	–	x	–	–	–	–	X	5
Apocynum cannabinum L.	–	–	–	1	–	–	–	–	N	4
Apocynum cannabinum L. (*Apocynum sibiricum* Jacq.)	–	–	–	x	–	–	–	–	X	2
Aquilegia canadensis L.	–	–	–	x	x	–	–	–	X	6
Aralia nudicaulis L.	x	–	–	–	x	–	–	x	X	8
SF***Aralia racemosa*** L.	–	x	–	–	–	–	–	–	X	10
Arctium minus (Hill) Bernhardi	x	x	x	x	–	x	X	x	X	*
Arisaema dracontium (L.) Schott	x	x	–	x	–	–	–	–	X	7
Arisaema triphyllum (L.) Schott	x	x	15	x	–	–	x	–	X	4
SF***Aristolochia serpentaria*** L.	–	–	–	x	–	–	–	–	X	10
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	–	–	–	1	25	–	–	–	N	6
Asarum canadense L.	–	x	–	x	–	–	x	–	X	7
Asclepias exaltata L.	–	13	–	–	–	–	–	–	N	9
Asclepias hirtella (Pennell) Woodson	–	–	–	1	–	–	–	–	N	10
Asclepias incarnata L.	–	–	–	x	–	–	–	–	X	4
SF***Asclepias sullivantii*** A. Gray	–	–	–	56	–	–	–	–	N	8
Asclepias syriaca L.	–	–	–	x 1	12	–	–	x	X	0
Asclepias tuberosa L.	–	–	–	50	–	–	–	–	N	8
Asimina triloba (L.) Dunal	x	–	–	–	–	–	–	–	X	9
Asparagus officinalis L.	–	–	–	x	–	–	–	–	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes	–	–	–	x 9	–	–	–	–	X	4
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	–	x	–	x	x	–	–	x	X	8
Aureolaria virginica (L.) Pennell	–	45	–	–	–	–	–	–	N	10
Avena sativa L.	x	–	–	–	–	–	–	–	X	*
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	–	–	–	1	–	–	–	–	N	8
Barbarea vulgaris W.T. Aiton	x	–	–	x	–	x	x	–	X	*
Berberis thunbergii DC.	x	x	x	x	x	x	x	–	X	*
Bidens cernua L.	–	–	–	x	–	–	–	–	X	5
Bidens frondosa L.	–	–	–	x	–	–	–	–	X	1
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	–	–	–	x	–	–	–	–	X	9

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Bidens tripartita L. (*Bidens comosa* (A. Gray) Wiegand)	–	–	–	x	–	–	–	–	X	5
SF***Bidens vulgata*** Greene	–	–	–	–	–	–	–	x	X	1
Blephilia hirsuta (Pursh) Benth.	–	x	–	x	–	–	–	–	X	8
Boechera laevigata (Muhl. ex Willd.) Al-Shehbaz (*Arabis laevigata* (Willd.) Poir.)	–	–	–	x	–	x	X	x	X	5
Boehmeria cylindrica (L.) Sw.	–	x	–	x	12	–	–	x	X	2
Botrychium virginianum (L.) Sw.	x	x	–	x	x	–	–	–	X	6
SF***Brachyelytrum erectum*** (Schreb.) P. Beauv.	–	–	–	–	–	–	x	–	N	10
Bromus inermis Leyss.	–	R	–	–	–	–	–	x	X	*
Bromus japonicus Thunb.	–	–	–	x	–	–	–	–	X	*
Bromus pubescens Spreng.	–	–	–	–	–	–	x	x	X	5
Bromus tectorum L.	–	–	–	–	–	–	–	–	X	*
Calamagrostis canadensis (Michx.) P. Beauv.	–	–	–	1	–	–	–	–	N	3
Caltha palustris L.	–	–	–	–	–	x	–	–	X	5
Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	–	–	–	x	–	–	–	–	X	1
Camassia scilloides (Raf.) Cory	–	x	x	x	–	–	–	–	X	6
Campanula americana L.	x	x	29	–	–	–	–	–	X	3
Campanula rapunculoides L.	–	–	–	–	–	–	–	–	X	*
Capsella bursa-pastoris (L.) Medik.	–	–	–	–	–	–	–	–	X	*
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	–	x	–	x	x	–	–	–	X	6
Cardamine concatenata (Michx.) O. Schwarz (*Dentaria laciniata* Willd.)	–	x	–	x	x	–	–	–	X	5
Cardamine douglassii Britton	–	x	–	x	–	–	–	–	X	7
Cardamine pensylvanica Muhl. ex Willd.	–	–	–	x	x	–	–	–	X	4
SF***Carex aggregata*** Mack.	–	–	–	–	–	–	x	–	N	5
Carex annectens (E.P. Bicknell) E.P. Bicknell	x	x	–	–	–	–	–	–	X	5
Carex annectens (E.P. Bicknell) E.P. Bicknell (*Carex annectens* E.P. Bicknell var. *xanthocarpa* (E.P. Bicknell) Wiegand)	x	x	–	x	–	–	x	–	X	7
Carex aquatilis Wahlenb. var. *substricta* Kukenth. (*Carex aquatilis* Wahlenb. var. *altior* (Rydb.) Fernald)	R	–	–	–	–	–	–	–	R	5
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	–	–	–	1	–	–	–	–	N	6
Carex bicknellii Britton	–	–	–	1	–	–	–	–	N	10
Carex blanda Dewey	–	–	–	x	–	–	x	x	X	1
Carex brevior (Dewey) Mackenzie ex Lunell	x	–	–	–	–	–	–	–	X	4
SF***Carex bushii*** Mack.	x	–	–	–	–	–	–	–	X	*
Carex cephalophora Muhl. ex Willd.	x	x	–	–	x	x	x	–	X	3
Carex crinita Lam. var. *crinita*	–	–	–	–	x	–	–	–	X	10
SF***Carex digitalis*** Willd.	–	–	–	48	–	–	–	–	N	10

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Carex glaucodea Tuck. ex Olney	x	–	–	–	–	–	–	–	X	*
Carex gracilescens Steud.	–	–	–	x	–	–	–	–	X	10
Carex grayi J. Carey	–	x	–	x	–	–	x	–	X	7
Carex grisea Wahlenb.	x	x	x	x	–	x	x	x	X	2
Carex hirsutella Mack.	x	–	–	x 1	–	–	–	–	X	4
Carex jamesii Schwein.	–	x	–	–	–	–	–	–	X	5
Carex laxiflora Lam.	x	x	x	x	x	–	–	–	X	10
Carex lupulina Willd.	–	–	–	x	–	–	–	–	X	7
Carex molesta Mack. ex Bright	–	–	–	x	–	–	–	–	X	2
Carex pensylvanica Lam.	x	–	–	x	x	–	x	–	X	5
Carex rosea Schkuhr ex Willd.	x	x	–	x	x	x	x	x	X	4
Carex scoparia Schkuhr ex Willd. var. *scoparia*	R	–	–	1	–	–	–	–	R	7
Carex sparganioides Muhl. ex Willd.	–	–	x	x	–	–	–	–	X	3
Carex squarrosa L.	x	–	–	–	–	–	–	–	X	10
Carex stipata Muhl. ex Willd.	–	x	–	x	x	x	–	–	X	3
Carex swanii (Fernald) Mack.	–	–	–	2	–	–	–	–	N	8
Carex tetanica Schkuhr	–	–	–	x	–	–	–	–	X	9
Carex tribuloides Wahlenb.	–	–	–	x	–	–	–	–	X	3
Carex vulpinoidea Michx.	x	–	–	x 1	–	–	x	–	X	2
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow (*Carpinus caroliniana* Walter var. *virginiana* (Marshall) Fernald)	–	–	–	x	–	–	x	–	X	8
Carya cordiformis (Wangenh.) K. Koch	x	x	x	x	–	–	x	–	X	7
SF***Carya laciniosa*** (F. Michaux) G. Don	–	–	–	–	–	–	–	x	N	10
Carya ovata (Mill.) K. Koch	x	x	–	x	x	x	x	–	X	5
Catalpa speciosa Teas	4	–	–	–	–	x	–	x	X	ad
Celastrus orbiculatus Thunb.	x	N	N	x	N	N	N	–	X	*
SF***Celastrus scandens*** L.	–	x	–	1	–	–	x	–	X	4
Celtis occidentalis L.	x	–	x	x	x	x	–	x	X	3
Cenchrus longispinus (Hack.) Fernald	–	–	–	–	–	–	–	x	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	–	–	–	1	–	–	–	–	N	*
Cephalanthus occidentalis L.	–	–	–	x	x	–	–	–	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L).	–	–	–	x 1	–	–	–	–	X	*
Cercis canadensis L.	–	x	–	–	–	–	–	–	X	ad
Chaerophyllum procumbens (L.) Crantz	–	x	–	x	x	x	–	–	X	5
Chelone glabra L.	–	–	–	x	x	–	–	–	X	8
Chenopodium album L.	–	R	–	x	–	–	x	x	X	*

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Chenopodium standleyanum Aellen	–	–	–	–	–	–	–	x	N	4
Chionodoxa lochiae Meikle	–	–	57	–	–	–	–	–	N	*
Chionodoxa luciliae Boiss.	–	–	57	–	–	–	–	–	N	*
Cichorium intybus L.	–	x	–	–	–	–	–	–	X	*
Cicuta maculata L.	–	–	–	x	x	x	x	–	X	6
Cinna arundinacea L.	–	x	–	x	27	x	x	x	X	5
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	x	x	x	x	x	x	x	X	1
Cirsium altissimum (L.) Spreng.	–	–	–	–	–	–	x	–	X	6
Cirsium arvense (L.) Scop.	–	3	–	x 1	–	x	–	–	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	–	–	–	x	–	–	–	–	X	2
Cirsium vulgare (Savi) Ten.	–	–	–	x	–	x	x	–	X	*
Claytonia virginica L.	x	x	–	x	–	x	–	–	X	2
Clematis virginiana L.	–	x	–	x	–	–	–	–	X	4
Commelina communis L.	–	–	–	17	25	–	–	–	N	*
Convallaria majalis L.	x	–	x	–	–	–	–	–	X	*
Convolvulus arvensis L.	–	–	–	1	–	–	–	–	N	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	–	–	–	x	–	–	–	x	X	0
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	–	–	–	51	–	–	–	–	N	5
Coreopsis tripteris L.	–	–	–	1	–	–	–	–	N	5
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	–	23	–	x	x	x	–	–	X	6
Cornus racemosa Lam.	x	x	x	x	x	x	x	x	X	1
Corylus americana Walter	x	x	x	x	x	–	x	x	X	5
Crataegus coccinea L.	–	–	–	1	–	–	x	–	X	4
Crataegus crus-galli L.	–	–	–	x	–	x	–	–	X	2
Crataegus × *disperma* Ashe	–	–	–	58	–	–	–	–	N	3
Crataegus macrosperma Ashe (*Crataegus flabellata* Ashe)	x	–	–	x	–	–	–	x	X	5
Crataegus mollis (Torr. & A. Gray) Scheele var. *mollis*	R	x	–	x	–	x	–	–	X	2
Crataegus pruinosa (H.L. Wendl.) K. Koch	x	x	–	–	–	–	–	–	X	5
Crataegus punctata Jacq.	–	x	–	x	–	–	–	x	X	2
SF***Crataegus succulenta*** Schrad. ex Link	–	–	–	–	–	–	X 62	–	X	5
Cryptotaenia canadensis (L.) DC.	x	x	x	x	x	x	x	x	X	2
Cyperus strigosus L.	–	–	–	x	–	–	–	–	X	1
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	–	37	–	–	–	–	–	–	N	6
Dactylis glomerata L.	–	–	–	x 1	–	–	–	–	X	*

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Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Dasistoma macrophylla (Nutt.) Raf. (*Seymeria macrophylla* Nutt.)	–	15	x	–	–	–	–	–	X	8
Datura stramonium L.	–	x	–	–	–	–	–	–	X	ad
Daucus carota L.	x	–	–	x 1	–	x	–	–	X	*
Desmodium canadense (L.) DC.	–	–	–	x 1	–	–	–	x	X	4
SF***Desmodium canescens*** (L.) DC.	–	–	–	14	–	–	–	–	X	9
Desmodium paniculatum (L.) DC.	–	x	–	1	–	–	–	–	X	6
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	x	–	x	–	–	–	–	X	2
Digitaria sanguinalis (L.) Scop.	–	–	–	–	–	–	–	x	N	*
Dioscorea villosa L.	–	–	–	11	x	–	–	x	X	7
Diphasiastrum digitatum (Dill. ex A. Braun) Holub (*Lycopodium complanatum* L. var. *flabelliforme* Fernald)	–	x	–	–	–	–	–	–	X	8
Dipsacus fullonum L. (*Dipsacus sylvestris* Huds.)	x	–	–	–	–	–	x	–	X	*
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	–	–	–	1	–	–	–	–	N	9
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O.F. Müll.) Watt)	–	–	–	x	x	–	x	x	X	8
Echinochloa crusgalli (L.) P. Beauv.	–	–	–	x 1	–	–	–	–	X	0
Echinocystis lobata (Michx.) Torr. & A. Gray	–	–	–	14	–	x	x	x	X	5
Elaeagnus angustifolia L.	–	–	–	1	–	–	–	–	X	*
Elaeagnus umbellata Thunb.	59	–	–	–	–	–	–	–	N	*
Eleocharis elliptica Kunth	–	–	–	1	–	–	–	–	N	8
Eleocharis obtusa (Willd.) Schult.	–	–	–	x	–	–	–	–	X	3
Eleusine indica (L.) Gaertn.	–	–	–	–	25	–	–	–	N	*
Elymus hystrix L. (*Hystrix patula* Moench)	–	–	x	x	–	–	x	–	X	5
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	R	–	x	–	–	–	–	X	*
Elymus riparius Wiegand	–	x 8	–	–	–	x 10	–	–	X	5
Elymus villosus Muhl. ex Willd.	–	x	–	x	–	–	x	–	X	5
Elymus virginicus L.	–	–	–	x	–	x	x	x	X	4
Enemion biternatum Raf. (*Isopyrum biternatum* (Raf.) Torr. & A. Gray)	–	–	15	x	–	–	–	–	X	8
Epifagus virginiana (L.) W.P.C. Barton	–	x	–	–	–	–	–	–	X	10
Epilobium coloratum Biehler	–	–	–	x	–	x	–	–	X	3
Epipactis helleborine (L.) Crantz	–	–	–	–	–	–	–	x	N	*
Equisetum arvense L.	–	–	–	x	x	x	–	x	X	0
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	–	–	–	x	–	x	–	–	X	3

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Eragrostis pectinacea (Michx.) Nees	–	–	–	–	25	–	–	–	N	0
Eragrostis spectabilis (Pursh) Steud.	–	–	–	–	–	–	–	x	N	3
Eranthis hyemalis (L.) Salisb.	–	–	–	–	–	–	–	–	N	*
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	–	–	–	x	–	–	x	x	X	2
Erigeron annuus (L.) Pers.	–	–	–	x 1	–	x	x	x	X	0
Erigeron philadelphicus L.	R	x	–	x	x	–	–	–	X	4
Erigeron strigosus Muhl. ex Willd.	–	R	–	–	–	–	–	–	R	5
Eryngium yuccifolium Michx.	–	–	–	1	–	–	–	–	N	9
Erythronium albidum Nutt.	–	–	–	52	–	–	–	–	N	5
Euonymus obovatus Nutt.	–	x	–	x	x	–	–	–	X	7
Eupatorium perfoliatum L.	–	–	–	x	27	x	–	–	X	4
Eupatorium serotinum Michx.	–	–	–	x	–	–	–	–	X	0
Euphorbia corollata L.	–	–	–	x 1	27	–	–	x	X	2
Euphorbia cyparissias L.	43, 49	–	–	–	–	–	–	–	X	*
Euphorbia × *pseudoesula* Schur [*E. cyparissias* × *E. esula*]	–	44	–	–	–	–	–	–	N	*
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	–	x	–	–	–	–	–	–	X	8
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	–	–	–	x 1	–	–	–	x	X	3
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	–	–	–	x	x	–	–	–	X	4
Eutrochium purpureum (L.) E.E. Lamont (*Eupatorium purpureum* L.)	–	x	x	x	–	–	–	–	X	7
Fagus grandifolia Ehrh.	x	x	x	x	–	–	–	–	X	5
Fallopia convolvulus (L.) A. Löve (*Polygonum convolvulus* L.)	–	–	–	x	–	x	–	–	X	*
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	x	–	x 7	–	–	–	x	–	X	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	–	–	–	–	25	–	x	x	X	1
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	–	x	–	x	x	x	x	–	X	5
Filipendula vulgaris Moench	40	–	–	–	–	–	–	–	N	*
Floerkea proserpinacoides Willd.	–	x	–	x	–	–	–	–	X	8
Fragaria virginiana Miller	x	x	x	x	–	x	–	x	X	1
SF***Frasera caroliniensis*** Walter (*Swertia caroliniensis* (Walter) Kuntze)	–	–	–	x	–	–	–	–	X	10
SF***Fraxinus americana*** L.	x	x	x	x	x	x	–	–	X	5
SF***Fraxinus nigra*** Marshall	–	x	–	x	–	–	–	–	X	10
SF***Fraxinus pennsylvanica*** Marshall	–	x	–	x	–	–	–	–	X	5

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SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	–	x	x	x	x	x	x	x	X	1
Galanthus elwesii Hook. f.	–	–	60	–	–	–	–	–	N	*
Galanthus nivalis L.	–	–	60	–	–	–	–	–	N	*
Galium aparine L.	x	x	x	x	x	x	–	–	X	1
Galium circaezans Michx. var. *hypomalacum* Fernald	–	x	x	–	x	x	–	–	X	7
Galium concinnum Torr. & A. Gray	x	x	–	x	x	x	–	x	X	5
SF***Galium lanceolatum*** (Torr.) Torr.	–	–	–	–	x	–	–	–	X	10
Galium obtusum Bigelow	–	–	–	x	–	–	–	–	X	5
Galium triflorum Michx.	x	x	–	x	–	–	x	–	X	5
Gentiana andrewsii Griseb.	–	–	–	33	–	–	–	–	N	8
Geranium maculatum L.	x	x	–	x	x	x	x	x	X	4
Geum canadense Jacq.	x	x	x	x	x	x	x	x	X	1
Geum laciniatum Murray (*Geum laciniatum* Murray var. *trichocarpum* Fernald)	x	–	–	x	–	–	–	–	X	5
Glechoma hederacea L.	x	x	–	x	27	x	–	–	X	*
Glyceria striata (Lam.) Hitchc.	–	–	x	x	x	x	–	–	X	4
Hackelia virginiana (L.) I. M. Johnst.	x	–	–	x	27	x	x	x	X	0
Hamamelis virginiana L.	x	x	x	x	x	–	x	–	X	8
SF***Hasteola suaveolens*** (L.) Pojark. (*Cacalia suaveolens* L.)	–	–	–	24	–	–	–	–	N	10
Helenium autumnale L.	–	–	–	33	–	x	–	–	X	5
Helianthus annuus L.	–	–	–	–	–	–	–	–	X	ad
Helianthus divaricatus L.	–	–	–	–	–	x	–	–	X	5
Helianthus giganteus L.	–	–	–	1	–	–	–	–	N	9
Helianthus grosseserratus M. Martens	–	x	–	–	–	–	x	–	X	2
Helianthus occidentalis Riddell	–	–	–	1	–	–	–	–	N	10
Helianthus strumosus L.	–	–	–	–	–	–	–	x	N	5
Hemerocallis fulva (L.) L.	x	–	–	x	–	–	x	x	X	*
Heracleum spondylium Linnaeus	–	–	–	x	–	–	–	–	X	5
Hesperis matronalis L.	–	–	–	–	–	x	x	x	X	*
Heterotheca subaxillaris (Lam.) Britton & Rusby ssp. *latifolia* (Buckley) Semple	–	–	–	–	–	–	–	x	X	ad
Hieracium aurantiacum L.	–	–	–	x	x	–	–	–	X	*
Hieracium caespitosum Dumort.	x	–	–	x 1	–	–	–	–	X	*
Hordeum vulgare L.	–	x	–	–	–	–	–	–	X	*
Houstonia caerulea L.	–	–	–	x	–	–	–	–	X	9
Humulus japonicus Siebold & Zucc.	–	–	–	–	–	x	–	–	X	*
Hydrophyllum appendiculatum Michx.	–	x	–	–	–	–	–	–	X	8

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Hydrophyllum virginianum L.	x	–	18	x	–	–	–	–	X	5
Hylodesmum glutinosum (Willd.) H. Ohashi & R. R. Mill (*Desmodium glutinosum* (Willd.) Alph. Wood)	–	x	–	15	27	–	x	x	X	5
Hypericum perforatum L.	x	–	–	x	–	–	–	–	X	*
Hypericum punctatum Lam.	–	–	–	x	–	–	–	–	X	4
SF***Hypopitys monotropa*** Crantz (*Monotropa hypopitys* L.)	–	–	15	–	–	–	–	–	N	10
Impatiens capensis Meerb.	x	x	x	x	x	x	x	–	X	3
Impatiens pallida Nutt.	x	x	15	–	–	–	–	x	X	6
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	–	–	–	1	x	–	–	–	X	10
SF***Ipomoea pandurata*** (L.) G. Mey.	–	–	–	–	–	32	–	–	N	5
Ipomoea purpurea (L.) Roth	–	–	–	–	–	–	–	x	N	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	–	R	–	x	x	–	x	–	X	5
SF***Juglans cinerea*** L.	x	–	–	–	–	–	–	–	X	8
Juglans nigra L.	–	x	–	x	–	x	x	x	X	5
Juncus canadensis J. Gay ex Laharpe	–	–	–	1	–	–	–	–	N	7
Juncus dudleyi Wiegand	–	–	–	x 1	–	–	–	–	X	4
Juncus effusus L.	x	R	–	x 1	–	–	x	–	X	7
Juncus interior Wiegand	x	–	–	–	–	–	–	–	X	6
Juncus marginatus Rostk. (*Juncus biflorus* Elliott)	–	–	–	x	–	–	–	–	X	10
Juncus pylaei Laharpe	x	–	–	–	–	–	–	–	N	5
SF***Juncus scirpoides*** Lam.	–	–	–	1	–	–	–	–	N	9
Juncus tenuis Willd.	x	x	x	x 23	–	x	–	–	X	0
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	–	–	–	x	–	–	–	–	X	2
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	–	–	–	1	–	–	–	–	N	7
Krigia biflora (Walter) S.F. Blake	–	–	–	x	x	–	–	–	X	7
Lactuca canadensis L.	–	–	–	–	–	x	–	–	X	2
Lamium purpureum L.	–	–	–	–	–	x	–	–	X	*
Laportea canadensis (L.) Wedd.	–	x	–	x	x	–	x	x	X	3
Lathyrus latifolius L.	–	–	–	x	–	–	–	–	X	*
SF***Lathyrus venosus*** Muhl. ex Willd. (*Lathyrus venosus* Willd.)	–	x	–	–	–	–	–	–	X	9
Leersia oryzoides (L.) Sw.	–	–	–	x	–	–	x	–	X	4
Leersia virginica Willd.	–	x	x	x	12	–	x	x	X	7
Lemna minor L.	–	–	–	x	–	–	–	–	X	5
Leonurus cardiaca L.	x	–	–	–	–	x	x	x	X	*

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Lepidium campestre (L.) W.T. Aiton	–	–	x	x	–	–	–	–	X	*
Lepidium virginicum L.	–	–	–	–	–	–	–	–	X	0
Lespedeza capitata Michx.	–	–	–	x 1	–	–	–	–	X	4
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte)	x	–	–	x 1	–	–	–	–	X	*
Liatris cylindracea Michx.	–	–	–	1	–	–	–	–	N	8
Liatris spicata (L.) Willd.	–	–	–	1	–	–	–	–	N	6
Ligustrum vulgare L.	–	–	–	–	25	–	–	–	N	*
Lilium michiganense Farw.	x	x	–	x	x	–	–	–	X	6
Linaria vulgaris Mill.	–	–	–	1	–	–	–	–	N	*
Lindera benzoin (L.) Blume	R	x	x	x	x	–	–	x	X	7
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	–	–	–	1	–	–	–	–	N	6
Lobelia cardinalis L.	–	–	–	–	25	–	–	–	N	7
Lobelia inflata L.	–	–	–	–	25	–	–	–	N	4
Lobelia siphilitica L.	–	x	x	x	–	–	–	–	X	6
Lobelia spicata Lam.	–	–	–	1	–	–	–	–	N	6
SF***Lonicera dioica*** L.	–	–	–	x	–	–	–	–	X	10
Lonicera maackii (Rupr.) Maxim.	–	–	–	–	–	–	–	x	N	*
Lonicera reticulata Raf. (*Lonicera prolifera* (Kirchn.) Rehder)	–	–	–	x	–	–	–	–	X	7
Lonicera × *minutiflora* Zabel [*L. morrow*ii × *L. xylosteo*ides] (*Lonicera* × *muendeni*ensis Rehder))	x	x	x	x	x	x	x	x	X	*
Lunaria annua L.	–	–	–	23	–	–	–	–	N	*
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	x	x	–	x	x	–	–	–	X	7
Lycopus americanus Muhl. ex W.P.C. Barton	–	–	–	x	–	–	–	–	X	5
Lysimachia ciliata L.	–	–	–	x	–	–	–	–	X	4
Lysimachia lanceolata Walter	–	–	–	x 1	–	–	–	–	X	7
Lysimachia nummularia L.	–	R	x	x	12	x	–	–	X	*
Lysimachia thyrsiflora L.	–	–	–	x	–	–	–	–	X	9
Maclura pomifera (Raf.) C. K. Schneid.	–	–	–	41	–	–	–	–	N	ad
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	x	x	x	x	x	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	–	–	–	–	–	–	x	X	5
Malus ioensis (Alph. Wood) Britton	x	x	–	14	–	x	–	–	X	3
Malus domestica (Suckow) Borkh.	–	–	–	–	25	–	–	–	X	*
Malva neglecta Wallr.	–	x	–	–	–	–	–	–	X	*
Melilotus alba Medik.	–	–	–	x 1	–	–	x	–	X	*

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Melilotus officinalis (L.) Lam.	x	–	–	x	–	–	–	–	X	*
Menispermum canadense L.	–	–	–	14	–	–	–	–	N	6
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	–	–	–	x	–	–	–	–	X	5
Mentha spicata L.	x	–	–	–	–	–	–	–	X	*
Mertensia virginica (L.) Pers. ex Link	R	–	–	–	–	–	–	–	R	ad
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	–	–	–	x	–	–	–	–	X	10
Mimulus ringens L.	–	–	–	x	–	–	–	–	X	6
Mitella diphylla L.	–	–	x	–	x	–	–	–	X	10
Moehringia lateriflora (L.) Fenzl (*Arenaria lateriflora* L.)	–	–	–	–	–	x	X	–	X	8
Monarda fistulosa L.	–	–	–	x	–	–	–	–	X	4
Monarda punctata L.	–	–	–	–	–	–	–	x	N	5
Morus alba L.	x	–	–	–	–	–	x	x	X	*
Muhlenbergia frondosa (Poir.) Fernald	–	–	–	–	–	–	–	x	N	3
Muhlenbergia schreberi J. F. Gmel.	–	–	–	–	25	–	–	–	N	0
SF***Myosotis laxa*** Lehm.	–	–	–	36	–	–	–	–	N	10
Nepeta cataria L.	x	–	–	–	–	–	–	–	X	*
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	–	–	–	–	–	–	–	–	X	6
Oenothera biennis L.	–	–	–	1	–	–	–	x	X	0
Onoclea sensibilis L.	–	x	–	x	x	–	–	–	X	8
Osmorhiza claytonii (Michx.) C.B. Clarke	x	x	x	x	x	–	x	x	X	3
Osmorhiza longistylis (Torr.) DC.	x	–	–	x	–	x	–	x	X	3
Osmunda claytoniana L.	x	–	–	–	–	x	–	–	X	9
Ostrya virginiana (Mill.) K. Koch	–	x	–	–	12	x	x	–	X	5
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	–	–	–	x	–	–	–	–	X	0
Oxalis stricta L. (*Oxalis europaea* Jord.)	x	–	–	x	x	–	x	x	X	0
SF***Oxalis violacea*** L.	–	–	–	61	–	–	–	–	N	9
Pachysandra terminalis Siebold & Zucc.	–	–	15	–	–	–	–	–	N	*
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	–	–	–	–	12	–	–	–	X	7
Packera glabella (Poir) C. Jeffrey (*Senecio glabellus* Poir.)	–	–	–	–	–	–	–	–	N	ad
Panicum capillare L.	–	–	–	x	–	–	–	x	X	1
Panicum virgatum L.	–	–	–	1	–	–	–	x	X	5
Parietaria pensylvanica Muhl. ex Willd.	–	–	–	–	–	–	–	x	N	3
Parthenium integrifolium L.	–	–	–	x 6	–	–	–	–	X	8
Parthenocissus quinquefolia (L.) Planch.	x	x	x	x	x	x	x	x	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	x	–	–	x	–	–	–	–	X	1
Penstemon digitalis Nutt. ex Sims	–	–	–	1	–	–	–	–	N	4

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Penthorum sedoides L.	–	–	–	x	25	–	–	–	X	5
Persicaria hydropiper (L.) Spach (*Polygonum hydropiper* L.)	–	–	–	–	–	–	x	–	N	2
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	–	–	–	x	12	–	–	–	X	7
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	–	x	–	x	–	–	–	x	X	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	x	–	–	x	–	–	–	x	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	–	–	x	–	–	–	–	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	–	–	–	–	25	–	–	–	N	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	x	x	x	x	x	x	x	x	X	2
Phalaris arundinacea L.	–	–	–	x	–	x	x	–	X	*
Phleum pratense L. ssp. *pratense*	–	x	–	x 1	–	–	–	–	X	*
Phlox divaricata L.		x	x	x	x	–	–	–	X	5
Phlox paniculata L.	–	–	–	x 5	–	–	–	–	X	ad
Phryma leptostachya L. var. *leptostachya*	x	–	–	x	12	x	–	x	X	4
Phytolacca americana L.	–	–	–	x	12	x	x	x	X	1
Pilea pumila (L.) A. Gray	–	x	x	x	12	x	x	x	X	5
SF***Pinus banksiana*** Lamb.	x	–	–	x	–	–	–	–	X	ad
SF***Pinus strobus*** L.	x	–	–	–	–	–	–	–	X	ad
Pinus sylvestris L.	30	–	–	x	–	–	–	–	X	*
Plantago lanceolata L.	–	–	–	x	–	–	–	–	X	*
Plantago rugelii Decne.	–	–	–	x	–	–	–	–	X	0
Platanus occidentalis L.	46	–	–	–	–	–	–	–	N	9
Poa annua L.	–	–	–	–	–	–	–	–	X	*
Poa compressa L.	–	–	–	x 1	–	–	x	x	X	*
Poa palustris L.	–	–	–	x	–	–	–	–	X	9
Poa pratensis L.	x	–	–	x 1	–	x	–	–	X	*
Poa trivialis L.	–	–	–	–	–	x	–	–	X	*
Podophyllum peltatum L.	x	x	23	x	x	x	x	–	X	4
Polemonium reptans L.	–	–	–	–	–	x	–	–	X	5
Polygala sanguinea L.	–	–	–	33	–	–	–	–	N	6
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	x	x	x	x	x	–	x	X	3
Polygonatum pubescens (Willd.) Pursh	x	x	x	x	x	–	–	–	X	7
Polygonum aviculare L.	–	x	–	–	–	–	–	–	X	*

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Populus deltoides W. Bartram ex Marshall	–	x	–	x	–	x	x	x	X	2
Populus grandidentata Michx.	–	–	–	x	–	–	–	–	X	6
Populus tremuloides Michx.	–	–	–	x	–	–	–	–	X	4
Potentilla inclinata Vill.	–	–	–	x	–	–	–	–	X	*
Potentilla norvegica L.	–	–	–	x	–	–	–	–	X	0
Potentilla recta L.	–	–	–	1	–	–	–	–	X	*
Potentilla simplex Michx.	x	x	x	x	x	–	x	–	X	4
Prenanthes alba L.	–	x	–	x	–	–	x	–	X	5
Prenanthes altissima L.	–	x	–	–	–	–	–	x	X	8
Primula meadia (L.) A. R. Mast & Reveal (*Dodecatheon meadia* L.)	–	–	–	x	–	–	–	–	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	x	x	x	x	x	–	–	–	X	0
Prunus avium (L.) L.	–	x	–	–	–	–	–	–	X	*
Prunus serotina Ehrh.	x	x	x	x	x	x	x	x	X	1
Prunus virginiana L.	x	x	x	x	x	x	x	x	X	3
Pseudotsuga menziesii (Mirbel) Franco	4	–	–	–	–	–	–	–	N	ad
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	–	–	–	x	–	–	–	–	X	7
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	–	–	–	–	–	–	–	X	5
Pyrus communis L.	–	–	–	22	–	–	–	–	N	*
Quercus alba L.	x	x	x	x	x	x	x	x	X	5
Quercus bicolor Willd.	–	R	–	x	–	–	–	–	X	6
Quercus coccinea Munchh.	–	–	–	–	–	–	x	–	N	4
Quercus imbricaria Michx.	–	x	–	x	x	–	–	–	X	7
Quercus macrocarpa Michx.	–	x	–	x	–	–	–	–	X	5
Quercus palustris Munchh.	–	–	–	1	–	–	x	–	X	8
Quercus rubra L.	x	x	x	x	x	x	x	x	X	7
Quercus velutina Lam.	x	x	–	1	–	x	–	x	X	6
Ranunculus abortivus L.	x	x	x	x	x	x	x	x	X	0
Ranunculus fascicularis Muhl. ex Bigelow	–	–	–	x	x	x	–	–	X	6
Ranunculus flabellaris Raf.	–	–	–	x	–	–	–	–	X	7
Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan (*Ranunculus septentrionalis* Poir.)	–	x	x	x	x	x	–	–	X	5
Ranunculus recurvatus Poir.	x	x	–	–	x	x	–	–	X	5
Rhus aromatica Aiton	–	15	–	–	–	–	–	–	N	10
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	–	x	–	1	–	–	–	–	X	6
Rhus glabra L.	–	–	–	1	–	–	–	–	N	1
Rhus typhina L.	–	–	–	1	–	x	x	–	X	1

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Ribes americanum Mill.	–	–	–	x	x	–	–	–	X	7
Ribes aureum Pursh var. *villosum* DC (*R. odoratum* H. Wendl.)	–	–	–	42	–	–	–	–	N	ad
Ribes cynosbati L.	x	x	x	x	x	–	–	–	X	5
Ribes missouriense Nutt.	–	–	–	–	–	–	–	x	N	5
Robinia hispida L.	–	–	–	–	–	–	–	–	X	ad
Robinia pseudoacacia L.	x	3	–	x 1	–	x	x	x	X	ad
Rorippa palustris (L.) Besser ssp. *palustris* (*Rorippa palustris* (L.) Besser var. *fernaldiana* (Butters & Abbe) Stuckey)	x	–	–	–	–	–	–	–	X	4
Rosa canina L.	–	–	–	–	–	–	–	–	X	*
Rosa carolina L.	–	–	–	x	–	–	–	–	X	5
Rosa multiflora Thunb.	R	–	x	x	–	x	x	x	X	*
Rosa palustris Marshall	–	–	–	x	x	–	–	–	X	7
Rosa setigera Michx.	–	–	–	1	–	–	–	–	N	7
Rubus allegheniensis Porter	–	x	–	x	x	x	–	–	X	3
Rubus flagellaris Willd.	x	–	–	x 16	–	–	–	–	X	3
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	–	–	–	16	–	–	–	–	N	3
Rubus occidentalis L.	x	x	–	x	–	x	x	x	X	2
Rubus pensilvanicus Poir.	–	–	–	x	–		x	x	X	3
Rudbeckia hirta L.	–	–	–	x	–	–	–	–	X	1
Rudbeckia laciniata L. var. *laciniata*	–	–	–	x	x	x	x	x	X	5
Rumex acetosella L.	–	–	–	1	–	–	–	–	X	*
Rumex altissimus Alph. Wood	–	–	–	–	–	x	–	–	X	2
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	–	–	–	x	x	x	–	–	X	8
Rumex crispus L.	x	–	–	x	–	–	–	–	X	*
Rumex obtusifolius L.	x	–	–	–	–	–	–	–	X	*
Rumex verticillatus L.	–	–	–	x	–	–	–	–	X	6
Sagittaria latifolia Willd.	–	–	–	21	25	–	–	–	N	4
Salix amygdaloides Andersson	–	–	–	x	–	–	–	–	X	5
Salix discolor Muhl.	–	–	–	x 1	–	x	–	–	X	2
Salix eriocephala Michx.	–	–	–	x	–	x	–	–	X	5
Salix euxina J. Belyaeva (*Salix fragilis* L.)	–	–	–	x	–	–	–	–	X	*
Salix interior Rowlee	–	–	–	x	–	–	–	x	X	1
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	–	–	–	x	–	–	–	–	X	7
Salix nigra Marshall	–	–	–	x	x	–	–	–	X	4
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	x	x	x	x	x	x	x	X	1

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Sanguinaria canadensis L.	x	x	x	x	27	–	–	–	X	6
Sanicula canadensis L.	–	–	–	x	–	–	x	x	X	7
Sanicula odorata (Raf.) Pryer & Phillippe (*Sanicula gregaria* E.P. Bicknell)	x	x	x	x	x	–	–	x	X	2
Saponaria officinalis L.	x	–	–	1	–	–	–	–	X	*
Sassafras albidum (Nutt.) Nees	–	–	x	x	x	–	x	x	X	3
SF***Sceptridium dissectum*** (Spreng.) Lyon (*Botrychium dissectum* Spreng.)	–	x	–	–	–	–	–	–	X	6
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	R	R	–	x 1	–	–	–	–	X	*
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	–	–	–	1	–	–	–	–	N	5
Scirpus atrovirens Willd.	–	–	–	x 1	–	–	x	–	X	4
Scirpus cyperinus (L.) Kunth	R	–	–	x	–	–	–	–	X	6
Scrophularia marilandica L.	–	x	x	x	–	–	–	x	X	4
Scutellaria lateriflora L.	–	–	–	x	12	–	–	–	X	5
Sedum sarmentosum Bunge	x	–	–	34	–	–	–	–	X	*
Setaria faberi R.A.W. Herrm.	–	–	–	x	–	–	–	–	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	–	–	–	x 1	12	–	–	–	X	*
Setaria viridis (L.) P. Beauv.	–	–	–	–	–	–	–	x	N	*
Silene stellata (L.) W. T. Aiton	–	–	–	x	x	–	–	x	X	6
SF***Silene virginica*** L.	x	–	–	–	–	–	–	–	X	10
Silphium laciniatum L.	–	–	–	33	–	–	–	–	N	5
Silphium perfoliatum L. var. *perfoliatum*	–	–	–	1	–	x	–	–	X	5
Silphium terebinthinaceum Jacq. var. *terebinthinaceum*	–	–	–	x	–	–	–	–	X	5
Sium suave Walter	–	–	–	x	–	–	–	–	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	–	x	x	x	x	–	x	–	X	5
Smilax lasioneura Hook.	–	x	–	x	x	–	–	x	X	5
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	x	x	x	x	–	–	x	x	X	5
Solanum carolinense L.	–	–	–	–	–	–	–	x	N	ad
Solanum dulcamara L.	x	–	–	x	12	x	–	x	X	*
Solanum ptychanthum Dunal (*Solanum americanum* Mill.)	–	–	–	x	25	–	–	–	X	0
Solidago altissima L.	x	x	–	x 1	–	x	–	–	X	1
Solidago caesia L.	–	x	x	x	x	x	x	x	X	7
Solidago canadensis L.	–	–	–	–	–	–	–	x	N	1
Solidago flexicaulis L.	–	–	–	x	x	–	–	–	X	7

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Solidago gigantea Aiton	–	x	–	x 19	–	–	–	x	X	4
Solidago juncea Aiton	R	–	–	x 1	–	–	–	–	X	5
Solidago nemoralis Aiton	–	–	–	x 1	–	–	–	–	X	4
Solidago rigida L.	–	–	–	1	–	–	–	–	N	4
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	–	–	–	1	–	–	–	–	N	6
SF***Solidago speciosa*** Nutt.	–	–	–	1	–	–	–	–	N	7
Solidago ulmifolia Muhl. ex Willd.	x	x	–	x	–	–	x	–	X	5
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	–	–	–	–	–	–	–	–	X	*
Sorghastrum nutans (L.) Nash	–	–	–	1	–	–	–	–	N	5
Sparganium eurycarpum Engelm.	–	–	–	x	–	–	–	–	X	6
Sphenopholis intermedia (Rydb.) Rydb.	–	–	–	–	–	–	x	–	N	4
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	–	–	–	1	–	–	–	–	N	9
Spiranthes cernua (L.) Rich.	–	–	–	35	–	–	–	–	N	7
SF***Spiranthes ovalis*** Lindl. var. ***erostellata*** Catling	–	38	–	–	–	–	–	–	N	10
Sporobolus heterolepis (A. Gray) A. Gray	–	–	–	39	–	–	–	–	N	10
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida* (Pursh) Fernald)	–	–	–	–	–	–	x	–	N	5
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	–	–	–	–	x	–	–	–	X	5
Staphylea trifolia L.	–	–	–	14	–	–	–	–	N	7
Stellaria media (L.) Vill.	x	–	–	x	–	x	–	–	X	*
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	–	–	x	–	x	–	–	–	X	7
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	x	–	–	–	x	–	–	–	X	2
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	–	–	–	31	–	–	–	–	N	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	–	–	–	1	–	–	–	–	X	5
Symphyotrichum firmum (Nees) G.L. Nesom (*Aster puniceus* L. var. *firmus* (Nees) Torr. & A. Gray)	–	–	–	–	–	x	–	–	X	8
Symphyotrichum laeve (L.) A. Löve & D. Löve var. *laeve* (*Aster laevis* L.)	–	–	–	3A	–	–	–	–	N	9
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	–	–	–	x	–	x	x	x	X	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	–	x	x	x	–	x	x	–	X	4
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	–	–	–	31	–	–	–	–	N	4

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	–	–	–	1	–	–	–	–	N	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	–	x	x	x 1	–	x	–	–	X	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)	–	–	–	1	–	–	–	–	N	9
SF***Symphyotrichum sericeum*** (Vent.) G.L. Nesom (*Aster sericeus* Vent.)	–	–	–	33	–	–	–	–	N	10
Symphyotrichum shortii (Lindl.) G.L. Nesom (*Aster shortii* Lindl.)	–	x	x	x	–	–	–	–	X	8
Symphyotrichum urophyllum (Lindl.) Nesom (*Aster sagittifolius* Willd.)	–	–	–	–	–	x	–	–	X	5
Symplocarpus foetidus (L.) W. Salisb.	–	–	–	20	x	x	x	x	X	8
Syringa vulgaris L.	–	3	–	23	12	–	–	x	X	*
Taenidia integerrima (L.) Drude	–	x	–	–	x	–	–	–	X	9
Taraxacum officinale F. H. Wiggers	x	–	–	x	–	x	–	–	X	*
Taxodium distichum (L.) Rich.	–	–	–	–	–	–	55	–	N	ad
Teucrium canadense L.	–	–	–	x	–	–	–	–	X	3
Teucrium canadense L. var. *occidentale* (A. Gray) E.M. McClintock & Epling (*Teucrium occidentale* A. Gray)	–	–	–	–	25	–	–	–	N	3
Thalictrum dasycarpum Fisch. & Avé-Lall.	–	–	–	x	–	–	–	–	X	5
Thalictrum dioicum L.	x	x	–	x	x	x	x	x	X	7
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	x	x	–	x	x	–	–	–	X	7
Tilia americana L.	x	x	x	x	x	–	–	–	X	5
Torilis japonica (Houtt.) DC.	x	–	–	–	–	–	–	–	X	*
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	x	x	x	x	x	x	X	2
Tradescantia ohiensis Raf.	–	–	–	–	–	–	–	x	N	2
Tragopogon pratensis L.	–	x	–	–	–	–	–	–	X	*
Trifolium aureum Pollich	–	x	–	–	–	–	–	–	X	*
Trifolium hybridum L.	–	–	–	x	–	–	–	–	X	*
Trifolium pratense L.	–	–	–	x 1	–	–	–	–	X	*
Trifolium repens L.	–	–	–	x	–	–	–	–	X	*
Trillium recurvatum L. C. Beck	x	x	–	x	x	–	–	–	X	5
Triosteum aurantiacum E.P. Bicknell	–	–	–	x	–	–	–	–	X	5
Triticum aestivum L.	–	–	–	–	–	–	–	–	X	*
Typha angustifolia L.	–	–	–	x	–	–	–	–	X	1
Typha latifolia L.	–	–	–	x	–	–	–	–	X	1
Ulmus americana L.	x	x	x	x	x	x	x	–	X	3
Ulmus pumila L.	x	–	–	1	–	–	–	x	X	*
Ulmus rubra Muhl.	x	x	–	–	12	–	–	–	X	4

Table 21 (continued). Summary of species verified and reported at Bailly Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 22. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	–	–	–	x	–	x	x	x	X	2
Uvularia grandiflora Sm.	–	–	–	–	–	x	x	–	X	7
Vaccinium angustifolium Aiton	–	–	–	x	–	–	–	–	X	5
Verbascum blattaria L.	x	–	–	–	–	–	–	–	X	*
Verbascum thapsus L. ssp. *thapsus*	–	–	–	x	–	–	–	–	X	*
Verbena bracteata Cav. ex Lag. & Rodr.	–	–	–	–	–	–	–	–	X	0
Verbena hastata L.	–	–	–	x	–	–	–	–	X	4
Verbena stricta Vent.	–	–	–	–	–	–	–	–	X	4
Verbena urticifolia L.	–	x	–	x	–	–	x	x	X	5
Verbesina alternifolia (L.) Britton ex Kearney (*Actinomeris alternifolia* (L.) DC.)	–	x	–	x	–	x	X	x	X	5
Vernonia fasciculata Michx.	–	–	–	1	–	–	–	–	N	5
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt.)	–	x	–	–	12	–	x	–	X	3
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt. var. *taeniotricha* S.F. Blake)	–	–	–	x	–	–	–	–	X	5
Veronica arvensis L.	x	–	–	–	–	–	–	–	X	*
Veronica peregrina L.	x	–	–	–	–	–	–	–	X	0
Veronica serpyllifolia L.	x	–	–	–	–	–	–	–	X	*
Veronicastrum virginicum (L.) Farw.	–	–	–	33	–	–	–	–	N	7
Viburnum acerifolium L.	x	x	x	x	x	–	x	x	X	9
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* Fernald)	–	–	–	–	–	–	x	–	N	ad
Viburnum lentago L.	–	–	23	x	–	–	–	–	X	5
Viburnum opulus L. var. *opulus*	x	–	–	–	–	–	–	–	X	*
Viburnum rafinesquianum Schult.	x	x	–	–	x	–	–	x	X	5
Vinca minor L.	x	–	x	x	–	–	–	–	X	*
Viola affinis Leconte	–	–	–	x	–	–	–	–	X	4
Viola affinis Leconte (*Viola missouriensis* Greene)	x	–	–	–	–	–	–	–	X	4
Viola odorata L.	x	–	–	–	–	–	–	–	X	*
Viola pubescens Aiton	–	x	–	x	–	x	–	–	X	5
Viola sororia Willd.	x	x	x	x	x	x	–	x	X	3
Viola striata Aiton	–	x	–	x	–	–	–	–	X	6
Vitis aestivalis Michx.	–	x	–	x	–	x	x	–	X	7
Vitis riparia Michx.	x	x	x	x	x	x	x	x	X	2
Xanthium strumarium L.	–	–	–	–	–	–	–	–	X	*
Zizia aurea (L.) W. D. J. Koch	–	x	–	x	–	–	–	–	X	7

Table 22. Sources of new species verified and reported from Bailly. Notes are MOR = Morton Arboretum Herbarium.

Notes	Source(s)	Date	Species
1	P. Benjamin	1996	*Achillea millefolium*, *Agrimonia parviflora*, *Agropyron cristatum*, *Agrostis gigantea*, *Agrostis hyemalis*, *Ambrosia trifida*, *Andropogon gerardii*, *Anemone virginiana* var. *virginiana*, *Apocynum cannabinum*, *Aronia* × *prunifolia*, *Asclepias hirtella*, *Asclepias syriaca*, *Baptisia lactea*, *Calamagrostis canadensis*, *Carex bebbii*, *Carex bicknellii*, *Carex hirsutella*, *Carex scoparia* var. *scoparia*, *Carex vulpinoidea*, *Celastrus scandens*, *Centaurea stoebe* ssp. *micranthos*, *Cerastium fontanum* ssp. *vulgare*, *Cirsium arvense*, *Convolvulus arvensis*, *Coreopsis tripteris*, *Crataegus coccinea*, *Dactylis glomerata*, *Daucus carota*, *Desmodium canadense*, *Desmodium paniculatum*, *Doellingeria umbellata* var. *umbellata*, *Echinochloa crusgalli*, *Elaeagnus angustifolia*, *Eleocharis elliptica*, *Erigeron annuus*, *Eryngium yuccifolium*, *Euphorbia corollata*, *Euthamia graminifolia*, *Helianthus giganteus*, *Helianthus occidentalis*, *Hieracium caespitosum*, *Ionactis linariifolia*, *Juncus canadensis*, *Juncus dudleyi*, *Juncus effusus*, *Juncus scirpoides*, *Koeleria macrantha*, *Lespedeza capitata*, *Leucanthemum vulgare*, *Liatris cylindracea*, *Liatris spicata*, *Linaria vulgaris*, *Liparis liliifolia*, *Lobelia spicata*, *Lysimachia lanceolata*, *Melilotus alba*, *Oenothera biennis*, *Panicum virgatum*, *Penstemon digitalis*, *Phleum pratense* ssp. *pratense*, *Poa compressa*, *Poa pratensis*, *Potentilla recta*, *Quercus palustris*, *Quercus velutina*, *Rhus copallinum* var. *copallinum*, *Rhus glabra*, *Rhus typhina*, *Robinia pseudoacacia*, *Rosa setigera*, *Rumex acetosella*, *Salix discolor*, *Saponaria officinalis*, *Schedonorus arundinaceus*, *Schizachyrium scoparium*, *Scirpus atrovirens*, *Setaria pumila* ssp. *pumila*, *Silphium perfoliatum* var. *perfoliatum*, *Solidago altissima*, *Solidago juncea*, *Solidago nemoralis*, *Solidago rigida*, *Solidago rugosa*, *Solidago speciosa*, *Sorghastrum nutans*, *Spiraea tomentosa* var. *rosea*, *Symphyotrichum ericoides*, *Symphyotrichum oolentangiense*, *Symphyotrichum pilosum*, *Symphyotrichum praealtum*, *Trifolium pratense*, *Ulmus pumila*, *Vernonia fasciculata*
2	C. Fox	1 Feb 1985	*Carex swanii*
3	D. Mickey	Fall 2003	*Ailanthus altissimus*, *Alliaria petiolata*, *Cirsium arvense*, *Robinia pseudoacacia*, *Syringa vulgaris*
4	D. Mickey and K. Quinlan	3 Nov 2003	*Pseudotsuga menziesii*
5	M. Newgent and B. Plampin	Aug 1994	*Phlox paniculata*
6	N.B. Pavlovic	14 Oct 1993	*Parthenium integrifolium*
7	N.B. Pavlovic	Aug 1999	*Fallopia japonica*
8	Pavlovic et al. (Exotic Project)	14 July 1999	*Elymus riparius*
9	Pavlovic et el. (Exotic Project)	9 Aug 1999	*Asplenium platyneuron*
10	Pavlovic et al. (Exotic Project)	27 June 2000	*Elymus riparius*
11	B. Plampin, B.	Jun 1991	*Dioscorea villosa*
12	B. Plampin	Aug 1991	*Asclepias syriaca*, *Boehmeria cylindrica*, *Leersia virginica*, *Lysimachia nummularia*, *Ostrya virginiana*, *Packera aurea*, *Persicaria hydropiperoides*, *Phryma leptostachya* var. *leptostachya*, *Phytolacca americana*, *Pilea pumila*, *Scutellaria lateriflora*, *Setaria pumila*, *Solanum dulcamara*, *Syringa vulgaris*, *Ulmus rubra*, *Vernonia gigantea*
13	B. Plampin	July 1992	*Asclepias exaltata*
14	B. Plampin	May 1994	*Desmodium canescens, Echinocystis lobata, Malus ioensis, Menispermum canadense, Staphylea trifolia*
15	B. Plampin	Aug 1994	*Amphicarpaea bracteata*, *Anemone quinquefolia* var. *quinquefolia*, *Anemone americana*, *Arisaema triphyllum*, *Dasistoma macrophylla*, *Hylodesmum glutinosum*, *Enemion biternatum*, *Impatiens pallida*, *Hypopitys monotropa*, *Pachysandra terminalis*, *Rhus aromatica*
16	B. Plampin	Oct 1994	*Rubus flagellaris*, *Rubus idaeus* ssp. *strigosus*
17	B. Plampin	1994	*Ambrosia artemisiifolia*, *Anemone cylindrica*, *Commelina communis*

Table 22 (continued). Sources of new species verified and reported from Bailly. Notes are MOR = Morton Arboretum Herbarium.

Notes	Source(s)	Date	Species
18	B. Plampin	Jun 1995	*Hydrophyllum virginianum*
19	B. Plampin	Oct 1995	*Solidago gigantea*
20	B. Plampin	4 May 1997	*Symplocarpus foetidus*
21	B. Plampin	5 July 2004	*Sagittaria latifolia*
22	B. Plampin and M. Newgent	1989	*Pyrus communis*
23	B. Plampin and M. Newgent	Aug 1994	*Cornus obliqua*, *Juncus tenuis*, *Lunaria annua*, *Podophyllum peltatum*, *Syringa vulgaris*, *Viburnum lentago*
24	B. Plampin and M. Newgent	19 Oct 1995	*Hasteola suaveolens*
25	B. Plampin, M. Newgent, and K. Board	Aug 1991	*Agrostis perennans*, *Aronia* × *prunifolia*, *Commelina communis*, *Eleusine indica*, *Eragrostis pectinacea*, *Fallopia scandens*, *Ligustrum vulgare*, *Lobelia cardinalis*, *Lobelia inflata*, *Malus domestica*, *Muhlenbergia schreberi*, *Penthorum sedoides*, *Persicaria sagittata*, *Sagittaria latifolia*, *Solanum ptychanthum*, *Teucrium canadense* var. *occidentale*
26	B. Plampin et al.	May 1991	*Agastache scrophulariifolia*
27	B. Plampin et al.	Aug 1991	*Ailanthus altissimus*, *Alisma subcordatum*, *Ageratina altissima* var. *altissima*, *Anemone americana*, *Cinna arundinacea*, *Eupatorium perfoliatum*, *Euphorbia corollata*, *Glechoma hederacea*, *Hackelia virginiana*, *Hylodesmum glutinosum*, *Sanguinaria canadensis*
28	B. Plampin et al.	Aug 1994	*Alliaria petiolata*
29	B. Plampin et al.	1994	*Campanula americana*
30	K. Quinlan and D. Mickey	3 Nov 2003	*Pinus sylvestris*
31	A. Resetar	Oct 1993	*Symphyotrichum dumosum*, *Symphyotrichum novae-angliae*
32	A. Resetar and D. Resetar	Aug 1993	*Ipomoea pandurata*
33	A. Resetar and D. Resetar	Oct 1993	*Gentiana andrewsii*, *Helenium autumnale*, *Polygala sanguinea*, *Silphium laciniatum*, *Symphyotrichum sericeum*, *Veronicastrum virginicum*
34	A. Resetar and D. Resetar	Oct 1993, May 1994	*Sedum sarmentosum*
35	A. Resetar and D. Resetar	1993	*Spiranthes cernua*
36	D. Beamer and N.B. Pavlovic	2002	*Myosotis laxa*
37	D. Mason and B. Daum	8/14/2008	*Cystopteris protrusa*
38	S. Leicht-Young, N.B. Pavlovic, and L. Cremin	7 Oct 2009	*Spiranthes ovalis* var. *erostellata*
39	N.B. Pavlovic	undated	*Sporobolus heterolepis*
40	N.B. Pavlovic	5 June 2013	*Filipendula vulgaris*
41	N. Pavlovic and S.A. Leicht-Young	2008	*Maclura pomifera*
42	K. Dritz	4 May 1980	*Ribes aureum* Pursh var. *villosum*
43	S. Kobal, S.	12 June 1999	*Euphorbia cyparissias*
44	S. Leicht-Young, N.B. Pavlovic, and K. Potts	14 May 2007	*Euphorbia* × *pseudoesula*
45	B. Plampin	8 Aug 1989	*Aureolaria virginica*
46	N.B. Pavlovic	10 Apr 2014	*Platanus occidentalis*
47	G. Tonkovich	24 May 2011	*Adiantum pedatum*
48	S. Kobal	12 June 1999	*Carex digitalis*

Table 22 (continued). Sources of new species verified and reported from Bailly. Notes are MOR = Morton Arboretum Herbarium.

Notes	Source(s)	Date	Species
49	R. Hiebert and J. Payton	3 May 1982	*Euphorbia esula* annotated to *E. cyparissias*
50	N. Pilla		*Asclepias tuberosa*, probably introduced from restoration plantings since this conspicuous species was not observed previously
51	N. Pilla		*Corallorhiza odontorhiza*
52	N. Pilla		*Erythronium albidum*
53	C. Fox (MOR)	10 May 1984	*Amelanchier* × *grandiflora*
54	E. Kjellmark (MOR)	28 Apr 1987	*Antennaria howellii* ssp. *petaloidea*, *A. parlinii*
55	L. Miramontes	12 May 2017	*Taxodium distichum*
56	C. Deam	25 Aug 1916	*Asclepias sullivantii*
57	G. Wilhelm and L. Rericha (MOR)	15 Apr 2013	*Chionodoxa lochiae*, *Chionodoxa luciliae*
58	G. Wilhelm (MOR)	28 May 1979	*Crataegus* × *disperma*
59	E. Kjellmark (MOR)	22 May 1987	*Elaeagnus umbellata* var. *parvifolia*
60	G. Wilhelm and L. Rericha	15 Apr 2013	*Eranthis hyemalis*
61	B. Plampin and D. Hamilla	5 June 2019	*Oxalis violacea*
62	G. Wilhelm	21 July 1997	*Crataegus succulenta*

Special flora summary

Wilhelm (1990) lamented the low quality of the Bailly Unit based on the low numbers of special flora; however, the number of special flora has more than quadrupled since then, from seven in 1990 to 36 in 2021. This increase points out that in such disturbed landscapes, species may persist in numerically small and isolated pockets, making their discovery labor- and time-intensive.

There is a specimen of *Betula pendula* (Kjellmark #46, MOR) from "one small tree . . . [at the] border of a pasture" in Bailly B. See the discussion of *Betula populifolia* in chapter 2. In 1989, Plampin wrote to Wilhelm, recollecting having seen *Corallorhiza maculata* off the side of the Little Calumet River Trail in July 1981 but did not recommend it be included in the annotated list because of the vagueness of the account (Wilhelm 1990).

Nineteen special flora are confirmed, 16 are new, and one is believed to be extirpated (*Asclepias sullivantii*). New special flora to Bailly include *Acorus americana*, *Adiantum pedatum*, *Asclepias sullivantii*, *Brachyelytrum erectum*, *Carex aggregata*, *Carex bebbii*, *Carex digitalis*, *Carya laciniosa*, *Hasteola suaveolens*, *Ipomoea pandurata*, *Juncus scirpoides*, *Hypopitys monotropa*, *Myosotis laxa*, *Spiranthes ovalis erostellata*, and *Symphyotrichum sericeum* (Table 23). A total of 11 species are unique to Bailly relative to the rest of the Indiana Dunes: *Acorus americanus*, *Bidens vulgata*, *Camassia scilloides*, *Carex aggregata*, *C. annectens*, *Desmodium canescens*, *Frasera caroliniensis*, *Hasteola suaveolans*, *Rosa setigera*, and *Silene virginica*.

Bailly A around the park headquarters harbors only six special flora. Bailly B has eight special flora within the uplands and ravines surrounding the Chellberg farm and the Environmental Learning Center. Only one special flora element is recorded for Bailly C. Bailly D has the highest number of special flora (19), largely because this area harbors the remnants of the large silt loam prairie now called Mnoke Prairie. The remaining E, F, G, and H sub-units possess one, one, four, and two special flora species, respectively.

Floristic summary

Bailly has a total of 601 taxa including 457 native taxa, 23 adventive taxa, and 121 exotic

taxa (Table 23). Bailly reliably harbors a total of 447 native species, 119 exotic, and 21 adventive species. Of the 457 native taxa, 447 are species, nine are varieties, and one is a hybrid. Of the 15 Indiana-listed species, one is endangered, 11 are threatened, three are watch listed, and none are extirpated. Native species richness represents a 150% (302) increase from 1990, principally due to the floristic surveys in the Mnoke Prairie! Bailly has a mean CoC of 5.1 and an FQI of 109.

New native species added since 1990 include *Adiantum pedatum*, *Agrostis hyemalis*, *Agrostis perennans*, *Anemone cylindrica*, *Anemone virginiana* L. var. *virginiana*, *Antennaria howellii petaloidea*, *Apocynum cannabinum*, *Aronia* × *prunifolia*, *Asclepias exaltata*, *A. hirtella*, *A. tuberosa*, *Aureolaria virginicus*, *Baptisia lactea*, *Brachyelytrum erectum*, *Calamagrostis canadensis*, *Carex aggregata*, *C. bebbii*, *C. bicknellii*, *C. digitalis*, *C. swanii*, *Carya laciniosa*, *Chenopodium*

Table 23. Summary of floristic statistics by subunit of Bailly. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

	Subunit								
Category	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	Entire Unit
Area (ha and acres)	68/167	72/179	32/79	203/502	5/11	37/90	91/224	27/68	534/1,320
Special flora total	6	7	1	19	1	1	4	2	36
Confirmed	5	6	0	12	1	0	3	2	19
New	1	1	1	6	0	1	1	0	16
Reported	0	0	0	0	0	0	0	0	0
Extirpated	0	0	0	1	0	0	0	0	1
Total taxa, FNA/ITIS	173	198	94	425	156	126	130	135	601
Total native taxa, FNA/ITIS	121	167	77	353	142	100	107	108	457
Native species, FNA/ITIS	117	163	75	345	139	98	105	106	447
Native variety, FNA/ITIS	4	4	2	7	2	2	2	2	9
Native hybrid, FNA/ITIS	0	0	0	1	1	0	0	0	1
Total adventive taxa, FNA/ITIS	8	5	0	5	0	2	3	5	23
Total adventive species, FNA/ITIS	8	4	0	5	0	2	3	5	22
Total adventive variety, FNA/ITIS	0	0	0	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	1	0	0	0	0	0	0	1
Total exotic taxa, FNA/ITIS	44	26	17	67	14	24	20	22	121
Total exotic species, FNA/ITIS	42	24	16	66	13	23	19	21	118
Total exotic variety, FNA/ITIS	1	0	0	0	0	0	0	0	1
Total exotic hybrid, FNA/ITIS	1	2	1	1	1	1	1	1	2
Total Indiana-listed	5	1	1	7	0	1	2	1	15
Endangered	0	1	0	0	0	0	0	0	1
Threatened	5	0	0	5	0	1	2	1	11
Rare	0	0	0	0	0	0	0	0	0
Watch List	0	0	1	2	0	0	0	0	3
Extirpated	0	0	0	0	0	0	0	0	0
Sum CC	524	825	345	1,753	665	363	450	390	2,336
Sum CC adventive & invasive	476	796.5	328	1,683.5	651	338	428.5	365.5	2,203.5
Mean CoC	4.3	4.88	4.42	4.91	4.65	3.59	4.13	3.55	5.07
Mean CoC with adventive and invasive	3	4	3	4	4	3	3	3	4
FQI	47	63	39	93	56	36	43	37	109
FQI with adventive and invasive	36	56	34	81	52	30	37	31	90

standleyanum, *Corallorhiza odontorhiza*, *Coreopsis tripteris*, *Crataegus* × *disperma*, *Cystopteris protrusa*, *Doellingeria umbellata*, *Eleocharis elliptica*, *Eragrostis pectinacea*, *E. spectabilis*, *Eryngium yuccifolium*, *Erythronium albidum*, *Eurybia macrophylla*, *Gentiana andrewsii*, *Hasteola suaveolens*, *Helianthus giganteus*, *H. occidentalis*, *H. strumosus*, *Ipomoea pandurata*, *Juncus canadensis*, *J. pylaei*, *J. scirpoides*, *Koeleria macrantha*, *Liatris cylindracea*, *L. spicata*, *Liparis lilifolia*, *Lobelia cardinalis*, *L. inflata*, *L. spicata*, *Menispermum canadense*, *Monarda punctata*, *Hypopitys monotropa*, *Muhlenbergia frondosa*, *M. schreberi*, *Myosotis laxa*, *Oxalis violacea*, *Packera glabella*, *Parietaria pensylvanica*, *Penstemon digitalis*, *Persicaria hydropiper*, *P. sagittata*, *Platanus occidentalis*, *Polygala sanguinea*, *Quercus coccinea*, *Rhus aromatica*, *R. glabra*, *Ribes aureum*, *R. missouriense*, *Rosa setigera*, *Rubus idaeus strigosus*, *Sagittaria latifolia*, *Schizachyrium scoparium*, *Silphium laciniatum*, *Solidago canadensis*, *S. rigida*, *S. rugosa*, *S. speciosa*, *Sorghastrum nutans*, *Sphenopholis intermedia*, *Spiraea tomentosa*, *Spiranthes cernua*, *S. ovalis*, *Sporobolus heterolepis*, *Stachys hispida*, *Staphylea trifolia*, *Symphyotrichum dumosum*, *S. laeve*, *S. novae-angliae*, *S. oolentangiense*, *S. praealtum*, *S. sericeum*, *Teucrium canadense occidentale*, *Tradescantia ohiensis*, *Vernonia fasciculata*, *Veronicastrum virginicum*, and *Viburnum dentatum lucidum*.

New adventive species include *Maclura pomifera*, *Pseudotsuga menziesii*, *Solanum carolinense*, *Taxodium distichum*, and *Viburnum dentatum lucidum*.

New exotic species include *Agropyron cristatum*, *Centaurea stoebe* ssp. *micranthos*, *Chionodoxa lochiae*, *C. luciliae*, *Commelina communis*, *Convolvulus arvensis*, *Digitaria sanguinalis*, *Elaeagnus angustifolia*, *Eleusine indica*, *Epipactis helleborine*, *Eranthis hyemalis*, *Euphorbia* × *pseudoesula*, *Filipendula vulgaris*, *Galanthus elwesii*, *G. nivalis*, *Ipomoea purpurea*, *Ligustrum vulgare*, *Linaria vulgaris*, *Lonicera maackii*, *Lunaria annua*, *Pachysandra terminalis*, *Pyrus communis*, and *Setaria viridis*.

Conservation issues

Bailly A

Encompassing the national park headquarters, Bailly A includes the 68-hectare (167-acre) area south of U.S. 12, north of Oak Hill Road, and west of Mineral Springs Road. The groundlayer of the mesophytic forest west of park headquarters is of low plant diversity and cover but represents one of the better quality forests in the Bailly Unit, and it is distinctive because it is the only place where the vegetation transitions between dune sand to the north and moraine soil to the south. The composition and structure of the woody understory and overstory is of high quality. Since 1991, the authors have recorded 117 native species (109 in 1990), with a mean CoC of 4.3 and an FQI of 47.

Much of Bailly contains abandoned old fields which are succeeding into weedy forests dominated by oriental bittersweet and autumn olive. A useful conservation goal could be to restore these areas to oak hickory forest that would sequester CO_2 from the atmosphere and restore ground flora species diversity.

Forest restoration in this subunit would require eliminating invading exotic plants, protecting tree saplings from abundant deer browse, and planting understory herbaceous perennials. Concomitant with old field restoration would be the introduction of herbaceous diversity into those forest remnants that experienced prior disturbance from human activity. Such efforts could enhance the conservation importance of Bailly as oak hickory forest.

Bailly B

The 72 hectares (179 acres) of Bailly B include the ravine forest that flanks the Chellberg farm and the bluffs and bottoms around the Bailly homestead, east of Howe Road, south of Oak Hill Road, and west of 100W Road. Including the recent herbarium records, Bailly B includes 163 native species (164 in 1990), with a mean CoC of 4.9 and an FQI of 63. The ecological problems here (and in subunit D) are complex, and some problems with sources outside the park could be challenging to remedy. The Little

Calumet River carries heavy amounts of silt from eroded, row-cropped uplands after high rainfall events, and concurrent confined sewage discharges impact the watershed (Save the Dunes 2015). The sewage discharges are diminishing as Chesterton increases its storm water storage capacity. The abrasive character and deposition of such silts, trash, and debris during flood events maintain a low floristic quality. Forests along the bluffs are now confined to steep slopes, the upper edges of which interface with open, highly disturbed, often artificial habitats which may discourage both stability in groundcover vegetation and tendencies toward moderation of the mesophytic microclimate. These transitions have been a zone for invasion of garlic mustard and oriental bittersweet, both species that can then invade the mature forest remnants (Leicht-Young et al. 2010b).

Bailly C

Bailly C is a 32-hectare (79-acre) tract that includes the ravine forest and upland woods mapped as mesophytic forest. We have recorded 75 native plants (79 in 1990), with a mean CoC of 4.4 and an FQI of 39. The northern portion of this subunit that abuts Oak Hill Road includes a diverse oak hickory forest overstory, but the understory is depauperate in herbs. This is an area where herbaceous perennial reintroduction could be beneficial or where a light burning to remove leaf litter might encourage the understory flora.

Bailly D

The 203 hectares (502 acres) of Bailly D contain some of the largest and highest quality (high diversity and structure) riparian vegetation in the Chicago Region (Wilhelm 1990). In the bottomland and along the adjacent bluffs in the mesophytic forest, we catalogued 345 native species, with a mean CoC of 4.9 and an FQI of 93.

Bailly D has been the focus of vegetation sampling and prairie restoration for about 20 years (Grundel and Pavlovic 2007a, 2007c, 2008, 2010, 2020). The difficulty in this restoration has been the pervasive presence of exotic grasses and forbs of European origin, introduced when the area was farmed. The rich soil makes control of invasive species more difficult. Recent removal of north-south fence rows has created a broad vista of prairie-like landscape but has eliminated the scattered open-grown oaks within the prairie matrix. Abundance of C4 grasses has increased at the expense of prairie forbs (Pavlovic, pers. obs.). The prairie restoration in this subunit could benefit from incorporating techniques developed over the last 70 years to achieve better control of invasives and successful reintroduction of native prairie species (Anderson et al. 2007, Brudvig et al. 2007, Foster et al. 2007, Milbauer and Leach 2007, Jordan et al. 2008, MacDougall et al. 2008, Summerville 2008, Grygiel et al. 2009, Thogmartin et al. 2009, Yurkonis et al. 2010). Much could be learned from the landscape scale restorations being conducted in the greater Chicago Region, such as at Midewin National Grassland (Glass et al. 2021, Zylka et al. 2016). Prairie sedges, prairie dropseed, and other rare prairie plants representative of the silt-loam prairie remnant in the southwestern portion of the prairie could be introduced rather than the more common Indian grass and turkey-foot grass.

Remnant patches of shooting star (*Primula meadia*) and columbo (*Frasera caroliniensis*) on the south-facing bluff on the north side of the Little Calumet River harken back to a time when the forest was more open as a result of occasional land fires. Whether some thinning of trees would benefit these locally rare species could be determined experimentally by clearing trials as adaptive management. These trials would be tempered by the probability that garlic mustard and oriental bittersweet would increase in abundance. Since these are the only known locations for shooting star and columbo in the east unit of the park, such work could be of value. There is a very large and magnificent American elm (*Ulmus americana*) along the main trail, northwest of the Dunes Learning Center, observed by Pavlovic, Justin Chappelle, and Brock Struecker on 23 August 2017.

There is an 18-hectare (45-acre) extension of Bailly D between Route 149 and the New York Central Railroad, but the authors have

not conducted a vegetation survey in this area.

Bailly E

When Wilhelm (1990) surveyed the five-hectare (11-acre) Bailly E subunit on 28 May 1979, it may have been the most groundlayer-rich, mesophytic forest ravine in the Indiana Dunes, but it is now being overrun with garlic mustard (*Alliaria petiolata*) and oriental bittersweet (*Celastrus orbiculatus*). On only one short visit, Wilhelm recorded 110 (109) native flora, with a mean CoC of 4.9. The lower slopes and bottomland were, in places, quite fen-like in character, making it formerly one of the most hydrologically and floristically diverse ravines in the Bailly Unit. According to Wilhelm (1990), Jacob's ladder was rare in this high-quality ravine. It may have succumbed to the prolific invasion of garlic mustard and oriental bittersweet. Jacob's ladder is more common to the south of INDU, with the nearest collection from the east side of Chesterton. No specimen or photograph exists to document this species in the Indiana Dunes. Since its discovery in the Dunes State Park by Doug Botka, it is possible these occurrences are native, or else they were both planted. While we record 139 native species, with a mean CoC of 4.7 and an FQI of 56, it is possible that the actual number of species has declined, given the high cover of the two invasive species.

Bailly F

Bailly F is a 37-hectare (90-acre) area that includes bottomland and mesophytic forest areas along Salt Creek. Wilhelm (1990) surveyed this subunit on 13 May 1987. Ninety-eight (101) native species were recorded, with a mean CoC of 3.6 and representing an FQI of 36. Two additional reported species bring the total to 101, mean CoC to 3.6, and the FQI to 36.

Other sub-units

Bailly G, a large (195 acre) tract west of Route 149, along the Little Calumet River bottomlands and bluffs to Samuelson Road, south to the section line off of Boo Road, has not been surveyed. In 1989, Plampin reported *Silphium terebinthinaceum* from a degraded prairie remnant in this vicinity—a notable find since it is the first and only known record for prairie dock in INDU.

Bailly H is a 27-hectare (68-acre) tract west of Samuelson Road, along the south side of the channelized Little Calumet River; Bailly I, a 12-hectare (30-acre) tract, is along the north side.

There are about 32 hectares (80 acres) altogether along U.S. 12, most of which have been heavily disturbed (sub-units J and K). Wilhelm (1990) surveyed the central portion in 1979 and found it lacking in native plant species, so he did not map them as natural area. If the pines, which may have been planted there, were included in the calculations, the FQI would be approximately 22, with a mean CoC of 3.4. These areas could be inventoried for native species.

Bailly D has the most special flora species and the highest richness of the Bailly subunits (Table 23). This subunit also has the highest floristic quality (93), with the two next highest subunits being B (FQI 63) and E (FQI 56). For the entire unit, we have recorded 447 native species, with a mean CoC of 5.1 and an FQI of 109. These are high values for a morainal area of rich silt loam soils that was largely converted to agricultural use prior to the creation of INDU.

Unit 7: Cowles Dunes (formerly Dune Acres)

The writer was amused by a remark made to him [Dr. John Merle Coulter] *by an American botanist to the effect that whatever part of the United States one visited one was always told by the local botanist that this was a specially interesting region, because it was the meeting-point of two floras, the eastern and the western—or perhaps the northern and the southern—the obvious inference being that the conception of a "northern" or of a "western"*

flora gradually shifted as one moved south or east. There can be no doubt, however, as Professor Cowles insisted, that the Chicago region is, in a very real sense, the meeting-place of a northern and southern flora, and of an eastern and western vegetation. This means, of course, that there are actually a large number of species characteristic of the north or of the south which are found intermingled in this region, and that in Illinois and neighbouring States, the great eastern deciduous forest begins to give way to prairie.

—Arthur Tansley (1913)

The general characteristics of the country do not appear to be essentially different of the Porter County dunes of Lake Michigan, but there appear to be some striking differences between the eastern and the western ends in the plants found in each. West of Mineral Springs are found such striking plants as Clintonia, Liparis loeselii, Hypoxis, Hydrocotyle, Eryngiurn, Hudsonia, Phlox bifida, Linnaea, Sabatia, Dasystephana puberula, Aster sericeus. *East of Mineral Springs only a few conspicuous plants are found which do not occur westward,* Blepharoglottis psycodes, Viola primulifolia, Platanus occidentalis.

—Marcus Lyon (1930)

The Cowles Dunes Unit occupies about 801 hectares (1,731 acres) around the village of Dune Acres (Figure 18). Wilhelm (1980, 1990) called this unit Dune Acres, and while portions of this unit include the Town of Dune Acres, it is more appropriate to name it for the dominant feature: Cowles Bog. Since this unit also includes the high dunes it was decided to rename the unit Cowles Dunes.

The area west of Mineral Springs Road (subunit A) occupies approximately 397 hectares (980 acres), about 20% of which is a highly disturbed remnant of the famous Cowles Bog Wetland Complex and which now includes the NIPSCO Greenbelt. The area east of Mineral Springs Road (primarily subunit B) includes about 242 hectares (597 acres), nearly 45% of which, including the formerly floristically rich Cowles Bog Wetland Complex, has been altered by past attempts at farming and invasion of hybrid cattail and phragmites. Most of subunit C south of the Chicago South Shore & South Bend Traction Line and north of U.S. 12 (about 34 hectares/84 acres) has been altered by former lumbering, human disturbance, and homesite construction (Cook and Jackson 1978). North of the traction line in the southeastern portion of the Cowles Dunes is an intact hydromesophytic forest designated subunit D. The right-of-way along the traction line and the bike trail from Mineral Springs Road to Waverly Road is designated Cowles Dunes E. Cowles Dunes was surveyed by Wilhelm on 4 June and 19 August 1998.

The Cowles Dunes Unit is a microcosm of the dunes in general, including lands at the toe of the Calumet Dunes, the Great Marsh with Cowles Bog, the Tolleston Dunes, and the high dunes and mesophytic pockets with foredunes and blowouts adjacent to Lake Michigan. The grandeur of this landscape can be seen at the Calumet Bike Trail parking lot west of Mineral Springs Road. Here, restoration of the wet-mesic prairie has eliminated the invading red maple forest and opened the viewshed to Cowles Bog and the high dunes above Lake Michigan. This complexity of landforms and substrates has created the habitat diversity that contributes to the high plant diversity of Cowles Dunes.

Several areas within the Cowles Dunes are of interest because they have been known to provide the habitat for numerous special flora. These areas include Little Lake and Cowles Bog (A), the Lois Howes Prairie (B), and the west portion of the Great Marsh

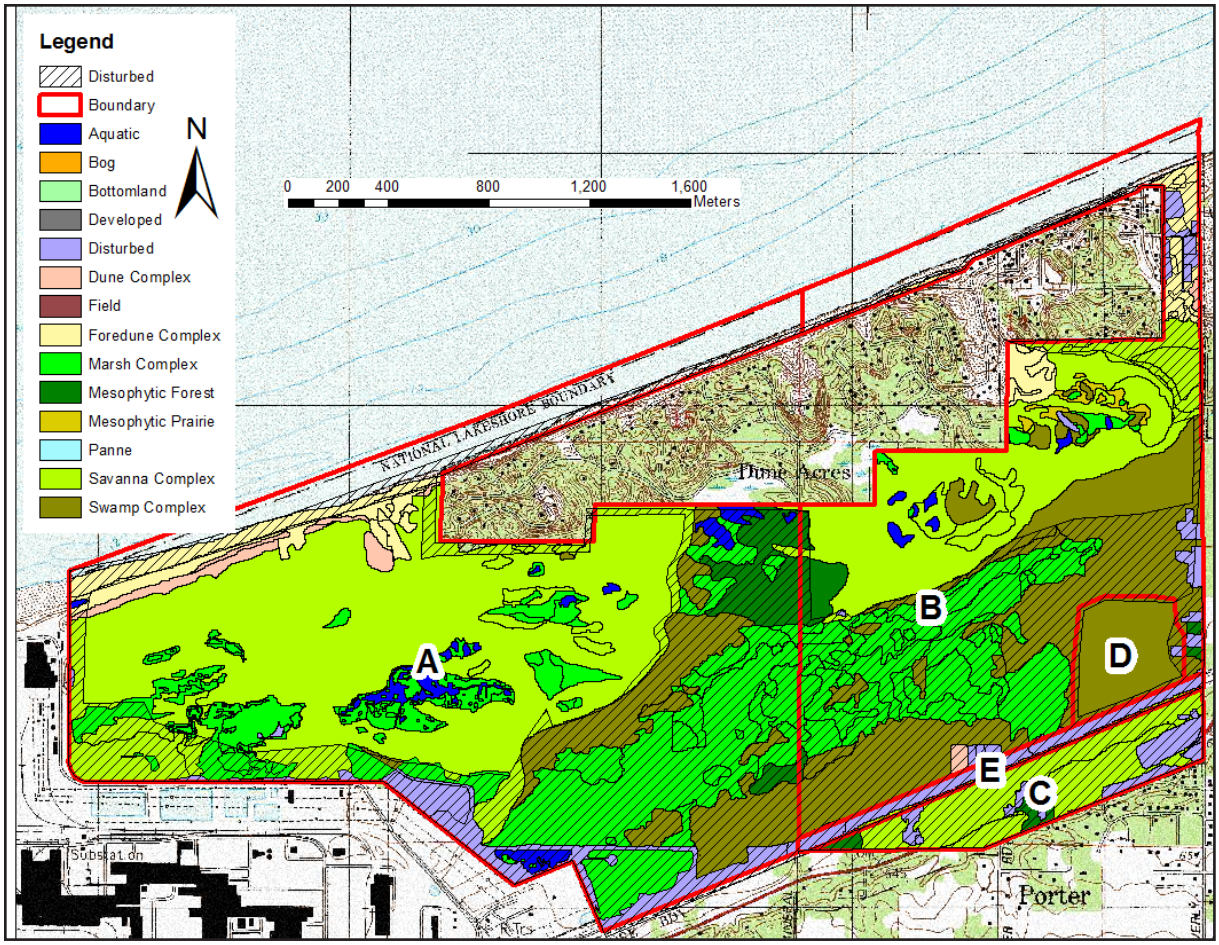


Figure 18. Vegetation of Cowles Dunes Unit. Subunits indicated by letters. Cross-hatching indicates disturbed areas. The Town of Dune Acres is surrounded by the national park. Portions of Dune Acres park lands to the east and west of Mineral Springs Road are included in the mapped area. This does not negate or minimize the town's right to management of these lands.

(called the Cowles Bog Wetland Complex), which is common to subunits A and B. Immediately to the west of this, Cowles Dunes, and perhaps even yet partially extant in the Blag Slough (NIPSCO Ponds) and Little Lake, was the large wetland complex known as Goose Lake, Walker Lake, and Mud Lake (Pavlovic et al. 2009). Goose Lake was partially filled in 1959 when the NIPSCO coal-fired powerplant was being constructed. The main portion of Goose Lake was subsequently filled with the construction of the Bethlehem Steel Mill Complex soon thereafter.

Little Lake

Little Lake, located about one mile west of Mineral Springs Road and bisected by the section line about one-half mile south of Lake Michigan, was one of the very few interdunal depressions within INDU where open water frequently remained throughout the growing season. Lyon (1927), lamenting the recent drainage of Little Lake, regarded it as "...a very interesting pond." Cook and Jackson (1978) describe in detail the drainage of Little Lake and its subsequent use by the residents of Dune Acres as a golf course. Apparently, according to Cook and Jackson, after about 10 years of use, the golf course was abandoned, but the drainage ditch from Little Lake remained partially functional until the late 1960s, when "Little Lake... became a year round pond as it had been before 1924. It was changed, however, in that it now had a direct outlet into the Great Marsh." There were two ditches constructed, one extending due south from Little Lake into the wetland to the south, and an east-west ditch that extended from the south wetland to the Cowles Bog Wetland Complex to the east. There is some debate whether the ditch that traversed the dune at the west end of the Cowles Bog Wetland

Complex ever functioned (Wilcox, pers. comm. with Pavlovic; Pavlovic, pers. obs.). The ditch closest to Little Lake has been blocked since sometime around 2000 by the park botanist and aquatic species specialist, Daniel Mason. Today, a significant number of the special flora remain extant in Little Lake; however, these flora are a subset of those that occurred in Goose Lake.

Wilhelm (1990) believed the destruction of the Goose Lake area more than decimated the populations of some of the Indiana Dunes special flora. Several species of plants were known locally only from Goose Lake, including *Eleocharis quadrangulata*, *Fuirena pumila*, and *Juncus militaris*. About *Juncus militaris*, for example, Swink and Wilhelm (1979) wrote:

> *Many hundreds of these plants were discovered . . . in the shallow waters of Goose Lake in Porter County before the destruction of that lake. . . . This was the only station in the Chicago area, and according to Gleason, the nearest colony is in northern Michigan. At Goose Lake the Soldier Rush grew with* Cladium mariscoides, Dulichium arundinaceum, Hypericum boreale, Hypericum virginicum *var.* fraseri [*Triadenum fraseri*], Ludwigia alternifolia, Polygonum coccineum, Pontederia cordata, Rhynchospora capitellata, Sagittaria graminea, *and* Utricularia purpurea.

For several decades, the likelihood that these species were still extant was thought to be remote (Wilhelm 1980). Since 1980, precious Goose Lake denizens such as *Dichanthelium dichotomum* ssp. *lucidum*, *Juncus militaris*, *Panicum verrucosum*, and *Scleria reticularis* have been discovered in Little Lake along with other interesting species such as *Persicaria hydropiperoides*, *Potamogeton pulcher*, and *Rhynchospora scirpoides*. At Blag Slough (NIPSCO ponds), Ken Dritz rediscovered *Fuirena pumila* and it has recently reappeared in Little Lake. Certainly, the rich associations described by Lyon, Pepoon, Swink and Wilhelm, and others are now destroyed, the only remnants being Little Lake and the "NIPSCO ponds." In the late 1980s, mid to late 1990s, and early first decade of the twenty-first century, as drawdown conditions prevailed after the dewatering of the constructed fly ash ponds to the south, more exploration for drawdown dependent special floristic annuals and short-lived perennials was possible. During this time, about twenty special flora were recorded from this remarkable wet meadow and small lake (Pavlovic et al. 2009): *Brasenia schreberi*, *Rhynchospora scirpoides*, *Chamaedaphne calyculata*, *Rhexia virginica*, *Cladium mariscoides*, *Rhynchospora macrostachya*, *Cyperus odoratus*, *Sagittaria rigida*, *Drosera intermedia*, *Schoenoplectiella purshiana*, *Eleocharis geniculata*, *Schoenoplectiella smithii*, *Juncus militaris*, *Scleria reticularis*, *Juncus pelocarpus*, *Sparganium americanum*, *Ludwigia sphaerocarpa*, *Utricularia gibba*, *Panicum verrucosum*, *Utricularia purpurea*, *Persicaria hydropiperoides*, and *Vitis labrusca*.

Eleocharis geniculata has been attributed to Cowles Dunes A without an actual observation but on the basis of its association with *Rhynchospora scirpoides* at Little Lake (Bowles et al. 1985). (Neither *Eleocharis flavescens* var. *olivacea* nor *E. obtusa* were mentioned by Bowles et al. even though they are frequently found with *Rhynchospora scirpoides*.) The lake bed is being invaded by solid stands of *Calamagrostis canadensis* in some areas and by *Cephalanthus occidentalis* along the margins, as well as *Typha* × *glauca* (hybrid cattail) and *Phragmites australis* ssp. *australis* (phragmites, common reed).

Wilhelm (1990) recommended that Little Lake be burned to permit the rare annual flora to replenish the persistent seed bank found in the wet meadow soil, but while fire can do this, the primary process that rejuvenates the seed bank for these coastal plain disjunct species are mud flats created during drawdowns of water in drier years (Keddy 1985, Wisheu and Keddy 1989). Little Lake did burn in 2003 when the second Cowles Dunes prescribed burn was conducted by INDU staff even though the substrate was wet (Pavlovic, unpublished fire map). In especially dry periods, fire possibly might kill the rare species seeds that are near

the soil surface, but whether this is true is unknown.

Several studies report that replenishment of the seed bank after drawdowns will allow species to persist between flooding periods, when bluejoint grass will attain dominance until new flooding followed by drawdowns will allow their reemergence from the seed bank by germination (Keddy and Reznicek 1982, Wisheu and Keddy 1989). The highest recorded water levels in Little Lake occurred in September 2009 after 14 inches of rain fell (Buszka et al. 2011). After 2009, water levels receded but Little Lake remained flooded through 2011. The drawdown due to the severe drought in 2012 created mudflat conditions that allowed the rich seedbank flora to germinate. It was in this context that Roger Hedge and Emily Stork from the Indiana DNR–Division of Nature Preserves discovered *Rhynchospora nitens* near and within Little Lake (Hedge and Stork 2013).

Blag Slough

Blag Slough, or Pond B or NIPSCO ponds, is a northward extending remnant of Goose Lake and is found west of Little Lake. Blag Slough is named for the Civil War veteran George Blag, who lived in a shack between the pond and Lake Michigan (Cook and Jackson 1978). The slough was first impacted by the construction of the NIPSCO Bailly Generating Station in 1959. After the wetlands to the south were filled, fly-ash settling ponds were constructed, from which flowed heavy metal-laden waters from the dewatering of coal ash. Thus, Blag Slough was flooded from about 1965 to 1979, after which the fly-ash ponds were sealed and contaminated water no longer flowed into the ponds (Hardy 1981, Meyer and Tucci 1979). Pavlovic has documented the vegetation dynamics of this wetland for the last 30 years (Pavlovic et al. 2009).

Cowles Bog wetland complex

No single area within the Indiana Dunes has been written about more than the famous Cowles Bog area, located west of Mineral Springs Road in the northern portion of the wetland complex in Cowles Dunes A (Cook 1999). In the vernacular sense, the name "bog" for this area is appropriate because the area has sphagnum moss and the substrate is springy, but technically this area is more accurately identified as a fen, an alkaline water-fed wetland (minerotrophic; i.e., groundwater) rather than an acidic bog (ombrotrophic; i.e., closed depression that is fed by rainfall). In the past, there has been some controversy whether it should be correctly called "Cowles Fen" (Wilhelm 1980, Wilcox et al. 1986). Cowles, during the tour of the International Phytogeographical Excursion in 1913, characterized it as a fen (Cook 1999). Cowles Bog has long been known to contain dozens of plant species we consider to be among the special flora. Part of Cowles Bog is a raised fen due to artesian waters (Shedlock et al. 1994).

Cowles Bog proper is in the northeastern portion of the area mapped as Marsh and Swamp Complex in Cowles Dunes A (Figure 18). According to Wilhelm (1990), "The area is of uneven quality (with mean C ranging from 4.0 to 8.5, depending upon the disturbance histories of the sampling sites)." The disturbances to the bog, as observed by the authors, are largely due to fire suppression, logging, light cattle grazing, haying, water fluctuations, invasion of hybrid cattail (*Typha* × *glauca*) and common reed (*Phragmites australis* ssp. *australis*) and more recently the arrival of beaver. This area includes a higher elevation portion inhabited by arbor vitae, or northern white cedar (*Thuja occidentalis*), and the adjacent seepage inhabited by American tamarack (*Larix laricina*), along with the marsh and swamp complex communities to the north—an area that encompasses 10 to 15 acres. To the northeast of the raised bog and south of the swamp is a graminoid fen, the "ellipse," where many special flora occur or have occurred in the past. This relatively small tract provides the habitat for representatives of at least 40 special flora! These past and present species include *Symphyotrichum boreale*, *Linnaea borealis* var. *longiflora*, *Bartonia virginica*, *Lonicera dioica*, *Betula alleghaniensis*, *Mitchella repens*, *Betula papyrifera*, *Myosotis laxa*, *Betula pumila*, *Ilex mucronata*, *Carex atherodes*, *Pinus strobus*, *Carex bromoides*, *Poa paludigena*, *Carex limosa*, *Persicaria arifolia*, *Carex seorsa*, *Comarum palustre*, *Coptis trifolia*, *Rhamnus*

alnifolia, *Cornus canadensis*, *Toxicodendron vernix*, *Cypripedium acaule*, *Ribes hirtellum*, *Cypripedium parviflorum* var. *pubescens*, *Rubus pubescens*, *Cypripedium candidum*, *Salix candida*, *Cypripedium reginae*, *Salix sericea*, *Eleocharis rostellata*, *Sarracenia purpurea*, *Galium labradoricum*, *Thuja occidentalis*, *Galium trifidum*, *Trientalis borealis*, *Platanthera clavellata*, *Vaccinium corymbosum*, *Platanthera aquilonis*, and *Viola macloskeyi* ssp. *pallens*.

Wilhelm (1990) noted,

> *These 40 special flora species, combined with the 136 additional species known to live in association in the Cowles Bog, represent a natural area of the highest order. In terms of floristic significance, these few acres reflect an overall mean C of 7.89, and a FQI of 104!*

Despite this richness, Cowles Bog has been degraded by woody plant encroachment, deer browsing on arbor vitae (the deer exclosure now protects this species) and other species, and invasion of hybrid cattail and phragmites. According to Wilhelm (1990),

> *The early findings of Hendrickson and Wilcox (1979) are fairly lucid with respect to the understanding of some of the problems in Cowles Bog. They recognized, for example, the absence of cattails in the early 1920s. They infer from Kurz (1923) that the prominent species seen in a transect run from the lake to the "old floating mat of Cowles Bog" were* Carex *species,* Gentianopsis crinita, Parnassia glauca, *and* Sarracenia purpurea. *Specifically, Kurz was silent on* Typha *species even though he recognized them in other bogs he studied. The species he did mention for Cowles Bog are there today, but the last three especially are now overwhelmed by the cattail.*

This spot is clearly the ellipsoid-shaped graminoid fen that was northeast of the raised bog. Hendrickson and Wilcox (1979) go on to say,

> *As is the case with the reduction in the tamarack, the replacement of the sedge/grass by cattail can be hypothesized to relate to less frequent fire in the last 5 or 6 decades. The cattail now present produces generous amounts of dry litter, potential fuel, suggesting that it could burn at some time. For that prospect, we can predict that fire control within the cattail itself will not be possible. . . . it is likely that a single burning will not cause the cattail to revert to the earlier grass/sedge stage. Frequent burns would be required to accomplish the latter.*

While reintroduction of fire has been proposed for Cowles Bog as a restoration tool and as a means of reducing abundant hybrid cattail fuel, the negative side is that such a burn could be intense, lead to an increase in light reaching the ground surface, and possibly release the hybrid cattail seed bank. Dr. Daniel Mason, NPS botanist, has been successfully reintroducing *Cypripedium acaule* to Cowles Bog and may do the same for *C. candidum* and *Sarracenia purpurea*.

The Cowles Bog Wetland Complex (the bog, fens, and marsh complex sometimes considered part of the Great Marsh), also referred to in many of the older herbarium specimen sheets as ". . . sedge meadow northwest of Mineral Springs Stop," was once rich in special flora and hundreds of other species of plants. Haying, pasturage, drainage, and fire suppression have caused the decline of these species in the Great Marsh. Grasses and sedges dominated this system until recently. Floyd Swink remembered only few, if any, cattails in the area as late as the 1950s (Wilhelm 1990). Cook and Jackson (1978, pages 54–57) discussed the agricultural uses of the Great Marsh in some detail, but they apparently had difficulty correlating what is now all-but-solid cattail marsh with the descriptions given by the original land surveyors, as well as with those of the turn-of-the-century inhabitants and later observers.

Researchers and botanists have proposed various hypotheses as to the steps required to restore the Cowles Bog Wetland Complex. For example, Wilcox et al. (1984) believed the absence of water level fluctuations was the problem and that once restored, the

hybrid cattail would decline. Wilhelm (1990) focused on the importance of regular fire as being necessary for restoration, as did Apfelbaum (1983). Although Wilhelm (1990) disdained cutting and use of herbicides on cattail, this has since been tried with much success by INDU botanist Daniel Mason and Paul Labus (formerly of The Nature Conservancy). Many of these approaches fail to recognize that where cattail has invaded, the former organic layer has been replaced by a thick cattail root matrix (D. Mason, pers. comm. with Pavlovic, 2005). This change in soil substrate can have profound effects on vegetation dynamics. Mason has found that once the cattail thatch has been removed, the former soil buried beneath rises and floats on top of the water (Mason, pers. comm. with Pavlovic). Wilhelm suggested that the reintroduction of fire with hydrological variability would achieve the desired restoration, which is included in the analysis by Daniel Mason (since 2000). Mason has found that planting sedges and forbs after cattail removal can achieve some improvement in the vegetation quality, with depleting the cattail seed bank being most important. He found it necessary to apply herbicide on some cattail every summer while the seed bank was being depleted (Mason, pers. comm. with Pavlovic, 2005). Planting of *Carex lacustris* appears to limit the regrowth of cattail (Mason, pers. comm. with Pavlovic).

Lois Howes Prairie

The area mapped as mesophytic prairie in Cowles Dunes B includes about 20 hectares (50 acres) east of Pepoon Ridge (Lupine Lane dune) and south of Hamilton Slide (Goodman 1920; Bergendahl, unpublished modification of the 1920 map produced by Goodman). According to Wilhelm (1990), John Bacone (Indiana Division of Nature Preserves) took one look at the prairie on 15 July 1979 and, awe-struck, muttered simply, "This is the best prairie in the state!" The first one to recognize it as a unique area in the 20th century was Lois Howes, who brought it to the attention of Floyd Swink after 1940, when she discovered the rare *Buchnera americana* (Miramontes Loyd 2009). Since then, the area has been referred to in field notes and on herbarium specimens as the "Pine Lane Prairie," the "Dune Acres Prairie," and the "Howes Prairie." The last name has been accepted by the NPS. The area should not be confused with "Lupine Lane Prairie," which is the smaller and less diverse prairie to the west over the high parabolic dune (Pepoon Ridge) on the southwest side of Howes Prairie. Early herbarium specimens (Consortium of Midwest Herbaria 2021) labeled as "interdunal meadow, Port Chester" likely refer to this area. Less clear is whether "interdunal meadow, Mineral Springs" in these same early records refers to Little Lake or Howes Prairie. It is important to not confuse Howes Prairie with Howe Road in the Bailly Unit. The authors suspect that reference to "Portchester prairie" may mean Howes Prairie, north of the Portchester stop on the CSSSBR.

Howes Prairie is fully as significant from a floral standpoint as Cowles Bog, given the high numbers of special flora. Past and present special flora include *Bartonia virginica*, *Juncus arcticus* var. *balticus*, *Sceptridium multifidum*, *Lilium philadelphicum*, *Bromus kalmii*, *Linum virginianum*, *Buchnera americana*, *Lycopodium clavatum*, *Calopogon tuberosus* var. *tuberosus*, *Monotropa uniflora*, *Campanula rotundifolia*, *Oenothera fruticosa* ssp. *tetragona*, *Carex foena*, *Orobanche fasciculata*, *Castilleja coccinea*, *Persicaria arifolia*, *Chamaedaphne calyculata*, *Pinus banksiana*, *Chimaphila maculata*, *Platanthera ciliaris*, *Cladium mariscoides*, *Rhexia virginica*, *Corallorhiza maculata*, *Rhynchospora recognita*, *Desmodium ciliare*, *Sabatia angularis*, *Drosera intermedia*, *Sisyrinchium atlanticum*, *Eleocharis melanocarpa*, *Smilax rotundifolia*, *Epigaea repens*, *Spiranthes lacera*, *Fimbristylis puberula*, *Stachys hyssopifolia*, *Gentiana alba*, *Symphyotrichum boreale*, *Gentiana saponaria*, *Turritis glabra*, *Geranium bicknellii*, *Xyris torta*, and *Hypopitys monotropa*.

According to Wilhelm (1990), "When these 41 species are included with another 97 species known from the prairie, the mean C is 8.83, and the FQI registers 103." Like

Cowles Bog, several of the special flora once known from this area have not been observed in recent years. When Lois Howes noticed the absence of special flora, she became concerned about fire having been absent from the prairie. She pointed out in the early 1970s that shrubs and trees had proliferated (Wilhelm 1990). The last wildfire to burn in this area was in 1964 (Kenneth Cole and Pavlovic, personal observations). In 1983, Norman Henderson and Ron Hiebert, and later Kenneth Cole, embarked on a research study to quantify the effects of prescribed burning and water fluctuations on the vegetation of the savanna complex (Cole 1986, 2001; Henderson and Heibert 1983). Pavlovic conducted the vegetation sampling for this project. Cole (1986) discusses the importance of both fire and water table fluctuations in the maintenance of the prairie ecosystem. Since 1986, prescribed burns have been conducted on portions of Howes Prairie in 1986–1988, 1990, 1993, 1995, 1997, 1999, 2003, 2006, 2010, 2012, and 2016 (Pavlovic, personal observation).

Special flora summary

The Cowles Dunes is habitat for 225 of INDU's special flora (Tables 24 and 25). Of these, 85.6% have been noted over the last decade. The remaining 16.4% of the special flora have likely been extirpated: *Aralia hispida*, *Calopogon tuberosus* var. *tuberosus*, *Carex atlantica* ssp. *capillacea*, *Carex pauciflora*, *C. stipata maxima*, *Carex trisperma*, *Chimaphila umbellata* ssp. *umbellata*, *Cornus canadensis*, *Cypripedium reginae*, *Desmodium cuspidatum*, *Diphasiastrum tristachyum*, *Eriocaulon aquaticum*, *Eriophorum angustifolium*, *Gentiana alba*, *Linnaea borealis* var. *longiflora*, *Orobanche fasciculata*, *Orthilia secunda*, *Platanthera aquilonis*, *Platanthera ciliaris*, *Sabatia angularis*, *Sagittaria rigida*, *Salix pedicellaris*, *Stylophorum diphyllum*, *Scleria muehlenbergii*, *Symphyotrichum sericeum*, *Utricularia minor*, *Vaccinium macrocarpon*, *Veronica americana*, *Woodwardia areolata*, and *Xyris torta*.

Table 24. Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Abutilon theophrasti Medik.	–	–	–	–	x	X	*
Acer negundo L.	–	73	x	–	x	X	0
Acer rubrum L.	x	x	x	x	x	X	7
Acer saccharum Marshall	–	–	x	–	–	X	3
Achillea millefolium L.	x	x	–	–	x	X	*
SF***Acorus americanus*** (Raf.) Raf. (*Acorus calamus* L. *americanus*)	rp	–	–	–	–	N	7
Actaea pachypoda Elliott	x	50	–	x	–	X	7
SF***Actaea rubra*** (Aiton) Willd.	x	–	–	–	–	X	10
SF***Adiantum pedatum*** L.	14	x	–	–	–	X	10
Agalinis purpurea (L.) Pennell	–	x	–	–	x	X	6
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	x	x	–	–	–	X	4
Agrimonia gryposepala Wallr.	x	x	–	93	x	X	2
Agrimonia parviflora Aiton	x	x	–	93	–	X	7
Agrostis gigantea Roth (*Agrostis alba* L.)	x	–	–	–	x	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	x	–	–	–	X	1

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Agrostis perennans (Walter) Tuck.	x	x	–	–	x	X	3
Ailanthus altissimus (Mill.) Swingle	x	–	7	–	x	X	*
SF***Aletris farinosa*** L.	R	x	–	–	x	X	10
Alisma subcordatum Raf.	x	X 55	–	–	–	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	x	x	7	–	–	X	*
Allium canadense L. var. *canadense* (*Allium canadense* L.)	–	–	–	x	–	X	2
Allium tricoccum Aiton	–	–	–	x	–	X	7
SF***Alnus incana*** (L.) Moench ssp. ***rugosa*** (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng.)	x	x	–	–	x	X	8
Amaranthus blitoides S. Watson (*Amaranthus graecizans* L.)	–	–	–	–	–	X	*
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	–	–	–	x	X	0
Ambrosia trifida L.	x	–	–	–	–	X	0
Amelanchier arborea (F. Michx.) Fernald	x	x	x	x	–	X	8
Amelanchier interior E. L. Nielsen	x	–	–	–	–	X	8
Amelanchier laevis Wiegand	x	93	–	93	–	X	8
Amelanchier spicata (Lam.) K. Koch	157	–	–	–	–	N	9
Ammannia robusta Heer & Regel	–	114	–	–	–	N	4
SF***Ammophila breviligulata*** Fernald	x	x	–	–	–	X	7
Amphicarpaea bracteata (L.) Fernald	x	41	–	93	–	X	4
Amphicarpaea bracteata (L.) Fernald var. *comosa* (L.) Fernald	–	x	–	–	–	X	5
Andropogon gerardii Vitman	x	x	–	–	x	X	5
Andropogon virginicus L.	–	–	–	–	x	X	ad
Anemone acutiloba (DC.) G. Lawson (*Hepatica acutiloba* DC.)	x	–	–	–	–	X	6
Anemone cylindrica A. Gray	x	x	–	–	–	X	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	29	93	–	x	–	X	7
Anemone virginiana L. var. *virginiana* (*Anemone virginiana* L.)	x	–	–	–	x	X	5
Angelica atropurpurea L.	x	93	–	–	x	X	7
Antennaria howellii Greene ssp. *petaloidea* (Fernald) R. J. Bayer	–	136	–	–	–	N	3
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	x	–	–	–	X	3
Anthriscus caucalis M. Bieb.	–	–	–	–	–	X	*
Apios americana Medik.	x	x	x	–	x	X	7
Apocynum androsaemifolium L.	x	x	–	–	–	X	5
Apocynum cannabinum L. (includes former *A. sibiricum*)	x	93	x	–	x	X	4
Aquilegia canadensis L.	x	x	–	–	–	X	6
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	x	x	–	–	–	X	5
Arabidopsis thaliana (L.) Heynh.	–	x 49	–	–	–	X	*

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Aralia hispida*** Vent.	R 103	–	–	–	–	R	10
Aralia nudicaulis L.	x	x	x	x	–	X	8
Arctium minus (Hill) Bernhardi (*Arctium minus* Schkuhr)	–	–	–	–	–	X	*
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald & J. F. Macbr.)	x	x	–	–	–	X	10
Arenaria serpyllifolia L.	x	–	–	–	–	X	*
Arisaema dracontium (L.) Schott	–	93	–	–	–	N	7
Arisaema triphyllum (L.) Schott	x	93	–	x	R	X	4
Aristida oligantha Michx.	–	–	–	71	–	N	0
Aristida purpurascens Poir.	48	x	–	–	–	X	5
Arnoglossum atriplicifolium (L.) H. Rob. (*Cacalia atriplicifolia* L.)	x	x	–	–	–	X	8
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocar*pa × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	x	x	x	–	x	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	x	x	–	–	–	X	5
Artemisia vulgaris L.	R	–	–	–	–	X	*
Asarum canadense L.	–	R	–	–	–	R	7
Asclepias amplexicaulis Sm.	2	x	–	–	–	X	7
Asclepias exaltata L.	–	2	–	–	–	N	9
Asclepias hirtella (Pennell) Woodson	–	2	–	–	–	N	10
Asclepias incarnata L.	x	x	–	–	x	X	4
SF***Asclepias purpurascens*** L.	–	60	–	–	–	N	8
SF***Asclepias sullivantii*** Engelm. ex A. Gray (*Asclepias sullivantii* Engelm.)	R	–	–	–	–	R	8
Asclepias syriaca L.	x	x	–	–	x	X	0
Asclepias tuberosa L.	x	x	–	–	–	X	7
Asclepias verticillata L.	?	x	–	–	–	X	1
SF***Asclepias viridiflora*** Raf.	X	?	–	–	–	N	10
Asimina triloba (L.) Dunal	57	x	–	–	–	X	9
Asparagus officinalis L.	–	x	–	–	x	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	x	R	–	–	–	X	4
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	–	–	–	X	–	X	8
Atriplex patula L.	R	–	–	–	–	R	*
Aureolaria flava (L.) Farw.	x	x	–	–	–	X	9
Aureolaria pedicularia (L.) Raf. ex Pennell (*Aureolaria pedicularia* (L.) Raf. var. *ambigens* (Fernald) Farw.)	x	x	–	–	–	X	7
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	–	x	–	–	–	X	8
Barbarea vulgaris W.T. Aiton	x	–	–	–	–	X	*
SF***Bartonia virginica*** (L.) Britton, Sterns & Poggenburg	x	x	–	25	–	X	10

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Berberis thunbergii DC.	x	x	–	x	–	X	*
SF***Betula alleghaniensis*** Britton	x	–	–	–	–	X	10
SF***Betula papyrifera*** Marshall	x	–	–	–	–	X	10
SF***Betula populifolia*** Marshall	1	–	–	–	–	X	10
SF***Betula pumila*** L.	x	x	–	–	–	X	10
Betula × *purpusii* C.K. Schneider [*B. alleghaniensis* × *B. pumila*]	137	–	–	–	–	N	10
Bidens connata Muhl. ex Willd.	R	–	–	–	–	R	5
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	x	x	–	–	–	X	9
Bidens tripartita L. (*Bidens comosa* (A. Gray) Wiegand	x	x	–	–	–	X	5
Boechera canadensis (L.) Al-Shehbaz (*Arabis canadensis* L.)	x	–	–	–	–	X	10
Boechera laevigata (Muhl. ex Willd.) Al-Shebbaz (*Arabis laevigata* (Willd.) Poir.	–	R	–	–	–	N	8
Boehmeria cylindrica (L.) Sw.	x	x	–	93	–	X	2
Boehmeria cylindrica (L.) Sw. var. *drummondiana* (Wedd.) Wedd.	x	–	–	–	–	X	5
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	x	–	–	–	–	X	4
SF***Botrychium matricariifolium*** (Retz.) A. Braun ex W.D.J. Koch	76	–	–	–	–	N	10
Botrychium virginianum (L.) Sw. (*Botrypus virginianus* (L.) Michx.)	x	R	–	x	–	X	6
SF***Brachyelytrum erectum*** (Schreb.) P. Beauv.	–	x	–	x	–	X	10
SF***Brasenia schreberi*** J. F. Gmel.	x 12	–	–	–	–	X	10
Brickellia eupatorioides (L.) Shinners var. *corymbulosa* (Torr. & A. Gray) Shinners (*Kuhnia eupatorioides* L. var. *corymbulosa* Torr. & A. Gray)	x	x	–	–	–	X	6
Bromus ciliatus L.	R	–	–	–	–	R	10
Bromus commutatus Schrad.	x	–	–	–	–	X	*
Bromus hordeaceus L.	138	–	–	–	–	N	*
Bromus inermis Leyss.	–	–	–	–	–	X	*
Bromus japonicus Thunb.	x	–	–	–	–	X	*
SF***Bromus kalmii*** A. Gray	–	x	–	–	–	X	10
Bromus tectorum L.	x	–	–	–	x	X	*
SF***Buchnera americana*** L.	–	x	–	–	–	X	10
Bulbostylis capillaris (L.) C.B. Clarke	x	–	–	–	x	X	4
SF***Cakile edentula*** (Bigelow) Hook. ssp. *edentula* var. *lacustris* Fernald	x	x	–	–	–	X	9
Calamagrostis canadensis (Michx.) P. Beauv.	x	x	–	–	x	X	3
Calamagrostis stricta (Timm) Koeler ssp. *inexpansa* (A. Gray) C.W. Greene (*Calamagrostis inexpansa* A. Gray var. *brevior* (Vasey) Stebbins)	R	–	–	–	x	X	5
Calamovilfa longifolia (Hook) Hack. ex Scribn. & Southw. var. *magna* Scribn. & Merr.	x	x	–	–	–	X	5
SF***Callitriche heterophylla*** Pursh	–	34	–	–	–	X	9
SF***Calopogon tuberosus*** (L.) Britton, Sterns & Poggenburg var. ***tuberosus*** (*Calopogon tuberosus* (L.) Britton, Sterns & Poggenburg)	R rp	R	–	–	–	R	10

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Caltha palustris L.	x	53	–	x	–	X	5
Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	x	x	–	–	x	X	1
Campanula aparinoides Pursh	x	x	–	–	–	X	8
Campanula rapunculoides L.	–	120	–	–	–	N	*
SF***Campanula rotundifolia*** L.	x	x	–	–	–	X	10
Cannabis sativa L.	–	–	–	–	–	X	*
Capsella bursa-pastoris (L.) Medik.	–	x	–	–	–	X	*
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	x	x	–	x	–	X	6
Cardamine douglassii Britton	–	–	–	x	–	X	7
Cardamine pensylvanica Muhl. ex Willd.	x	–	–	x	–	X	4
SF***Carex alata*** Torr.	x	x	–	–	x	X	10
Carex albicans Willd. ex Spreng. var. *albicans*	–	x 49	–	–	–	X	8
Carex albicans Willd. ex Spreng. var. *emmonsii* (Dewey ex Torr.) Rettig (*Carex emmonsii* Torr.)	x	–	–	x	R	X	9
Carex albolutescens Schwein.	x	–	–	–	–	X	8
Carex annectens (E.P. Bicknell) E.P. Bicknell	x	–	–	–	–	X	7
Carex aquatilis Wahlenb. var. *substricta* Kukenth.	x	x	–	–	–	X	5
SF***Carex atherodes*** Spreng.	x	–	–	–	–	X	5
SF***Carex atlantica*** L.H. Bailey ssp. ***capillacea*** (L.H. Bailey) Reznicek (*Carex atlantica* L.H. Bailey var. *capillacea* (L.H. Bailey) Cronquist or *C. howei* Mack.)	R	–	–	–	–	R	10
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	–	–	–	–	R	R	6
Carex blanda Dewey	–	93	–	–	–	N	1
Carex brevior (Dewey) Mackenzie ex Lunell	–	92	–	–	–	N	4
SF***Carex bromoides*** Schkuhr. ex Willd. (*Carex bromoides* Willd.)	x	93	–	x	–	X	10
Carex buxbaumii Wahlenb.	x	x	–	–	R	X	9
Carex comosa Boott	x	–	–	–	–	X	5
SF***Carex conoidea*** Schkuhr. ex Willd.	x	93	–	–	–	X	10
Carex crinita Lam. var. *crinita*	rp	93	–	x	x	X	10
Carex cristatella Britton	rp	–	–	–	R	R	4
SF***Carex debilis*** Michx. var. ***rudgei*** L.H. Bailey	–	–	–	x	x	X	10
Carex festucacea Schkuhr ex Willd.	–	–	–	R	–	R	8
SF***Carex folliculata*** L.	rp	x	–	–	x	X	10
Carex gracilescens Steud.	R	93	–	–	84	R	10
Carex gracillima Schwein.	–	x	–	x	–	X	10
Carex grisea Wahlenb.	–	93	–	–	R	R	2
Carex haydenii Dewey	R	–	–	–	–	R	6
Carex hystericina Muhl. ex Willd.	x	–	–	–	–	X	5

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	A	*B*	*C*	*D*	*E*		
SF***Carex intumescens*** Rudge	–	x	–	x	x	X	10
Carex lacustris Willd.	x	x	–	x	–	X	6
Carex lacustris Willd. unnamed hybrid [*Carex lacustris* Willd. × *Carex lasiocarpa americana* (Fernald) Hulten]	–	–	–	–	x	X	6
Carex lasiocarpa Ehrh. ssp. *americana* (Fernald) Hulten (*Carex lasiocarpa* Ehrh. var. *americana* Fernald)	x	x	–	–	–	X	10
SF***Carex laxiculmis*** Schwein.	117?	–	–	R	–	R	10
Carex laxiflora Lam.	x	–	–	x	–	X	10
SF***Carex leptalea*** Wahlenb.	X 153	–	–	x	–	X	10
SF***Carex leptonervia*** (Fernald) Fernald	–	111	–	–	x	X	10
SF***Carex limosa*** L.	x	–	–	–	–	X	10
Carex longii Mack.	–	x	–	–	–	X	6
Carex lupulina Willd.	rp	93	–	–	R	R	7
Carex lurida Wahlenb.	rp	93	–	–	x	X	8
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.)	x	x	–	–	–	X	5
SF***Carex pauciflora*** Lightf.	139	–	–	–	–	N	10
Carex pellita Willd.	x	x	–	–	x	X	4
Carex pensylvanica Lam.	x	x	x	x	–	X	5
SF***Carex prairea*** Dewey	R	–	–	–	–	R	10
Carex projecta Mack.	rp	–	–	–	–	N	4
Carex radiata (Wahlenb.) Small	–	93	–	93	–	N	6
Carex rosea Schkuhr ex Willd.	–	x	–	–	–	X	4
Carex sartwellii Dewey	x	x	–	–	–	X	6
Carex scoparia Schkuhr ex Willd. var. *scoparia*	x	–	–	93	x	X	7
SF***Carex seorsa*** Howe	x	x	–	x	–	X	10
SF***Carex siccata*** Dewey	–	x	–	–	–	X	10
Carex squarrosa L.	x	–	–	–	–	X	10
SF***Carex stipata*** Muhl. ex Willd.	x	x	–	93	x	X	3
Carex stipata Willd. var. *maxima* Chapm. ex Boott	–	140	–	–	–	N	10
Carex stricta Lam.	x	x	–	x	–	X	5
Carex suberecta (Olney) Britton	x	–	–	–	–	X	8
Carex swanii (Fernald) Mack.	x	x	–	93	x	X	8
Carex tenera Dewey	–	–	–	–	R	R	8
Carex tetanica Schkuhr	R	–	–	–	–	R	9
SF***Carex tonsa*** (Fernald) E.P. Bicknell	x	–	–	–	–	X	7
Carex tribuloides Wahlenb.	rp	–	–	–	R	R	3
SF***Carex trisperma*** Dewey	R	–	–	–	–	R	10

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Carex typhina Michx.	x	–	–	R	–	X	10
Carex umbellata Schkuhr ex Willd.	–	20	–	–	–	N	9
Carex utriculata Boott	R	–	–	–	–	R	10
Carex vesicaria L. (*Carex vesicaria* L. var. *monile* (Tuck.) Fernald)	–	x 19	–	–	–	X	10
Carex vulpinoidea Michx.	x	–	–	R	x	X	2
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow	–	–	–	x	–	X	8
Carya cordiformis (Wangenh.) K. Koch	–	x	–	–	–	X	7
Carya ovata (Mill.) K. Koch	–	–	x	x	–	X	5
SF***Castilleja coccinea*** (L.) Spreng.	–	x	–	–	–	X	10
Caulophyllum thalictroides (L.) Michx.	R	–	–	–	–	R	8
Ceanothus americanus L.	x	x	–	–	–	X	6
Celastrus orbiculatus Thunb.	x	x	x	x	x	X	*
SF***Celastrus scandens*** L.	x	x	–	–	–	X	4
Celtis occidentalis L.	x	–	–	–	–	X	3
SF***Celtis tenuifolia*** Nutt.	x	46	–	–	–	X	10
Cenchrus longispinus (Hack.) Fernald	–	–	x	–	–	X	0
Centaurium pulchellum (Sw.) Druce	x	–	–	–	x	X	*
Cephalanthus occidentalis L.	x	x	–	93	–	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L.)	x	–	–	–	–	X	*
Chaenorhinum minus (L.) Lange	–	–	–	–	x	X	*
SF***Chamaedaphne calyculata*** (L.) Moench (*Chamaedaphne calyculata* (L.) Moench var. *angustifolia* (Aiton) Rehder)	R	x	–	–	–	X	10
Chelone glabra L.	x	x	–	x	–	X	8
Chenopodium album L.	x	–	–	–	x	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	x	–	–	–	–	X	5
SF***Chimaphila maculata*** (L.) Pursh	3	23	–	–	–	X	10
SF***Chimaphila umbellata*** (L.) W.P.C. Barton ssp. ***umbellata***	R	–	–	–	–	R	10
SF***Chrysosplenium americanum*** Schwein. ex Hooker	–	–	–	x	–	X	10
Cicuta bulbifera L.	x	x	–	–	–	X	8
Cicuta maculata L.	x	x	–	x	x	X	6
Cinna arundinacea L.	x	x	–	27	–	X	5
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	93	x	x	–	X	1
Cirsium altissimum (L.) Spreng.	R	–	–	–	–	R	6
Cirsium arvense (L.) Scop.	x	x	–	–	x	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	–	x	–	–	x	X	2
Cirsium muticum Michx.	x	x	–	–	x	X	10

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	A	*B*	*C*	*D*	*E*		
SF***Cirsium pitcheri*** (Torr. ex Eaton) Torr. & A. Gray	x	28	–	–	–	X	10
Cirsium vulgare (Savi) Ten.	x	–	–	–	x	X	*
SF***Cladium mariscoides*** (Muhl.) Torr.	67	x	–	–	–	X	10
Claytonia virginica L.	x	85	–	x	–	X	2
Clematis virginiana L.	x	93	–	93	–	X	4
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	x	x	–	x	X	7
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	x	–	–	–	–	X	10
Commelina communis L.	–	–	–	–	x	X	*
Commelina erecta L. (*Commelina erecta* L. var. *deamiana* Fernald)	40	x	–	–	–	X	10
Conoclinium coelestinum (L.) DC. (*Eupatorium coelestinum* L.)	121	–	–	–	–	N	*
SF***Conopholis americana*** (L.) Wallr.	–	78	–	–	–	N	10
Convallaria majalis L.	–	–	x	–	–	X	*
Convolvulus arvensis L.	–	93	–	–	–	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	x	–	–	–	x	X	0
SF***Coptis trifolia*** (L.) Salisb.	x	–	–	–	–	X	10
SF***Corallorhiza maculata*** (Raf.) Raf.	x	74	–	–	–	X	10
SF***Corallorhiza maculata*** Raf. var. ***maculata***	90	–	–	–	–	N	10
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	4	66	–	–	–	X	9
Coreopsis lanceolata L.	–	x	–	–	–	X	5
Coreopsis palmata Nutt.	R	x	–	–	–	X	6
Coreopsis tripteris L.	x	x	–	–	–	X	5
Cornus alternifolia L. f.	45	–	–	–	–	N	9
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	x	x	–	–	x	X	6
SF***Cornus canadensis*** L.	x	–	–	–	–	X	10
Cornus florida L.	–	x	–	x	–	X	8
Cornus racemosa Lam.	x	x	x	x	–	X	1
SF***Cornus rugosa*** Lam.	x	–	–	–	–	X	10
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	x	x	–	–	–	X	6
Corylus americana Walter	x	x	x	x	x	X	5
Crataegus pruinosa (H.L. Wendl.) K. Koch	–	–	x	–	–	X	5
Crocanthemum canadense (L.) Britton (*Helianthemum canadense* (L.) Michx.)	x	x	–	–	–	X	8
Crocus vernus (L.) Hill	–	108	–	–	–	N	*
Croton capitatus Michx.	x	–	–	–	–	X	ad
Cryptotaenia canadensis (L.) DC.	x	93	x	93	–	X	2
Cuscuta cephalanthi Engelm.	–	99	–	–	–	N	6
Cuscuta gronovii Willd. ex Schult.	x	–	–	–	–	X	4
Cycloloma atriplicifolium (Spreng.) J. M. Coult.	x	–	–	–	–	X	7

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	A	*B*	*C*	*D*	*E*		
Cyperus erythrorhizos Muhl.	x	–	–	–	–	X	2
Cyperus esculentus L.	–	–	–	–	x	X	0
SF***Cyperus houghtonii*** Torr.	x	–	–	–	–	X	2
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* (*Cyperus filiculmis* Vahl)	x	x	–	–	–	X	5
SF***Cyperus odoratus*** L. (*Cyperus engelmanii* Steud.)	x	–	–	–	–	X	6
Cyperus odoratus L. (*Cyperus ferruginescens* Boeck.)	x	–	–	–	–	X	2
Cyperus schweinitzii Torr.	x	–	–	–	–	X	5
Cyperus squarrosus L. (*Cyperus inflexus* Muhl.)	–	–	–	–	x	X	4
Cyperus strigosus L.	x	–	–	–	x	X	1
SF***Cypripedium acaule*** Aiton	x	–	–	–	–	X	10
SF***Cypripedium candidum*** Muhl. ex Willd.	x	–	–	–	–	X	10
SF***Cypripedium parviflorum*** Salisb. var. ***makasin*** (Farw.) Sheviak (*Cypripedium calceolus* L. var. *parviflorum* (Salisb.) Fernald)	–	R	–	–	–	R	10
SF***Cypripedium parviflorum*** Salisb. var. ***pubescens*** (Willd.) O.W. Knight (*Cypripedium calceolus* L. var. *pubescens* (Willd.) Correll)	x	x	–	–	–	X	10
SF***Cypripedium reginae*** Walter	x	–	–	–	–	X	10
Cypripedium × *andrewsii* A. M. Fuller [*C. candidum* × *C. parviflorum*]	107	–	–	–	–	N	10
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	30	–	–	–	–	N	6
Dactylis glomerata L.	x	–	–	–	–	X	*
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	–	x	–	–	–	X	3
Datura stramonium L.	122 rp	–	–	–	–	N	ad
Daucus carota L.	x	–	–	–	x	X	*
Decodon verticillatus (L.) Elliott	x	–	–	–	–	X	8
Desmodium canadense (L.) DC.	R	x	–	–	–	X	4
SF***Desmodium ciliare*** (Muhl. ex Willd.) DC.	R	–	–	–	–	R	10
SF***Desmodium cuspidatum*** (Muhl. ex Willd.) DC. ex G. Don	–	0	–	–	–	X	8
Desmodium glabellum (Michx.) DC.	x	–	–	–	–	X	5
Desmodium paniculatum (L.) DC.	x	x	–	–	–	X	6
Desmodium sessilifolium (Torr.) Torr. & A. Gray	x	x	–	–	–	X	8
Dianthus armeria L.	x	–	–	–	–	X	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *columbianum* (Scribn.) Freckmann & Lelong (*Panicum columbianum* Scribn.)	–	x	–	–	–	X	7
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	x	–	–	x	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *implicatum* (Scribn.) Freckmann & Lelong (*Panicum meridionale* Ashe)	–	x	–	–	–	X	8
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	x	x	–	–	–	X	9

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Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *spretum* (Schultes) Freckmann & Lelong (*Panicum spretum* Schult.)	x	x	–	–	–	X	9
Dichanthelium clandestinum (L.) Gould (*Panicum clandestinum* L.)	x	x	x	–	x	X	6
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	–	x	–	–	–	X	7
SF***Dichanthelium dichotomum*** (L.) Gould ssp. ***dichotomum*** (*Panicum dichotomum* L.)	–	x	–	–	x	X	10
SF***Dichanthelium dichotomum*** (L.) Gould ssp. ***lucidum*** (Ashe) Freckmann & Lelong (*Panicum lucidum* Ashe)	–	–	–	–	x	X	10
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	x	x	–	x	–	X	5
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	x	–	–	–	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	x	–	–	–	X	7
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong) (*Panicum villosissimum* Nash)	–	x	–	–	–	X	8
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	–	x	–	–	–	X	8
SF***Diervilla lonicera*** Mill.	x	x	x	–	–	X	9
Digitaria cognata (J.A. Schultes) Pilger (*Leptoloma cognatum* (Schult.) Chase)	–	–	–	–	x	X	3
Digitaria ischaemum (Schreb.) Muhl.	–	–	–	–	x	X	*
Digitaria sanguinalis (L.) Scop.	–	–	–	–	x	X	*
Dioscorea villosa L.	x	x	–	x	x	X	7
SF***Diphasiastrum tristachyum*** (Pursh) Holub (*Lycopodium tristachyum* Pursh)	x	–	–	–	–	X	10
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	X	x	–	93	x	X	9
SF***Drosera intermedia*** Hayne	x	x	–	–	–	X	10
SF***Drosera rotundifolia*** L.	rp	–	–	–	x	X	10
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O. F. Müll.) Watt)	x	x	–	x	–	X	8
Dryopteris cristata (L.) A. Gray	–	–	–	R	x	X	10
Dryopteris intermedia (Muhl. ex Willd.) A. Gray	77	–	–	x	–	X	8
Duchesnea indica (Andrews) Teschemacher	–	94	–	–	–	N	*
Dulichium arundinaceum (L.) Britton	x	x	–	–	–	X	9
Dysphania botrys (L.) Mosyakin & Clemants (*Chenopodium botrys* L.)	x	–	–	–	–	X	*
Echinochloa crusgalli (L.) P. Beauv.	–	–	–	–	x	X	0
Echinochloa muricata (P. Beauv.) Fernald	141	–	–	–	–	N	4
Echinochloa muricata (P. Beauv.) Fernald var. *microstachya* Wiegand	–	142	–	–	–	N	2
Elaeagnus angustifolia L.	–	–	–	–	–	X	*

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Elaeagnus umbellata Thunb.	x	–	–	–	–	X	*
Eleocharis elliptica Kunth	–	–	–	–	x	X	8
Eleocharis engelmannii Steud.	x	–	–	–	–	X	9
Eleocharis erythropoda Steud.	x	x	–	–	x	X	2
Eleocharis flavescens (Poir.) Urb. var. *olivacea* (Torr.) Gleason (*Eleocharis olivacea* Torr.)	x	51	–	–	–	X	9
SF***Eleocharis geniculata*** (L.) Roem. & Schult.	?	–	–	–	–	X	10
SF***Eleocharis melanocarpa*** Torr.	x	x	–	–	–	X	10
Eleocharis obtusa (Willd.) Schult.	x	45	–	–	R	X	3
Eleocharis palustris (L.) Roemer & J.A. Schultes	x	–	–	–	–	X	10
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis smallii* Britton)	x	x	–	–	–	X	5
SF***Eleocharis quadrangulata*** (Michx.) Reom. & Schult.	154	–	–	–	–	X	10
SF***Eleocharis rostellata*** (Torr.) Torr.	x	–	–	–	–	X	10
Eleusine indica (L.) Gaertn.	–	–	–	–	x	X	*
Elymus canadensis L.	x	x	–	–	–	X	4
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	–	–	–	x	X	*
Elymus trachycaulus (Link) Gould ex Shinners ssp. *subsecundus* (Link) A. Löve & D. Löve (*Agropyron trachycaulum* (Link) Malte var. *unilaterale* (Cassidy) Malte)	R	–	–	–	–	R	8
Elymus virginicus L.	–	93	–	–	x	X	4
Epifagus virginiana (L.) W.P.C. Barton	–	–	–	x	–	X	10
SF***Epigaea repens*** L.	x	x	–	–	–	X	10
SF***Epilobium ciliatum*** Raf.	115	–	–	–	–	N	3
Epilobium coloratum Biehler	x	x	–	93	–	X	3
Epilobium hirsutum L.	x	R	–	–	–	X	*
Epilobium leptophyllum Raf.	x	x	–	–	–	X	10
Epilobium parviflorum Schreb.	115	–	–	–	–	N	*
SF***Epilobium strictum*** Muhl.	R	–	–	–	–	R	10
Epipactis helleborine (L.) Crantz	x	–	–	–	–	X	*
Equisetum arvense L.	x	x	x	x	–	X	0
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	–	x	–	–	–	X	3
Equisetum laevigatum A. Braun	x	x	–	–	–	X	2
Eragrostis cilianensis (All.) Vignolo ex Janchen	–	–	–	–	x	X	*
Eragrostis minor Host (*Eragrostis poaeoides* Roem. & Schult.)	–	–	–	–	x	X	*
Eragrostis pectinacea (Michx.) Nees	–	–	–	–	x	X	0
Eragrostis spectabilis (Pursh) Steud.	x	x	–	–	–	X	3
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	x	x	–	–	x	X	2
Erigeron annuus (L.) Pers.	x	–	–	–	x	X	0
Erigeron philadelphicus L.	x	x	–	–	–	X	4

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Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Erigeron pulchellus*** Michx.	R	86	–	–	–	R	10
Erigeron strigosus Muhl. ex Willd.	R	x	–	–	x	X	5
SF***Eriocaulon aquaticum*** (Hill) Druce (*Eriocaulon septangulare* With.)	R	–	–	–	–	R	10
SF***Eriophorum angustifolium*** Honck.	–	R	–	–	–	R	10
Eryngium yuccifolium Michx.	R	x	–	–	–	X	9
Euonymus alatus (Thunb.) Slebold	–	93	–	–	–	N	*
Euonymus obovatus Nutt.	R	–	–	x	–	X	7
Eupatorium perfoliatum L.	x	x	–	–	x	X	4
Eupatorium serotinum Michx.	x	–	–	–	–	X	0
SF***Eupatorium sessilifolium*** L. (*Eupatorium sessilifolium* L. var. *brittonianum* Porter)	70	R	–	–	–	X	10
Euphorbia corollata L.	x	x	x	–	x	X	2
Euphorbia cyparissias L.	–	123	–	–	–	N	*
Euphorbia davidii Subils	–	106	–	–	–	N	*
Euphorbia dentata Michx.	–	–	–	–	x	X	*
Euphorbia maculata L. (*Euphorbia supina* Raf.)	–	–	–	–	x	X	0
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	–	x	–	–	x	X	0
SF***Euphorbia polygonifolia*** L.	x	x	–	–	–	X	10
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	x	x	–	–	–	X	8
SF***Euthamia caroliniana*** (L.) Greene ex Porter & Britton (*Solidago tenuifolia* Pursh)	42	–	–	–	–	X	10
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb.)	x	x	–	–	R	X	4
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	x	–	–	x	X	3
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	x	x	–	–	x	X	5
Eutrochium fistulosum (Barratt) E.E. Lamont (*Eupatorium fistulosum* Barratt)	x	x	–	–	x	X	10
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	x	x	–	93	x	X	4
Fagus grandifolia Ehrh.	–	–	x	x	–	X	5
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	–	–	–	–	–	X	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	x	–	–	–	x	X	1
Festuca ovina L.	x	–	x	–	–	X	*
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	x	x	–	–	–	X	5
Fimbristylis autumnalis (L.) Roem. & Schult.	x	87	–	–	x	X	5
SF***Fimbristylis puberula*** (Michx.) Vahl. var. *puberula*	–	x	–	–	–	X	10
Forsythia suspensa (Thunb.) Vahl	–	–	15	–	–	N	*
Fragaria virginiana Miller	x	x	x	x	x	X	1
Frangula alnus Mill	–	x	–	–	–	X	*

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Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Fraxinus americana*** L.	x	x	x	x	x	X	5
SF***Fraxinus nigra*** Marshall	x	–	–	x	–	X	10
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	–	93	–	93	x	X	1
SF***Fuirena pumila*** (Torr.) Spreng.	x	–	–	–	–	X	10
Galium aparine L.	x	93	x	x	–	X	1
Galium circaezans Michx. var. *hypomalacum* Fernald	x	x	–	–	–	X	7
Galium concinnum Torr. & A. Gray	x	–	–	x	–	X	5
SF***Galium labradoricum*** (Wiegand) Wiegand	x	–	–	–	–	X	10
Galium obtusum Bigelow	x	x	–	–	–	X	5
Galium pilosum Aiton	x	x	–	–	–	X	10
Galium tinctorium L.	x	–	–	–	–	X	8
SF***Galium trifidum*** L.	x	93	–	–	–	X	10
Galium triflorum Michx.	x	–	x	x	–	X	5
Gaultheria procumbens L.	x	x	x	–	–	X	9
Gaylussacia baccata (Wangenh.) K. Koch	x	x	x	–	–	X	9
SF***Gentiana alba*** Muhl. ex Nutt. (*Gentiana flavida* A. Gray)	–	R	–	–	–	R	9
Gentiana andrewsii Griseb.	rp	–	–	–	–	N	8
SF***Gentiana saponaria*** L.	x	x	–	–	x	X	8
Gentianopsis crinita (Froel.) Ma (*Gentiana crinita* Froel.)	–	R	–	–	x	X	10
SF***Gentianopsis virgata*** (Raf.) Holub ssp. ***virgata*** (*Gentiana procera* Holm)	x	–	–	–	–	X	9
SF***Geranium bicknellii*** Britton	–	x	–	–	–	X	7
Geranium maculatum L.	x	93	–	x	–	X	4
Geum canadense Jacq.	x	x	–	x	R	X	1
Geum laciniatum Murray (*Geum laciniatum* Murray var. *trichocarpum* Fernald)	x	–	–	x	–	X	5
Glechoma hederacea L.	–	93	–	–	x	X	*
Glyceria canadensis (Michx.) Trin.	x	x	–	93	x	X	10
Glyceria septentrionalis Hitchc.	–	x	–	–	–	X	8
Glyceria striata (Lam.) Hitchc.	x	x	x	x	–	X	4
Gratiola neglecta Torr.	–	54	–	–	–	N	7
Hackelia virginiana (L.) I. M. Johnst.	x	–	x	–	–	X	0
Hamamelis virginiana L.	x	x	x	x	–	X	8
Hedera helix L.	–	x	–	–	–	X	*
Helenium autumnale L.	rp	–	–	–	56	N	5
Helianthus annuus L.	–	–	–	–	x	X	ad
Helianthus divaricatus L.	x	x	x	–	x	X	5
Helianthus giganteus L.	x	–	–	–	R	X	9

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	A	*B*	*C*	*D*	*E*		
Helianthus grosseserratus M. Martens	x	–	–	–	x	X	2
SF***Helianthus hirsutus*** Raf.	–	–	–	–	x	N	5
Helianthus occidentalis Riddell	R	x	–	–	–	X	10
Helianthus petiolaris Nutt. ssp. *petiolaris*	R	–	–	–	–	R	ad
Helianthus strumosus L.	–	–	–	–	R	R	5
Helianthus tuberosus L.	–	R	–	–	–	R	3
Hemerocallis fulva (L.) L.	–	–	–	–	–	X	*
Hesperis matronalis L.	x	–	–	–	–	X	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	R	x	–	–	–	X	7
Heuchera richardsonii R. Br.	–	x	–	–	–	X	8
Hibiscus laevis Alliioni	–	155	–	–	–	N	6 ad?
Hibiscus moscheutos L. ssp. *moscheutos* (*Hibiscus palustris* L.)	rp	–	–	–	–	N	9
Hieracium caespitosum Dumort.	x	–	–	–	–	X	*
Hieracium gronovii L.	x	x	–	–	–	X	6
Hieracium piloselloides VilL. (*Hieracium florentinum* All.)	46	–	–	–	–	N	*
Hieracium scabrum Michx.	–	x	–	–	–	X	8
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	–	x	–	–	x	X	6
Holcus lanatus L.	–	–	–	–	–	X	*
Hordeum jubatum L.	–	–	–	–	–	X	*
Houstonia caerulea L.	x	x	–	–	–	X	9
SF***Hudsonia tomentosa*** Nutt.	R	x	–	–	–	R	10
SF***Huperzia lucidula*** (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	–	x	–	–	–	X	10
Hylodesmum glutinosum (Muhl. ex Willd.) H. Ohashi & R. R. Mill (*Desmodium glutinosum* (Willd.) A. W. Wood)	–	123	–	–	–	N	7
Hylodesmum nudiflorum (L.) H. Ohashi & R. R. Mill (*Desmodium mudiflorum* (L.) DC.)	x	x	–	–	–	X	9
SF***Hypericum boreale*** (Britton) E.P. Bicknell	x	–	–	–	–	X	10
SF***Hypericum canadense*** L.	x	–	–	–	–	X	10
Hypericum gentianoides (L.) Britton, Sterns & Poggenburg	R	–	–	–	–	R	7
SF***Hypericum kalmianum*** L.	x	x	–	–	–	X	10
Hypericum majus (A. Gray) Britton	–	–	–	–	R	R	6
Hypericum mutilum L.	–	x	–	–	–	X	8
Hypericum perforatum L.	x	–	–	–	–	X	*
Hypericum punctatum Lam.	–	–	–	–	x	X	4
SF***Hypopitys monotropa*** Crantz (*Monotropa hypopitys* L.)	x	x	–	–	–	X	10
Hypoxis hirsuta (L.) Coville	–	69	–	–	–	X	9
SF***Ilex mucronata*** (L.) M. Powell, V. Savolainen, S. Andrews (*Nemopanthus mucronatus* (L.) Trel.)	x	x	–	–	–	X	10

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	A	*B*	*C*	*D*	*E*		
Ilex verticillata (L.) A. Gray	x	x	–	x	–	X	9
Impatiens capensis Meerb.	x	x	–	x	x	X	3
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	x	–	–	–	X	10
SF***Ipomoea pandurata*** (L.) G. Mey.	119	–	–	–	–	N	4
Ipomoea purpurea (L.) Roth	–	93	–	–	–	X	*
Iris pseudacorus L.	x	–	–	–	–	X	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	x	x	x	x	X	5
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	–	–	–	–	R	R	7
Juncus anthelatus (Wiegand) R. E. Brooks	144	145	–	–	–	N	6
SF***Juncus arcticus*** Willd. var. ***balticus*** (Willd.) Trautvetter (*Juncus balticus* Willd. var. *littoralis* Engelm.)	–	x	–	–	–	X	6
SF***Juncus articulatus*** L.	5	–	–	–	x	X	7
Juncus brachycephalus (Engelm.) Buchenau	x	–	–	–	R	X	9
Juncus canadensis J. Gay ex Laharpe	x	x	–	–	–	X	7
Juncus dudleyi Wiegand	x	–	–	–	x	X	4
Juncus effusus L.	x	x	–	x	x	X	7
Juncus greenei Oakes & Tuck.	–	x	–	–	R	X	8
Juncus marginatus Rostk.	–	x	–	–	x	X	9
SF***Juncus militaris*** Bigelow	6	–	–	–	–	N	10
Juncus nodosus L.	rp	–	–	–	x	X	6
SF***Juncus pelocarpus*** E. Mey.	x	–	–	–	–	X	10
SF***Juncus scirpoides*** Lam.	–	x	–	–	x	X	9
Juncus tenuis Willd.	x	x	–	–	–	X	0
Juncus torreyi Coville	rp	–	–	–	x	X	4
SF***Juniperus communis*** L.	x	–	–	–	–	X	10
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	x	x	–	–	–	X	2
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	x	x	–	–	–	X	7
Kolkwitzia amabilis Graebn.	–	–	16	–	–	N	*
Krigia biflora (Walter) S.F. Blake	x	x	x	–	–	X	7
Krigia virginica (L.) Willd.	x	x	–	–	–	X	6
Lactuca canadensis L.	x	x	x	–	x	X	2
Lactuca serriola L.	x	–	–	–	x	X	*
Laportea canadensis (L.) Wedd.	–	–	–	x	–	X	3
SF***Larix laricina*** (Du Roi) K. Koch	x	–	–	–	–	X	10
Lathyrus palustris L.	x	53	–	–	–	X	8
Lathyrus palustris L. (*Lathyrus palustris* L. var. *myrtifolius* (Willd.) A. Gray)	x	x	–	–	–	X	6
Lechea minor L.	–	x	–	–	–	X	7
Lechea mucronata Raf. (*Lechea villosa* Elliott)	X	x	–	–	–	X	6

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	A	*B*	*C*	*D*	*E*		
Lechea pulchella Raf. var. *moniliformis* (E.P. Bicknell ex Britton) Mohlenbr. (*Lechea pulchella* Raf.)	x	x	–	–	–	X	7
Lechea tenuifolia Michx.	–	R	–	–	–	R	8
Leersia oryzoides (L.) Sw.	x	x	–	–	–	X	4
Leersia virginica Willd.	–	x	–	93	–	X	7
Lemna minor L.	X	–	–	–	–	X	5
Lemna minuta Kunth (*Lemna minuscula* Hertel)	–	x	–	–	–	X	5
Leonurus cardiaca L.	–	–	–	–	x	X	*
Lepidium campestre (L.) W.T. Aiton	x	–	–	–	–	X	*
Lepidium densiflorum Schrad.	x	–	–	–	–	X	*
Lepidium perfoliatum L.	–	–	–	–	146	N	*
Lepidium virginicum L.	X	–	–	–	–	X	0
Lespedeza capitata Michx.	x	x	–	–	x	X	4
Lespedeza cuneata (Dum. Cours.) G. Don	–	X	–	–	–	X	*
Lespedeza hirta (L.) Hornem.	x	x	–	–	–	X	6
Lespedeza × *longifolia* DC.	147	–	–	–	–	N	7
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte	x	–	–	–	–	X	*
Liatris aspera Michx.	X	x	–	–	–	X	6
Liatris cylindracea Michx.	X	x	–	–	–	X	8
Liatris spicata (L.) Willd.	R	x	–	–	x	X	6
Ligustrum vulgare L.	66	93	–	–	–	N	*
Lilium michiganense Farw.	x	–	–	x	83	X	6
SF***Lilium philadelphicum*** L. (*Lilium philadelphicum* L. var. *andinum* (Nutt.) Ker Gawl.)	R	x	–	–	–	X	10
Lindera benzoin (L.) Blume	x	x	–	x	–	X	7
Lindernia dubia (L.) Pennell	–	–	–	–	R	R	5
SF***Linnaea borealis*** L. var. ***longiflora*** Torr. (*Linnaea borealis* L. var. *americana* (Forbes) Rehder)	R	–	–	–	–	R	10
SF***Linum striatum*** Walter	132	133	–	–	x	X	10
SF***Linum virginianum*** L.	–	x	–	–	R	X	10
Liparis liliifolia (L.) Rich. Ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	–	x	–	–	–	X	6
SF***Liparis loeselii*** (L.) Rich.	x	x	–	–	–	X	7
Liriodendron tulipifera L.	–	36	x	x	–	X	5
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist	x	x	–	–	–	X	8
Lobelia cardinalis L.	rp	–	–	27	x	X	7
Lobelia inflata L.	x	–	–	–	R	X	4
Lobelia kalmii L.	R	–	–	–	–	R	10
Lobelia siphilitica L.	x	–	–	–	x	X	6

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Lobelia spicata Lam.	–	R	–	–	–	R	6
Lolium perenne L.	X	–	–	–	–	X	*
SF***Lonicera dioica*** L.	x	x	–	x	–	X	10
Lonicera japonica Thunb.	–	–	–	–	–	X	*
Lonicera × *bella* Zabel [*L. tartarica* × *L. morrowii*]	X	x	–	–	–	X	*
Lonicera × *minutiflora* Zabel [*L. morrow*ii × *L. xylosteoides] (Lonicera* × *muendeniensis* Rehder))	x	–	–	–	–	X	*
Lonicera × *notha* Zabel [*L. tartarica* × *L. ruprechtiana*]	–	–	–	–	100	N	*
Ludwigia alternifolia L.	x	x	–	–	x	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	R	x 35	–	x	–	X	5
SF***Ludwigia sphaerocarpa*** Elliott (*Ludwigia sphaerocarpa* Elliott var. *deamii* Fernald & Griscom)	x	–	–	–	–	X	10
Lunaria annua L.	–	–	x	–	–	X	*
Lupinus perennis L. var. *occidentalis* S. Watson	x	x	–	–	–	X	7
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	R	–	x	–	R	X	7
SF***Lycopodiella inundata*** (L.) Holub (*Lycopodium inundatum* L.)	–	–	–	–	x	X	10
SF***Lycopodium clavatum*** L.	–	x 61	–	–	–	EX	10
Lycopus americanus Muhl. ex W.P.C. Barton	x	–	–	–	x	X	5
Lycopus rubellus Moench	x	93	–	–	–	X	10
Lycopus uniflorus Michx.	x	x	–	–	x	X	7
Lycopus virginicus L.	x	x	–	–	x	X	9
Lysimachia ciliata L.	R	93	–	x	–	X	4
Lysimachia lanceolata Walter	–	x	–	–	R	X	7
Lysimachia quadriflora Sims	R	–	–	–	–	R	9
Lysimachia terrestris (L.) Britton, Sterns & Poggenb.	x 26	x	–	–	x	X	8
Lysimachia thyrsiflora L.	x	x	–	–	–	X	9
Lythrum alatum Pursh	x	R	–	–	–	X	7
Lythrum salicaria L.	x	x	–	–	–	X	*
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	x	x	x	–	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	x	x	–	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	x	x	x	–	X	5
Malus ioensis (Alph. Wood) Britton	x	–	x	–	–	X	3
Malva neglecta Wallr.	–	–	–	–	x	X	*
Medeola virginiana L.	x	x	–	x	–	X	10
Medicago lupulina L.	x	–	–	–	–	X	*
SF***Melampyrum lineare*** Desr.	x	x	–	–	–	X	10

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Melilotus alba Medik.	x	–	–	–	x	X	*
Melilotus officinalis (L.) Lam.	x	–	–	–	–	X	*
Menispermum canadense L.	–	x	–	–	–	X	6
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	x	x	–	–	–	X	5
SF***Menyanthes trifoliata*** L.	134	–	–	–	–	N	10
Mertensia virginica (L.) Pers. ex Link	–	x	–	–	–	N	ad
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	x	–	–	x	–	X	10
SF***Mimulus alatus*** Aiton	–	x	–	–	–	X	7
Mimulus ringens L.	x	–	–	26	x	X	6
SF***Mitchella repens*** L.	x	x	–	x	–	X	10
Mitella diphylla L.	R	–	–	x	–	X	10
Mollugo verticillata L.	x	–	–	–	–	X	ad
Monarda fistulosa L.	x	x	x	–	x	X	4
Monarda punctata L.	x	x	–	–	–	X	5
SF***Monotropa uniflora*** L.	x	x	–	–	–	X	10
Morus alba L.	–	–	x	–	–	X	*
Muhlenbergia glomerata (Willd.) Trin.	x	–	–	–	–	X	10
Muhlenbergia mexicana (L.) Trin.	R	x	–	–	R	X	5
Muhlenbergia schreberi J. F. Gmel.	x	x	–	–	–	X	0
SF***Myosotis laxa*** Lehm.	x	x 37	–	93	–	X	10
Myosotis stricta Link ex Roem. & J.A. Schultes	R	–	–	–	–	N	*
Nasturtium officinale W.T. Aiton	x	–	–	–	–	X	*
Nepeta cataria L.	–	–	–	–	x	X	*
Nuphar advena (Aiton) W. T. Aiton	x	x	–	–	–	X	7
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	x	x	–	–	–	X	6
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist (*Nymphaea tuberosa* Paine)	x	–	–	–	–	X	7
Nyssa sylvatica Marshall	x	x	x	93	–	X	8
Oenothera biennis L.	x	–	–	–	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	x	–	–	–	X	7
SF***Oenothera fruticosa*** L. ssp. ssp. ***tetragona*** (Roth) W.L. Wagner (*Oenothera tetragona* Roth var. *longistipata* (Pennell) Munz)	–	x	–	–	–	X	9
SF***Oenothera perennis*** L.	–	x	–	–	–	X	10
Onoclea sensibilis L.	x	x	–	x	x	X	8
SF***Ophioglossum pusillum*** Raf. (*Ophioglossum vulgatum* L. var. *pseudopodum* (S.F. Blake) Farw.)	–	31	–	–	–	X	9
Opuntia cespitosa Raf. (*O. humifusa* (Raf.) Raf.)	x	x	–	–	–	X	5
Origanum vulgare L.	–	–	–	–	21	N	*

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Orobanche fasciculata*** Nutt.	–	R	–	–	–	R	10
SF***Orobanche uniflora*** L.	–	32	–	–	–	X	10
SF***Orthilia secunda*** (L.) House (*Pyrola secunda* L.)	R	–	–	–	–	R	10
Osmorhiza claytonii (Michx.) C.B. Clarke	x	x	x	x	–	X	3
Osmorhiza longistylis (Torr.) DC.	x	–	–	–	–	X	3
Osmunda claytoniana L.	R	–	–	–	–	R	9
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	x	x	x	x	x	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	x	x	x	x	–	X	7
Ostrya virginiana (Mill.) K. Koch	–	–	–	x	–	X	5
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	x	93	–	–	x	X	0
Oxalis stricta L. (*Oxalis europaea* Jord.)	x	–	–	–	x	X	0
Oxypolis rigidior (L.) Raf.	x	x	–	x	x	X	7
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	x	R	–	–	–	X	7
Packera glabella (Poir) C. Jeffrey (*Senecio glabellus* Poir.)	82	–	–	–	–	N	ad
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	–	91	–	–	–	N	6
Packera plattensis (Nutt.) W.A. Weber & A. Löve (*Senecio plattensis* Nutt.)	R	–	–	–	–	R	6
Packera pseudaurea (Rydb.) W.A. Weber & A.. Löve var. *semicordata* (Mack. & Bush) D.K. Trock & T.M. Barkley (*Senecio aureus* L. var. *semicordatus* (Mack. & Bush) Greenm.)	–	–	–	–	–	N	8
SF***Panax trifolius*** L.	–	68	–	x	–	X	10
Panicum capillare L.	x	–	–	–	x	X	1
Panicum dichotomiflorum Michx.	x	–	–	–	x	X	0
Panicum flexile (Gatt.) Scribn.	–	–	–	–	x	X	9
Panicum rigidulum Bosc ex Nees	–	x	–	–	x	X	5
SF***Panicum verrucosum*** Muhl.	x	–	–	–	–	X	10
Panicum virgatum L.	x	x	–	–	x	X	5
Parietaria pensylvanica Muhl. ex Willd.	22	–	–	–	–	N	3
Parnassia glauca Raf.	x	–	–	–	–	X	10
Parthenocissus quinquefolia (L.) Planch.	x	x	x	x	x	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	x	–	–	–	x	X	1
SF***Patis racemosa*** (Sm.) Romasch., P.M. Peterson & Soreng (*Piptatherum racemosum* (Sm.) Eaton)	x	–	–	–	–	N	10
Pedicularis canadensis L.	x	x	–	–	–	X	9
Pedicularis lanceolata Michx.	x	–	–	–	–	X	9
SF***Peltandra virginica*** (L.) Schott	R	13	–	–	–	X	10
Penstemon digitalis Nutt. ex Sims	x	–	–	–	x	X	4
Penthorum sedoides L.	x	x	–	9	–	X	5

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	A	*B*	*C*	*D*	*E*		
Persicaria amphibia (L.) Delarbre (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman and *P. coccineum* Willd.)	x	x	–	–	–	X	4
SF***Persicaria arifolia*** (L.) Haroldson (*Polygonum arifolium* L. var. *pubescens* (Keller) Fernald)	x	93	–	24	–	X	9
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	x	x	–	–	–	X	7
SF***Persicaria hydropiperoides*** (Michx.) Small (*Polygonum opelousanum* Riddell var. *adenocalyx* Stanford)	x	x	–	–	–	X	9
Persicaria lapathifolia (L.) Delarbre (*Polygonum lapathifolia* L.)	125	–	–	–	–	N	0
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	–	–	–	–	x	X	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	R	–	–	–	x	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	x	x	–	–	–	X	6
SF***Persicaria robustior*** (Small) E.P. Bicknell	–	–	–	–	149	N	10
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	x	x	–	27	x	X	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	–	93	–	x	–	X	2
Phalaris arundinacea L.	x	x	–	–	x	X	*
SF***Phegopteris hexagonoptera*** (Michx.) Fee (*Dryopteris hexagonoptera* (Michx.) C. Chr.)	–	R	–	–	–	N	10
Phleum pratense L. ssp. *pratense*	–	–	–	–	x	X	*
Phlox bifida L. C. Beck	x	–	–	–	–	X	8
Phlox divaricata L.	–	x	–	x	–	X	5
Phlox paniculata L.	–	–	–	–	x	X	ad
Phlox pilosa L.	x	R	–	–	–	X	7
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	x	–	–	–	x	X	1
Phryma leptostachya L. var. *leptostachya*	–	–	x	–	–	X	4
Physalis heterophylla Nees	x	–	–	–	x	X	3
Physalis virginiana Mill.	R rp	–	–	–	–	R	4
Physocarpus opulifolius (L.) Maxim.	–	x	–	–	–	X	8
Physostegia virginiana (L.) Benth.	–	–	–	–	x	X	6
Phytolacca americana L.	x	–	–	–	x	X	1
Pilea fontana (Lunell) Rydb.	x	93	–	93	–	X	7
Pilea pumila (L.) A. Gray	R	x	–	–	–	X	5
SF***Pinus banksiana*** Lamb.	x	x	–	–	–	X	9
Pinus nigra J.F. Arnold	–	–	x	–	–	X	*
SF***Pinus strobus*** L.	x	x	–	–	–	X	9
Plantago lanceolata L.	x	–	–	–	–	X	*
Plantago major L.	x	–	–	–	–	X	*
Plantago rugelii Decne.	R	62	–	–	x	X	0

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	A	*B*	*C*	*D*	*E*		
SF***Platanthera aquilonis*** Sheviak (*Habenaria hyperborea* (L.) R. Br. var. *huronensis* (Nutt.) Farw.)	R	–	–	–	–	R	10
SF***Platanthera ciliaris*** (L.) Lindl. (*Habenaria ciliaris* (L.) R. Br.)	R	R	–	–	–	R	10
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	x	x	–	–	x	X	10
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* (Michx.) Lodd.)	25	11	–	–	–	X	10
SF***Poa alsodes*** A. Gray	–	–	–	R	–	R	10
Poa annua L.	x	x	–	–	–	X	*
Poa compressa L.	x	x	x	–	x	X	*
SF***Poa paludigena*** Fernald & Weigand	x	–	–	–	–	X	10
Poa pratensis L.	x	93	–	–	x	X	*
SF***Poa saltuensis*** Fernald & Wiegand ssp. ***languida*** (Hitchc.) A. Haines (*Poa languida* Hitchc.)	–	–	–	–	x	X	10
Poa trivialis L.	–	93	–	–	–	N	*
Podophyllum peltatum L.	x	x 26	–	x	–	X	4
Polygala cruciata L. var. *aquilonia* Fernald & B. G. Schub.	x	x	–	–	–	X	10
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	x	x	–	–	–	X	9
Polygala sanguinea L.	–	–	–	–	x	X	6
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	x	x	93	–	X	3
Polygonatum pubescens (Willd.) Pursh	x	93	x	x	–	X	7
SF***Polygonum articulatum*** L. (*Polygonella articulata* (L.) Meisn.)	x	x	–	–	–	X	10
Polygonum tenue Michx.	–	x	–	–	–	X	7
SF***Polypodium virginianum*** L.	R	–	–	–	–	R	9
Polystichum acrostichoides (Michx.) Schott	R	x	–	x	–	X	9
Pontederia cordata L.	x	–	–	–	–	X	10
Populus alba L.	–	–	–	–	–	X	*
Populus deltoides W. Bartram ex Marshall	x	x	x	x	–	X	2
Populus grandidentata Michx.	x	–	–	–	–	X	6
Populus nigra L. (*Populus nigra* L. var. *italica* Moench)	x	–	–	–	–	X	*
Populus tremuloides Michx.	x	x	x	–	–	X	4
Potamogeton amplifolius Tuck.	128	–	–	–	–	N	10
SF***Potamogeton bicupulatus*** Fernald	R	–	–	–	–	X	10
SF***Potamogeton diversifolius*** Raf.	R	–	–	–	–	R	9
Potamogeton illinoensis Morong	126	–	–	–	–	N	8
Potamogeton natans L.	127	–	–	–	–	N	8
Potamogeton nodosus Poir.	–	59	–	–	–	N	7
SF***Potamogeton pulcher*** Tuck.	65	–	–	–	–	N	10

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	A	*B*	*C*	*D*	*E*		
SF***Potamogeton pusillus*** L.	116	–	–	–	–	N	7
Potentilla argentea L.	x	–	–	–	–	X	*
Potentilla norvegica L.	x	–	–	–	–	X	0
Potentilla recta L.	x	x	–	–	–	X	*
Potentilla simplex Michx.	x	x	x	x	–	X	4
Prenanthes alba L.	x	x	–	x	–	X	5
Prenanthes racemosa Michx.	x	x	–	–	x	X	8
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	x	x	–	–	–	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	x	x	–	–	–	X	0
Prunella vulgaris L. ssp. *vulgaris*	–	–	–	–	–	X	*
Prunus americana Marshall	–	–	–	–	x	X	5
SF***Prunus pensylvanica*** L. f.	x	43	–	–	–	X	5
Prunus pumila L.	x	x	–	–	–	X	8
Prunus serotina Ehrh.	x	x	x	x	–	X	1
Prunus virginiana L.	x	x	x	x	–	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	x	x	–	–	–	X	2
Ptelea trifoliata L. ssp. *trifoliata* var. *mollis* Torr. & A. Gray	x	x	–	–	–	X	8
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	x	x	–	x	X	5
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	x	x	–	–	x	X	5
SF***Pyrola americana*** Sweet (*Pyrola rotundifolia* L. *americana* (Sweet) Fernald)	x	x	–	–	–	X	10
SF***Pyrola elliptica*** Nutt.	x	x	–	–	–	X	10
Quercus alba L.	x	x	x	–	x	X	5
Quercus bicolor Willd.	81	x	–	x	x	X	6
Quercus palustris Munchh.	x	x	–	x	x	X	8
Quercus rubra L.	R	–	x	x	R	X	7
Quercus velutina Lam.	x	x	x	–	–	X	6
Ranunculus abortivus L.	x	–	x	x	–	X	0
Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan (*Ranunculus septentrionalis* Poir.)	–	–	–	x	–	X	5
Ranunculus pensylvanicus L. f.	x	93	–	–	–	X	6
Ranunculus recurvatus Poir.	x	93	–	–	–	X	5
Ranunculus sceleratus L.	x	–	–	–	–	X	6
SF***Rhamnus alnifolia*** L'Her.	x	–	–	–	–	X	10
SF***Rhexia virginica*** L.	x	x	–	–	x	X	10
SF***Rhus aromatica*** Aiton var. ***arenaria*** (Greene) Fernald	x	x	–	–	–	X	9

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	x	x	x	–	x	X	6
Rhus typhina L.	x	–	–	–	x	X	1
Rhynchospora capillacea Torr.	R	–	–	–	–	R	10
Rhynchospora capitellata (Michx.) Vahl	x	x	–	–	x	X	8
SF***Rhynchospora macrostachya*** Torr. ex A. Gray	x	–	–	–	–	X	10
SF***Rhynchospora nitens*** (Vahl) A. Gray (*Psilocarya nitens* (Vahl) Alph. Wood)	96 97	–	–	–	–	N	10
Rhynchospora recognita (Gale) Kral (*Rhynchospora globularis* (Chapm.) Small var. *recognita* Gale)	–	x	–	–	–	X	10
SF***Rhynchospora scirpoides*** (Torr.) Grisebach (*Psilocarya scirpoides* Torr.)	x	–	–	–	–	X	10
Ribes americanum Mill.	x	–	–	–	–	X	7
Ribes americana Willd. var. *mesochorum* (Nieuwl.) Peattie	150	–	–	–	–	N	10
Ribes cynosbati L.	–	–	–	x	–	X	5
SF***Ribes hirtellum*** Michx.	R	–	–	–	–	R	10
Robinia neomexicana A. Gray var. *neomexicana* (*Robinia luxurians* (Dieck) C.K. Schneid. ex Tarouca & C.K. Schneid.)	–	–	x 7	–	–	X	ad
Robinia pseudoacacia L.	–	8	x	–	–	X	ad
Rorippa palustris (L.) Besser ssp. *palustris* (*Rorippa palustris* (L.) Besser var. *fernaldiana* (Butters & Abbe) Stuckey)	x	–	–	–	–	X	4
Rosa carolina L.	x	x	x	–	x	X	5
Rosa multiflora Thunb.	x	x	–	x	x	X	*
Rosa palustris Marshall	x	x	–	–	–	X	7
Rosa setigera Michx.	109	–	–	–	–	N	5
Rotala ramosior (L.) Koehne	x 18	59	–	–	–	X	10
Rubus allegheniensis Porter	x	x	–	93	x	X	3
Rubus × *avipes* L.H. Bailey [*R. pensilvanicus* × *R. allegheniensis*]	–	151	–	–	–	N	10
Rubus flagellaris Willd.	x	93	–	93	x	X	3
Rubus hispidus L.	x	x	–	93	–	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	x	x	x	–	x	X	3
Rubus occidentalis L.	x	93	x	–	x	X	2
Rubus pensilvanicus Poir.	x	x	x	93	x	X	3
SF***Rubus pubescens*** Raf.	x	x	–	x	–	X	10
SF***Rubus setosus*** Bigelow	–	x	–	–	–	X	10
Rudbeckia hirta L.	x	x	–	–	x	X	1
SF***Rudbeckia subtomentosa*** Pursh	–	–	–	–	x	X	9
Rumex acetosella L.	x	–	–	–	–	X	*
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	x	x	–	–	–	X	8
Rumex crispus L.	x	–	–	–	–	X	*

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Rumex obtusifolius L.	R	–	–	–	–	R	*
Rumex verticillatus L.	–	33	–	–	–	N	6
SF***Sabatia angularis*** (L.) Pursh	R	R	–	–	–	R	10
Sagittaria graminea Michx.	x	–	–	–	–	X	9
Sagittaria latifolia Willd.	x	–	–	–	–	X	4
SF***Sagittaria rigida*** Pursh	R	–	–	–	–	R	10
Salix amygdaloides Andersson	x	x	–	–	x	X	5
Salix bebbiana Sarg.	x	–	–	–	x	X	8
SF***Salix candida*** Flüggé ex Willd.	x	–	–	–	–	X	10
Salix cinerea L.	–	–	–	–	101	N	*
Salix discolor Muhl.	x	x	–	–	x	X	2
Salix eriocephala Michx.	x	–	–	–	x	X	5
Salix euxina J. Belyaeva (*Salix fragilis* L.)	x	–	–	–	x	X	*
Salix humilis Marshall	R 93	x	x	–	–	X	6
Salix interior Rowlee	x	x	–	–	–	X	1
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	x	x	–	–	x	X	7
Salix nigra Marshall	x	x	–	–	x	X	4
SF***Salix pedicellaris*** Pursh (*Salix pedicellaris* Pursh var. *hypoglauca* Fernald)	R	–	–	–	–	R	10
Salix petiolaris Sm.	x	x	–	–	–	X	7
SF***Salix sericea*** Marshall	x	–	–	–	–	X	10
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	x	x	x	x	X	1
Samubucs racemosa L. ssp. *pubens* (Michx.) Hultén (*Sambucus pubens* Michx.)	R	–	–	–	–	R	10
Samolus parviflorus Raf.	R	–	–	–	–	R	6
Sanicula marilandica L.	–	93	–	–	–	R	6
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	–	93	–	93	–	R	2
Saponaria officinalis L.	x	–	–	–	x	X	*
SF***Sarracenia purpurea*** L.	x	–	–	–	–	X	10
Sassafras albidum (Nutt.) Nees	x	x	x	–	x	X	3
Satureja hortensis L.	R	–	–	–	–	R	*
Saururus cernuus L.	x	x	–	27	–	X	9
SF***Sceptridium dissectum*** (Spreng.) Lyon (*Botrychium dissectum* Spreng.)	x	R	–	–	–	X	6
SF***Sceptridium multifidum*** (S.G. Gmel.) M. Nishida (*Botrychium multifidum* (S.G. Gmel.) Rupr.; *B. multifidum* var. *intermedium* (D.C. Eaton) Farw.)	–	R	–	–	–	R	10
SF***Sceptridium oneidense*** (Gilbert) Holub (*Botrychium oneidense* (Gilbert) House)	124	–	–	–	–	N	5

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	x	–	–	–	x	X	*
Schedonorus pratensis (Huds.) P. Beauv.	152	–	152	–	–	N	*
SF***Schizachyrium littorale*** (Nash) E.P. Bicknell	x	x	–	–	–	N	10
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	x	–	–	x	X	5
SF***Schoenoplectiella hallii*** (A. Gray) Lye (*Schoenoplectus hallii* (A. Gray) S.G. Sm.; *Scirpus hallii* A. Gray)	–	129	–	–	–	N	5
SF***Schoenoplectiella purshiana*** (Fernald) Lye (*Schoenoplectus purshianus* (Fernald) M.T. Strong; *Scirpus purshianus* Fernald)	x	47	–	–	–	X	9
SF***Schoenoplectiella smithii*** (A. Gray) Hayasaka (*Schoenoplectus smithii* (A. Gray) Sojak; *Scirpus smithii* A. Gray)	17	–	–	–	–	N	10
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	x	58	–	–	–	X	6
Schoenoplectus pungens (Vahl) Palla (*Scirpus pungens* Vahl)	R rp	–	–	–	–	R	5
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl var. *creber* Fernald)	R rp	–	–	–	–	R	5
Scilla sibirica Andrews	–	–	143	–	–	N	*
Scirpus atrovirens Willd.	x	x	–	–	x	X	4
Scirpus cyperinus (L.) Kunth	x	x	–	–	x	X	6
SF***Scirpus georgianus*** R. M. Harper	–	79	–	–	–	N	5
SF***Scirpus hattorianus*** Makino	102	102	–	–	–	R	
Scirpus pendulus Muhl.	R rp	–	–	–	–	R	4
SF***Scirpus polyphyllus*** Vahl	97	–	–	–	–	X	10
SF***Scleria muehlenbergii*** Steud. (*Scleria reticularis* Michx. var. *pubescens* Britton)	0	–	–	–	–	N	10
SF***Scleria reticularis*** Michx.	x	44	–	–	–	X	10
Scleria triglomerata Michx.	R	x	–	–	–	X	10
Scrophularia lanceolata Pursh	130 rp	–	–	–	–	N	4
Scrophularia marilandica L.	x	–	–	–	–	X	4
Scutellaria galericulata L. (*Scutellaria epilobiifolia* A. Ham.)	x	x	–	–	–	X	5
Scutellaria lateriflora L.	x	x	–	27	x	X	5
Sedum acre L.	–	72	–	–	–	N	*
Sedum sarmentosum Bunge	–	–	–	–	x	X	*
Setaria faberi R.A.W. Herrm.	–	–	–	–	x	X	*
Setaria italica (L.) P. Beauv.	–	–	–	–	x	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	–	–	–	–	x	X	*
Setaria viridis (L.) P. Beauv.	–	x	–	–	x	X	*
Silene antirrhina L.	x	–	–	–	–	X	1
Silene latifolia Poir. (*Lychnis alba* Mill.)	x	–	–	–	–	X	*

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Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Sisyrinchium angustifolium*** Mill.	x	x	–	–	R	X	10
SF***Sisyrinchium atlanticum*** E.P. Bicknell	x	x	–	–	–	X	10
Sium suave Walter	x	x	–	–	–	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	x	–	x	–	–	X	5
Smilax lasioneura Hook.	x	x	–	–	–	X	5
Smilax rotundifolia L.	x	x	x	x	x	X	7
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	x	x	–	–	–	X	5
Solanum carolinense L.	x	–	–	–	–	X	ad
Solanum dulcamara L.	x	93	–	–	x	X	*
Solanum ptychanthum Dunal (*Solanum americanu*m Mill.)	R	–	–	–	–	R	0
Solidago altissima L.	x	x	–	93	x	X	1
Solidago caesia L.	x	x	x	x	–	X	7
Solidago gigantea Aiton	x	x	–	–	x	X	4
Solidago juncea Aiton	–	x	–	–	x	X	5
Solidago nemoralis Aiton	x	x	–	–	–	X	4
Solidago ohioensis Riddell	R rp	–	–	–	–	R	9
Solidago patula Muhl. ex Willd	x	x	–	x	–	X	9
Solidago riddellii Frank	x	–	–	–	–	X	7
Solidago rigida L.	–	x	–	–	–	X	4
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	x	x	x	93	x	X	6
Solidago sempervirens L.	131	–	–	–	–	N	ad
SF***Solidago simplex*** Kunth var. ***gillmanii*** (A. Gray) G.S. Ringius (*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald)	x	–	–	–	–	X	10
SF***Solidago speciosa*** Nutt.	x	x	–	–	–	X	7
Solidago uliginosa Nutt.	R rp	–	–	–	–	R	10
Solidago ulmifolia Muhl. ex Willd.	–	x	–	–	–	X	5
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	–	104	–	–	x	X	*
Sonchus oleraceus L.	–	–	–	–	–	X	*
Sorghastrum nutans (L.) Nash	x	x	–	–	–	X	5
SF***Sparganium americanum*** Nutt.	x 64	x 52	–	–	–	X	10
SF***Sparganium androcladum*** (Engelm.) Morong	75	–	–	–	–	N	10
Sparganium emersum Rehmann (*Sparganium chlorocarpum* Rydb.)	53	–	–	–	–	N	10
Sparganium eurycarpum Engelm.	46	–	–	–	–	N	6
Spartina pectinata Link	x	–	–	–	x	X	4
Sphenopholis intermedia (Rydb.) Rydb.	x	–	–	–	R	X	4
Spiraea alba Du Roi	x	x	–	–	x	X	7

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	A	*B*	*C*	*D*	*E*		
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	x	x	–	–	x	X	9
Spiranthes cernua (L.) Rich.	x	R	–	–	x	X	7
SF***Spiranthes lacera*** (Raf.) Raf.	–	x	–	x	–	X	10
SF***Spiranthes lucida*** (H. H. Eaton) Ames	–	x	–	–	–	X	10
SF***Spiranthes magnicamporum*** Sheviak	98	–	–	–	–	N	10
SF***Spirodela polyrhiza*** (L.) Schleid.	112	–	–	–	–	N	7
Sporobolus cryptandrus (Torr.) A. Gray	–	–	–	–	x	X	7
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida* (Pursh) Fernald)	–	93	–	–	R	R	5
SF***Stachys hyssopifolia*** Michx.	x	x	–	–	–	X	9
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	x	–	–	–	x	X	5
Stellaria longifolia Muhl. ex Willd.	R	–	–	–	–	R	8
Stellaria media (L.) Vill.	–	–	–	–	–	X	*
Strophostyles helvola (L.) Elliott	x	–	–	–	–	X	7
Stylophorum diphyllum (Michx.) Nutt.	88	–	–	–	–	R	ad
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve	x	x	–	–	–	X	10
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	–	–	–	x	–	X	7
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	–	–	x	–	–	X	2
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	x	x	–	–	–	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	–	x	–	–	–	X	5
Symphyotrichum firmum (Nees) G.L. Nesom (*Aster puniceus* L. var. *firmus* (Nees) Torr. & A. Gray)	x	–	–	–	–	X	8
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *interior* (Wiegand) G.L. Nesom (*Aster simplex* Willd. var. *interior* (Weigand) Cronquist)	R 158	–	–	–	–	R	3
SF***Symphyotrichum lanceolatum*** (Willd.) G.L. Nesom var. ***lanceolatum*** (*Aster simplex* Willd.)	X	x	–	–	x	X	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	x	x	–	93	–	X	4
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	x	x	–	–	–	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	x	–	–	–	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	x	–	–	–	x	X	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)	x	93	–	–	x	X	9
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	x	x	–	–	–	X	7
SF***Symphyotrichum sericeum*** (Vent.) G.L. Nesom (*Aster sericeus* Vent.)	R	–	–	–	–	R	10
Symplocarpus foetidus (L.) W. Salisb.	x	x	–	x	–	X	8
Syringa vulgaris L.	–	8	–	–	–	N	*
Tanacetum parthenium (L.) Schultz-Bip.	–	–	–	–	–	X	*
Taraxacum officinale F. H. Wiggers	x	46	–	–	x	X	*

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	A	*B*	*C*	*D*	*E*		
Taxodium distichum (L.) Rich.	95	–	–	–	–	X	ad
Taxus cuspidata Siebold & Zucc.	–	–	7	–	–	N	*
Tephrosia virginiana (L.) Pers.	x	x	–	–	–	X	8
Teucrium canadense L.	x	–	–	–	–	X	3
Teucrium canadense L. var. *occidentale* (A. Gray) E.M. McClintock & Epling (*Teucrium occidentale* A. Gray)	–	–	–	–	x	X	3
Thalictrum amphibolum Greene (*Thalictrum revolutum* DC.)	x	–	–	–	–	X	6
Thalictrum dasycarpum Fisch. & Avé-Lall.	x	93	–	–	–	X	5
Thalictrum dasycarpum Fisch. & Ave-Lall. (*Thalictrum dasycarpum* Fisch. & Avé-Lall. var. *hypoglaucum* (Rydb.) Boivin)	x	–	–	–	x	X	5
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	–	–	–	x	–	X	7
SF***Thelypteris noveboracensis*** (L.) Nieuwl. (SF***Dryopteris noveboracensis*** (L.) A. Gray)	–	–	–	x	x	X	10
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	x	x	–	–	x	X	6
SF***Thuja occidentalis*** L.	x	–	–	–	–	X	10
Tilia americana L.	x	–	–	x	x	X	5
Torilis japonica (Houtt.) DC.	–	110	–	–	–		*
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	x	x	–	X	2
SF***Toxicodendron rydbergii*** (Small ex Rydb.) Greene	–	–	–	–	–	N	7
SF***Toxicodendron vernix*** (L.) Kuntze (*Rhus vernix* L.)	x	x	–	–	x	X	10
Tradescantia ohiensis Raf.	x	x	x	–	x	X	2
Tragopogon dubius Scop.	x	–	–	–	–	X	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald)	x	x	–	–	–	X	8
Triadenum virginicum (L.) Raf. (*Hypericum virginicum* L.)	x	–	–	–	–	X	10
Tridens flavus (L.) Hitchc. (*Triodia flava* (L.) Smyth)	–	–	–	–	x	X	ad
SF***Trientalis borealis*** Raf.	x	x	–	x	–	X	10
Trifolium dubium Sibth.	–	–	–	–	–	X	*
Trifolium hybridum L.	x	–	–	–	–	X	*
Trifolium pratense L.	x	x	–	–	–	X	*
Trifolium repens L.	x	–	–	–	–	X	*
Triglochin maritima L.	R	–	–	–	–	R	10
Trillium flexipes Raf.	–	–	–	x	–	X	6
Trillium grandiflorum (Michx.) Salisb.	–	x	–	–	–	X	8
Trillium recurvatum L. C. Beck	–	38	–	x	–	X	5
SF***Turritis glabra*** L. (*Arabis glabra* (L.) Bernh.)	x	–	–	–	–	X	6
Typha angustifolia L.	x	x	–	–	–	X	1
Typha latifolia L.	x	x	–	–	x	X	1
Typha × *glauca* Godr. [*T. angustifolia* × *T. latifolia*]	x	x	–	–	–	N	1

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Ulmus americana L.	x	x	–	x	–	X	3
Ulmus pumila L.	–	73	–	–	–	X	*
Ulmus rubra Muhl.	–	93	–	x	–	X	4
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	x	–	x	–	–	X	2
SF***Utricularia cornuta*** Michx.	80	–	–	–	–	N	10
SF***Utricularia gibba*** L.	x	–	–	–	–	X	10
SF***Utricularia intermedia*** Hayne	113	–	–	–	–	N	10
SF***Utricularia minor*** L.	R	–	–	–	–	R	10
SF***Utricularia purpurea*** Walter	X 65	–	–	–	–	X	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen (*Utricularia vulgaris* L.)	x	10	–	–	–	X	9
Uvularia grandiflora Sm.	–	–	–	x	–	X	7
Vaccinium angustifolium Aiton	x	x	x	–	–	X	5
Vaccinium corymbosum L.	x	x	–	–	–	X	8
SF***Vaccinium macrocarpon*** Aiton	R	–	–	–	–	R	10
Vaccinium pallidum Aiton	x	x	x	–	–	X	5
Verbascum blattaria L.	–	58	–	–	–	N	*
Verbascum thapsus L. ssp. *thapsus*	x	–	–	–	x	X	*
Verbena hastata L.	x	x	–	–	x	X	4
Verbena urticifolia L.	–	–	–	–	x	X	5
Vernonia fasciculata Michx.	–	x	–	–	–	X	5
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt.)	x	–	–	–	–	X	3
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt. var. *taeniotricha* S.F. Blake)	x	–	–	–	–	X	5
Vernonia missurica Raf.	–	x	–	–	x	X	4
SF***Veronica americana*** Schwein. ex Benth.	159	–	–	–	–	R	10
SF***Veronica catenata*** Pennell (*V. anagallis-aquatica* L. or *Veronica comosa* Richt.)	R	29	–	–	–	X	10
Veronica peregrina L.	–	x	–	–	–	X	0
Veronica scutellata L.	x	–	–	–	–	X	10
Viburnum acerifolium L.	x	x	–	x	–	X	9
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* L.)	–	93	–	–	93	N	ad
Viburnum lentago L.	x	x	–	x	–	X	5
Viburnum opulus L. var. *opulus*	–	–	–	93	x	X	*
Viburnum prunifolium L.	–	–	–	x	–	X	5
Viburnum rafinesqueanum Schult.	x	R	x	–	–	X	5
Vicia villosa Roth	–	–	x	–	105	X	*
SF***Viola blanda*** Willd. (*V. incognita* Brainerd; *V. incognita* var. *forbesii* Brainerd)	R	x	–	–	–	X	10

Table 24 (continued). Summary of species verified and reported at Cowles Dunes Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 25. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Unit-wide Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Viola cucullata Aiton	R	89	–	x	–	X	9
Viola labradorica Schrank (*Viola conspersa* Rchb.)	–	x	–	–	–	X	6
Viola lanceolata L.	–	x	–	–	–	X	7
SF***Viola macloskeyi*** F.E. Lloyd (*V. pallens* (Banks ex Ging.) Brainerd; *V. macloskeyi* ssp. *pallens* (Banks ex Ging.) M.S. Baker)	x	x	–	x	–	X	10
Viola pedata var. *linearilobа* Ging.	x	x	–	–	–	X	9
Viola pubescens Aiton	–	39	–	x	–	X	5
Viola sagittata Aiton var. *sagittata*	–	x	–	–	x	X	7
Viola sororia Willd.	x	–	–	–	–	X	3
Vitis aestivalis Michx.	x	x	–	–	–	X	7
SF***Vitis labrusca*** L.	x	x	–	93	x	X	9
Vitis riparia Michx.	x	x	x	x	x	X	2
Vulpia octoflora (Walter) Rydb.	x	x	–	–	–	X	4
Wolffia brasiliensis Wedd.	135	–	–	–	–	N	6
SF***Woodwardia areolata*** (L.) T. Moore	x	–	–	–	–	X	10
SF***Woodwardia virginica*** (L.) Sm.	x	x	–	–	–	X	10
Xanthium strumarium L.	R	–	–	–	–	R	*
SF***Xyris torta*** Sm.	R	x	–	–	–	X	10
Zea mays L.	–	–	–	–	–	X	*
SF***Zizania aquatica*** L. var. *aquatica*	R	–	–	–	–	R	10
Zizia aurea (L.) W. D. J. Koch	x	x	–	–	63	X	7

Table 25. Sources of new species verified and reported from Cowles Dunes.

Notes	Source(s)	Date	Species
1	M. Bowles	5 Jan 1994	*Betula populifolia*
2	R. Hiebert	1981	*Asclepias amplexicaulis*
3	R. Johnson	1988	*Chimaphila maculata*
4	R. Johnson and B. Plampin	Sept 1993	*Corallorhiza odontorhiza*
5	C. Johnson, B. Plampin, and P. Nilles	Aug 1992	*Juncus articulatus*
6	D. Mason	1999	*Juncus militaris*
7	C. Fox	22 May 1985	*Robinia neomexicana*, *Taxus cuspidata*
8	D. Mickey and K. Quinlan	13 Nov 2003	*Robinia pseudoacacia*, *Syringa vulgaris*
9	M. Newgent	Aug 1990	*Penthorum sedoides*
10	M. Newgent	July 1991	*Utricularia vulgaris* ssp. *macrorhiza*
11	M. Newgent	June 1994	*Platanthera lacera*
12	M. Newgent and B. Plampin	22 July 1991	*Brasenia schreberi*
13	S. O'Brien and B. Plampin	June 1995	*Peltandra virginica*
14	L. Olsen and B. Plampin	n.d.	*Adiantum pedatum*
15	B. Parry	4 Aug 1989	*Forsythia suspensa*
16	B. Parry	26 Aug 1989	*Kolkwitzia amabilis*
17	N.B. Pavlovic	4 Oct 1984	*Schoenoplectiella smithii*
18	N.B. Pavlovic	July 1991	*Rotala ramosior*
19	N.B. Pavlovic	1 June 1994	*Carex vesicaria*
20	N.B. Pavlovic	1994	*Carex umbellata*
21	N.B. Pavlovic	11 July 2003	*Origanum vulgare*
22	Pavlovic et al. (Exotic Project)	27 Aug 1999	*Parietaria pensylvanica*
23	E. Pitcher	1988	*Chimaphila maculata*
24	B. Plampin	June 1985	*Persicaria arifolia*
25	B. Plampin	June 1990	*Bartonia virginica*, *Platanthera lacera*
26	B. Plampin	July 1990	*Lysimachia terrestris*, *Mimulus ringens*, *Podophyllum peltatum*
27	B. Plampin	Aug 1990	*Cinna arundinacea*, *Lobelia cardinalis*, *Persicaria sagittata*, *Saururus cernuus*, *Scutellaria lateriflora*
28	B. Plampin	Sept 1990	*Cirsium pitcheri*
29	B. Plampin	July 1991	*Anemone quinquefolia* L. var. *quinquefolia*, *Veronica catenata*
30	B. Plampin	Sept 1991, June 1999	*Cystopteris protrusa*
31	E. Kjellmark	1991	*Ophioglossum pusillum*
32	B. Plampin	June 1992	*Orobanche uniflora*
33	B. Plampin	July 1992	*Rumex verticillatus*
34	B. Plampin	28 Aug 1992	*Callitriche heterophylla*
35	B. Plampin	Oct 1992	*Ludwigia palustris*
36	B. Plampin	Dec 1992	*Liriodendron tulipifera*
37	B. Plampin	1992	*Myosotis laxa*
38	B. Plampin	Apr 1993	*Trillium recurvatum*
39	B. Plampin	May 1993	*Viola pubescens*
40	B. Plampin	July 1993	*Commelina erecta*
41	B. Plampin	Aug 1993	*Amphicarpaea bracteata*
42	B. Plampin	Sept 1993	*Euthamia caroliniana*
43	B. Plampin	May 1994	*Prunus pensylvanica*

Table 25 (continued). Sources of new species verified and reported from Cowles Dunes.

Notes	Source(s)	Date	Species
44	B. Plampin	Sept 1994	*Scleria reticularis*
45	B. Plampin	Oct 1994	*Cornus alternifolia*, *Eleocharis obtusa*
46	B. Plampin	June 1995	*Celtis tenuifolia*, *Hieracium piloselloides*, *Sparganium eurycarpum*, *Taraxacum officinale*
47	B. Plampin	27 Sept 1995	*Schoenoplectiella purshiana*
48	B. Plampin	Oct 1995	*Aristida purpurascens*
49	B. Plampin	May 1996	*Arabidopsis thaliana*, *Carex albicans* var. *albicans*
50	B. Plampin	Jun 1996	*Actaea pachypoda*
51	B. Plampin	Sep 1996	*Eleocharis flavescens* var. *olivacea*
52	B. Plampin	Sept 1996, Oct 1997, Oct 1998	*Sparganium americanum*
53	B. Plampin	June 1997	*Caltha palustris*, *Lathyrus palustris*, *Sparganium emersum*
54	B. Plampin	June 1997, June 1998	*Gratiola neglecta*
55	B. Plampin	Aug 1997	*Alisma subcordatum*
56	B. Plampin	Sep 1997	*Helenium autumnale*
57	B. Plampin	6 Aug 1998	*Asimina triloba*
58	B. Plampin	Sept 1998	*Schoenoplectus acutus* var. *acutus*, *Verbascum blattaria*
59	B. Plampin	Oct 1998	*Potamogeton nodosus*, *Rotala ramosior*
60	B. Plampin	June 1999	*Asclepias purpurascens*
61	B. Plampin	1999	*Lycopodium clavatum*
62	B. Plampin	1999 and earlier	*Plantago rugelii*
63	B. Plampin	May 2000	*Zizia aurea*
64	B. Plampin and M. Newgent	5 July 1990	*Sparganium americanum*
65	B. Plampin and M. Newgent	22 July 1991	*Potamogeton pulcher*, *Utricularia purpurea*
66	B. Plampin and M. Newgent	Oct 1999	*Corallorhiza odontorhiza*, *Ligustrum vulgare*
67	B. Plampin, M. Newgent, and G. Wilhelm	22 July 1991	*Cladium mariscoides*
68	B. Plampin and L. Olsen	June 1990	*Panax trifolius*
69	B. Plampin and E. Pitcher	1986	*Hypoxis hirsuta*
70	B. Plampin and A. Putnam	Sept 1990	*Eupatorium sessilifolium*
71	B. Plampin et al.	23 Oct 1995	*Aristida oligantha*
72	K. Quinlan and E. Greiner	12 June 2003	*Sedum acre*
73	K. Quinlan and D. Mickey	13 Nov 2003	*Acer negundo*, *Ulmus pumila*
74	B. Squires	1993	*Corallorhiza maculata*
75	B. Wilhelm and M. Bowles	30 Aug 1988	*Sparganium androcladum*
76	G. Yatskievych and K. Yatskievych	1999	*Botrychium matricariifolium*
77	D. Hamilla	23 Oct 2008	*Dryopteris intermedia*
78	N.B. Pavlovic	3 June 2009	*Conopholis americana*
79	D. Hamilla and B. Plampin	16 Aug 2010	*Scirpus georgianus*
80	S. Leicht-Young and K. Kangas	29 Sept 2010	*Utricularia cornuta*
81	N.B. Pavlovic and S. Leicht-Young	21 Oct 2010	*Quercus bicolor*
82	D. Mason	7 May 2011	*Packera glabella*
83	N.B. Pavlovic	13 July 2011	*Lilium michiganense*

Notes	Source(s)	Date	Species
84	B. Plampin	15 July 2006	*Carex gracilescens*
85	B. Plampin	13 May 2002	*Claytonia virginica*
86	B. Plampin	2 June 1991	*Erigeron pulchellus*
87	B. Plampin	26 Sept 1998	*Fimbristylis autumnalis*
88	B. Plampin	May 2007	*Stylophorum diphyllum*
89	B. Plampin	Apr 2007	*Viola cucullata*
90	L. Olsen and M. Newgent	12 Aug 1993	*Corallorhiza maculata* var. *flavida*
91	B. Plampin	2 June 1989	*Packera paupercula*
92	K. Klick	8 June 1989	*Carex brevior*
93	M. Hacker, C. Satkoski, J. Dollard, and R. Langlie	2011	*Agrimonia gryposepala*, *Agrimonia parviflora*, *Amelanchier laevis*, *Amphicarpaea bracteata*, *Anemone quinquefolia* var. *quinquefolia*, *Angelica atropurpurea*, *Apocynum cannabinum*, *Arisaema dracontium*, *Arisaema triphyllum*, *Boehmeria cylindrica*, *Carex blanda*, *Carex bromoides*, *Carex conoidea*, *Carex crinita* var. *crinita*, *Carex gracilescens*, *Carex grisea*, *Carex lupulina*, *Carex lurida*, *Carex radiata*, *Carex scoparia*, *Carex stipata*, *Carex swanii*, *Cephalanthus occidentalis*, *Circaea canadensis* ssp. *canadensis*, *Clematis virginiana*, *Convolvulus arvensis*, *Cryptotaenia canadensis*, *Doellingeria umbellata* var. *umbellata*, *Elymus virginicus*, *Epilobium coloratum*, *Euonymus alatus*, *Eutrochium maculatum*, *Fraxinus pennsylvanica*, *Galium aparine*, *Galium trifidum*, *Geranium maculatum*, *Glechoma hederacea*, *Glyceria canadensis*, *Ipomoea purpurea*, *Leersia virginica*, *Ligustrum vulgare*, *Lycopus rubellus*, *Lysimachia ciliata*, *Myosotis laxa*, *Nyssa sylvatica*, *Oxalis dillenii*, *Persicaria arifolia*, *Persicaria virginiana*, *Pilea fontana*, *Poa pratensis*, *Poa trivialis*, *Polygonatum biflorum*, *Polygonatum pubescens*, *Ranunculus pensylvanicus*, *Ranunculus recurvatus*, *Rubus allegheniensis*, *Rubus flagellaris*, *Rubus hispidus*, *Rubus occidentalis*, *Rubus pensilvanicus*, *Salix humilis*, *Sanicula odorata*, *Sanicula marilandica*, *Solanum dulcamara*, *Solidago altissima*, *Solidago rugosa*, *Stachys hispida*, *Symphyotrichum lateriflorum*, *Symphyotrichum praealtum*, *Thalictrum dasycarpum*, *Ulmus rubra*, *Viburnum opulus* var. *opulus*, *Viburnum dentatum* var. *lucidum*, *Vitis labrusca*
94	B. Plampin	30 May 2012	*Duchesnea indica*
95	National Park Service	28 Sept 2012	*Taxodium distichum*
96	R. Hedge and E. Stork	27 Sept 2012	*Rhynchospora nitens*
97	M. Hacker	12 Aug 2013	*Rhynchospora nitens*, *Scirpus polyphyllus*
98	M. Hacker	16 Sept 2013	*Spiranthes magnicamporum*

Table 25 (continued). Sources of new species verified and reported from Cowles Dunes.

Notes	Source(s)	Date	Species
99	E. Kjellmark	23 July 1987	*Cuscuta cephalanthi*
100	G. Wilhelm and E. Shimp	7 May 1987	*Lonicera* × *notha*
101	G. Wilhelm	30 July 1989	*Salix cinerea*
102	G. Wilhelm and L. Rericha	13 June 2004	*Scirpus hattorianus*
103	F. Swink	13 June 1946	*Aralia hispida*
104	R. Hiebert	16 July 1982	*Sonchus arvensis* L. ssp. *uliginosus*
105	L. Rericha and G. Wilhelm	20 June 2003	*Vicia villosa*
106	S. Von Oettingen	3 Aug 1982	*Euphorbia davidii*
107	M. Hacker	2011	*Cypripedium* × *andrewsii*
108	N.B. Pavlovic	11 Apr 2014	*Crocus vernus*
109	E. Kjellmark	14 July 1989	*Rosa setigera*
110	S. Erdelac	31 July 2015	*Torilis japonica*
111	S. Namestnik L. Namestnik, and Curtis	15 May 2009	*Carex leptonervia*
112	S. Namestnik	18 July 2016	*Spirodela polyrhiza*
113	Plampin and Hamilla	16 Aug 2007	*Utricularia intermedia*
114	N. Pilla and A. Balzer	25 Sept 2016	*Ammannia robusta*
115	S. Namestnik	29 July 2015	*Epilobium ciliatum*, *Epilobium parviflorum*
116	N. Pilla and N. Dell	11 June 2017	*Potamogeton pusillus*
117	N. Pilla	9 Oct 2015	*Carex laxiculmis*
118	R. Hedge and N. Pilla	9 Sept 2017	*Schoenoplectiella smithii*
119	N. Pilla	7 Aug 2014	*Ipomoea pandurata*
120	N. Pilla and A. Balzer	9 July 2016, 12 July 2018	*Campanula rapunculoides*
121	N. Pilla	11 Oct 2015	*Conoclinium coelestinum*
122	N. Pilla	26 Sept 2015	*Datura stramonium*
123	N. Pilla	8 May 2016, 16 May 2018, Feb 2020	*Euphorbia cyparissias*
124	D. Hamilla	11 Nov 2017	*Sceptridium oneidense*
125	N. Pilla	7 Aug 2015	*Persicaria lapathifolia*
126	N. Pilla	5 June 2017	*Potamogeton illinoensis*
127	N. Pilla	21 Aug 2016	*Potamogeton natans*
128	N. Pilla and A. Balzer	1 Sept 2016	*Potamogeton amplifolius*
129	B. Plampin	1989?	*Schoenoplectiella hallii*
130	N. Pilla	11 June 2016	*Scrophularia lanceolata*
131	N. Pilla	9 Oct 2015	*Solidago sempervirens*
132	Alix	22 July 1989	*Linum striatum*
133	H.R. Bennett	16 Oct 1960	*Linum striatum*
134	A.S. Armstrong	21 May 1965	*Menyanthes trifoliata* var. *trifoliata*
135	N. Pilla and D. Mason	19 Oct 2018	*Wolffia brasiliensis*
136	N.B. Pavlovic (MOR)	2 May 1985	*Antennaria howellii* ssp. *petaloidea*
137	C.C. Deam (IU)	14 Aug 1911, 25 May 1913	*Betula* × *purpusii*
138	H.R. Bennett (IU)	4 July 1962	*Bromus hordeaceus* var. *pseudothomimes*
139	J.A. Nieuwland	1918	*Carex pauciflora*
140	L. Umbach (MOR)	22 June 1912	*Carex stipata* var. *maxima*
141	A.B. Wolcott (F)	13 Sept 1911	*Echinochloa muricata*

Table 25 (continued). Sources of new species verified and reported from Cowles Dunes.

Notes	Source(s)	Date	Species
142	S. von Oettingen (MOR)	30 July 1982, 6 Aug 1982	*Echinochloa muricata* var *microstachya*
143	R. Hiebert	25 Apr 1985	*Scilla sibirica*
144	H.R. Bennett (F)	4 July 1955, 14 Aug 1955	*Juncus anthelatus*
145	H.R. Bennett (F)	11 July 1959	*Juncus anthelatus*
146	H.R. Bennett (F)	18 May 1958	*Lepidium perfoliatum*
147	R. Hiebert	27 Sept 1985	*Lespedeza* × *longifolia*
148	C. Fox (MOR)	1 May 1985	*Packera pseudaurea* var. *semicordata*
149	H.C. Benke (F and IU)	12 Sept 1932	*Persicaria robustior*
150	Nieuwland (ND)	29 May 1913	*Ribes americanum* var. *mesochorum*
151	L. Rericha and G. Wilhelm (MOR)	20 June 2003	*Rubus* × *avipes*
152	N.B. Pavlovic (MOR), D. Otto (MOR)	2 Oct 1984, 24 June 1982	*Schedonorus pratensis*
153	K. Klick (MOR)	9 June 1988	*Carex leptalea*
154	N. Pilla	16 Sept 2019	*Eleocharis quadrangulata*
155	N. Pilla	27 Sept 2019	*Hibiscus laevis*
156	K. Dritz	15 June 1980	*Schoenoplectus pungens*
157	H.R. Bennett	26 Aug 1961	*Amelanchier spicata*
158	C.C. Deam	20 Sept 1927	*Symphyotrichum lanceolatum* var. *interior*
159	Nieuwland	n.d.	*Veronica americana*

Of this unit's special flora, 150 species are confirmed, 28 are new, 36 are reported, and 11 are extirpated (Table 26). Cowles Dunes A harbors 173 special flora. One hundred and twenty-one special flora are found in Cowles Dunes B. Cowles Dunes C, D, and E harbor one, 21, and 29 special flora, respectively.

Newly added species to the special flora of Cowles Dunes, by additions to this category and new discoveries, include *Aletris farinosa*, *Asclepias purpurascens*, *Asclepias viridiflora*, *Botrychium matricariifolium*, *Callitriche heterophylla*, *Carex bebbii*, *C. leptalea*, *C. pauciflora*, *C. prairea*, *C. siccata*, *C. stipata maxima*, *Celastrus scandens*, *Conopholis americana*, *Cyperus houghtonii*, *Desmodium cuspidatum*, *Eleocharis flavescens olivacea*, *E. geniculata*, *E. quandrangulata*, *E. tenuis verrucosa*, *Epilobium ciliatum*, *E. strictum*, *Erigeron pulchellus*, *Euthamia caroliniana*, *Fimbristylis puberula*, *Fraxinus americana*, *F. nigra*, *F. pennsylvanica*, *Helianthus hirsutus*, *Ipomoea pandurata*, *Juncus militaris*, *Larix laricina*, *Menyanthes trifoliata*, *Mimulus alatus*, *Oenothera perennis*, *Persicaria robustior*, *Phegopteris hexagonoptera*, *Platanthera lacera*, *Potamogeton bicupulatus*, *P. pulcher*, *P. pusillus*, *Rhynchospora nitens*, *R. scirpoides*, *Rubus setosus*, *Rudbeckia subtomentosa*, *Sceptridium oneidense*, *Schoenoplectiella hallii*, *S. smithii*, *Schizachyrium littorale*, *Scirpus georgianus*, *S. hattorianus*, *Spiranthes magnicamporum*, *S. ovalis erostellata*, *Spirodela polyrhiza*, and *Utricularia cornuta*.

About 15% of the special flora now known from the Cowles Dunes are unknown from any other INDU unit. These species include *Betula alleghaniensis*, *Betula pumila*, *Buchnera americana*, *Carex atlantica* ssp. *capillacea*, *Corallorhiza maculata* forma *flavida*, *Cypripedium candidum*, *Cypripedium reginae*, *Dichanthelium dichotomum* ssp. *lucidum*, *Eleocharis rostellata*, *Eriocaulon aquaticum*, *Fimbristylis puberula*, *Fuirena pumila*, *Galium labradoricum*, *Galium trifidum*, *Juncus articulatus*, *Oenothera fruticosa* ssp. *tetragona*, *Panicum verrucosum*, *Rhamnus alnifolia*, *Rhynchospora nitens*, *Salix candida*, *Scirpus polyphyllus*, *Sparganium americanum*, and *Spiranthes lacera*.

Floristic summary

Cowles Dunes is the richest unit of Indiana Dunes National Park, with 985

taxa comprising 818 native taxa, 24 adventive taxa, and 143 exotic taxa. There are 788 native species, 24 adventive, and 139 exotic species (Table 26). Of the 818 native taxa, 788 are native species, 24 are varieties, and six are hybrids. Of the 134 state-listed species from Cowles Dunes, 33 are endangered, 62 are threatened, 34 are watch list, and five are extirpated. The 788 native species in Cowles Dunes is more than half of all the native species found in INDU, and Cowles Dunes has the highest floristic quality of any park unit (188).

Twenty-five new species have been discovered in Cowles Dunes since 1990: *Ammannia robusta*, *Aristida oligantha*, *Asclepias exaltata*, *A. hirtella*, *A. purpurascens*, *Botrychium matricariifolium*, *Carex umbellata*, *Conopholis americana*, *Corallorhiza maculata* forma *flavida*, *Cornus alternifolia*, *Cypripedium* × *andrewsii*, *Cystopteris protrusa*, *Gratiola neglecta*, *Helenium autumnale*, *Juncus militaris*, *Parietaria pensylvanica*, *Potamogeton nodosus*, *P. pulcher*, *Rhynchospora nitens*, *Rumex verticillatus*, *Schoenoplectiella smithii*, *Scirpus georgianus*, *Sparganium androcladum*, *S. emersum*, *S. eurycarpum*, and *Utricularia cornuta*.

The only newly adventive species in the Cowles Dunes Unit is *Packera glabella*. New exotic species include *Forsythia suspensa*, *Hieracium piloselloides*, *Kolkwitzia amabilis*, *Ligustrum vulgare*, *Origanum vulgare*, *Sedum acre*, *Syringa vulgaris*, and *Verbascum blattaria*. Older collections of waifs include *Persicaria robustior* (Port Chester) that Pavlovic has assigned to subunit E due to lack of habitat information.

Wilhelm and Rericha (2016) claimed the discovery of a new species separated from *Hypericum kalmianum* L. that is called *Hypericum swinkianum* Wilhelm & Rericha. This species is distinguished from the former species by the greater leaf length, leaf width, sepal length of central flower, and the number of flowers per dichasium. A Lyon specimen collected in 1922 from "dunes near Mineral Springs" may have been collected in Cowles Dunes. The specimen is labeled as a paratype specimen by Wilhelm and Rericha (2016). The authors will not include this species in the flora until its validity and occurrence are verified. Perhaps because of the old nature of the Lyon collection, Wilhelm and Rericha (2017) do

Table 26. Summary of floristic statistics by subunit for Cowles Dunes. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

	Subunit					
Category	*A*	*B*	*C*	*D*	*E*	Entire Unit
Area (ha/acres)	397/980	242/597	34/84	18/44	10/26	801/1,731
Special flora total	174	119	2	23	29	225
Confirmed	104	78	2	17	23	150
New	26	27	0	4	3	28
Reported	38	10	0	2	3	36
Extirpated	6	4	0	0	0	11
Total taxa, FNA/ITIS	722	551	97	173	272	985
Total native taxa, FNA/ITIS	637	507	80	169	217	818
Native species, FNA/ITIS	617	487	78	167	213	788
Native variety, FNA/ITIS	16	17	1	2	2	24
Native hybrid, FNA/ITIS	4	3	1	0	2	6
Total adventive taxa, FNA/ITIS	11	5	2	0	6	24
Total adventive species, FNA/ITIS	11	5	2	0	6	24
Total adventive variety, FNA/ITIS	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0	0	0
Total exotic taxa, FNA/ITIS	74	39	15	4	49	143
Total exotic species, FNA/ITIS	72	38	15	3	47	139
Total exotic variety, FNA/ITIS	0	0	0	1	1	1
Total exotic hybrid, FNA/ITIS	2	1	0	0	1	3
Total Indiana-listed	108	57	1	7	15	134
Endangered	23	10	0	0	5	33
Threatened	51	27	0	4	4	62
Rare	0	0	0	0	0	0
Watch List	29	20	1	3	6	34
Extirpated	5	0	0	0	0	5
Sum CC	4,225	3,337	342	1,031	1,158	5,411
Sum CC adventive & invasive	4,145	3,276	325	1,027	1,105	5,254
Mean CoC	7	6	4	6	5	7
Mean CoC with adventive and invasive	6	6	3	6	4	5
FQI	166	147	38	79	78	188
FQI with adventive and invasive	154	140	33	78	67	167

not include this species in Porter County in their new flora.

Conservation issues

Cowles Dunes contains seven of the eleven general community types of INDU; no other survey unit is that phytosociologically diverse (see Figure 18). These communities include aquatic communities, an extensive foredune complex, an area of dune complex, a marsh complex in which locally there are some affinities to the panne, a mesophytic prairie, an extensive and varied savanna complex, and a large swamp complex. The unit also includes the NIPSCO right-of-way, which is a mosaic of marsh complex, mesic prairie, and many areas of degraded habitat.

No other natural area in the park—or, for that matter, the Chicago Region—is so rich or significant in flora. There are, for example, about 1,550 native vascular plant taxa known from the 22-county Chicago Region, a region which occupies about 2,974,439 hectares (7,350,000 acres) (Wilhelm, pers. comm. with Pavlovic, 2018), while 791 native vascular plant taxa have been recorded from the Cowles Dunes, an area of 701 hectares (1,731 acres) of natural vegetation. Taken together, Cowles Dunes and the Indiana Dunes State Park comprise some of the most significant contiguous natural area in the Midwest. The Cowles Dunes Unit owes its apparently unique floristic wealth in part to its topographic, physiographic, and hydrological diversity.

Of the 801 hectares (1,731 acres) comprising the Cowles Dunes, about 35% has been seriously disturbed. Much of this disturbed area occupies what was once the floristically rich Cowles Bog wetland complex and interdunal ponds to the west, about which Cook and Jackson (1978) have written extensively in regard to the degree to which it has been drained, pastured, and hayed. Their discussion of this west portion of the Great Marsh and the Bailly area provides comprehensive information on presettlement and subsequent anthropogenic disturbances.

Cowles Dunes, along with the Dunes State Park, contains the largest extent of the foredune complex communities remaining in Indiana. The portion of this unit west of the town of Dune Acres is particularly diverse, both visually and floristically, as are the adjacent and related dune complex areas (see Figure 18). Moreover, only the west portion of Cowles Dunes A and Miller dunes have active foredune formation processes, while all other areas are impacted by shoreline erosion or chronic human trampling or both. The Bailly power plant and ArcelorMittal (now Cleveland-Cliffs Inc.) complex pier that extends into the lake captures the littoral drift sand coming from the east, thus providing sand for dune formation. With the exceptions of the foredune complex and the swamp complex (see also notes under *Betula papyrifera*), all of the lands in the savanna complex in Cowles Dunes A and B that generate herbaceous and graminoid fuels in the fall of the year could be managed with controlled burns. Since 1994, the dunes north of the Cowles Bog wetland complex have been burned by park staff five times. The understory that is dominated by *Carex pensylvanica* and *Vaccinium pallidum* could increase in diversity with more fire and mechanical thinning and *in situ* dispersal from refugia, although active reintroduction may be needed in some portions.

Cowles Dunes A

Subunit A includes all the national park area west of Mineral Springs Road and north of the CSSSBR traction line, an area of about 397 hectares (980 acres). About 20% of Cowles Dunes A is mapped as highly disturbed; this disturbed section includes the Great Marsh area south of the ditch that was used to drain Little Lake (Cook and Jackson 1978, pages 10 and 11). Little Lake itself, and the one-time cranberry marsh to the south (Watts 1957), now filled with fly ash or hybrid cattail (*Typha* × *glauca*) and common reed (*Phragmites australis* ssp. *australis*), were mapped as natural vegetation even though they have been drained. The recovery of Little Lake is substantial given that the wetland was partially drained and converted to a golf course in the 1920s and 1930s (Cook and Jackson 1978). Little Lake harbors considerable plant diversity in part

because of its proximity to the cranberry marsh to the south and to the former Goose Lake to the southwest.

On the south side of the Cowles Bog wetland complex, in Cowles Dunes A and immediately west of Mineral Springs Road, was a zone of red maple-dominated woods that grew up after the area was ditched and then farming was attempted (Pavlovic, personal observation). The red maples grew up after the farm was abandoned and created a community devoid of plant diversity in the understory. Examination of the Government Land Survey records from 1832 reveal that much of the red maple woods was marsh and wet prairie and that the toe of the southward uplands was transitional savanna with white, pin, and swamp white oak. This 25-acre wetland complex was thinned of maples and understory spicebush by the NPS in 2014 to restore the marsh/wet prairie mosaic (Dan Mason, personal communication with Pavlovic). Not only has there been a successful recovery of vegetation and spontaneous reappearance of lost species, but now visitors can see the crests of the high dunes to the north beyond the Cowles Bog wetland complex (Pavlovic, personal observation). To the east, in the central part of the Cowles Bog wetland complex in Cowles Dunes B is a rectangular shaped woods mapped as swamp complex that extends far north and outlines the some of ditching and attempted agriculture. A portion of this area just north of former Wagner Road terminus was restored by NPS in the early 2010s.

Overall, 617 native floristic elements have been documented from Cowles Dunes A; their mean C is 6.6 and they represent an FQI of 166! It is possible that a few reports for subunit A were based upon records from Unit B. This possibility exists because the authors have interpreted reports referencing locations in terms of "Mineral Springs" as referring to the area west of Mineral Springs Road. Reports from the eastern side of Mineral Springs Road were usually referenced in relation to "Port Chester." Nevertheless, it is likely that the term "Mineral Springs" referred to Cowles Dunes B in a few instances.

Cowles Dunes B

Cowles Dunes B includes all of the national park area east of Mineral Springs Road and north of the CSSSBR traction line (excluding the area shown as subunit D in Figure 18). This subunit includes 242 hectares (597 acres). Nearly 45% of subunit B is mapped as highly disturbed. In terms of overall importance, Cowles Dunes B currently stands as virtually equivalent to Cowles Dunes A in floristic significance. Like Cowles Bog in subunit A, Howes Prairie in subunit B contributes greatly to the floral richness.

This subunit was subject to fire suppression after the construction of the Bethlehem Steel Mill in 1962–1963), which stopped accidental fires set along the main railroad line (Conklin et al. 1992). Nevertheless, in April 1964, a wildfire burned across this landscape, as documented in an aerial photograph (Kenneth Cole, INDU research botanist, and Pavlovic, pers. obs., 1988). The image showed that the fire started just to the west of the Dune Acres train station, the southwest winds blew it north and to the east until it converged to a point where it jumped Mineral Springs Road and burned across Cowles Dunes B into Howes Prairie (Taylor 1990). This was the last wildfire in subunit B until the first prescribed burn in Howes Prairie on 29 March 1986.

On the northeast corner of Cowles Dunes B lies a narrow strip of land between the Dunes State Park on the east and the "Porter Beach" portion of the Town of Porter on the west (see Figure 18). This area would not seem important except for two facts: the northeast corner of the site was part of the location of the 1916 Dunes Pageant (Herbert Read of Save the Dunes, pers. comm. with Pavlovic, 2017) (Figure 19), and Pitcher's thistle occurs in the southeast portion where there are high dunes. Overall, 489 native species have been documented from Cowles Dunes B; their Mean CoC is 6.4 and they represent an FQI of 147.

Cowles Dunes C

Cowles Dunes C consists of the 34-hectare (84-acre) tract of wooded area between U.S. 12 and the CSSSBR traction line (see Figure 18). According to Wilhelm (1990), "I mapped

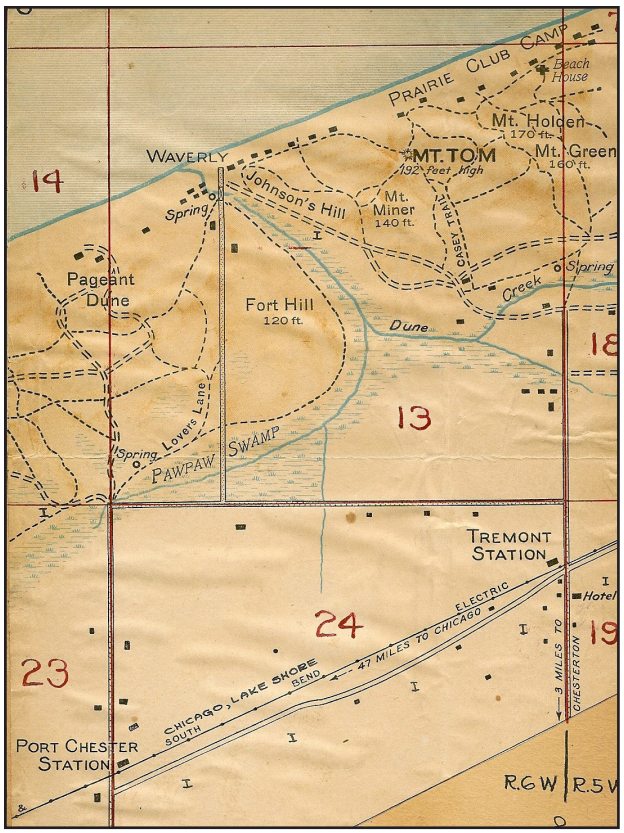


Figure 19. Portion of Norman Bergendahl's annotated copy of the 1922 Goodman map showing the future entrance of the Dunes State Park from Tremont Road (north of Tremont Station; middle right of map). The Pageant Dune is shown at the west boundary of Section 13 that would become the west boundary of the Dunes State Park. The former name of Mt. Jackson, named for Governor Edward Jackson who signed the state park authorization bill in 1925, is shown as Mt. Green. This map is currently in possession of the senior author.

it as Savanna Complex; but it is a mesophytic phase of savanna complex which in recent years has taken on the superficial aspect of mesophytic forest as described by Wilhelm (1987)." In 2013, the discovery of a xeric oak savanna (*Quercus velutina*) to wet-mesic oak savanna (*Q. alba*, *Q. palustris*, and *Q. bicolor*) to marsh complex from the Calumet dune into the Cowles Bog wetland complex, based on the 1832 Government Land Office survey notes, confirms Wilhelm's conjecture that this area was formerly savanna complex (Pavlovic, personal observation). The absence of fire in other locations has encouraged the development of such trees as sugar maple (*Acer saccharum*) and beech (*Fagus grandifolia*). The successful invasion of both trees could mean that in the future their shade may make conditions hostile to the few remaining savanna species. The relatively low mean CoC of 4.2 and FQI of 38 suggest that this trend may be quite advanced. Cowles Dunes C is not "succeeding" to mesophytic forest in the holistic sense of the term; rather, it is becoming a mesophytic overstory with a depauperate understory.

Cowles Dunes D

This 18 hectares (44 acres) of intact hydromesophytic forest is an island surrounded by subunit B in its southeastern quadrant. Wilhelm visited this subunit only once, on 7 May 1987, but turned up 124 native species, including several special flora. The authors record 167 native species, with three exotic species. The mean CoC is 6 and FQI is 79.

Cowles Dunes E

Subunit E is the 10 hectares (26 acres) of NIPSCO right-of-way, mostly between Mineral Springs Road and Waverly Road. While this area has native vegetation, including several special flora that grow nowhere else in the Cowles Dunes, it has been slowly degraded by heavy equipment used by NIPSCO contractors to cut and apply herbicide on woody plants, and by the invasion of hybrid cattail and phragmites. This subunit is a mixture of mesophytic prairie, fen, hydromesophytic swamp, and bog species reflecting the complex mosaic of communities resulting from topographic and hydrological variation. The authors know of at least 213 native species, with a mean CoC of 5.24. The area north of Wagner Road, within the transition of B and E and including an abandoned home site, was cleared of red maple and other trees by Dan Mason in the winter of 2014–2015. During that same time Dan transplanted *Juncus articulatus* from the Calumet Bike Trail to this location.

The number of special flora, native species richness, and FQI rank in the same order as usual, A > B > E > D > C. In the words of Wilhelm (1990), "Cowles Dunes is a leviathan among natural areas." We can testify to the existence of 788 species altogether. Their mean CoC is 6.5 and the area has an FQI of 188. This 801-hectare

(1,731-acre) tract represents a world-class natural area based on its floristic quality.

Unit 8: Indiana Dunes State Park

During the five years that I have visited the region I have been impressed with the fact that its flora has undergone a few changes and is destined to undergo, many more in the future. These changes are dependent upon the destruction of the original flora by fire, clearing, artificial drainage, and that more or less natural drainage which is slowly occurring in the lake region. Pasturage is another factor aiding in the destruction of the original flora. Another factor changing it is the introduction of foreign plants, mainly ordinary weeds of old-world origin which are ubiquitous, and in part, native plants. The newcomers follow in along the roadways leading from the Dunes Highway to Lake Michigan and along the roads and trails that traverse the more frequented portions of the region.

—Marcus Lyon (1927)

The Indiana Dunes State Park occupies about 963 hectares (2,386 acres, or 2,050 acres after excluding roads) north of Tremont between the towns of Dune Acres and Beverly Shores (Figure 20). It is the oldest protected unit in INDU, being established in 1925 (Cottman 1930). Only about 15% of the state park has been disturbed to the point where special flora are no longer likely (Figure 20). The NIPSCO right-of-way north of the CSSSBR is mapped as subunit B and is 18 hectares (46 acres) in area. The Dunes State Park contains foredune complex (blowouts), dune complex (plus mesophytic pockets), swamp complex, marsh complex, pannes, aquatic habitats, and bottomland.

According to previous reports, Wilhelm (1990) spent less time in the state park compared to the other areas of INDU; thus, he depended largely upon the sleuthing of others to turn up hidden or cryptic floral surprises. He devoted a couple of hours to surveying the state park on 28 June 1979, when he was accompanied by John Bacone and Norman Henderson; in May of 1986, he surveyed the woody plants of this unit with Floyd Swink and Ross Clark; he surveyed the prairie along Trail 3 with Pavlovic on 1 July 1987. On 29 April 1987, with Robert F. Betz and Eric Kjellmark, and on 11 August 1987 with Elizabeth Shimp, Wilhelm surveyed portions of the swamp complex west of Route 49 and west of Kemil Road. On 2 October 1989, Linda Wetstein and Wilhelm spent a half day in the park and added numerous new records, including *Corallorhiza odontorhiza* and *Bidens discoidea*. The NIPSCO right-of-way was surveyed by Wilhelm and Linda Masters on 10 August 1994. Individuals that have assisted with surveys over the years include Norman Bergendahl, Keith Board, Dianne Butkovich, Ken Dritz, Ray Grow, Marilyn Halperin, Noreen Hannon, Rita Hassert, Emma Pitcher, Plampin, and Valdemar Schwarz.

On 25 May 1989, Wilhelm joined a team of botanists from the Indiana Division of Nature Preserves led by Michael Homoya that included Lee Casebere, Cloyce Hedge, Sheryl LeBlanc, Tom Post, and Art Spingarn. Divided into four teams, they combed the park eastward along Trail 10 and northward through the dune complex, and returned through the hydromesophytic swamp (Wilhelm 1990). They discovered numerous individuals and populations of special flora, including *Carex laxiculmis*, *C. seorsa*, *Chrysosplenium americanum*, *Cypripedium parviflorum* var. *pubescens*, *Juniperus communis*, *Oryzopsis asperifolia*, *Poa alsodes*, *Polygala paucifolia*, *Pyrola elliptica*, and *P. americana*, to name just a few species. Wilhelm (1990) noted that at no time in the recorded floristic history of Indiana Dunes State Park were so many gathered to explore the botanical treasures of this magnificent area.

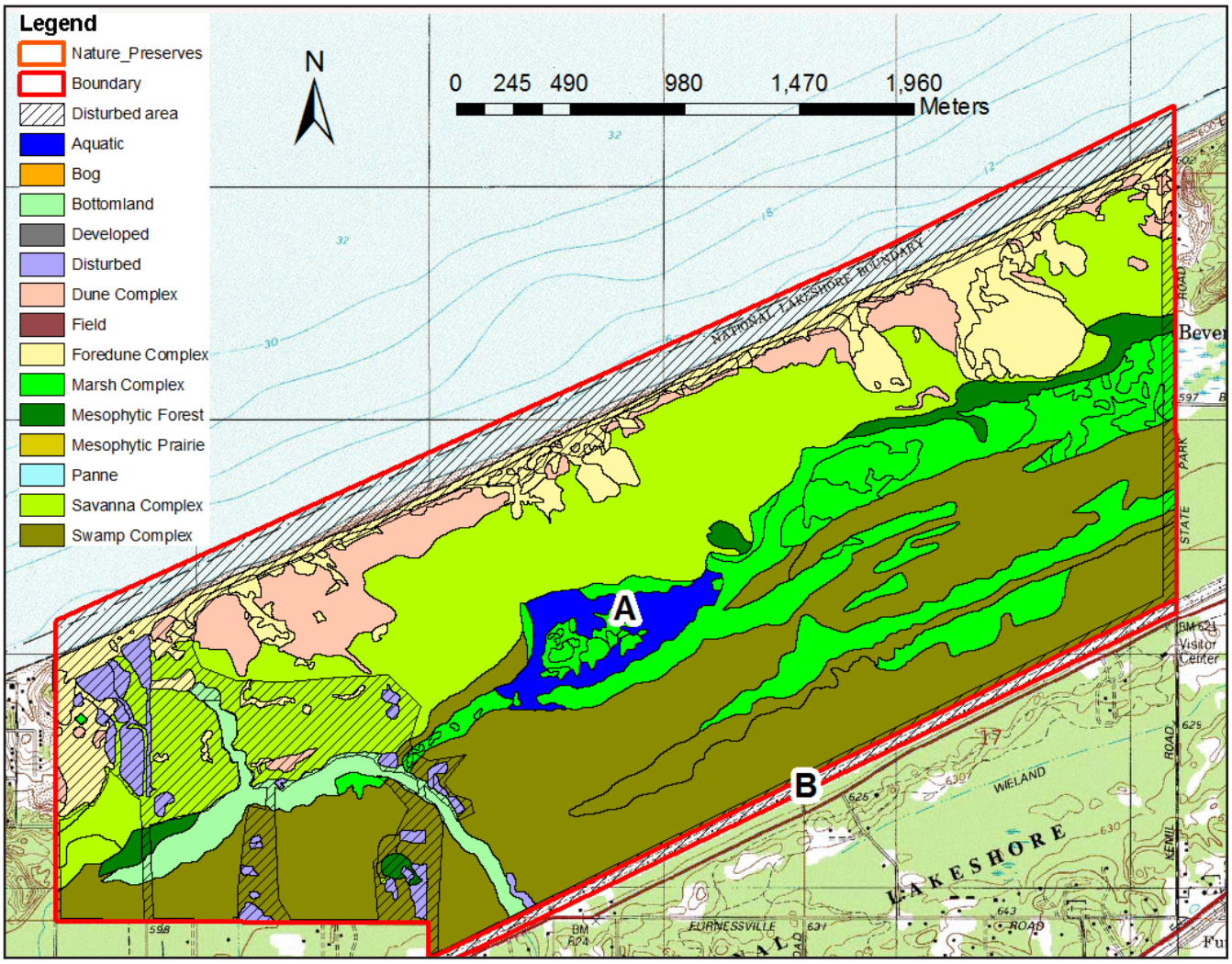


Figure 20. Vegetation of Indiana Dunes State Park Unit. Letters indicate subunits. Cross-hatching indicates disturbed areas.

Several authors have dealt specifically with the flora of the Dunes State Park. Lyon (1927, 1930) compiled a comprehensive list of the vascular plants of "Dunes State Park and Vicinity." Peattie (1930), in his *Flora of the Indiana Dunes*, made numerous references to Indiana Dunes State Park. Both Pepoon (1927) and Swink and Wilhelm (1979) made frequent references to the various plants of this unit in their regional treatments of the Chicago Region flora. Laughlin (1953) compiled a comprehensive catalogue of the trees and shrubs of Indiana Dunes State Park. Haney (1986) sampled the woody vegetation of the Dunes State Park.

During the first survey of this unit in 1979, Wilhelm (1980) observed 278 native floristic elements and gleaned an additional 210 reports from reliable sources. Ten years later, he had seen 432 elements and was aware of an additional 136 (Wilhelm 1990). Now we record 549 verified and 116 reliably reported!

Meadow parsnip (*Thaspium trifoliatum* (L.) A. Gray) is reported from the Dunes State Park as growing in "edges subdunal woods, Tremont" by Lyon (1927), although this species is easily confused with *Zizia aurea* (L.) W. D. J. Koch (a species that Lyon reports from "subdunal woods, wooded dune, Port Chester"). Wilhelm and Rericha (2017) indicate that *Thaspium chapmanii* (J. M. Coult. & Rose) Small, formerly *Thaspium barbinode* (Michx.) Nutt., is reported from Porter County but that *T. trifoliatum* is not. Since there are no specimens collected from the Dunes region, the authors have removed this species from the flora list until it is rediscovered.

Wilhelm (1990) recorded the presence of

Amelanchier humilis in the Dunes State Park, especially in the east end. Wilhelm and Rericha (2017) now note that *A. humilis* does not grow in northwest Indiana, leaving the plants in the state park in question. It is possible that these shrubs could be *A. spicata*, a similar shrubby species. Until a field identification and specimen has been secured, the authors have deleted *A. humilis* from the flora despite it being a state endangered species. According to Wilhelm (1990),

> *Laughlin (1953) reported that two woody species, known from the park, had become extinct in his time. One was Bladdernut (*Staphylea trifolia*), about which he wrote: "In 1938 W.F. Durno showed me a colony of Bladdernuts west of Tremont Road and south of the creek. They seemed to be suffering from some sort of blight or fungus. I have seen no specimens of the species since 1941, and a search of the locality in 1951 failed to reveal any." Later, Laughlin (1955) reported that he had learned of numerous Bladdernuts a short distance west of Tremont Road and south of the east fork of Dunes Creek. In 1987, Keith Board noted that he found a healthy population in the "exact" location described by Laughlin.*

There has been a controversy surrounding the nativity and persistence of a second woody species, American chestnut (*Castanea dentata*) at the Indiana Dunes State Park. According to Wilhelm (1990), Laughlin (1953) wrote:

> *There was a small colony of chestnuts on the east bank of the east fork of Dunes Creek about 150 feet north of the railroad. In 1942 the largest tree had a diameter of 28'* [28 feet], *a circumference of 7'9"* [seven feet, nine inches] *and a height of 54'* [54 feet]. *In 1944 this tree was found to be dead from the Asiatic chestnut blight. Another tree 16'* [16 feet] *in diameter continued to live until 1947, when it succumbed. Feeble second-generation sprouts from the bases of two of the dead trunks persisted until the winter of 1951–52, when the last of the sprouts died.*

Wilhelm continues,

> *Laughlin (1955) amended his conclusions by reporting that there was one sapling chestnut with a diameter of 3 inches and height of about 20 feet a few feet west of the east fork of Dunes Creek and a short distance northwest of the old colony; he noted that it was a perfectly healthy tree. Swink and Wilhelm (1979), in reference to Laughlin's comment, add:*
>
> *"The senior author saw a different Chestnut sapling in the same park in 1950; it was seen south of Trail 2 in a thicket of* Sassafras albidum. *Since Deam cites chestnut only in southern Indiana, it is questionable that any specimens found in our counties are to be considered native."*

Furthermore, Wilhelm (1990) wrote that in 1988, Norman Bergendahl "wrote to Floyd Swink and enclosed a map which described the location of a Chestnut 2 feet in diameter, 68 feet west of Dunes Creek, 45 feet north of the cyclone fence which marks the park boundary." Wilhelm mentions also that "... in the 1940s, there were about a dozen planted chestnut trees in a north & south row about 100 feet east of Dunes Creek," perhaps 80 feet north of the cyclone fence. These latter trees may have been the trees that Floyd saw in 1950. The following remarks of Bergendahl are of great interest:

> *I am fascinated by an American Chestnut tree at Indiana Dunes State Park. It is a vigorous tree 2'-0* [two feet] *dia. B.H. and is at least 50'-0* [50 feet] *high. Inasmuch as this tree has existed for probably 40 years or more since the advent of the blight, it would appear to be blight resistant. October 17* [1988], *a visit to the tree was made with the intention of obtaining some nuts. I did not find any as the squirrels beat me to it. However, while looking for nuts, 26 seedling trees were found. There are probably more that escaped my eye, as the understory is dense with spicebush. In 1945, after a hike on the Appalachian Trail, I planted many nuts at the park. The nuts that were planted came from basal shoots from tall gray trunks of blight affected trees.*

According to Wilhelm (1990),

> *A 28'* [28-foot] *chestnut, recorded in 1942, began growing prior to the plantings of Norman Bergendahl, but does not seem likely to have preceded settlement (Cook and Jackson 1978). Certainly, the trees noted by Laughlin (1955) may have been planted. We have several records of large Chestnuts from similar habitats in nearby Berrien County, Michigan. If American chestnut was native here, then it should certainly be a cardinal element of special flora.*

However, 1938 aerial photographs reveal that this portion of the park was disturbed by residential and perhaps pastoral human activity, making the presence of this species suspect and it more likely may have been planted (Pavlovic, personal observation, 1998). Since Tremont Road was formerly the main entrance to the Dunes State Park, prior to the construction of the Pavilion, the scale of disturbance at that time could explain the presence of American Chestnut (Cottman 1930). Plampin notes that Jean Fultz, now deceased, told of her grandparents farming there. Plampin and Newgent found *Castanea* growing in a former homesite south of U.S. 12 and east of Tremont Road west of Dunes Creek.

Another Appalachian species, *Rubus odoratus*, is now known to have been planted under the white pines off Trail 10. In 1989, Plampin noted that *Clintonia borealis*, bluebead, also had been planted in the Pinery (Wilhelm 1990). Wilhelm (1990) states that Ken Dritz reported that bee balm (*Monarda didyma* L.) had been planted south of the boardwalk near the east end of Trail 10. The authors presume that this was planted by Norman Bergendahl.

Planting rare plants in natural areas may be well-intentioned, but it also can confuse our understanding of the composition of natural areas. Diversity of plant communities, however, is limited by dispersal and can be augmented by adding species (Tilman 1993, 1997). Wilhelm (1990) wrote,

> *The only location in the region, for example, where* Polygala paucifolia *grows natively is in the dune complex of Indiana Dunes State Park—not Cowles Bog, or Keiser, or anywhere else. Just exactly why, no one knows. But its singular presence there should point up the imperative need to safeguard and manage well the dune complex of the park itself, for clearly there is more to that special place than our inchoate understandings can comprehend.*

If, however, preserving these locally rare species is a goal, introduction of new populations would be important for mitigating environmental and genetic stochasticity for increasing viability (Maunder 1992).

Dunes Nature Preserve

Dunes Nature Preserve, an area north and east of the campground and nature center, and east of Wilson Shelter, comprises 68% (644 hectares, 1,591 acres) of the Dunes State Park (subunit A). It is a floristic stronghold second only to Cowles Dunes. As with Cowles Dunes, the local diversity is proportional to the habitat diversity, which includes foredunes, secondary dunes, jack pine forests, mesophytic pockets, oak woodland and forest, marsh, fens, hydromesophytic forest, swamp forest, mesic prairie, floodplain forest, and pannes.

Dunes Prairie Nature Preserve

Dunes Prairie Nature Preserve is found in the southwest corner of the state park in the area that is mapped as savanna complex, a small subset of subunit A (Indiana Division of Nature Preserves 2021). Pavlovic visited Trail 3 on 22 June 1987 with Sarah Pavlovic. After entry near the original guard station and ascent to the high dune, and after seeing the parabolic dune sloping to a valley to the west he exclaimed, "Oh my God, there is a prairie down here." Upon running down slope, they were greeted with the presence of dry mesic prairie plants! The next day, Marcy DeMauro visited the site with Pavlovic. Pavlovic revisited the prairie with Marcy DeMauro, Marlin Bowles, and Gerould Wilhelm on 19 July 1987. In 1990, Wilhelm named this prairie "Pavlovic Prairie" (Wilhelm 1990), but it is now dedicated as the Dunes Prairie Nature Preserve (24 hectares, 58 acres). Because

the prairie is closer to Lake Michigan than Howes Prairie to the west, it is drier and lacks mesophytic species such as *Baptisia lactea*, *Eryngium yuccifolium*, and *Liatris spicata*. Representative species of this prairie include *Aristida tuberculosa*, *Arnoglossum atriplicifolium*, *Asclepias verticillata*, *Coreopsis tripteris*, *Hesperostipa spartea*, *Lespedeza hirta*, *Liatris cylindracea*, *Lupinus perennis, Oenothera clelandii*, *Opuntia cespitosa*, *Pedicularis canadensis*, *Polygala polygama*, *Schizachyrium scoparium*, *Selaginella rupestris*, and *Sorghastrum nutans*.

Combining what was seen on 19 July with recordings from Pavlovic in 1987, there are 113 known species, with a mean CoC of 6.24 and an FQI of 66 (Wilhelm 1990). Indiana Division of Nature Preserves personnel conducted prescribed burns there in 2003 and 2007, and in 2007 initiated cutting and herbiciding of woody plants to open the canopy (John Ervin, former employee of the Division of Nature Preserves, personal communication with Pavlovic, 2008). These burns, including a subsequent burn in 2009, have contributed to the restoration of the prairie as well as the savanna and flatwoods in this newer nature preserve. The Division of Nature Preserves removed cut material prior to burning rather than leaving it in place, eliminating fuel that could have sterilized the soil and killed savanna plants that have survived despite low light levels resulting from fire suppression and subsequent woody plant invasion (Pavlovic, personal observation). These measures could benefit the only diverse mesophytic prairie in the state park. A complete flora of the Dunes State Park is provided in Table 27.

Table 27. Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Acalypha rhomboidea Raf.	x	–	X	0
Acer negundo L.	x	–	X	0
Acer platanoides L.	x	–	X	*
Acer rubrum L.	x	x	X	7
Acer saccharinum L.	R	–	R	0
Acer saccharum Marshall	x	–	X	3
Achillea millefolium L.	x	x	X	*
SF***Acorus americanus*** (Raf.) Raf. (*Acorus calamus* L.)	R	–	R	7
Actaea pachypoda Elliott	x	–	X	7
SF***Adiantum pedatum*** L.	x	–	X	10
Agalinis purpurea (L.) Pennell	–	x	X	6
Agalinis tenuifolia (Vahl) Raf.	50	–	R	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	x	–	X	4
Agrimonia gryposepala Wallr.	x	–	X	2
Agrimonia parviflora Aiton	x	–	X	7
Agrimonia pubescens Wallr.	x	–	X	5

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Agrostis gigantea Roth (*Agrostis alba* L.)	–	x	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	x	X	1
Agrostis perennans (Walter) Tuck.	R	–	R	3
Agrostis stolonifera L.	62	–	N	2
Ailanthus altissimus (Mill.) Swingle	R 50	x	X	*
SF***Aletris farinosa*** L.	R	–	R	10
Alisma subcordatum Raf.	x	x	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	x	–	X	*
Allium canadense L. var. *canadense* (*Allium canadense* L.)	x	–	X	2
Allium tricoccum Aiton	x	–	X	7
SF***Alnus incana*** (L.) Moench ssp. ***rugosa*** (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng.)	x	x	X	8
Amaranthus albus L.	78	–	N	ad
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	x	X	0
Amelanchier arborea (F. Michx.) Fernald	x	–	X	8
Amelanchier laevis Wiegand	x	–	X	8
SF***Ammophila breviligulata*** Fernald	x	–	X	7
Amphicarpaea bracteata (L.) Fernald	x	–	X	4
Andropogon gerardii Vitman	x	–	X	5
Andropogon virginicus L.	–	x	X	ad
Anemone acutiloba (DC.) G. Lawson (*Hepatica acutiloba* DC.)	x	–	X	6
Anemone americana (DC.) H. Hara (*Hepatica americana* (DC.) Ker Gawl.)	x	–	X	9
Anemone canadensis L.	R 50	–	R	4
Anemone cylindrica A. Gray	x	–	X	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	x	–	X	7
Anemone virginiana L. var. *virginiana* (*Anemone virginiana* L.)	x	–	X	5
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	–	X	3
Apios americana Medik.	x	x	X	7
SF***Aplectrum hyemale*** (Muhl. ex Willd.) Torr.	x	–	X	10
Apocynum androsaemifolium L.	x	–	X	5
Apocynum cannabinum L.	R	–	R	4
Aquilegia canadensis L.	X	–	X	6
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz	x	–	X	5
Aralia nudicaulis L.	x	–	X	8
SF***Aralia racemosa*** L.	R	–	R	10
Arctium minus (Hill) Bernhardi	R	–	R	*

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Arctostaphylos uva-ursi*** (L.) Spreng.	x	–	X	10
Arenaria serpyllifolia L.	x	–	X	*
Arisaema dracontium (L.) Schott	R	–	R	7
Arisaema triphyllum (L.) Schott	x	–	X	4
Aristida purpurascens Poir.	R	–	R	5
SF***Aristida tuberculosa*** Nutt.	R	–	R	9
Arnoglossum atriplicifolium (L.) H. Rob.	51, 53	–	N	8
Artemisia vulgaris L.	R	–	R	*
Asarum canadense L.	x	–	X	7
Asclepias exaltata L.	x	–	X	9
Asclepias incarnata L.	x	x	X	4
SF***Asclepias purpurascens*** L.	R	–	R	8
Asclepias syriaca L.	x	x	X	0
Asclepias tuberosa L; also have ssp. *interior*	x	x	X	7
Asclepias verticillata L.	x	–	X	1
SF***Asclepias viridiflora*** Raf.	R	–	R	10
Asimina triloba (L.) Dunal	x	–	X	9
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg	x	–	X	4
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson	x	x	X	8
Aureolaria flava (L.) Farwell	x	–	X	9
Aureolaria pedicularia (L.) Rafinesque ex Pennell	x	–	X	7
Baptisia lactea (Raf.) Thieret	x	–	X	8
Barbarea vulgaris W.T. Aiton	R	–	R	*
SF***Bartonia virginica*** (L.) Britton, Sterns & Poggenburg	x	–	X	10
Berberis thunbergii DC	R	–	R	*
SF***Betula papyrifera*** Marshall	x	x	X	10
Betula pendula Roth	–	x	X	*
SF***Bidens aristosa*** (Michx.) Britton	R	–	R	3
Bidens connata Muhl. ex Willd. (*Bidens connata* Muhl.)	21	–	N	5
SF***Bidens discoidea*** (Torr. & A. Gray) Britton	x	–	X	9
Bidens frondosa L.	x	–	X	1
Boechera canadensis (L.) Al-Shehbaz (*Arabis canadensis* L.)	x	–	X	10
Boehmeria cylindrica (L.) Sw.	x	–	X	2
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	x	–	X	4
SF***Botrychium matricariifolium*** (Retz) A. Braun ex W.D.J. Koch (*Botrychium matricariifolium* (Döll) A. Braun ex Koch)	x	–	X	10
Botrychium virginianum (L.) Sw.	x	–	X	6

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Brachyelytrum aristosum*** (Michx.) P. Beauv. ex Branner & Coville (*Brachyelytrum aristosum* (Michx.) Trel.)	25	–	N	10
SF***Brachyelytrum erectum*** (Schreb.) P. Beauv.	x	–	X	10
Brickellia eupatorioides (L.) Shinners var. *corymbulosa* (Torr. & A. Gray) Shinners (*Kuhnia eupatorioides* L. var. *corymbulosa* Torr. & A. Gray)	x	–	X	6
Bromus ciliatus L.	x	–	X	10
Bromus inermis Leyss.	–	x	X	*
Bromus nottowayanus Fernald	83	–	N	5
SF***Bromus kalmii*** A. Gray	R	–	R	10
SF***Bromus nottowayanus*** Fernald	83	–	N	5
Bromus pubescens Spreng.	x	–	X	5
Bromus tectorum L.	x	–	X	*
SF***Cakile edentula*** ssp. ***edentula*** var. ***lacustris*** Fernald	x	–	X	9
Calamagrostis canadensis (Michx.) P. Beauv.	x	x	X	3
Calamovilfa longifolia (Hook.) Hack. ex Scr*ibn. &* Southw. var. magna Scribn. & Merr.	x	–	X	5
SF***Callitriche heterophylla*** Pursh	11	–	N	9
Caltha palustris L.	x	–	X	5
Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	x	x	X	1
Campanula americana L.	–	–	N	
Campanula aparinoides Pursh	R 50	x	X	8
SF***Campanula rotundifolia*** L.	x	–	X	10
Capsella bursa-pastoris (L.) Medik.	R	–	R	*
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	x	–	X	6
Cardamine concatenata (Michx.) O. Schwarz (*Dentaria laciniata* Willd.)	x	–	X	5
Cardamine douglassii Britton	x	–	X	7
Cardamine pensylvanica Muhl. ex Willd.	x	–	X	4
Carduus nutans L.	26	–	N	*
SF***Carex alata*** Torr.	x	x	X	10
Carex albicans Willd. ex Spreng. var. *albicans*	76	–	N	5
Carex albicans Willd. ex Spreng. var. *emmonsii* (Dewey ex Torr.) Rettig (*Carex emmonsii* Torr.)	x	–	X	5
Carex albursina E. Sheld.	x	–	X	7
Carex amphibola Steud.	x	–	X	10
Carex annectens (E.P. Bicknell) E.P. Bicknell (Carex an*nectens E.P. Bic*knell var. xanthoc*arpa (E.P. Bi*cknell) Wiegand)	–	x	X	7
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	–	x	X	6
Carex brevior (Dewey) Mack. ex Lunell	54	–	N	3
SF***Carex bromoides*** Schkuhr ex Willd. (*Carex bromoides* Willd.)	x	–	X	10

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Carex castanea*** Walenb.	79	–	N	10
Carex comosa Boott	x	–	X	5
Carex crinita Lam. var. *crinita*	x	x	X	10
Carex cristatella Britton	R	x	X	4
SF***Carex cryptolepis*** Mack.	R	–	R	9
SF***Carex debilis*** Michx. var. ***rudgei*** L.H. Bailey	R	x	X	10
SF***Carex digitalis*** Willd.	R	–	R	10
SF***Carex echinodes*** (Fernald) P. Rothrock, A. Reznicek, and Hipp	63	–	N	10
SF***Carex folliculata*** L.	x	x	X	10
Carex frankii Kunth	41	–	N	ad
SF***Carex garberi*** Fernald	R	–	R	10
Carex gracilescens Steudel	83	–	N	10
Carex gracillima Schwein.	x	–	X	10
Carex granularis Muhl. ex Willd.	x	x	X	4
Carex grayi J. Carey	x	–	X	7
Carex grisea Wahlenb.	x	–	X	2
SF***Carex intumescens*** Rudge	x	x	X	10
Carex lacustris Willd.	x	x	X	6
SF***Carex laxiculmis*** Schwein.	x	–	X	10
Carex laxiflora Lam.	x	–	X	10
SF***Carex leptonervia*** (Fernald) Fernald	x 6	–	X	10
Carex longii Mack.	–	x	X	6
Carex lupulina Willd.	x	–	X	7
Carex lurida Wahlenb.	x	x	X	8
Carex muehlenbergii Schkuhr ex Willd. (*Carex muehlenbergii* Schkuhr ex Willd.)	x	x	X	5
Carex normalis Mack.	x	–	X	5
SF***Carex pedunculata*** Muhl. ex Willd.	x	–	X	10
Carex pellita Willd.	x	–	X	4
Carex pensylvanica Lam.	x	–	X	5
Carex rosea Schkuhr ex Willd.	x	–	X	4
Carex scoparia Schkuhr ex Willd. var. *scoparia*	x 7	–	X N	7
SF***Carex seorsa*** Howe	x	x	X	10
Carex stipata Muhl. ex Willd.	x	x	X	3
Carex stricta Lam.	x	x	X	5
Carex suberecta (Olney) Britton	–	x	X	8
Carex swanii (Fernald) Mack.	x	x	X	8

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Carex tonsa*** (Fernald) E.P. Bicknell	x	–	X	7
Carex tribuloides Wahlenb.	x 7	–	X	3
Carex umbellata Schkuhr ex Willd.	R	–	R	9
Carex utriculata Boott	R	–	R	10
Carex vesicaria L. (*Carex vesicaria* L. var. *monile* (Tuck.) Fernald)	x 5	–	X	10
Carex virescens Muhl. ex Willd.	R	–	R	10
Carex vulpinoidea Michx.	x	x	X	2
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow (*Carpinus caroliniana* Walter var. *virginiana* (Marshall) Fernald)	x	–	X	8
Carya cordiformis (Wangenh.) K. Koch	x	–	X	7
Carya ovata (Mill.) K. Koch	x	–	X	5
Castanea dentata (Marshall) Borkh.	x	–	X	ad
Catalpa speciosa Teas	R 50	–	R	ad
Caulophyllum thalictroides (L.) Michx.	x	–	X	8
Ceanothus americanus L.	x	–	X	6
Celastrus orbiculatus Thunb.	x	N	X	*
SF***Celastrus scandens*** L.	x	–	X	4
SF***Celtis tenuifolia*** Nutt.	10	–	X	10
Cenchrus longispinus (Hack.) Fernald	55	–	N	0
Centaurium pulchellum (Sw.) Druce	–	x	X	*
Cephalanthus occidentalis L.	x	x	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L.)	x	–	X	*
Ceratophyllum demersum L.	56	–	N	2
SF***Ceratophyllum echinatum*** A. Gray	N 56	–	N	10
Cercis canadensis L.	83	–	N	ad
Chamaecrista fasciculata (Michx.) Greene	–	59	N	4
SF***Chamaedaphne calyculata*** (L.) Moench (*Chamaedaphne calyculata* (L.) Moench var. *angustifolia* (Aiton) Rehder)	R	–	R	10
Chelidonium majus L.	R 43	–	N	*
Chelone glabra L.	x	–	X	8
Chenopodium album L.	x	–	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	x	–	X	5
SF***Chimaphila maculata*** (L.) Pursh	32, 50	–	X	10
SF***Chimaphila umbellata*** (L.) W.P.C. Barton ssp. ***umbellata*** (*Chimaphila umbellata* (L.) Barton var. *cisatlantica* S.F. Blake)	x	–	X	10

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Chrysosplenium americanum*** Schwein. ex Hooker	x	–	X	10
Cicuta maculata L.	x	x	X	6
Cinna arundinacea L.	x	–	X	5
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	–	X	1
Cirsium altissimum (L.) Spreng.	R	–	R	6
Cirsium arvense (L.) Scop.	x	x	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	x	–	X	2
Cirsium muticum Michx.	x	x	X	10
SF***Cirsium pitcheri*** (Torr. ex Eaton) Torr. & A. Gray	x	–	X	10
Cirsium vulgare (Savi) Ten.	x	x	X	*
SF***Cladium mariscoides*** (Muhl.) Torr.	R	–	R	10
Claytonia virginica L.	x	–	X	2
Clematis virginiana L.	x	x	X	4
SF***Clintonia borealis*** (Aiton) Raf.	1	–	N	10
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	–	X	7
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	R	–	R	10
Commelina communis L.	50	–	R	*
SF***Conopholis americana*** (L.) Wallr.	x	–	X	10
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	–	x	X	0
SF***Coptis trifolia*** (L.) Salisb.	20	–	N	10
SF***Corallorhiza maculata*** (Raf.) Raf.	x	–	X	10
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	x	–	X	9
Coreopsis lanceolata L.	x	–	X	5
Coreopsis tripteris L.	x	x	X	5
Corispermum americanum (Nutt.) Nutt. (*Corispermum hyssopifolium* L.)	x	–	X	5
Corispermum nitidum Kitaibel ex Schultes	64	–	N	*
Corispermum pallasii Steven	65	–	N	2
Cornus alternifolia L. f.	x	–	X	9
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	x	x	X	6
Cornus florida L.	x	–	X	8
Cornus racemosa Lam.	x	x	X	1
SF***Cornus rugosa*** Lam.	x	–	X	10
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	x	–	X	6
Corylus americana Walter	x	x	X	5
Crataegus calpodendron (Ehrh.) Medik.	R	–	R	7
Crataegus crus-galli L.	R	–	R	2
Crataegus macrosperma Ashe (*Crataegus flabellata* Ashe)	R	–	R	5

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Crataegus pruinosa (H.L. Wendl.) K. Koch	R	–	R	5
Crataegus punctata Jacq.	R	–	R	2
Crocanthemum canadense L. Britton (*Helianthemum canadense* (L.) Michx.)	x	–	X	8
Cryptotaenia canadensis (L.) DC.	x	–	X	2
Cuscuta coryli Engelm.	–	x	X	10
Cuscuta gronovii Willd. ex Schult.	x	–	X	4
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	x	x	X	4
SF***Cyperus houghtonii*** Torr.	x	–	X	2
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* (*Cyperus filiculmis* Vahl)	–	x	X	5
Cyperus schweinitzii Torr.	x	x	X	5
Cyperus strigosus L.	–	x	X	1
SF***Cypripedium acaule*** Aiton	x	–	X	10
SF***Cypripedium candidum*** Muhl. ex Willd.	x	–	X	10
SF***Cypripedium parviflorum*** Salisb. var. ***makasin*** (Farw.) Sheviak (*Cypripedium calceolus* L. var. *parviflorum* (Salisb.) Fernald)	X 37	–	X	10
SF***Cypripedium parviflorum*** Salisb. var. ***pubescens*** (Willd.) O.W. Knight (*Cypripedium calceolus* L. var. *pubescens* (Willd.) Correll)	x	–	X	10
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	x	–	X	6
Dactylis glomerata L.	x	–	X	*
SF***Dactylorhiza viridis*** (L.) R.M. Bateman, A.M. Pridgeon & M.W. Chase (*Coeloglossum viride* (L.) Hartman (*Habenaria viridis* (L.) R. Br. var. *bracteata* (Willd.) A. Gray))	R	–	R	10
SF***Danthonia compressa*** Austin	84	–		10
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	x	–	X	3
Daucus carota L.	x	x	X	*
Decodon verticillatus (L.) Elliott	19	–	N	8
SF***Dendrolycopodium dendroideum*** (Michx.) A. Haines (*Lycopodium obscurum* L.)	R	–	R	10
SF***Dendrolycopodium hickeyi*** (W.H. Wagner, Beitel & R.C. Moran) A. Haines	66	–	N	10
SF***Deparia acrostichoides*** (Sw.) M. Kato (*Athyrium thelypterioides* (Michx.) Desv.)	2	–	X	10
Desmodium canadense (L.) DC.	–	x	X	4
Desmodium paniculatum (L.) DC.	x	–	X	6
SF***Desmodium perplexum*** B. G. Schub.	R	–	N	5
Dianthus armeria L.	R	x	X	*
Dicentra cucullaria (L.) Bernh.	x	–	X	6
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	x	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	x	–	X	9
SF***Dichanthelium boreale*** (Nash) Freckmann (*Panicum boreale* Nash)	x	–	X	10

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Dichanthelium clandestinum (L.) Gould (*Panicum clandestinum* L.)	x	x	X	6
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	x	–	X	7
SF***Dichanthelium dichotomum*** (L.) Gould ssp. ***dichotomum*** (*Panicum dichotomum* L.)	R	–	R	10
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	x	–	X	5
SF***Dichanthelium oligosanthes*** (J.A. Schultes) Gould ssp. ***oligosanthes*** (*Panicum oligosanthes* Schult.)	R	x	X	9
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	–	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	–	X	7
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	x	–	X	8
SF***Dichanthelium perlongum*** (Nash) Freckmann (*Panicum perlongum* Nash)	R	–	R	10
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	–	x	X	8
SF***Diervilla lonicera*** Mill.	x	–	X	9
Digitaria cognata (J.A. Schultes) Pilger (*Leptoloma cognatum* (Schult.) Chase)	–	x	X	3
Digitaria ischaemum (Schreb.) Muhl.	x	–	X	*
Digitaria sanguinalis (L.) Scop.	x	–	X	*
Dioscorea villosa L.	x	x	X	7
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	x	x	X	9
Draba verna L.	83	–	N	*
SF***Drosera rotundifolia*** L.	R	x	X	10
Dryopteris × *boottii* (Tuck.) Underw. [*D. cristata* × *D. intermedia*]	–	68	N	10
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O.F. Müll.) Watt)	x	–	X	8
SF***Dryopteris clintoniana*** (D. C. Eaton) Dowell	R	–	R	10
Dryopteris cristata (L.) A. Gray	x	x	X	10
Dryopteris intermedia (Muhl. ex Willd.) A. Gray	x	–	X	8
Dryopteris × *uliginosa* (A. Braun ex Döll) Kuntze ex *Druce* [*D. carthusiana* × *D. cristata*]	69	–	N	10
Echinochloa muricata (P. Beauv.) Fernald	70	–	N	4
Echinocystis lobata (Michx.) Torr. & A. Gray	17	–	R	5
Elaeagnus angustifolia L.	R	–	R	*
Elaeagnus umbellata Thunb.	x	x	X	*
Eleocharis acicularis (L.) Roem. & Schult.	R	–	R	2
Eleocharis elliptica Kunth	x	x	X	8
Eleocharis erythropoda Steud.	–	x	X	2
Eleocharis obtusa (Willd.) Schult.	–	x	X	3

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis palustris* (L.) Roem. & Schult. var. *major* Sond.)	R	–	R	10
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis smallii* Britton)	–	x	X	5
Eleusine indica (L.) Gaertn.	x	–	X	*
Elymus canadensis L.	x	–	X	4
Elymus hystrix L. (*Hystrix patula* Moench)	x	x	X	5
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	R	x	X	*
Elymus trachycaulus (Link) Gould ex Shinners ssp. *subsecundus* (Link) A. Löve & D. Löve (*Agropyron trachycaulum* (Link) Malte var. *unilaterale* (Cassidy) Malte)	x	–	X	8
Elymus virginicus L.	x	x	X	4
Epifagus virginiana (L.) W.P.C. Barton	x	–	X	10
SF***Epigaea repens*** L.	x	–	X	10
Epilobium coloratum Biehler	x	–	X	3
Epipactis helleborine (L.) Crantz	12	–	N	*
Equisetum arvense L.	x	x	X	0
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	x	–	X	3
Equisetum × *ferrissii* Clute *[E. hyem*ale × *E. la*evigatum]	–	x	X	2
Eragrostis spectabilis (Pursh) Steud.	83	–	N	3
Erigeron annuus (L.) Pers.	x	x	X	0
Erigeron philadelphicus L.	x	–	X	4
SF***Erigeron pulchellus*** Michaux	80	–	R	10
Erigeron strigosus Muhl. ex Willd.	x	–	X	5
Erucastrum gallicum (Willd.) O. E. Schulz	–	71	N	*
Eryngium yuccifolium Michx.	x	–	X	9
Erythronium americanum Ker Gawl.	x	–	X	8
Euonymus alatus (Thunb.) Siebold	83	–	N	*
Euonymus obovatus Nutt.	x	–	X	7
Eupatorium perfoliatum L.	x	x	X	4
SF***Eupatorium sessilifolium*** L. (*Eupatorium sessilifolium* L. var. *brittonianum* Porter)	50, 51	–	R	10
Euphorbia corollata L.	x	x	X	2
Euphorbia cyparissias L.	x	–	X	*
Euphorbia maculata L. (*Euphorbia supina* Raf.)	X	x	X	0
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	R 50	x	X	0
SF***Euphorbia polygonifolia*** L.	x	–	X	10
SF***Eurybia furcata*** (E.S. Burgess) G. L. Nesom (*Aster furcatus* E. S. Burgess)	23	–	X	10
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	x	–	X	8
SF***Eurybia schreberi*** (Nees) Nees	67	–	N	10

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Euthamia caroliniana (L.) Greene ex Porter & Britton	77	–	R	10
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	–	x	X	3
Eutrochium fistulosum (Barratt) E.E. Lamont (*Eupatorium fistulosum* Barratt)	x	x	X	10
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	x	x	X	4
Fagus grandifolia Ehrh.	x	–	X	5
Fallopia convolvulus (L.) A. Löve (*Polygonum convolvulus* L.)	–	x	X	*
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	x	–	X	5
Fimbristylis autumnalis (L.) Roem. & Schult.	–	x	X	5
Floerkea proserpinacoides Willd.	x	–	X	8
Forsythia × *intermedia* Zabel [*F. suspensa* × *F. viridissima*]	R 50	–	X	*
Fragaria virginiana Miller	x	x	X	1
SF***Fraxinus americana*** L.	x	–	X	5
SF***Fraxinus nigra*** Marshall	x	–	X	10
SF***Fraxinus pennsylvanica*** Marshall	x	x	X	5
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	x	x	X	1
SF***Galearis spectabilis*** (L.) Raf. (*Orchis spectabilis* L.)	R	–	R	10
Galium aparine L.	x	–	X	1
Galium asprellum Michx.	22	–	N	10
Galium circaezans Michx. var. *hypomalacum* Fernald	x	–	X	7
Galium concinnum Torr. & A. Gray	x	–	X	5
SF***Galium lanceolatum*** (Torr.) Torr.	x	–	X	10
Galium obtusum Bigelow	x	–	X	5
Galium pilosum Aiton	x	–	X	10
Galium tinctorium L.	x	x	X	8
Galium triflorum Michx.	x	–	X	5
Gaultheria procumbens L.	x	–	X	9
Gaylussacia baccata (Wangenh.) K. Koch	x	–	X	9
SF***Gentiana alba*** Muhl. ex Nutt. (*Gentiana flavida* A. Gray)	x	–	X	9
Gentiana andrewsii Griseb.	R 50	–	R	8
Gentianopsis crinita (Froel.) Ma (*Gentiana crinita* Froel.)	R 50	–	R	10
Geranium carolinianum L.	R	–	R	3
Geranium maculatum L.	x	–	X	4
Geum canadense Jacq.	x	x	X	1
Geum laciniatum Murray (*Geum laciniatum* Murray var. *trichocarpum* Fernald)	x	x	X	5

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	A	*B*		
Glyceria canadensis (Michx.) Trin.	R	x	X	10
Glyceria septentrionalis Hitchc.	16	–	R	8
Glyceria striata (Lam.) Hitchc.	x	x	X	4
SF***Goodyera pubescens*** (Willd.) R. Br.	14	–	X	9
Gratiola neglecta Torr.	x	–	X	7
Hackelia virginiana (L.) I. M. Johnst.	x	–	X	0
Hamamelis virginiana L.	x	–	X	8
Helianthus divaricatus L.	x	x	X	5
Helianthus giganteus L.	–	x	X	9
Helianthus grosseserratus M. Martens	–	x	X	2
Helianthus petiolaris Nutt. ssp. *petiolaris*	83	–	N	ad
Helianthus strumosus L.	83	–	N	5
Hesperis matronalis L.	R 42	–	N	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	x	–	X	7
Heterotheca subaxillaris (Lamarck) Britton & Rusby ssp. *latifolia* (Buckley) Semple	R 44	–	N	ad
Heuchera richardsonii R. Brown	R 42	–	N	8
Hibiscus moscheutos L. ssp. *moscheutos* (*Hibiscus palustris* L.)	x	–	X	9
Hieracium gronovii L.	x	x	X	6
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	x	–	X	6
Humulus lupulus L. including var. *pubescens* E. Small	–	X 72	X	5
SF***Huperzia lucidula*** (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	x	–	X	10
Hydrophyllum appendiculatum Michx.	x	–	X	8
Hylodesmum glutinosum (Muhl. ex Willd.) H. Ohashi & R. R. Mill (*Desmodium glutinosum* (Willd.) Alph. Wood)	x	–	X	5
Hylodesmum nudiflorum (L.) H. Ohashi & R. R. Mill (*Desmodium mudiflorum* (L.) DC.)	R 50	–	R	9
SF***Hypericum kalmianum*** L.	x	–	X	10
Hypericum mutilum L.	x	–	X	8
Hypericum perforatum L.	x	–	X	*
Hypericum punctatum Lam.	R	x	X	4
Hypochaeris radicata L.	R	–	R	*
SF***Hypopitys monotropa*** Crantz (*Monotropa hypopitys* L.)	34	–	X	10
Ilex opaca Aiton (*Ilex opaca* L.)	–	x	N	ad
Ilex verticillata (L.) A. Gray	x	x	X	9

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	A	*B*		
Impatiens capensis Meerb.	x	x	X	3
Impatiens pallida Nutt.	x	–	X	6
Inula helenium L.	R	–	R	*
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	–	X	10
Iris germanica L.	x	–	X	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	x	X	5
SF***Juglans cinerea*** L.	x	–	X	8
Juncus acuminatus Michx.	R	x	X	6
SF***Juncus arcticus*** Willd. var. ***balticus*** (Willd.) Trautvetter (*Juncus balticus* Willd. var. *littoralis* Engelm.)	x	–	X	6
Juncus canadensis J. Gay ex Laharpe	–	x	X	7
Juncus dudleyi Wiegand	–	x	X	4
Juncus effusus L.	x	x	X	7
SF***Juncus scirpoides*** Lam.	33	–	X	9
Juncus tenuis Willd.	x	x	X	0
SF***Juniperus communis*** L. Pursh	x	–	X	10
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	x	–	X	2
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	x	–	X	7
Krigia biflora (Walter) S.F. Blake	x	x	X	7
Krigia virginica (L.) Willd.	x	–	X	6
Lactuca canadensis L.	–	x	X	2
Lactuca serriola L.	x	–	X	*
Lamiastrum galeobdolon (L.) Ehrend. & Polatschek	83	–	N	*
Laportea canadensis (L.) Wedd.	x	–	X	3
SF***Larix laricina*** (Du Roi) K. Koch (planted)	83	–	N	10
SF***Lathyrus japonicus*** Willd. var. ***maritimus*** (L.) Kartesz & Gandhi (*Lathyrus japonicus* Willd. var. *glaber* (Ser.) Fernald)	x	–	X	10
SF***Lathyrus ochroleucus*** Hook.	R	–	R	10
Lathyrus palustris L. (*Lathyrus palustris* L. var. *myrtifolius* (Willd.) A. Gray)	x	–	X	6
Lechea mucronata Raf. (*Lechea villosa* Elliott)	R	–	R	6
Leersia oryzoides (L.) Sw.	x	x	X	4
Leersia virginica Willd.	x	–	X	7
Lemna minor L.	x	–	X	5
Lepidium campestre (L.) W.T. Aiton	x	–	X	*
Lepidium virginicum L.	x	x	X	0
Lespedeza capitata Michx.	x	x	X	4
Lespedeza hirta (L.) Hornem.	x	–	X	6

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	A	*B*		
Lespedeza thunbergii (DC.) Nakai	R 45	–	N	*
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte)	x	–	X	*
Liatris aspera Michx.	x	–	X	6
Liatris cylindracea Michx.	x	–	X	8
Liatris spicata (L.) Willd.	x	–	X	6
Lilium michiganense Farw.	x	x	X	6
Lindera benzoin (L.) Blume	x	–	X	7
Linum medium (Planch.) Britton var. *texanum* (Planch.) Fernald	R	–	R	7
SF***Linum striatum*** Walter	–	x	X	10
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	R	–	R	6
SF***Liparis loeselii*** (L.) Rich.	34	35	X	7
Liriodendron tulipifera L.	x	–	X	5
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	–	X	8
Lobelia cardinalis L.	x	x	X	7
Lobelia inflata L.	R 50	–	R	4
Lobelia siphilitica L.	R 46	–	N	6
SF***Lonicera dioica*** L.	x	–	X	10
Lonicera reticulata Raf.	83	–	N	7
Lonicera × *bella* Zabel [*L. tartarica* × *L. morrowii*]	x	–	X	*
Lonicera × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides*] (*Lonicera* × *muendeniensis* Rehder)	x	x	X	*
Lotus corniculatus L.	R 45	–	N	*
Ludwigia alternifolia L.	x	x	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	x	x	X	5
Lupinus perennis L. var. *occidentalis* S. Watson	x	–	X	7
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	x	–	X	7
SF***Lycopodiella inundata*** (L.) Holub (*Lycopodium inundatum* L.)	R	–	R	10
Lycopus americanus Muhl. ex W.P.C. Barton	x	x	X	5
Lycopus rubellus Moench	x	–	X	10
Lycopus uniflorus Michx.	R 50	x	X	7
Lysimachia ciliata L.	x	–	X	4
Lysimachia lanceolata Walter	R	–	R	7

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Lysimachia terrestris (L.) Britton, Sterns, & Poggenb.	R 50	x	X	8
Lythrum alatum Pursh	R	–	R	7
Lythrum salicaria L.	R 50	x	X	*
Madia sativa Molina	0	–	X	ad
SF***Maianthemum canadense*** Desf.	x	–	X	10
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	–	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	–	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	–	X	5
Malus coronaria (L.) Mill.	R	–	R	4
Malus domestica (Suckow) Borkh. (*M. pumila* Mill.)	x	–	X	*
Malus ioensis (Alph. Wood) Britton	x	x	X	3
Marrubium vulgare L.	R	–	R	*
Medeola virginiana L.	x	–	X	10
SF***Melampyrum lineare*** Desr.	R	–	R	10
Melilotus alba Medik.	–	x	X	*
Menispermum canadense L.	x	–	X	6
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	R	–	R	5
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	x	–	X	10
SF***Milium effusum*** L. ssp. ***cisatlanticum*** (Fernald) A. Haines	x	–	X	10
SF***Mimulus alatus*** Aiton	36	–	X	7
Mimulus ringens L.	R 50	x	X	6
SF***Minuartia michauxii*** (Fenzl) Farw. (*Arenaria stricta* Michx.)	R	–	R	10
SF***Mitchella repens*** L.	x	–	X	10
Mitella diphylla L.	x	–	X	10
Moehringia lateriflora (L.) Fenzl (*Arenaria lateriflora* L.)	R	–	R	8
Mollugo verticillata L.	4	–	N	ad
Monarda didyma L.	x	–	X	
Monarda fistulosa L.	x	x	X	4
Monarda punctata L.	x	x	X	5
SF***Monotropa uniflora*** L.	x	–	X	10
Morus alba L.	R	–	R	*
SF***Morus rubra*** L.	R	–	R	10
Muhlenbergia mexicana (L.) Trin.	R 50	x	X	5
Muhlenbergia schreberi J. F. Gmel.	x	–	X	0

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Muhlenbergia tenuiflora*** (Willd.) Britton, Sterns & Poggenburg	R	–	R	10
SF***Myosotis laxa*** Lehm.	R 8	x	X	10
Myosotis stricta Link ex Roem. & J.A. Schult.	R 58	–	N	*
Nuphar advena (Aiton) W. T. Aiton	x	–	X	7
Nyssa sylvatica Marshall	x	x	X	8
Oenothera biennis L.	x	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	–	X	7
Onoclea sensibilis L.	x	x	X	8
Opuntia cespitosa Raf. (*Opuntia humifusa* (Raf.) Raf.)	x	–	X	5
SF***Orobanche uniflora*** L.	x	–	X	10
SF***Oryzopsis asperifolia*** Michx.	x	–	X	10
Osmorhiza claytonii (Michx.) C.B. Clarke	x	–	X	3
Osmorhiza longistylis (Torr.) DC.	x	–	X	3
Osmunda claytoniana L.	x	–	X	9
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	x	x	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	x	x	X	7
Ostrya virginiana (Mill.) K. Koch	x	–	X	5
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	–	x	X	0
Oxalis stricta L. (*Oxalis europaea* Jord.)	x	x	X	0
Oxypolis rigidior (L.) Raf.	x	x	X	7
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	x		X	7
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	R 50	x	X	6
Packera plattensis (Nutt.) W.A. Weber & A. Löve (*Senecio plattensis* Nutt.)	x	–	X	6
SF***Panax quinquefolius*** L.	x	–	X	9
SF***Panax trifolius*** L.	x	–	X	10
Panicum rigidulum Bosc ex Nees	–	x	X	5
Panicum virgatum L.	x	x	X	5
Parthenocissus quinquefolia (L.) Planch.	x	x	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	x	–	X	1
Pedicularis canadensis L.	x	–	X	9
Pedicularis lanceolata Michx.	x	–	X	9
SF***Peltandra virginica*** (L.) Schott	x	–	X	10
Penstemon calycosus Small	x	–	X	7
Penthorum sedoides L.	R	x	X	5

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Persicaria arifolia*** (L.) Haroldson (*Polygonum arifolium* L. var. *pubescens* (Keller) Fernald)	x	–	X	9
SF***Persicaria careyi*** (Olney) Greene (*Polygonum careyi* Olney)	x	x	X	9
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	x	x	X	7
Persicaria longiseta (Bruijn) Kitagawa (*Polygonum caespitosum* Blume var. *longisetum* (Bruijn) Stewart)	x	–	X	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	–	x	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	x	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	x	x	X	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	x	–	X	2
Phalaris arundinacea L.	x	x	X	*
SF***Phegopteris hexagonoptera*** (Michx.) Fee (*Dryopteris hexagonoptera* (Michx.) C. Chr.)	x	–	X	10
Phlox divaricata L.	x	–	X	5
Phlox drummondii Hook. (planted)	83	–	N	ad
Phlox paniculata L.	52	–	N	1
Phlox pilosa L.	x	–	X	7
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	x	x	X	1
Physalis heterophylla Nees	–	x	X	3
Physalis virginiana Mill.	x	–	X	4
Physocarpus opulifolius (L.) Maxim.	x	–	X	8
Physostegia virginiana (L.) Benth.	x	–	X	6
Phytolacca americana L.	x	–	X	1
Pilea fontana (Lunell) Rydberg	83	–	N	7
Pilea pumila (L.) A. Gray	x	–	X	5
SF***Pinus banksiana*** Lamb.	x	–	X	9
Pinus nigra J.F. Arnold	R	–	R	*
SF***Pinus strobus*** L.	x	–	X	9
Pinus sylvestris L.	x	–	X	*
SF***Piptatheropsis pungens*** (Spreng.) Romasch., P. M. Peterson & Soreng (*Piptatherum pungens* (Torr.) Dorn; *Oryzopsis pungens* (Torr.) Hitchc.)	R 38	–	R X	10
SF***Piptochaetium avenaceum*** (L.) Parodi (*Stipa avenacea* L.)	x	–	X	9
Plantago lanceolata L.	x	x	X	*
Plantago major L.	x	–	X	*
Plantago rugelii Decne.	x	–	X	0
SF***Platanthera ciliaris*** (L.) Lindl. (*Habenaria ciliaris* (L.) R. Br.)	R	–	R	10
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	x	x	X	10

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Platanthera flava*** (L.) Lindl. var. ***herbiola*** (R. Br.) Luer (*Habenaria flava* (L.) R. Br. var. *herbiola* (R. Br.) Ames & Correll)	x	–	X	10
SF***Platanthera hookeri*** (Torr. ex A. Gray) Lindl. (*Habenaria hookeri* Torr.)	x	–	X	10
SF***Platanthera psycodes*** (L.) Lindl. (*Habenaria psycodes* (L.) Spreng.	x	–	X	10
Platanus occidentalis L.	x	–	X	9
SF***Poa alsodes*** A. Gray	x	–	X	10
Poa annua L.	x	–	X	*
Poa bulbosa L.	R	–	R	*
Poa compressa L.	x	x	X	*
SF***Poa paludigena*** Fernald & Weigand	x	–	R	10
Poa palustris L.	R	–	R	9
Poa pratensis L.	x	x	X	*
SF***Poa saltuensis*** Fernald & Wiegand ssp. ***languida*** (Hitchc.) A. Haines (*Poa languida* Hitchc.)	x	–	X	10
Podophyllum peltatum L.	x	–	X	4
Polanisia dodecandra (L.) DC ssp. *dodecandra* (*Polanisia graveolens* Raf.)	57	–	N	ad
Polemonium reptans L.	83	–	N	5
SF***Polygala paucifolia*** Willd.	x	–	X	10
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	R 50	–	R	9
Polygala sanguinea L.	x	x	X	6
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	–	X	3
Polygonatum pubescens (Willd.) Pursh	x	–	X	7
SF***Polygonum articulatum*** L. (*Polygonella articulata* (L.) Meisn.)	R 50	–	R	10
Polygonum aviculare L.	x	–	X	*
SF***Polypodium virginianum*** L.	x	–	X	9
Polystichum acrostichoides (Michx.) Schott	x	–	X	9
SF***Populus balsamifera*** L.	24	–	X	10
Populus deltoides W. Bartram ex Marshall	x	x	X	2
Populus grandidentata Michx.	x	–	X	6
Populus tremuloides Michx.	x	x	X	4
SF***Potamogeton bicupulatus*** Fernald	0	–	N	10
SF***Potamogeton pulcher*** Tuck.	15	–	N	10
SF***Potentilla anserina*** L.	x	–	X	6
Potentilla norvegica L.	–	x	X	0
Potentilla recta L.	R	–	R	*
Potentilla simplex Michx.	x	x	X	4
Prenanthes alba L.	x	–	X	5

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*		
Prenanthes altissima L.	x	–	X	8
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	x	x	X	0
Prunus padus L.	28	–	N	*
SF***Prunus pensylvanica*** L. f.	x	x	X	5
Prunus pumila L.	x	–	X	8
Prunus serotina Ehrh.	x	x	X	1
Prunus virginiana L.	x	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	x	x	X	2
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	R 50	–	R	7
Ptelea trifoliata L. ssp. *trifoliata* var. *mollis* Torr. & A. Gray.	x	–	X	8
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	x	X	5
Pycnanthemum tenuifolium Schrad.	–	x	X	7
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	R 47	–	N	5
SF***Pyrola americana*** Sweet (*Pyrola rotundifolia* L. *americana* (Sweet) Fernald)	x	–	X	10
SF***Pyrola elliptica*** Nutt.	x	–	X	10
Quercus alba L.	x	x	X	5
Quercus bicolor Willd.	x	–	X	6
Quercus palustris Munchh.	x	x	X	8
Quercus rubra L.	x	x	X	7
Quercus velutina Lam.	x	–	X	6
Ranunculus abortivus L.	x	–	X	0
Ranunculus flabellaris Raf.	16	–	N	7
Ranunculus hispidus Michx. var. *caricetorum* (Greene) T. Duncan	73	–	N	10
Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan (*Ranunculus septentrionalis* Poir.)	x	–	X	5
Ranunculus pensylvanicus L. f.	x	–	X	6
Ranunculus recurvatus Poir.	x	–	X	5
Ranunculus testiculatus Crantz	27	–	N	*
Ratibida pinnata (Vent.) Barnhart	x	–	X	4
SF***Rhexia virginica*** L.	R 50	x	X	10
Rhodotypos scandens (Thunberg) Makino	83	–	N	*
Rhus aromatica Aiton	x	–	X	10
SF***Rhus aromatica*** Aiton var. ***arenaria*** (Greene) Fernald	x	–	X	9
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	x	x	X	6

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	A	*B*		
Rhus typhina L.	x	x	X	1
Rhynchospora capitellata (Michx.) Vahl	x	x	X	8
Ribes americanum Mill.	x	–	X	7
Ribes cynosbati L.	x	–	X	5
Ribes rubrum L. (*Ribes sativum* Syme)	R	–	R	*
Robinia neomexicana A. Gray var. *neomexicana* (*Robinia luxurians* (Dieck) C.K. Schneid. ex Tarouca & C.K. Schneid. (probably not *Robinia viscosa* Vent.))	R	–	R	ad
Robinia pseudoacacia L.	x	–	X	ad
Rosa blanda Aiton	x	–	X	5
Rosa carolina L.	x	–	X	5
Rosa carolina L. ssp. *subserulata* (Rydb.) W. H. Lewis	74	–	N	5
Rosa multiflora Thunb.	x	x	X	*
Rosa palustris Marshall	x	x	X	7
Rubus allegheniensis Porter	x	x	X	3
Rubus flagellaris Willd. (*Rubus enslenii* Tratt.)	x	x	X	3
Rubus hispidus L.	x	x	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	x	x	X	3
Rubus occidentalis L.	x	–	X	2
Rubus odoratus L.	x	–	X	5
Rubus pensilvanicus Poir.	x	–	X	3
SF***Rubus pubescens*** Raf.	x	x	X	10
Rudbeckia hirta L.	x	x	X	1
Rudbeckia laciniata L. var. *laciniata*	x	x	X	5
Rumex acetosella L.	x	x	X	*
Rumex altissimus Alph. Wood	x	–	X	2
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	x	–	X	8
Rumex crispus L.	x	x	X	*
Rumex obtusifolius L.	x	–	X	*
Rumex triangulivalvis (Danser) Rech. f.	81	–	N	0
Rumex verticillatus L.	x	–	X	6
SF***Sabatia angularis*** (L.) Pursh	9	x	X	10
Sagittaria latifolia Willd.	x	–	X	4
Salix amygdaloides Andersson	x	x	X	5
Salix bebbiana Sarg.	R	x	X	8
SF***Salix candida*** Flüggé ex Willd.	61	–	N	10
SF***Salix cordata*** Michx. (*Salix syrticola* Fernald)	x	–	X	10
Salix discolor Muhl.	x	x	X	2

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	A	*B*		
Salix eriocephala Michx.	x	x	X	5
Salix humilis Marshall	x	–	X	6
Salix interior Rowlee	x	x	X	1
SF***Salix lucida*** Muhl.	R	x	X	10
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	x	x	X	7
Salix nigra Marshall	x	x	X	4
Salix petiolaris Sm.	R	x	X	7
SF***Salix sericea*** Marshall	R	–	R	10
Salix × *glatfelteri* C. K. Schneid. [*S. amygdaloides* × *S. nigra*]	–	x	X	5
Salsola tragus L. (*Salsola kali* L. var. *tenuifolia* Tausch)	R 50	–	R	*
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	x	X	1
Sambucus racemosa L. ssp. *pubens* (Michx.) Hultén (*Sambucus pubens* Michx.)	x	–	X	10
Samolus parviflorus Raf.	13	–	N	6
Sanguinaria canadensis L.	x	–	X	6
Sanicula canadensis L.	x	–	X	7
Sanicula marilandica L.	x	–	X	6
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	x	–	X	2
Saponaria officinalis L.	x	x	X	*
Sassafras albidum (Nutt.) Nees	x	x	X	3
Saururus cernuus L.	x	x	X	9
SF***Sceptridium dissectum*** (Spreng.) Lyon (*Botrychium dissectum* Spreng.)	x	–	X	6
SF***Sceptridium mutifidum*** (S.G. Gmel.) M. Nishida (*Botrychium multifidum* (S.G. Gmelin) Rupr.; *B. multifidum* var. *intermedium* (D.C. Eaton) Farw.)	x	–	X	10
SF***Sceptridium oneidense*** (Gilbert) Holub (*Botrychium oneidense* (Gilbert) House))	x	–	X	10
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	x	x	X	*
SF***Schizachyrium littorale*** (Nash) E.P. Bicknell	x	–	N	10
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	x	X	5
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl var. *creber* Fernald)	R	–	R	5
Scirpus atrovirens Willd.	x	x	X	4
Scirpus cyperinus (L.) Kunth	–	x	X	6
SF***Scirpus expansus*** Fernald	–	x	X	9
SF***Scirpus hattorianus*** Makino	29	–	N	
Scirpus pendulus Muhl.	x	x	X	4
Scrophularia marilandica L.	R 47	–	N	4
Scutellaria lateriflora L.	x	–	X	5

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Selaginella rupestris*** (L.) Spring	x	–	X	10
Setaria viridis (L.) P. Beauv.	–	x	X	*
Silene antirrhina L.	–	x	X	1
Silene armeria L.	x	–	X	*
Silene noctiflora L.	R	–	R	*
Silene stellata (L.) W.T. Aiton	83	–	N	6
Sisyrinchium albidum Raf.	x	–	X	7
SF***Sisyrinchium angustifolium*** Mill.	R	–	R	10
SF***Sisyrinchium atlanticum*** E.P. Bicknell	R	–	R	10
Sium suave Walter	x	–	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	x	–	X	5
Smilax lasioneura Hook.	x	–	X	5
Smilax rotundifolia L.	x	–	X	7
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	x	–	X	5
Solanum dulcamara L.	x	x	X	*
Solanum ptychanthum Dunal (*Solanum americanum* Mill.)	x	–	X	0
Solidago altissima L.	x	x	X	1
Solidago caesia L.	x	–	X	7
Solidago flexicaulis L.	R 48	–	N	7
Solidago gigantea Aiton	X	x	X	4
Solidago juncea Aiton	–	x	X	5
Solidago nemoralis Aiton	x	x	X	4
Solidago patula Muhl. ex Willd	x	x	X	9
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	x	x	X	6
SF***Solidago simplex*** Kunth var. ***gillmanii*** (A. Gray) G.S. Ringius (*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald)	x	–	X	10
SF***Solidago speciosa*** Nutt.	x	–	X	7
Solidago uliginosa Nutt.	R	–	R	10
Solidago ulmifolia Muhl. ex Willd.	x	–	X	5
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	–	x	X	*
Sorghastrum nutans (L.) Nash	x	–	X	5
SF***Sparganium americanum*** Nutt.	R	–	R	10
Sparganium eurycarpum Engelm.	x	–	X	6
Spartina pectinata Link	R 43	–	N	4
Sphenopholis intermedia (Rydb.) Rydb.	x	–	X	4
Sphenopholis nitida (Biehler) Scribn.	30	–	N	10

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Spiraea alba Du Roi	x	x	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	x	x	X	9
Spiranthes cernua (L.) Rich.	R 50	x	X	7
SF***Spiranthes lucida*** (H. H. Eaton) Ames	R 42	–	N	10
SF***Spiranthes ovalis*** Lindl. var. *erostellata* Catling	40	–	N	10
SF***Spirodela polyrhiza*** (L.) Schleid.	x	–	X	7
SF***Stachys aspera*** Michx.	–	x	X	10
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida* (Pursh) Fernald)	R	x	X	5
SF***Stachys hyssopifolia*** Michx.		60	N	10
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	x	–	X	5
Staphylea trifolia L.	R	–	R	7
Stellaria longifolia Muhl. ex Willd.	x	–	X	8
Stellaria media (L.) Vill.	x	–	X	*
Strophostyles helvola (L.) Elliott	R	–	R	7
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve (*Aster borealis* Prov.)	R	–	R	10
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	x	–	X	7
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	x	–	X	2
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	R	–	R	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	R	–	R	5
Symphyotrichum firmum (Nees) G.L. Nesom (*Aster puniceus* L. var. *firmus* (Nees) Torr. & A. Gray)	x	–	X	8
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	x	x	X	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	x	x	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	–	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	R	x	X	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)		x	X	9
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	x	x	X	7
Symplocarpus foetidus (L.) W. Salisb.	x	–	X	8
Tanacetum parthenium (L.) Schultz-Bip. (*Chrysanthemum parthenium* (L.) Bernh.)	x	–	X	*
Tanacetum vulgare L.	R	–	R	*
Taraxacum officinale F. H. Wiggers	x	x	X	*
Taxodium distichum (L.) Rich.	R 49	–	N	ad
Tephrosia virginiana (L.) Pers.	x	–	X	8

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Teucrium canadense L.	R 50	x	X	3
Thalictrum dasycarpum Fisch. & Avé-Lall.	R	–	R	5
Thalictrum dioicum L.	x	–	X	7
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	x	–	X	7
Thaspium barbinode (Michx.) Nutt.	R	–	R	8
Thaspium trifoliatum (L.) A. Gray	R	–	R	7
SF***Thelypteris noveboracensis*** (L.) Nieuwl. (*Dryopteris noveboracensis* (L.) A. Gray)	x	–	X	10
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	x	x	X	6
Tilia americana L.	x	–	X	5
SF***Torreyochloa pallida*** (Torr.) G.L. Church var. ***pallida*** (*Glyceria pallida* (Torr.) Trin.)	R	–	R	10
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	X	2
SF***Toxicodendron rydbergii*** (Small ex Rydb.) Greene	x	–	X	7
SF***Toxicodendron vernix*** (L.) Kuntze (*Rhus vernix* L.)	x	x	X	10
Tradescantia ohiensis Raf.	x	x	X	2
Tragopogon dubius Scop.	x	x	X	*
Triadenum virginicum (L.) Raf.	83	–	N	10
Tridens flavus (L.) Hitchc. (*Triodia flava* (L.) Smyth)	x	–	X	ad
SF***Trientalis borealis*** Raf.	x	–	X	10
Trifolium hybridum L.	R	–	R	*
Trifolium repens L.	x	–	X	*
Trillium flexipes Raf.	x	–	X	6
Trillium grandiflorum (Michx.) Salisb.	x	–	X	8
Trillium recurvatum L. C. Beck	x	–	X	5
SF***Triphora trianthophoros*** (Sw.) Rydb.	R 39	–	RX	10
Triticum aestivum L.	R	–	R	*
SF***Turritis glabra*** L. (*Arabis glabra* (L.) Bernth.)	R 42	–	N	
Typha angustifolia L.	x	x	X	1
Typha latifolia L.	x	x	X	1
Typha × *glauca* Godr. [*T. angustifol*ia × *T. lat*ifolia]		x	X	1
Ulmus americana L.	x	–	X	3
Ulmus rubra Muhl.	16	–	R	4
Urtica dioica L.	21	–	N	*
Urtica dioica L. ssp. *gracilis* (Aiton) Selander (*Urtica procera* Willd.)	x	x	X	2
Uvularia grandiflora Sm.	x	–	X	7

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
Vaccinium angustifolium Aiton	x	–	X	5
Vaccinium corymbosum L.	x	–	X	8
SF***Vaccinium macrocarpon*** Aiton	R	–	R	10
Vaccinium pallidum Aiton	x	–	X	5
Verbascum thapsus L. ssp. *thapsus*	x	x	X	*
Verbena bracteata Cav. ex Lag. & Rodr.	R		R	0
Verbena hastata L.	x	x	X	4
Verbena urticifolia L.	R 50	x	X	5
Vernonia fasciculata Michx.	x	–	X	5
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt.)	R	–	R	3
SF***Veronica catenata*** Pennell (*V. anagallis-aquatica* L. or *Veronica comosa* Richt.)	R	–	R	10
Veronica scutellata L.	R 50	–	R	10
Veronica serpyllifolia L.	x	–	X	*
Viburnum acerifolium L.	x	–	X	9
Viburnum lentago L.	x	–	X	5
Viburnum opulus L. var. *opulus*	x	–	X	*
Viburnum prunifolium L.	x	–	X	5
Viburnum rafinesqueanum Schult.	x	–	X	5
Viola affinis Leconte	x	–	X	4
SF***Viola blanda*** Willd. (*Viola incognita* Brainerd)	x	–	X	10
SF***Viola canadensis*** L.	x	–	X	9
Viola cucullata Aiton	x	–	X	9
Viola lanceolata L.	R 49	–	N	7
SF***Viola macloskeyi*** F.E. Lloyd (*Viola pallens* (Banks) Brainerd; *V. macloskeyi* ssp. *pallens* (Banks ex Ging.) M.S. Baker)	x	–	X	10
Viola pedata L. (*Viola pedata* L. var. *linearilobа* DC.)	x	–	X	9
Viola pubescens Aiton (*Viola pubescens* Aiton var. *scabriuscula* Torr. & A. Gray)	x	–	X	5
Viola sagittata Aiton var. *sagittata* (Nutt.) Torr. & A. Gray	R 50	x	X	7
Viola sororia Willd.	x	–	X	3
Viola striata Aiton	x	–	X	6
SF***Viola primulifolia*** L.	82	–	N	10
Vitis aestivalis Michx.	x	x	X	7
SF***Vitis labrusca*** L.	x	x	X	9
Vitis riparia Michx.	x	x	X	2
Vulpia octoflora (Walter) Rydb.	x	–	X	4

Table 27 (continued). Summary of species verified and reported at Indiana Dunes State Park Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 28. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Unit-wide Species Status	CoC
	A	*B*		
SF***Wolffia columbiana*** H. Karst.	x	–	X	7
SF***Xyris torta*** Sm.	x	–	X	10
Zanthoxylum americanum Mill. (*Xanthoxylum americanum* Mill.)	18	–	R	3
Zizia aurea (L.) W. D. J. Koch	R 50	x	X	7

Table 28. Sources of new species verified and reported from Indiana Dunes State Park.

Notes	Source(s)	Date	Species
1	K. Board	May 1989	*Clintonia borealis*
2	K. Dritz, K. Board	13 Aug 1980, Aug 1990	*Deparia acrostichoides*
3	N. Kalkbrenner	Aug 1994	*Bartonia virginica*
4	N. Kalkbrenner and Caldwell	23 Aug 1994	*Mollugo verticillata*
5	N.B. Pavlovic	27 Apr 1997	*Carex vesicaria*
6	Pavlovic et al. (Exotic Project)	26 June 1999	*Carex leptonervia*
7	Pavlovic et al. (Exotic Project)	10 Aug 1999	*Carex scoparia*
8	B. Plampin	1989	*Myosotis laxa*
9	B. Plampin	Jun 1990	*Sabatia angularis*
10	B. Plampin	1 Nov 2000	*Celtis tenuifolia*
11	B. Plampin	Aug 1995	*Callitriche heterophylla*
12	B. Plampin	1996	*Epipactis helleborine*
13	B. Plampin	1997	*Samolus parviflorus*
14	K. Board and B. Plampin	1987, 14 July 1990	*Goodyera pubescens*
15	R. Scribailo; N. Pilla and A. Balzer	NO DATE (Scribailo), 17 Sept 2016	*Potamogeton pulcher*
16	C. Wolfe and N. Kalkbrenner	31 Aug 1993, 15 June 1994	*Glyceria septentrionalis*, *Ranunculus flabellaris*, *Ulmus rubra*
17	C. Wolfe and N. Kalkbrenner	1 Sept 1993, 15 June 1994	*Echinocystis lobata*
18	C. Wolfe and N. Kalkbrenner	24 Sept 1993, 1 July 1994	*Zanthoxylum americanum*
19	C. Wolfe and N. Kalkbrenner	29 Sept 1993	*Decodon verticillatus*
20	C. Wolfe and N. Kalkbrenner	8 Sept 1993, 20 June 1994	*Coptis trifolia*
21	C. Wolfe and N. Kalkbrenner	8 Sept 1993, 19 July 1994	*Bidens connata*, *Urtica dioica*
22	C. Wolfe and N. Kalkbrenner	9 Sept 1993, 20 June 1994	*Galium asprellum*
23	S.W. and N.B. Pavlovic	28 Aug 2010	*Eurybia furcata*
24	T. Post	12 Aug 2009	*Populus balsamifera*

Table 28 (continued). Sources of new species verified and reported from Indiana Dunes State Park.

Notes	Source(s)	Date	Species
25	B. Hess, N. Pordrasky, and M. Bowles	9 Apr 1984	*Brachyelytrum aristosum*
26	N.B. Pavlovic	2007	*Carduus nutans*
27	K. Board	2 May 1992	*Ranunculus testiculatus*
28	K. Board	1 June 1996	*Prunus padus*
29	G. Wilhelm, U. Rowlatt, and M. Wilhelm	19 June 1976	*Scirpus hattorianus*
30	K. Board	7 June 1991	*Sphenopholis nitida*
31	K. Board	6 July 1997	*Betula nigra*
32	K. Board and B. Plampin	1987	*Chimaphila maculata*
33	Bennett	25 Aug 1957	*Juncus scirpoides*
34	K. Board (per Wilhelm 1990)	1987	*Liparis loeselii*, *Hypopitys monotropa*
35	N. Bergendahl (per Wilhelm 1990)	1983	*Liparis loeselii*
36	D. Hibshman (per Wilhelm 1990)	1987	*Mimulus alatus*
37	M.L. Bowles	20 May 1987	*Cypripedium parviflorum makasin*
38	Deam (per Wilhelm 1990)	29 May 1929	*Piptatheropsis pungens*
39	Pearsall	27 Aug 1942	*Triphora trianthophoros*
40	D. Botka	Sept 2015	*Spiranthes ovalis* var. *erostellata*
41	Rericha and Wilhelm	21 July 2010	*Carex frankii*
42	D. Botka	June 2014	*Hesperis matronalis*, *Heuchera richardsonii*, *Spiranthes lucida*, *Turritis glabra*
43	D. Botka	July 2016	*Chelidonium majus*, *Spartina pectinata*
44	D. Botka	July 2015	*Heterotheca subaxillaris*
45	D. Botka	Aug 2016	*Lespedeza thunbergii*, *Lotus corniculata*
46	D. Botka	Sept 2014	*Lobelia siphilitica* L.
47	D. Botka	Aug 2014	*Pycnanthemum virginianum*, *Scrophularia marilandica*
48	D. Botka	Sept 2016	*Solidago flexicaulis*
49	D. Botka	June 2013	*Taxodium distichum*, *Viola lanceolata*
50	D. Botka (pers. comm.)	20 Dec 2016	*Agalinis tenuifolia*, *Ailanthus altissimus*, *Anemone canadensis*, *Apocynum cannabinum*, *Bartonia virginica*, *Campanula aparinoides*, *Catalpa speciosa*, *Chimaphila maculata*, *Commelina communis*, *Eupatorium sessilifolium*, *Euphorbia nutans*, *Forsythia* × *intermedia*, *Gentiana andrewsii*, *Gentianopsis crinita*, *Hylodesmum nudiflorum*, *Lobelia inflata*, *Lycopus uniflorus*, *Lysimachia terrestris*, *Lythrum salicaria*, *Mimulus ringens*, *Muhlenbergia mexicana*, *Packera paupercula*, *Polygala polygama*, *Polygonum articulatum, Ptelea trifoliata* ssp. *trifoliata*, *Rhexia virginica*, *Salsola tragus*, *Spiranthes cernua*, *Teucrium canadense*, *Verbena urticifolia*, *Veronica scutellata*, *Viola sagittata* var. *sagittata*, *Zizia aurea*
51	N.B. and S.W. Pavlovic	29 July 2017	*Arnoglossum atriplicifolium*, *Eupatorium sessilifolium*
52	N.B. Pavlovic	9 Aug 2017	*Phlox paniculata*
53	N. Pilla and N. Do	17 July 2015	*Arnoglossum atriplicifolium*
54	N. and D. Pilla	17 July 2017	*Carex brevior*
55	N. Pilla	2 Feb 2020 and before	*Cenchrus longispinus*
56	N. Pilla and A. Balzer	17 Sept 2016	*Ceratophyllum demersum*, *C. echinatum*

Table 28 (continued). Sources of new species verified and reported from Indiana Dunes State Park.

Notes	Source(s)	Date	Species
57	N. Pilla	17 July 2017	*Polanisia dodecandra* ssp. *dodecandra*
58	F. Swink	12 May 1991	*Myosotis stricta*
59	N.B. Pavlovic	9 Aug 2018	*Chamaecrista fasciculata* (pipeline adventive?)
60	Bennett	29 Aug 1959	*Stachys hyssopifolia*
61	R.M. Tryon, Jr.	17 May 1926	*Salix candida*
62	F. Drouet, H. B. Louderback, and L. Almoduvar (ILLS)	4 July 1956	*Agrostis stolonifera*
63	H.F. Bennett (F)	14 June 1953	*Carex echinodes*
64	P. Weatherwax	2 Sept 1941	*Corispermum nitidum*
65	C. Deam (IU)	16 Sept 2019	*Corispermum pallasii*
66	P.A. Orport (IU)	20 Sept 1956	*Dendrolycopodium hickeyi*
67	D. Peattie	20 Sept 2019	*Eurybia schreberi*
68	R.L. Peterson (HUH)	29 Dec 1971	*Dryopteris* × *boottii*
69	R.M. Tryon (IU)	20 July 1932	*Dryopteris* × *uliginosa*
70	L.M. Umbach (F)	23 Aug 1909	*Echinochloa muricata*
71	H.R. Bennett	18 Aug 1957	*Erucastrum gallicum*
72	D.C. Peattie	1926	*Humulus lupulus* var. *pubescens*
73	H.R. Bennett (F)	11 May 1958	*Ranunculus hispidus* var. *caricetorum*
74	C. Deam (IU)	25 June 1922	*Rosa carolina* ssp. *subserulata*
75	D. Botka and J.R. Churchill (MO)	23 Feb 2019, 22 Aug 1925	*Bromus nottowayanus*
76	H.R. Bennett	23 May 1953	*Carex albicans* var *albicans*
77	C. Deam	13 Sept 2019	*Euthamia caroliniana*
78	C. Deam	22 Aug 1925	*Amaranthus albus*
79	D. Botka	2019	*Carex castanea*
80	A.R. Bechtel	May 1925	*Erigeron pulchellus*
81	S.F. Glassman	27 July 1970	*Rumex triangulivalvis*
82	B. Plampin	30 Aug 2004	*Viola primulifolia*
83	D. Botka (pers. comm.)	24 Feb 2019	*Allium burdickii*, *Bromus nottowayanus*, *Campanula americana*, *Carex gracilescens*, *Cercis canadensis* (planted), *Cyperus bipartitus*, *Eragrostis spectabilis*, *Draba verna*, *Euonymus alatus*, *Helianthus petiolaris*, *H. strumosus*, *Lamiastrum galeobdolon* (planted), *Larix laricina* (planted), *Lonicera reticulata*, *Phlox drummondii* (planted), *Pilea fontana*, *Polemonium reptans*, *Rhodotypos scandens*, *Silene stellata*, *Triadenum virginicum*
84	D. Botka (pers. comm.)	29 July 2019	*Danthonia compressa*

Special flora summary

Indiana Dunes State Park provides habitat for at least 182 of Indiana Dunes National Park's special flora. This is an approximately 38% increase over the 132 recorded in 1990 (Wilhelm 1990). Several species that were special flora in 1990 have been dropped: *Amelanchier humilis*, *Asimina triloba*, *Galium brevipes*, *Packera plattensis*, *Smilax rotundifolia*, and *Vaccinium attrococum* (see Table 2). Of the special flora species, 96% have been seen in the last ten years or so. Eight special flora taxa have been extirpated, 111 have been confirmed, 23 are new, and 40 are reported. New special flora found or documented in the Dunes State Park include *Aletris farinosa*, *Asclepias purpurascens*, *Bidens aristosa*, *B. discoidea*, *Brachyelytrum aristosum*, *Bromus nottowayanus*, *Callitriche heterophylla*, *Carex bebbii*, *C. castanea*, *C. echinodes*, *C. leptonervia*, *Celastrus scandens*, *Ceratophyllum echinatum*, *Chamaedaphne calyculata*, *Clintonia borealis*, *Cyperus houghtonii*, *Danthonia compressa*, *Dendrolycopodium hickeyi*, *Desmodium perplexum*, *Dryopteris clintoniana*, *Eurybia schreberi*, *Euthamia caroliniana*, *Fraxinus americana*, *F. nigra*, *F. pensylvanica*, *Galearis spectabilis*, *Goodyera pubescens*, *Juglans cinerea*, *Larix laricina*, *Linum striatum*, *Muhlenbergia tenuiflora*, *Polemonium reptans*, *Potamogeton bicupulatus*, *Rhexia virginica*, *Rubus flagellaris* (*R. enslenii*), *Spirodela polyrhiza*, *Stachys aspera*, *Viola pubescens*, *V. primulifolia*, and *Wolffia columbiana*.

Of these special flora, eight (4%) are possibly extirpated including *Dactylorhiza viridis*, *Dendrolycopodium dendroideum*, *Eurybia schreberi*, *Platanthera hookeri*, *Lathyrus ochroleucus*, *Piptatheropsis pungens*, *Potamogeton bicupulatus*, and *Triphora trianthophoros*.

Twelve percent (22 species) of the Indiana Dunes State Park special flora is unknown from any other unit. These species include *Aplectrum hyemale*, *Bromus nottowayanus*, *Carex castanea*, *Carex echinodes*, *Dactylorhiza viridis*, *Danthonia compressa*, *Dendrolycopodium hickeyi*, *Dichanthelium oligosanthes* ssp. *oligosanthes*, *Dryopteris clintoniana*, *Eurybia schreberi*, *Galearis spectabilis*, *Morus rubra*, *Muhlenbergia tenuiflora*, *Oryzopsis asperifolia*, *Piptatheropsis pungens*, *Polygala paucifolia*, *Platanthera hookeri*, *Populus balsamifera*, *Stachys aspera*, *Thaspium trifoliatum*, *Triphora trianthophoros*, and *Wolffia columbiana*.

Floristic summary

The Dunes State Park provides habitat for 828 taxa divided into 685 native taxa, 18 adventive taxa, and 101 exotic taxa (Table 29). Of the 709 native taxa, 685 are native species, 18 are varieties, and six are hybrids. There are 18 adventive species and 97 exotic species. Of the 99 Indiana-listed species, 25 are endangered, 46 are threatened, 27 are watch list, and one is extirpated. New adventive species include *Ilex opaca*, *Mollugo verticillata*, and *Carex frankii*. Rericha and Wilhelm found *C. frankii* in a wetland restoration in the Dunes State Park on 21 July 2010 (Wilhelm and Rericha 2017). This area may be part of restoration efforts conducted within the park to increase light in the area of the old east parking lot. This type of restoration illustrates potential problems that can occur with inadvertent or uninformed introductions of plants that are not native to the dunes, and can also lead to confusion about the composition of the flora prior to human dominance in the landscape. Species introductions by restorationists and landscapers have been illustrated elsewhere in the discussion of the construction of the Paul Douglas Environmental Center in Miller Woods Unit of INDU. The restoration wetland area where *C. frankii* was found is similar habitat to the Chicago Region: "Local in moist wooded areas, on stream terraces, and along stream banks. This the first record for *C. frankii* in Porter County" (Swink and Wilhelm 1994). The Dunes State Park has a mean CoC of 6.4 and a floristic quality of 170. The Indiana Dunes State Park is second only to Cowles Dunes in regard to floristic richness and quality.

Conservation issues

Dune State Park A

The Indiana Dunes State Park consists of five general community types: an extensive foredune complex, a large and diverse dune

Table 29. Summary of floristic statistics by subunit of Indiana Dunes State Park. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit		Entire Unit
	A	*B*	
Area (ha/acres)	945 / 2,336	18/46	963 / 2,386
Special flora total	175	28	182
Confirmed	95	25	111
New	27	3	23
Reported	44	0	40
Extirpated	9	0	8
Total taxa, FNA/ITIS	763	253	828
Total native taxa, FNA/ITIS	657	218	709
Native species, FNA/ITIS	639	206	685
Native variety, FNA/ITIS	16	7	18
Native hybrid, FNA/ITIS	2	5	6
Total adventive taxa, FNA/ITIS	16	2	18
Total adventive species, FNA/ITIS	16	2	18
Total adventive variety, FNA/ITIS	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0
Total exotic taxa, FNA/ITIS	90	33	101
Total exotic species, FNA/ITIS	87	32	97
Total exotic variety, FNA/ITIS	1	0	1
Total exotic hybrid, FNA/ITIS	2	1	3
Total Indiana Listed	95	16	99
Endangered	24	1	25
Threatened	44	8	46
Rare	0	0	0
Watch List	26	7	27
Extirpated	1	0	1
Sum CC	4,286	1,141	4,565
Sum CC adventive & invasive	4,189	1,106	4,452
Mean CoC	6	5	6
Mean CoC with adventive and invasive	5	4	5
FQI	166	77	170
FQI with adventive and invasive	151	69	154

complex, a large marsh complex, a savanna complex, and an extensive and varied swamp complex. The bulk of the unit (subunit A) harbors 639 verified native species, which increases to 657 when all reported are included. Subunit B, the NIPSCO right-of-way and Calumet Bike Trail, a modest-sized area, is home to 206 native species. For the Indiana Dunes State Park in its entirety, there are a total of 536 verified native plants, with an overall total of 685!

The foredune complex along much of the lakefront of this unit has been impacted by chronic human activity in some areas (i.e., Devil's Slide) and by shoreline erosion and chronic trampling to the east. Brennan (1923) pointed out that "the Dunes were originally covered with giant white pines which were still in existence when the white people came in the early days, and that when these pines disappeared, mainly from the lumbering in the first half of the century, other trees, principally the oak, sprang up in their places." However, evidence from fossil pollen cores in the dunes reveals that pine had been declining and oak had been increasing in the dunes long before the white pines were logged in the 1850s (Futyma 1985, Cole and Taylor 1995). Brennan (1923) also observed that "The dunes, disturbed by the fall of these trees, began in places of great disturbance to crumble, and under the influence of wind, to drift and eventually form great moving dunes which cover forests and marshes." The blowouts were mostly the result of movement of sand inland after high stands of Lake Michigan (Anderton and Loope 1995, Arbogast and Loope 1999, Loope and Siterlet 2000). Nevertheless, it is true that human disturbance can activate dune movement inland, as has occurred at Mount Baldy west of Michigan City (Davis and Wood 1980).

The dune complex is locally quite broad in its community character, ranging from savanna to mesophytic forest. This broad spectrum of compositional diversity in the dune complex of Indiana Dunes State Park was the outdoor laboratory in which Henry Cowles began his pioneer studies on plant succession.

Although Cowles (1899b) described a linear sequence of succession, he did recognize that sites might not reach the regional climax (i.e., beech maple forest) because of local conditions and because succession was not particularly linear in sequence: "a variable

approaching a variable." Nevertheless, the Indiana Dunes have become known as the "birthplace of American ecology" (see Lindsey et al. 1969). The mesophytic pocket east of Mt. Tom and southwest of Mt. Holden is called "Ecology Cove" because James Watson discovered sugar maple and tulip tree growing there (Lindsey et al. 1969). Ironically, a young tulip tree was seen by Pavlovic growing in Big Blowout in the middle of a very dry little bluestem secondary dune on 3 July 2020.

Jerry Olson (1958d) discovered that, with time, black oak-dominated dune soils became progressively leached and acidic, rendering inaccurate the Clementsian view which held that beech-maple communities are the natural "climax" in such areas (Clements 1916). Kurz (1923) compiled data which, while also demonstrating that the calcareous sandy soils of the dunes become leached and acidic over time, also suggested that a replenishment of calcareous ions by the deposition of wind-blown calcareous sands takes place in certain areas of the beach and foredune complex near the lake. Olson (1958d) added that fire history probably helped maintain black oak in some areas that could otherwise have supported a richer forest and noted that "...the independent variable of abrupt topographic relief tends to isolate the rich dune pockets from spread of fire as well as to make their forest floor moister and less flammable." Pavlovic observed beech saplings in 1983 in the high dunes just east of the state park, as Norman Henderson pointed out (Norman Henderson, former INDU biologist, personal communication with Pavlovic, 1983). These beech saplings were subsequently killed by human-set wildfires, confirming the ability of beech to grow on the dunes and demonstrating the killing of beech by fire (Pavlovic, personal observation, 1983). The east-west orientation of the Indiana dune system suggests the importance of fire in maintaining a savanna complex near more mesophytic pockets that are protected from fire on steep dune slopes and with a nearshore microclimate (Henderson and Long 1984; Henderson 1987; Pavlovic, personal observation). The often-cooler nearshore winds that were onshore during the day would prevent fires from burning into the mesophytic pockets. At night, temperatures would decline more rapidly along the shoreline, where there was no tree cover to reduce radiative loss.

Henderson (1987) summarized the evolution of thinking on succession and dunes ecology from Cowles (1899b) to Cottam (1949) and Sauer (1950), and he provided compelling evidence for the role of fire locally. In this context, the Dunes State Park has experienced fire suppression from the mid-1920s, at least, to the 1990s when prescribed fire was first introduced. During this time, tree density and shading have increased, resulting in the loss of many of the savanna and pinelands species that occupied the dune complex. This was especially true because many of the lost species lack a seed bank from which to persist for such a long time (Glass 1989, Leicht-Young et al. 2009a). Since, in general, a mesophytic groundlayer flora is lacking in INDU, this trend toward mesophytic conditions in the shrub and tree layers from fire suppression is unlikely to be matched in the groundlayer. In addition, the groundlayer becomes depauperate because of the increasing shade and the build-up of persistent oak leaf litter (Pavlovic et al. 2006). Thus, if fire suppression continues, introduction of mesophytic ground flora may be needed to create mesophytic forest; but if burning is reinstituted, reintroduction of savanna and prairie groundlayer species may be needed to restore the dune complex. Either way, fire alone will not create the desired end. The spring geophyte flora is not in close enough proximity to disperse into the new forest, and there is very little seed bank to restore the oak savanna/prairie groundlayer (Leicht- Young et al. 2009a).

Brudvig el al. (2011) has shown that oak savanna groundlayer species are dispersal-limited. In addition, many of the black oak-dominated forests in the park are reaching the age of senescence and eventual tree mortality. While oak regeneration is still quite abundant, indications are that these fire-suppressed woodlands and forests will become a new mesophytic forest dominated by black cherry and oak with a depauperate groundlayer flora. Ash (*Fraxinus* species)

would have been a component of this new forest if the emerald ash borer had not been accidentally introduced into North America (Hausman et al. 2010). Thus, the former savanna portions of the dune complex could be restored from mesophication with fire traversing the dune landscape but burning the mesophytic pockets close to the lake less frequently (Nowacki and Abrams 2008).

The marsh complex portions of Indiana Dunes State Park, like the dune complex, have not been burned and have been ditched to the point where woody species have invaded to a substantial degree, though in some areas, rapid water level changes may have had a reverse effect. The arrival of beaver has modified the vegetation in the Great Marsh around the east end of Trail 2, and the damming necessitated the replacement of the Trail 2 boardwalk (Nevers 2015). The accumulations of enormous amounts of cattail and graminoid duff in the marsh complex may be competing with forbs and weak-stemmed sedges, which at one time were more numerous in the open wetlands of Indiana Dunes State Park. As is true of most of the Dunes Marsh Complex communities, the open wetlands could benefit from regular fire, but only after removal of the hybrid cattail and phragmites and reintroduction of marsh flora. The Dunes State Park portion of the Great Marsh might harbor coastal plant disjunct species in the seed bank. If true, this could increase the native and special flora species of the state park.

The swamp complex, which occupies a large portion of Indiana Dunes State Park, is still largely intact; it is composed mostly of various phases of the hydromesophytic swamp forest community and provides the habitat for many special flora (Wilhelm 1990; Pavlovic, personal observation). The seepage of water from the south off the Calumet dune ridge, along the 600-foot contour line, is important for the maintenance of this community. Fire is irrelevant in the swamp complex because, if water levels are maintained, burning is unlikely. The graminoid and herbaceous fuels are insufficient to sustain fire. Recent activities of beaver may be impacting this habitat along the seep zone. The Dunes State Park and the Indiana Division of Nature Preserves lack the resources to restore the Great Marsh and burn the sand dune uplands frequently enough to support savanna vegetation. The Indiana Dunes Ecosystem Alliance under the direction of Save The Dunes is working to increase interagency coordination and alleviate deficiencies in resources.

Subunit B: The NIPSCO right-of-way

The NIPSCO right-of-way is adjacent to the south edge of the Dunes State Park from Tremont Road to East State Park Road (Kemil Road). The NIPSCO right-of-way has been impacted by human activities resulting from the maintenance of the high-tension transmission lines, the CSSSBR right-of-way, and the combined maintenance road that serves as the Calumet Bike Trail. This portion of the Calumet Bike Trail is a mosaic of marshes, sedge fens, former pasture, and hydromesophytic forest understory without the trees. Portions of the wetter communities are dominated by hybrid cattail and phragmites. In the 1990s, portions of the vegetation were dominated by purple loosestrife that was up to 6 feet tall. The NIPSCO right-of-way contributes species to the state park list, resulting in a mean CoC of 5.2 and an FQI of 77.

Like Cowles Dunes, Indiana Dunes State Park is exceptionally rich floristically, with a very high proportion of special flora: 182 species, or 40% of the dunes' special flora (see Table 29). The bulk of the park (subunit A) has 175 special flora (39%), 639 native, 86 exotic, and 16 adventive species. Subunit B, the NIPSCO right-of-way, has 28 special flora, 206 native, 32 exotic, and two adventive species. Dunes State Park has 685 native flora, with a mean CoC of 6.4 and an FQI of 166 (subunit A), second only to Cowles Dunes. Including the NIPSCO right-of-way, the mean CoC overall decreases to 6.3 but the FQI increases to 170.

Unit 9: Furnessville (formerly Visitor Center)

Early in April 1971, fifty-five acres of Indiana Dunes National Lakeshore woods along

Furnessville Road, southeast of Tremont, burned in a 'wild' fire. Little did I know when I first saw the blackened area a few days later how that fire would change my life. The area was predominantly Black oak woods with Sassafras and Sumac understory. The little sand prairies were well known to me as good blueberry patches, because our summer cottage was nearby, and blueberry cobbler was a traditional family treat. . . .

Well to make a long story shorter, these acres were to become my home away from home. In early 1972 I was looking for a weekend bird research project that I could carry on without a car. . . .

Robert Tweit, Research Chairman for the Chicago Audubon Society, suggested conducting an Audubon Breeding Bird Census in the burned acreage, observing changes in bird populations with relation to plant succession after the fire. . . .

For the next thirteen springs I made as many observation trips as possible, listening for territorial claim singing and watching for parent birds carrying nest material or food, or feeding young. . . .

There are ever so many memories from many wonderful mornings that crowd my mind; wind and worm patterns in bare sand; two Green-backed Herons bowing to each other in a treetop courtship maneuver; threatened Pyrola *species blooming daintily down under the Bracken; fierce purple and navy blue thunder clouds blowing up out of nowhere; the noisy to-do of a baby Hairy Woodpecker being herded by an over-anxious parent; the rare Bob-white's whistle sounding through the fields in the early days (their numbers were greatly reduced by the severe winters of the late 1970's) tiny British Soldier lichens clinging to crusted, sterile sand and on and on – and on.*

—Emma Bickham (Bickie) Pitcher (1986)

The Furnessville Unit of INDU occupies about 606 hectares (1,499 acres) south of Indiana Dunes State Park, between Porter and Furnessville (Figure 21). This area was formerly called the Visitor Center Unit because the former Dorothy Buell Visitor Center was within the unit. The Furnessville Unit spans the southern edge of the Glenwood Dunes to the northern edge of the Calumet Dunes. The trail system through the Furnessville Unit was formerly called the Ly-co-ki-we Trail and extension but is now called the Glenwood Trail system. The Glenwood Trail traverses the Calumet Dunes north of Furnessville Road which is confusing since it implies that the Calumet Dunes are of Glenwood age. In addition, the Furnessville Unit includes former residential areas along Furnessville, Teal, Veden, and Hadenfeld Roads, and internal residential roads in the Tremont area of Potawatomie and Hawleywood subdivisions.

Prior to 1979, the Furnessville Unit had been largely unexplored floristically by previous botanists, or at least very little data on this area had made their way into the literature. It is unclear whether the historical designation of "Furnessville" was north of the Tremont stop or referred to the area along the western portion of Furnessville Road in the vicinity of Hadenfeld and Veden Roads. Several species that Wilhelm previously reported from the Dunes State Park, which he copied from Lyon (1930), have been observed in the Furnessville area by the authors. Certainly,

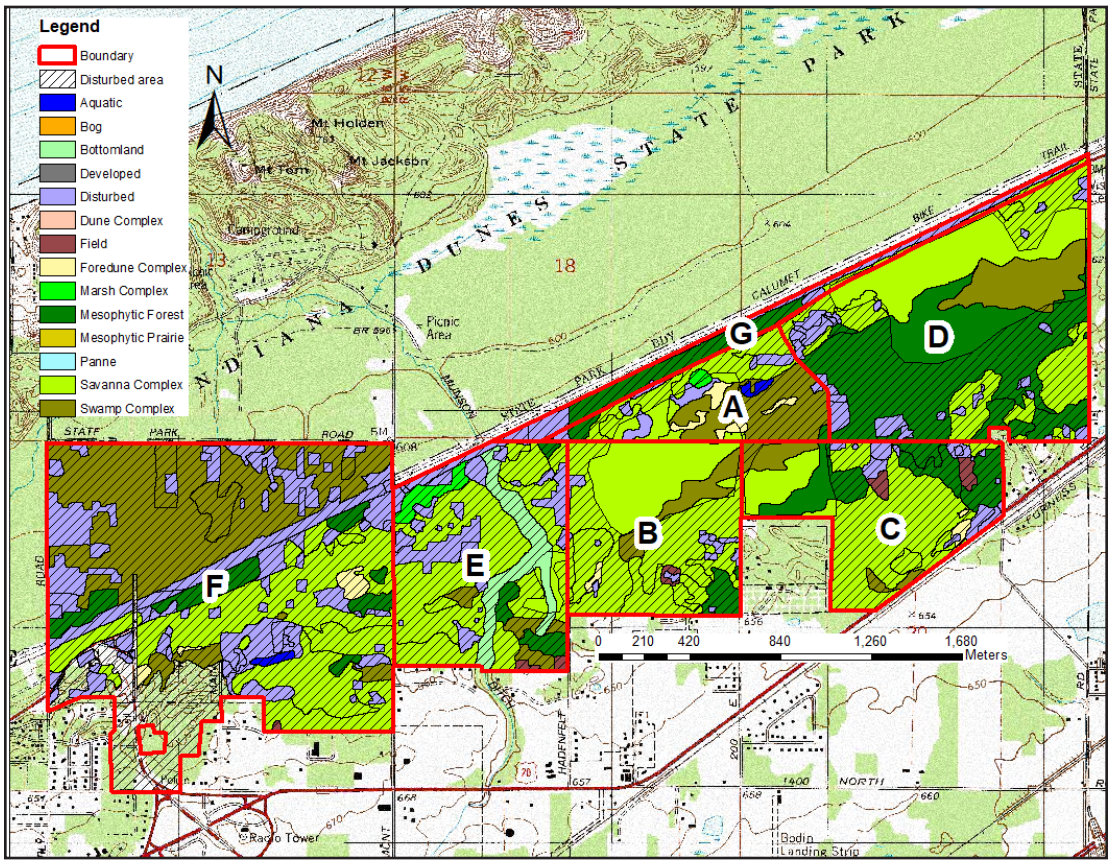


Figure 21. Vegetation of Furnessville Unit. Letters indicate subunits. Cross-hatching indicates disturbed areas.

Lyon's notations "…and vicinity" make this argument plausible. Nevertheless, Furnessville provides the habitat for 108 special flora just short of the 112 for the Miller Unit. Additional special flora taxa may be found here. Pavlovic has explored subunit E extensively.

Since 1979, Emma Pitcher, Plampin, Myrna Newgent, and others have spent extensive periods of time surveying plants in the western portion of Furnessville, particularly in subunit F. Wilhelm accompanied Plampin and Newgent on a survey of the old Buffalo and Mississippi Railroad bed between U.S. Highway 12 and the CSSSBR on 12 September 1997, an area designated as subunit G.

Wilhelm (1990) wrote that many of the special flora that are recorded for Furnessville A and B were brought to his attention by Emma "Bickie" Pitcher, without whom knowledge of these areas would be poor. Emma Pitcher, who once owned a house on Veden Road, had been interested in the vegetation of Furnessville A and B for many years while examining the impact of a wildfire on the bird diversity of the prairie. In 1987, she compiled a comprehensive flora of this portion of the unit for Wilhelm. Wilhelm (1990) recommends that Furnessville A and B, for ease of identity and to honor Emma Pitcher, be called the Emma Pitcher Prairies, North and South, respectively.

Furnessville Woods

Pavlovic recognized the significance of Furnessville Woods, located in Furnessville C, during the initial stages of the NPS/USGS vegetation mapping project. During the initial meetings in 2004, Pavlovic led a delegation of vegetation mappers (Kevin Hop, Jennifer Dieck, and others) to see this site as an example of mature oak forest. This site is comparable to the mature woods along Trail 2 south of the Great Marsh in the Dunes State Park. The overstory of this site is dominated by red oak, black oak, and white oak. Characteristic species of the rich understory include *Actaea pachypoda*, *Medeola virginiana*, *Adiantum pedatum*,

Mitchella repens, *Allium tricoccum burdickii*, *Mitella diphylla*, *Aralia nudicaulis*, *Panax trifolius*, *Asplenium platyneuron*, *Phlox divaricata*, *Caulophyllum thalictroides*, *Phryma leptostachya* var. *leptostachya*, *Carex blanda*, *Podophyllum peltatum*, *Circaea canadensis* ssp. *canadensis*, *Polygonatum pubescens*, *Cryptotaenia canadensis*, *Polystichum acrostichoides*, *Geranium maculatum*, *Prenanthes alba*, *Geum canadense*, *Ribes americanum*, *Sanguinaria canadensis*, *Anemone americana*, *Sanicula odorata*, *Impatiens capensis*, *Packera aurea*, *Laportea canadensis*, *Maianthemum stellatum*, *Lonicera dioica*, *Solidago flexicaulis*, *Thalictrum thalictroides*, *Luzula multiflora*, *Uvularia grandiflora*, *Maianthemum canadense*, and *Viola sororia*.

While the Furnessville Unit has no Lake Michigan shoreline, it harbors considerable habitat diversity, including oak savannas/woodland, marsh complex, mesophytic forest, swamp complex with seeps, and the largest portions of the Glenwood Dune system in the national park. Presented here is a complete list of flora for Furnessville (Table 30).

Special flora summary

Furnessville provides habitat for at least 106 of the special flora of Indiana Dunes National Park (Table 32). Eighty species are confirmed, 20 are new, five are reported, and one is extirpated. *Tradescantia subaspera* is known to be restricted only to Furnessville. Thirty-seven new species of special flora found in Furnessville include *Aletris farinosa*, *Asclepias purpurascens*, *Betula papyrifera*, *Callitriche heterophylla*, *Carex alata*, *C. bebbii*, *Celastrus scandens*, *Cyperus houghtonii*, *Eleocharis melanocarpa*, *Fraxinus americana*, *F. nigra*, *F. pensylvanica*, *Helianthus hirsutus*, *Hudsonia tomentosa*, *Juglans cinerea*, *Juncus scirpoides*, *Juniperus communis*, *Panax quinquefolius*, *Pinus strobus*, *Potamogeton diversifolius*, *Rubus flagellaris* (*R. enslenii*), *Ruellia humilis*, *Sceptridium multifidum*, *Sceptridium oneidense*, *Schoenoplectiella hallii*, *S. purshiana*, *Scleria pauciflora caroliniana*, *S. verticillata*, *Sisyrinchium angustifolium*, *Trichostema dichotomum*, *Trillium erectum*, *Turritis glabra*, *Valerianella chenopodiifolia*, *Verbena simplex*, *Veronica catenata*, and *Viola pubescens*. While the authors have recent

Table 30. Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Abies concolor (Gordon & Glend.) Lindl. ex Hildebr. (*Abies concolor* (Hook.) Nutt.)	–	–	–	–	120	–	–	N	
Acalypha rhomboidea Raf.	–	–	–	–	–	x	–	X	0
Acer negundo L.	–	–	–	–	–	x	x	X	0
Acer platanoides L.	–	–	17	–	129	x	–	X	*
Acer rubrum L.	x	x	X	x	x	x	x	X	7
Acer saccharinum L.	–	–	–	x	–	R	–	X	0
Acer saccharum Marshall	–	–	–	–	–	117	–	N	3
Achillea millefolium L.	x	x	–	x	–	R	x	X	*
Achillea ptarmica L.	–	–	–	–	–	14	–	N	*
Actaea pachypoda Elliott	–	x	X	x	x	–	x	X	7
SF***Adiantum pedatum*** L.	–	–	X	–	–	–	–	X	10
Aesculus glabra Willd.	–	–	–	–	29	–	–	N	3

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Agalinis purpurea (L.) Pennell	x	–	–	–	–	54	–	X	6
Agalinis tenuifolia (Vahl) Raf.	–	–	–	–	–	54	–	N	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	–	x	–	x	x	x	–	X	4
Agrimonia gryposepala Wallr.	–	x	X	–	x	x	x	X	2
Agrimonia parviflora Aiton	–	–	–	–	–	x	x	X	7
Agrimonia pubescens Wallr.	–	–	–	–	x	–	–	X	5
Agrostis gigantea Roth (*Agrostis alba* L.)	–	x	–	–	–	x	x	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	x	–	–	–	–	–	–	X	1
Agrostis perennans (Walter) Tuck.	–	x	X	x	–	–	x	X	3
Ailanthus altissimus (Mill.) Swingle	–	–	18	–	–	x	x	X	*
Ajuga reptans L.	–	–	135	–	–	–	–	N	*
SF***Aletris farinosa*** L.	x	x	–	x	–	–	–	X	10
Alisma subcordatum Raf.	–	–	72	49	–	85	–	N	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	–	97	18	18	18	18	–	N	*
Allium canadense L. var. *canadense* (*Allium canadense* L.)	–	–	–	–	x	–	x	X	2
Allium tricoccum Aiton var. *burdickii* Hanes	–	–	X	–	129	131	–	X	6
Allium vineale L.	–	–	–	–	–	R	–	R	*
SF***Alnus incana*** (L.) Moench ssp. ***rugosa*** (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng.)	–	x	X	–	–	x	x	X	8
Alopecurus aequalis Sobol.	–	–	X	–	–	–	x	X	6
Amaranthus retroflexus L.	–	–	–	–	–	x	–	X	*
Amaranthus tuberculatus (Moq.) J.D. Sauer (*Acnida altissima* Riddell)	–	–	–	–	–	x	–	X	0
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	x	X	x	x	x	x	X	0
Ambrosia trifida L.	–	–	–	–	–	R	–	R	0
Amelanchier arborea (F. Michx.) Fernald	–	–	X	x	x	x	x	X	8
Amelanchier laevis Wiegand	–	x	–	–	–	118, 119	X	X	8
Amphicarpaea bracteata (L.) Fernald	f	–	–	–	–	140	–	N	5
Anemone acutiloba (DC.) G. Lawson (*Hepatica acutiloba* DC.)	–	x	X	–	–	–	–	X	6
Anemone americana (DC.) H. Hara (*Hepatica americana* (DC.) Ker Gawl.)	–	–	X	–	x	43	–	X	9
Anemone blanda Schott & Kotschy	–	–	–	–	153	–	–	N	*
Anemone cylindrica A. Gray	–	x	–	–	–	–	–	X	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	x	–	x	x	x	48	x	X	7
Anemone virginiana L. var. *virginiana* (*Anemone virginiana* L.)	–	–	–	–	–	x	x	X	5

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Angelica atropurpurea L.	–	–	–	–	–	R	–	R	7
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	x	–	x	–	x	–	X	3
Apios americana Medik.	x	–	–	x	–	118	x	X	7
Apocynum androsaemifolium L.	–	R	x	x	–	–	x	X	5
Apocynum cannabinum L.	x	–	–	–	–	–	–	X	4
Aquilegia canadensis L.	–	x	x	–	–	–	–	X	6
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	R	–	–	x	–	x	–	X	5
Arabidopsis thaliana (L.) Heynh.	–	–	–	x	–	–	–	X	*
Aralia nudicaulis L.	–	x	X	x	x	x	X	X	8
Arctium minus (Hill) Bernhardi (*Arctium minus* Schkuhr)	–	–	–	–	–	x	–	X	*
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald & J. F. Macbr.)	–	x	–	–	–	–	–	X	10
Arenaria serpyllifolia L.	–	–	–	x	–	–	–	X	*
Arisaema triphyllum (L.) Schott	–	x	X	x	x	20	X	X	4
Aristida purpurascens Poir.	–	x	–	–	–	3	66	X	5
SF***Aristida tuberculosa*** Nutt.	x	–	–	65	101	–	–	X	9
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	–	x	X	x	x	–	X	X	6
Artemisia biennis Willd.	–	–	–	–	129	–	73	N	*
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	–	–	–	–	x	–	–	X	5
Artemisia vulgaris L.	–	–	–	–	–	–	X	X	*
Asarum canadense L.	–	–	–	–	–	R	–	R	7
Asclepias amplexicaulis Sm.	x	–	–	–	–	–	–	X	7
Asclepias exaltata L.	–	x	–	102	–	–	X	X	9
Asclepias incarnata L.	–	–	–	–	–	R	–	R	4
SF***Asclepias purpurascens*** L.	–	–	–	–	–	R	–	R	8
Asclepias syriaca L.	R	–	–	x	129	x	X	X	0
Asclepias tuberosa L.	R	x	–	–	–	x	–	X	7
Asimina triloba (L.) Dunal	–	–	X	–	129	82	76	X	9
Asparagus officinalis L.	–	–	–	–	–	–	X	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	99	–	–	100	x	59	–	X	4
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	–	–	X	x	x	119	X	X	8
Aureolaria flava (L.) Farw.	–	x	X	–	–	–	–	X	9
Aureolaria pedicularia (L.) Raf. ex Pennell (*Aureolaria pedicularia* (L.) Raf. var. *ambigens* (Fernald) Farw.)	–	x	–	x	–	–	–	X	7

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Avena sativa L.	–	–	–	–	–	–	–	X	*
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	–	x	–	–	–	–	–	X	8
Barbarea vulgaris W.T. Aiton	–	–	–	x	–	x	X	X	*
SF***Bartonia virginica*** (L.) Britton, Sterns & Poggenburg	x	x	–	–	78	–	X	X	10
Berberis thunbergii DC.	–	x	X	–	x	x	X	X	*
Betula nigra L.	–	–	–	–	–	118	–	N	ad
SF***Betula papyrifera*** Marshall	–	–	–	40	–	–	–	N	10
SF***Bidens discoidea*** (Torr. & A. Gray) Britton	–	–	X	x	–	–	–	X	9
Bidens frondosa L.	–	–	–	–	–	x	–	X	1
Blephilia hirsuta (Pursh) Benth.	–	x	–	–	–	–	–	X	8
Boehmeria cylindrica (L.) Sw.	–	x	–	–	x	x	X	X	2
Botrychium virginianum (L.) Sw.	–	x	–	–	x	–	73	X	6
SF***Brachyelytrum erectum*** (Schreb.) P. Beauv.	–	–	X	x	x	–	X	X	10
Bromus pubescens Spreng.	–	–	X	–	x	–	X	X	5
Bromus tectorum L.	–	–	–	–	–	x	–	X	*
Bulbostylis capillaris (L.) C.B. Clarke	–	–	–	–	–	3	–	N	4
Calamagrostis canadensis (Michx.) P. Beauv.	x	–	X	x	–	5	X	X	3
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. *magna* Scribn. & Merr.	–	–	–	–	x	–	–	X	5
SF***Callitriche heterophylla*** Pursh	–	–	–	–	–	52	–	N	9
Caltha palustris L.	–	x	X	x	x	–	–	X	5
Calycanthus floridus L.	–	–	109	–	–	–	–	N	Ad
Campanula rapunculoides L.	–	–	–	–	–	x	–	X	*
Campsis radicans (L.) Bureau	–	–	–	–	–	x	X	X	Ad
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	–	x	X	x	x	R	–	X	6
Cardamine pensylvanica Muhl. ex Willd.	–	x	–	–	x	43	X	X	4
SF***Carex alata*** Torr.	–	–	–	–	–	–	X	X	10
Carex albicans Willd. ex Spreng. var. *albicans*	–	–	–	–	–	–	X	X	5
Carex albicans Willd. ex Spreng. var. *emmonsii* (Dewey ex Torr.) Rettig (*Carex emmonsii* Torr.)	–	–	–	x	–	–	X	X	5
Carex albolutescens Schwein.	x	–	–	–	–	–	X	X	8
Carex albursina E. Sheld.	–	–	–	X	–	–	–	X	7
Carex amphibola Steud.	–	–	–	–	–	–	X	X	10
Carex annectens (E.P. Bicknell) E.P. Bicknell (*Carex annectens* E.P. Bicknell))	–	–	–	–	–	117	–	N	5
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	–	–	–	–	–	–	X	X	6
Carex blanda Dewey	–	–	–	–	–	x	X	X	1

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Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
SF***Carex bromoides*** Schkuhr ex Willd. (*Carex bromoides* Willd.)	–	x	X	X	x	117	–	X	10
SF***Carex canescens*** L.	–	x	–	–	–	–	–	X	10
Carex cephalophora Muhl. ex Willd.	–	x	–	–	–	x	–	X	3
Carex comosa Boott	–	–	–	X	–	–	–	X	5
Carex crinita Lam. var. *crinita*	–	x	–	–	x	117	X	X	10
Carex cristatella Britton	–	–	–	–	–	x	–	X	4
Carex debilis Michx.	–	–	–	–	–	–	143	N	10
SF***Carex debilis*** Michx. var. ***rudgei*** L.H. Bailey	–	–	–	X	x	119	X	X	10
SF***Carex digitalis*** Willd.	–	–	–	X	–	–	X	X	10
SF***Carex folliculata*** L.	–	–	–	X	78	–	X	X	10
Carex gracillima Schwein.	–	x	x	X	–	35	X	X	10
Carex granularis Muhl. ex Willd.	–	–	–	–	–	x	–	X	4
Carex grayi J. Carey	–	–	–	–	–	34	–	N	7
Carex grisea Wahlenb.	–	–	–	–	–	x	X	X	2
Carex hirsutella Mack.	–	–	–	–	–	x	–	X	4
Carex hirtifolia Mack.	–	–	–	–	x	–	–	X	5
SF***Carex intumescens*** Rudge	–	–	x	X	–	x	x	X	10
Carex lacustris Willd.	–	x	R	–	–	117	75	X	6
SF***Carex laxiculmis*** Schwein.	–	–	–	–	x	–	x	X	10
Carex laxiflora Lam.	–	–	x	X	x	–	x	X	10
SF***Carex leptonervia*** (Fernald) Fernald	–	x	–	X	–	–	–	X	10
Carex longii Mack.	–	–	–	–	–	–	x	X	6
Carex lupulina Willd.	–	–	–	–	–	118	–	N	7
Carex lurida Wahlenb.	–	–	–	–	–	x	x	X	8
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.)	x	x	–	X	–	3	–	X	5
Carex normalis Mack.	–	–	x	–	–	–	–	X	5
Carex pensylvanica Lam.	R	x	x	X	x	x	x	X	5
Carex projecta Mack.	–	–	–	–	–	x	–	X	4
Carex radiata (Wahlenb.) Small	–	–	–	–	–	117	x	X	6
Carex rosea Schkuhr ex Willd.	–	–	x	X	x	x	x	X	4
Carex scoparia Schkuhr ex Willd. var. *scoparia*	–	–	–	–	–	117	–	N	7
SF***Carex seorsa*** Howe	–	x	x	X	–	x	x	X	10
Carex stipata Muhl. ex Willd.	–	x	–	X	x	–	x	X	3
Carex stricta Lam.	–	x	–	–	x	117	–	X	5
Carex swanii (Fernald) Mack.	–	–	–	X	–	x	x	X	8
Carex tenera Dewey	–	–	–	–	–	x	–	X	8

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
SF***Carex tonsa*** (Fernald) E.P. Bicknell	–	–	–	X	–	–	–	X	7
Carex tribuloides Wahlenb.	–	–	–	X	–	x	x	X	3
Carex vulpinoidea Michx.	–	–	–	–	–	x	x	X	2
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow (*Carpinus caroliniana* Walter var. *virginiana* (Marshall) Fernald)	–	–	x	X	x	117, 119	x	X	8
Carya cordiformis (Wangenh.) K. Koch	–	–	x	–	–	x	–	X	7
Carya ovata (Mill.) K. Koch	–	R	x	–	x	x	–	X	5
Castanea dentata (Marshall) Borkh.	–	–	–	–	6	–	–	N	Ad
Catalpa bignonoides Walter	–	–	–	–	–	144	–	N	Ad
Catalpa speciosa Teas	–	–	–	–	x	x	–	X	Ad
Caulophyllum thalictroides (L.) Michx.	–	–	115	R	–	–	77	N	8
Celastrus orbiculatus Thunb.	18	N	N	N	N	118, 119	73	X	*
SF***Celastrus scandens*** L.	–	–	x	–	–	x	x	X	4
Celtis occidentalis L.	–	–	–	X	133	–	–	X	3
Cenchrus longispinus (Hack.) Fernald	–	–	–	–	–	x	–	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	–	–	–	–	–	31	–	N	*
Centaurium pulchellum (Sw.) Druce	–	–	–	–	–	x	–	X	*
Cephalanthus occidentalis L.	–	–	x	X	–	x	130	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L.)	–	–	–	X	–	–	x	X	*
Cercis canadensis L.	–	–	–	–	–	119	–	N	ad
Chaenorhinum minus (L.) Lange	–	–	–	–	–	x	–	X	*
Chaerophyllum procumbens (L.) Crantz	–	–	–	–	–	–	94	N	5
Chamaecrista fasciculata (Michx.) Greene var. *fasciculata*	–	–	–	–	–	156 rp	–	N	5
Chelone glabra L.	–	–	x	X	x	–	–	X	8
Chenopodium album L.	–	–	–	–	x	–	–	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	–	–	–	–	–	x	–	X	5
Chenopodium simplex (Torr.) Raf. (*Chenopodium hybridum* L. var. *gigantospermum* (Aellen) Rouleau)	–	–	–	–	–	x	x	X	3
SF***Chimaphila maculata*** (L.) Pursh	–	–	–	X	–	–	–	X	10
SF***Chrysosplenium americanum*** Schwein. ex Hooker	–	–	–	–	x	–	–	X	10
Cichorium intybus L.	–	–	–	–	136	x	–	X	*
Cicuta maculata L.	–	x	–	X	x	R	x	X	6
Cinna arundinacea L.	–	x	x	X	–	x	x	X	5
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	–	x	x	X	x	44	x	X	1

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Cirsium arvense (L.) Scop.	–	–	–	X	–	18	x	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	–	–	–	–	–	x	–	X	2
Cirsium muticum Michx.	–	–	–	–	–	–	x	X	10
Cirsium vulgare (Savi) Ten.	–	–	–	–	–	x	x	X	*
Claytonia virginica L.	–	x	x	X	x	132	–	X	2
Clematis virginiana L.	–	x	–	X	x	x	x	X	4
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	x	–	–	–	–	x	X	7
Commelina communis L.	18	–	–	–	18	x	x	X	*
SF***Conopholis americana*** (L.) Wallr.	R	x	x	45	129	119	x	X	10
Convallaria majalis L.	–	–	–	40	129	R	x	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	x	x	–	–	x	–	–	X	0
SF***Corallorhiza maculata*** (Raf.) Raf.	–	–	–	R	–	59	x	X	10
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	98	110	–	X	–	59	x	X	9
Coreopsis tripteris L.	x	x	–	–	–	44	73	X	5
Cornus alternifolia L. f.	–	x	–	X	x	119	–	X	9
Cornus florida L.	–	x	x	X	x	43	x	X	8
Cornus racemosa Lam.	–	x	–	X	x	x	x	X	1
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	–	x	–	–	–	–	–	X	6
Corylus americana Walter	–	x	x	X	x	R	x	X	5
Crataegus coccinea L.	–	–	x	–	–	92	–	X	4
Crataegus pruinosa (H.L. Wendl.) K. Koch	–	–	–	–	–	x	–	X	5
Crocanthemum canadense (L.) Britton (*Helianthemum canadense* (L.) Michx.)	–	x	–	X	–	59	–	X	8
Crocus vernus (L.) Hill (*Crocus vernus* Wulfen)	–	–	–	–	–	9	–	N	*
Cryptotaenia canadensis (L.) DC.	–	–	–	–	x	–	–	X	2
Cuscuta gronovii Willd. ex Schult.	–	–	–	–	x	–	–	X	4
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	–	–	–	–	–	118	–	N	4
Cyperus erythrorhizos Muhl.	–	–	–	–	–	x	–	X	2
SF***Cyperus houghtonii*** Torr.	–	–	–	–	x	–	–	X	2
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus* (*Cyperus filiculmis* Vahl)	x	x	–	–	–	x	–	X	5
Cyperus schweinitzii Torr.	x	–	–	–	x	–	–	X	5
Cyperus strigosus L.	–	x	–	–	–	54	–	X	1
SF***Cypripedium parviflorum*** Salisbury var. ***pubescens*** (Willdenow) O. W. Knight	–	–	157	157	–	–	–	R	10
Dactylis glomerata L.	–	–	–	–	–	x	x	X	*
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	–	x	–	X	–	x	x	X	3
Datura stramonium L.	–	–	–	–	18	–	–	N	Ad
Daucus carota L.	–	–	–	X	–	x	x	X	*

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SF***Dendrolycopodium dendroideum*** Michx. A. Haines (*Lycopodium obscurum* L.)	–	–	–	1	–	–	–	EX	10
SF***Desmodium ciliare*** (Muhl. ex Willd.) DC.	x	–	–	–	–	–	–	X	10
Desmodium marilandicum (L.) DC.	x	–	–	–	–	–	–	X	7
Desmodium paniculatum (L.) DC.	–	x	x	X	–	–	–	X	6
Desmodium sessilifolium (Torr.) Torr. & A. Gray	x	–	–	–	–	–	–	X	8
Dianthus armeria L.	x	R	–	–	–	58	–	X	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *columbianum* (Scribn.) Freckmann & Lelong (*Panicum columbianum* Scribn.)	–	–	–	X	–	–	–	X	7
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	–	x	x	X	–	x	–	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	–	–	–	X	–	–	–	X	9
Dichanthelium clandestinum (L.) Gould (*Panicum clandestinum* L.)	x	–	x	X	x	117, 118, 123	x	X	6
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	x	–	–	X	–	–	–	X	7
SF***Dichanthelium dichotomum*** (L.) Gould ssp. ***dichotomum*** (*Panicum dichotomum* L.)	x	x	–	X	–	–	x	X	10
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	–	x	–	X	x	–	x	X	5
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	–	x	–	X	–	x	–	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	–	–	X	x	–	–	X	7
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	–	–	–	X	–	–	–	X	8
SF***Diervilla lonicera*** Mill.	–	–	x	47	–	–	x	X	9
Digitaria cognata (J.A. Schultes) Pilger (*Leptoloma cognatum* (Schult.) Chase)	–	–	–	–	–	x	–	X	3
Digitaria sanguinalis (L.) Scop.	x	–	–	–	x	–	–	X	*
Dioscorea oppositifolia L.	–	–	–	–	–	104	–	N	*
Dioscorea villosa L.	–	x	x	X	x	x	x	X	7
Diphasiastrum digitatum (Dill. ex A. Braun) Holub (*Lycopodium complanatum* L. var. *flabelliforme* Fernald	–	x	–	32	x	–	–	X	8
SF***Diphasiastrum tristachyum*** (Pursh) Holub (*Lycopodium tristachyum* Pursh)	x	–	–	–	–	–	–	EX	10
Dipsacus fullonum L.	–	–	–	–	–	158	–	N	*

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	–	x	–	–	–	117, 119	x	X	9
Draba verna L.	–	–	–	–	–	41	–	N	*
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O. F. Müll.) Watt)	–	–	x	X	x	7	–	X	8
Dryopteris cristata (L.) A. Gray	–	–	–	–	x	141	74	X	10
Dryopteris intermedia (Muhl. ex Willd.) A. Gray	–	x	–	X	x	130	–	X	8
Dulichium arundinaceum (L.) Britton	–	–	–	948	–	–	–	N	9
Echinacea purpurea (L.) Moench	–	–	–	–	–	156 rp	–	N	ad
Echinochloa crusgalli (L.) P. Beauv.	–	–	–	–	–	x	–	X	0
Elaeagnus angustifolia L.	–	–	–	–	–	–	84	N	*
Elaeagnus umbellata Thunb.	–	154	–	–	–	x	x	X	*
Eleocharis engelmannii Steud.	–	111	–	–	–	25	–	N	9
Eleocharis erythropoda Steud.	–	–	–	–	–	59	–	N	2
Eleocharis flavescens (Poir.) Urb. var. *olivacea* (Torr.) Gleason (*Eleocharis olivacea* Torr.)	–	–	–	–	–	107	–	N	9
SF***Eleocharis melanocarpa*** Torr.	–	–	–	–	–	54	–	N	10
Eleocharis obtusa (Willd.) Schult.	–	–	–	–	–	107	–	N	3
Ellisia nyctelea (L.) L.	–	–	–	68	26	–	–	N	2
Elymus canadensis L.	–	x	–	–	–	–	–	X	4
Elymus hystrix L. (*Hystrix patula* Moench)	–	–	x	–	–	R	–	X	5
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	–	–	–	x	x	x	X	*
Elymus villosus Muhl. ex Willd.	–	–	–	–	x	117	–	X	5
SF***Epigaea repens*** L.	x	x	–	–	–	–	–	X	10
Epilobium coloratum Biehler	–	–	–	–	–	x	–	X	3
Equisetum arvense L.	36	x	x	–	x	43	x	X	0
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	–	–	–	–	x	118	–	X	3
Equisetum laevigatum A. Braun	–	–	–	–	x	–	–	X	2
Eragrostis spectabilis (Pursh) Steud.	x	x	–	80	–	–	–	X	3
Eranthis hyemalis (L.) Salisb.	–	–	–	–	145	–	–	N	*
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	–	x	x	X	x	–	x	X	2
Erigeron annuus (L.) Pers.	–	–	–	X	–	x	–	X	0
Erigeron philadelphicus L.	–	–	–	X	–	–	–	X	4
Erigeron strigosus Muhl. ex Willd.	–	–	–	X	–	R	–	X	5
Euonymus alatus (Thunb.) Siebold	–	–	–	–	–	118, 119	x	X	*
Euonymus atropurpureus Jacq.	–	x	–	–	–	118, 119	–	X	8

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Euonymus europeaus L.	–	–	–	–	28	–	–	N	*
Euonymus fortunei (Turcz.) Hand.-Mazz.	–	–	–	–	–	119	–	N	*
Euonymus obovatus Nutt.	–	x	x	X	x	–	–	X	7
Eupatorium perfoliatum L.	–	x	–	X	–	R	x	X	4
Eupatorium serotinum Michx.	–	–	–	X	–	118	–	X	0
Euphorbia corollata L.	x	x	–	X	–	x	–	X	2
Euphorbia dentata Michx.	–	–	–	–	x	–	–	X	*
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	–	–	–	–	x	–	–	X	0
SF***Eurybia furcata*** (E.S. Burgess) G. L. Nesom (*Aster furcatus* E. S. Burgess)	–	–	–	–	–	103	–	X	10
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	–	x	x	X	x	x	x	X	8
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	x	–	X	–	x	x	X	3
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	–	–	–	–	–	63	–	N	5
Eutrochium fistulosum (Barratt) E.E. Lamont (*Eupatorium fistulosum* Barratt)	–	–	x	X	–	x	x	X	10
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	–	x	–	X	–	R	–	X	4
Fagus grandifolia Ehrh.	–	–	–	X	x	R	x	X	5
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	–	–	155	–	16	27	–	N	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	–	–	–	–	x	–	–	X	1
Festuca ovina L.	–	–	–	–	–	–	–	X	*
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	–	x	x	X	x	117	x	X	5
Fimbristylis autumnalis (L.) Roem. & Schult.	–	x	–	–	–	54	–	X	5
Floerkea proserpinacoides Willd.	–	–	–	42	105	40	–	N	8
Fragaria virginiana Miller	x	x	–	X	x	44	73	X	1
SF***Fraxinus americana*** L.	–	x	x	X	–	x	x	X	5
SF***Fraxinus nigra*** Marshall	–	x	x	–	x	–	–	X	10
SF***Fraxinus pennsylvanica*** Marshall	x	–	x	–	–	119	–	X	5
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	–	–	–	X	–	x	x	X	1
Galinsoga quadriradiata Ruiz & Pavón (*Galinsoga ciliata* (Raf.) S.F. Blake)	–	–	–	–	–	x	–	X	*
Galium aparine L.	–	x	x	X	x	R	x	X	1
Galium circaezans Michx. var. *hypomalacum* Fernald	–	x	x	X	x	–	x	X	7
Galium concinnum Torr. & A. Gray	–	x	x	X	x	117	x	X	5
SF***Galium lanceolatum*** (Torr.) Torr.	–	79	x	–	–	–	–	X	10

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Galium obtusum Bigelow	–	–	–	X	–	–	x	X	5
Galium pilosum Aiton	–	x	–	–	–	–	–	X	10
Galium triflorum Michx.	–	x	x	X	x	x	x	X	5
Gaultheria procumbens L.	x	x	x	X	x	43	x	X	9
Gaylussacia baccata (Wangenh.) K. Koch	–	x	–	X	–	–	–	X	9
Gentiana andrewsii Griseb.	–	–	–	–	–	39	–	N	8
SF***Gentiana saponaria*** L.	x	x	–	71	–	R	–	X	8
Geranium carolinianum L.	–	–	–	–	–	x	–	X	3
Geranium maculatum L.	–	x	x	X	x	R	x	X	4
Geranium pusillum L.	–	–	–	–	–	x	–	X	*
Geum canadense Jacq.	–	x	x	X	x	x	x	X	1
Geum laciniatum Murray (*Geum laciniatum* Murray var. *trichocarpum* Fernald)	–	–	–	–	x	x	–	X	5
Glechoma hederacea L.	–	–	–	–	x	x	–	X	*
Glyceria canadensis (Michx.) Trin.	–	–	–	49	–	117	x	X	10
Glyceria septentrionalis Hitchc.	–	x	R	–	–	–	–	X	8
Glyceria striata (Lam.) Hitchc.	–	x	x	X	x	x	x	X	4
SF***Goodyera pubescens*** (Willd.) R. Br.	–	–	–	42	–	R	–	X	9
Hackelia virginiana (L.) I. M. Johnst.	–	–	–	–	129	x	x	X	0
Hamamelis virginiana L.	x	x	x	X	x	43	x	X	8
Hedera helix L.	–	–	–	–	–	119	–	N	*
Helenium autumnale L.	–	–	–	–	–	x	–	X	5
Helenium flexuosum Raf.	–	–	–	–	–	x	–	X	Ad
Helianthus divaricatus L.	–	x	x	X	–	x	x	X	5
Helianthus grosseserratus M. Martens	–	–	–	–	–	x	–	X	2
SF***Helianthus hirsutus*** Raf.	–	–	–	–	–	117	–	N	5
Helianthus occidentalis Riddell	–	x	–	–	–	–	–	X	10
Helianthus strumosus L.	–	–	–	–	–	x	–	X	5
Hemerocallis fulva (L.) L.	–	–	–	–	–	x	x	X	*
Heracleum sphondylium L. ssp. *montanum* (Schleich. ex Gaudin) Briq. (*Heracleum spondylium* Linnaeus)	–	123	123	123	–	121	–	N	5
Hesperis matronalis L.	–	x	–	X	129	x	–	X	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	–	R	–	–	–	–	–	R	7
Hieracium caespitosum Dumort.	–	–	–	X	–	–	x	X	*
Hieracium gronovii L.	x	x	x	X	–	–	x	X	6
Hieracium scabrum Michx.	–	x	–	X	–	–	–	X	8
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	–	x	–	–	–	57	–	X	6
Holcus lanatus L.	–	–	–	–	–	x	–	X	*

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
Houstonia caerulea L.	–	x	–	–	–	–	–	X	9
SF***Hudsonia tomentosa*** Nutt.	–	–	–	–	–	56	–	N	10
SF***Huperzia lucidula*** (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	–	x	–	X	–	R	–	X	10
Hyacinthoides non-scripta (L.) Chouard (*Scilla non-scripta* (L.) Hoffmanns. & Link)	–	–	–	–	–	10	–	N	*
Hydrophyllum appendiculatum Michx.	–	–	–	–	–	R	–	R	8
Hydrophyllum virginianum L.	–	–	–	–	–	R	–	R	5
Hylodesmum glutinosum (Muhl. ex Willd.) H. Ohashi & R. R. Mill (*Desmodium glutinosum* (Willd.) Alph. Wood)	–	–	x	47	x	46	–	X	5
Hylodesmum nudiflorum (L.) H. Ohashi & R. R. Mill (*Desmodium mudiflorum* (L.) DC.)	–	x	x	–	–	–	–	X	9
Hylotelephium telephium (L.) H. Ohba (*Sedum purpureum* (L.) Schult.)	–	–	–	–	–	–	83	N	*
SF***Hypericum boreale*** (Britton) E.P. Bicknell	–	–	–	–	–	85	–	N	10
SF***Hypericum canadense*** L.	–	x	–	–	–	–	–	X	10
SF***Hypericum kalmianum*** L.	x	x	–	X	–	22	–	X	10
Hypericum mutilum L.	–	–	–	–	–	x	–	X	8
Hypericum perforatum L.	R	–	–	–	–	x	–	X	*
Hypericum punctatum Lam.	–	–	–	–	–	x	–	X	4
SF***Hypopitys monotropa*** Crantz (*Monotropa hypopitys* L.)	–	–	–	X	61	61	x	X	10
Ilex opaca Aiton (*Ilex opaca* L.)	113	–	–	42	120	119	–	N	Ad
Ilex verticillata (L.) A. Gray	–	x	–	X	–	117, 119	x	X	9
Impatiens capensis Meerb.	–	x	x	X	x	132	x	X	3
Impatiens pallida Nutt.	–	–	–	X	136	R	–	X	6
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	x	–	–	–	–	–	X	10
Ipomoea hederacea Jacq.	–	120	–	–	–	–	–	N	*
Iris pseudacorus L.	–	–	–	–	129	–	–	N	*
Iris virginica L.(*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	–	x	x	X	x	R	x	X	5
SF***Juglans cinerea*** L.	–	–	–	–	–	87	–	X	8
Juglans nigra L.	99	–	–	–	–	x	–	X	5
Juncus acuminatus Michx.	–	–	–	–	–	118	–	N	6
Juncus canadensis J. Gay ex Laharpe	–	–	–	–	–	x	–	X	7
Juncus dudleyi Wiegand	–	–	–	–	–	x	–	X	4
Juncus effusus L.	–	–	x	X	–	x	x	X	7
Juncus greenei Oakes & Tuck.	x	–	–	–	–	–	–	X	8
SF***Juncus scirpoides*** Lam.	–	–	–	–	–	118	–	N	9
Juncus tenuis Willd.	–	x	–	X	–	x	x	X	0

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
SF***Juniperus communis*** L.	–	–	–	4	–	5	–	N	10
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	–	–	–	–	–	–	x	X	2
Kerria japonica (L.) DC.	–	–	–	–	x	–	–	X	*
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	x	x	–	X	–	–	–	X	7
Krigia biflora (Walter) S.F. Blake	x	x	–	X	–	43	x	X	7
Krigia virginica (L.) Willd.	x	–	–	X	–	44	–	X	6
Lactuca canadensis L.	x	x	–	X	x	–	–	X	2
Lamiastrum galeobdolon (L.) Ehrend. & Polatschek	–	114	–	–	–	–	–	N	*
Laportea canadensis (L.) Wedd.	–	x	–	–	x	–	–	X	3
Lathyrus latifolius L.	–	–	–	47	–	x	–	X	*
Lechea minor L.	–	x	–	–	–	–	–	X	7
Lechea mucronata Raf. (*Lechea villosa* Elliott)	x	x	–	44	–	64	–	X	6
Lechea pulchella Raf. var. *moniliformis* (E.P. Bicknell ex Britton) Mohlenbr. (*Lechea pulchella* Raf.)	–	x	–	–	–	–	–	X	7
Leersia oryzoides (L.) Sw.	–	x	x	X	–	117, 118	–	X	4
Leersia virginica Willd.	–	–	–	–	x	x	–	X	7
Lemna minor L.	–	x	x	X	–	–	x	X	5
Lemna trisulca L.	–	–	x	–	–	–	–	X	7
Leontodon saxatilis Lamarck	–	–	146	–	–	–	–	N	*
Leonurus cardiaca L.	–	–	–	–	x	x	–	X	*
Lepidium campestre (L.) W.T. Aiton	x	–	–	X	–	x	–	X	*
Lepidium perfoliatum L.	–	–	–	–	–	147	–	N	*
Lepidium virginicum L.	–	–	–	X	–	–	–	X	0
Lespedeza capitata Michx.	x	x	–	X	–	58	–	X	4
Lespedeza hirta (L.) Hornem.	x	x	–	X	–	–	–	X	6
Lespedeza thunbergii (DC.) Nakai	–	–	–	–	–	12	–	N	*
Lespedeza virginica (L.) Britton	x	–	–	–	–	–	–	X	4
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte)	x	–	–	–	–	–	73	X	*
Leucojum aestivum L.	–	–	–	–	x	132	–	X	*
Liatris aspera Michx.	x	x	–	X	–	70	–	X	6
Ligustrum vulgare L.	–	x	–	–	–	x	x	X	*
Lilium michiganense Farw.	–	x	x	40	x	108	x	X	6
Lindera benzoin (L.) Blume	–	x	x	X	x	x	x	X	7
Lindernia dubia (L.) Pennell (*Lindernia anagallidea* (Michx.) Pennell)	–	–	–	–	–	11	–	N	6
SF***Linum virginianum*** L.	–	x	–	–	86	22	–	X	10

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.	95	–	–	49	–	R	x	X	6
Lipocarpha micrantha (Vahl) G.C. Tucker (*Hemicarpha micrantha* (Vahl) Pax)	–	–	–	–	–	54	–	N	6
Liriodendron tulipifera L.	–	–	x	X	x	43	x	X	5
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	–	–	–	–	x	–	X	8
Lobelia cardinalis L.	R	–	–	–	–	x	x	X	7
Lobelia inflata L.	R	–	–	53	–	x	x	X	4
Lobelia siphilitica L.	–	–	–	–	x	–	x	X	6
Lolium multiflorum Lam.	–	R	–	–	–	–	–	R	*
SF***Lonicera dioica*** L.	R	–	–	–	x	–	–	X	10
Lonicera japonica Thunb.	–	–	–	–	–	x	x	X	*
Lonicera tatarica L.	–	–	–	–	–	–	73	X	*
Lonicera × *bella* Zabel [*L. tartarica* × *L. morrowii*]	–	–	–	–	–	x	–	X	*
Ludwigia alternifolia L.	x	–	–	–	–	54	–	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	–	–	–	–	–	60	–	N	5
Ludwigia polycarpa Short & R. Peter	–	–	–	–	–	82	–	N	6
Lunaria annua L.	–	–	–	–	–	x	–	X	*
Lupinus perennis L. var. *occidentalis* S. Watson	x	x	–	–	129	–	–	X	7
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	–	–	–	X	x	43	x	X	7
SF***Lycopodium clavatum*** L.	x	–	–	19	–	–	–	X	10
Lycopus americanus Muhl. ex W.P.C. Barton	–	–	–	–	–	x	x	X	5
Lycopus rubellus Moench	–	–	–	–	–	–	x	X	10
Lycopus uniflorus Michx.	–	x	–	–	–	–	x	X	7
Lycopus virginicus L.	x	–	–	X	–	–	–	X	9
Lysimachia ciliata L.	–	x	–	–	x	118, 119	–	X	4
Lysimachia nummularia L.	–	–	–	–	–	x	–	X	*
Lysimachia thyrsiflora L.	x	R	–	–	–	–	–	X	9
Lythrum salicaria L.	–	–	–	–	–	x	x	X	*
SF***Maianthemum canadense*** Desf.	–	–	–	X	–	–	73	X	10
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	x	x	X	x	40	x	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	–	x	x	X	129	x	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	R	x	–	X	x	x	x	X	5
Malus coronaria (L.) Mill.	–	–	–	–	–	–	x	X	4
Malus ioensis (Alph. Wood) Britton	x	x	–	–	x	–	–	X	3

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
SF***Matteuccia struthiopteris*** (L.) Tod. var. ***pensylvanica*** (Willd.) C.V. Morton	–	–	–	–	129	R	–	R	10
Medeola virginiana L.	–	x	x	X	x	x	x	X	10
Medicago lupulina L.	–	–	–	X	–	x	–	X	*
Melilotus alba Medik.	–	–	–	–	x	x	x	X	*
Menispermum canadense L.	–	x	–	–	125	x	–	X	6
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	–	x	–	49	x	–	–	X	5
Mertensia virginica (L.) Pers. ex Link	–	–	–	–	x	x	–	X	Ad
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	–	x	–	X	x	R	–	X	10
Mimulus ringens L.	–	–	–	–	–	R	x	X	6
Mirabilis nyctaginea (Michx.) MacMill.	–	–	–	–	–	x	–	X	Ad
SF***Mitchella repens*** L.	–	x	–	X	x	–	x	X	10
Mitella diphylla L.	–	x	–	–	x	–	–	X	10
Mollugo verticillata L.	–	–	–	–	–	x	–	X	Ad
Monarda fistulosa L.	–	x	–	X	–	R	x	X	4
Monarda punctata L.	x	x	–	X	x	70	–	X	5
SF***Monotropa uniflora*** L.	–	–	–	–	–	130	–	N	10
Morus alba L.	–	–	–	–	x	x	–	X	*
Muhlenbergia frondosa (Poir.) Fernald	–	–	–	X	–	–	x	X	3
Muhlenbergia mexicana (L.) Trin.	–	–	–	–	–	–	x	X	5
Muhlenbergia schreberi J. F. Gmel.	–	–	–	138	–	119	–	N	0
Myosurus minimus L.	–	–	–	–	–	148	–	N	*
Narcissus poeticus L.	–	–	–	126	–	–	–	N	*
Narcissus × *incomparabilis* Mill. [*N. poeticus* × *N. pseudonarcissus*]	–	–	–	126	–	–	–	N	*
Nasturtium officinale W.T. Aiton	–	–	–	–	–	R	–	R	*
Nepeta cataria L.	–	–	–	–	–	x	–	X	*
Nuttallanthus canadensis (L.) D.A. Sutton	–	154	–	–	–	–	–	N	
Nyssa sylvatica Marshall	–	x	x	X	x	43	x	X	8
Oenothera biennis L.	–	–	–	X	x	R	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	–	–	–	x	70	–	X	7
Oenothera pilosella Raf.	–	–	–	–	–	x	–	X	10
Onoclea sensibilis L.	x	x	x	X	x	x	x	X	8
Opuntia cespitosa Raf. (*O. humifusa* (Raf.) Raf.)	x	–	–	–	–	42	–	X	5
Ornithogalum umbellatum L.	–	–	–	–	67	x	x	X	*
Osmorhiza claytonii (Michx.) C.B. Clarke	–	x	x	X	x	–	x	X	3
Osmorhiza longistylis (Torr.) DC.	–	x	–	–	–	–	x	X	3
Osmunda claytoniana L.	–	–	79	–	x			X	9

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	x	x	x	X	x	43	x	X	8
Osmundastrum cinnamomeum (L. .) C. Presl (*Osmunda cinnanomea* L.)	–	x	x	X	x	43	x	X	7
Ostrya virginiana (Mill.) K. Koch	–	–	–	–	x	117		X	5
Oxalis dillenii Jacq.	–	–	–	X	–	117		X	0
Oxalis stricta L. (*Oxalis europaea* Jord.)	–	x	–	X	–	x	x	X	0
Oxypolis rigidior (L.) Raf.	–	x	x	X	x	117	x	X	7
Pachysandra terminalis Siebold & Zucc.	134	–	–	–	129	8		N	*
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	–	–	–	X	x	132		X	7
SF***Panax quinquefolius*** L.	–	–	–	–	–	43		N	9
SF***Panax trifolius*** L.	–	–	–	X	x	40	x	X	10
Panicum capillare L.	–	–	–	–	–	x	–	X	1
Panicum rigidulum Bosc ex Nees	x	–	–	–	–	3	–	X	5
Panicum virgatum L.	x	x	–	X	–	43	x	X	5
Parietaria pensylvanica Muhl. ex Willd.	–	–	–	–	x	x	–	X	3
Parthenocissus quinquefolia (L.) Planch.	–	x	x	X	–	x	x	X	2
Pedicularis canadensis L.	–	x	–	X	–	R	x	X	9
Pedicularis lanceolata Michx.	–	–	–	–	–	x	73	X	9
Penstemon digitalis Nutt. ex Sims	R	–	–	–	–	x	–	X	4
Penthorum sedoides L.	–	–	–	–	–	64	–	N	5
SF***Persicaria arifolia*** (L.) Haroldson (*Polygonum arifolium* L. var. *pubescens* (Keller) Fernald)	–	–	x	–	–	–	–	X	9
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	–	–	x	–	–	64	–	X	7
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	–	x	–	–	–	–	–	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	x	x	–	–	–	–	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	–	–	–	–	x	x	–	X	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	–	x	–	X	x	x	x	X	2
Phalaris arundinacea L.	–	–	–	–	–	–	x	X	*
SF***Phegopteris hexagonoptera*** (Michx.) Fee (*Dryopteris hexagonoptera* (Michx.) C. Chr.)	–	–	x	–	–	–	–	X	10
Phleum pratense L. ssp. *pratense*	–	–	–	–	–	x	–	X	*
Phlox divaricata L.	–	–	–	–	x	R	–	X	5
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	–	–	–	–	–	x	73	X	1
Phryma leptostachya L. var. *leptostachya*	–	–	–	–	38	–	–	N	4
Physostegia virginiana (L.) Benth.	–	–	–	–	–	R	–	N	6
Phytolacca americana L.	–	–	–	–	x	x	–	X	1

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Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Picea abies (L.) H. Karst.	–	–	–	–	120	x	–	N	*
Pilea pumila (L.) A. Gray	–	–	–	–	–	x	x	X	5
SF***Pinus banksiana*** Lamb.	x	–	–	65	–	R	–	X	9
Pinus resinosa Aiton	–	–	–	–	–	112	–	N	10
Pinus rigida Mill.	91	–	–	–	–	–	–	N	Ad
SF***Pinus strobus*** L.	–	–	–	96	–	93	–	N	9
Pinus sylvestris L.	17	–	–	–	–	–	–	N	*
Plantago lanceolata L.	–	–	–	–	–	x	–	X	*
Plantago rugelii Decne.	–	x	–	X	–	–	x	X	0
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	2	–	–	93	–	R	x	X	10
Platanus occidentalis L.	–	–	–	–	x	R	–	X	9
Poa annua L.	–	–	–	–	–	x	–	X	*
Poa compressa L.	R	x	–	X	–	x	x	X	*
Poa nemoralis L.	–	–	–	–	–	127	–	N	*
Poa palustris L.	–	–	–	–	–	x	–	X	9
Poa pratensis L.	–	–	–	X	x	x	x	X	*
SF***Poa saltuensis*** Fernald & Wiegand ssp. ***languida*** (Hitchc.) A. Haines (*Poa languida* Hitchc.)	–	x	–	–	–	–	x	X	10
Poa trivialis L.	–	–	–	–	–	117, 119	–	N	*
Podophyllum peltatum L.	–	x	x	X	x	59	73	X	4
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	x	R	–	47	–	62	–	X	9
Polygala sanguinea L.	–	x	–	–	–	–	–	X	6
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	–	x	–	X	–	x	–	X	3
Polygonatum pubescens (Willd.) Pursh	–	x	x	X	x	x	x	X	7
Polygonum tenue Michx.	x	x	–	–	–	50	–	X	7
Polystichum acrostichoides (Michx.) Schott	–	–	x	–	x	–	–	X	9
Pontederia cordata L.	–	–	–	–	x	–	–	X	10
Populus deltoides W. Bartram ex Marshall	x	x	–	X	129	x	x	X	2
Populus grandidentata Michx.	R	R	–	X	–	–	73	X	6
Populus tremuloides Michx.	x	x	–	X	–	–	x	X	4
SF***Potamogeton diversifolius*** Raf.	–	–	37	–	–	–	–	N	9
Potamogeton nodosus Poir.	–	–	–	–	–	55	–	N	7
Potentilla argentea L.	–	–	–	–	–	x	–	X	*
Potentilla norvegica L.	–	–	–	–	–	x	–	X	0
Potentilla recta L.	–	x	–	–	x	–	–	X	*
Potentilla simplex Michx.	–	x	x	X	–	x	x	X	4

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
Prenanthes alba L.	–	x	–	X	x	–	x	X	5
Prenanthes altissima L.	–	x	x	X	–	–	x	X	8
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	–	–	–	X	–	21	–	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	–	x	–	–	–	x	x	X	0
Prunus hortulana L.H. Bailey	–	–	–	–	–	15	–	N	*
SF***Prunus pensylvanica*** L. f.	x	x	–	X	–	–	–	X	5
Prunus persica (L.) Batsch	–	–	–	–	149	–	–	N	*
Prunus pumila L.	x	–	–	–	x	–	–	X	8
Prunus serotina Ehrh.	R	x	x	X	x	x	x	X	1
Prunus virginiana L.	–	x	x	X	x	R	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	x	x	–	X	–	11	–	X	2
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	–	–	–	–	–	R	–	R	7
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	R	x	x	X	x	44	x	X	5
Pycnanthemum tenuifolium Schrad.	–	–	–	–	–	x	–	X	7
SF***Pyrola americana*** Sweet (*Pyrola rotundifolia* L. *americana* (Sweet) Fernald)	x	–	–	46	–	–	–	X	10
SF***Pyrola elliptica*** Nutt.	–	x	–	47	–	–	x	X	10
Quercus alba L.	R	x	x	X	x	44	x	X	5
Quercus bicolor Willd.	–	x	x	–	–	x	–	X	6
Quercus palustris Munchh.	x	x	x	X	x	44	x	X	8
Quercus rubra L.	–	X	x	X	x	x	x	X	7
Quercus velutina Lam.	x	X	x	X	x	44	x	X	6
Ranunculus abortivus L.	–	X	x	X	x	–	x	X	0
Ranunculus flabellaris Raf.	–	X	R	–	–	–	–	X	7
Ranunculus hispidus var. *caricetorum* (Greene) T. Duncan	–	150	–	–	–	–	–	N	10
Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan (*Ranunculus septentrionalis* Poir.)	–	X	x	–	x	x	–	X	5
Ranunculus recurvatus Poir.	–	X	–	X	–	–	x	X	5
Ranunculus sceleratus L.	–	–	R	–	–	–	–	R	6
SF***Rhexia virginica*** L.	x	–	–	–	–	–	–	X	10
Rhodotypos scandens (Thunb.) Makino	–	–	–	–	91	–	–	N	*
SF***Rhus aromatica*** Aiton var. ***arenaria*** (Greene) Fernald	–	152	–	–	–	–	–	X	9
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	x	X	–	X	–	R	–	X	6
Rhus typhina L.	–	X	–	X	–	44	x	X	1
Rhynchospora capitellata (Michx.) Vahl	x	110	–	–	–	54	–	X	8

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Ribes americanum Mill.	–	–	x	X	x	118	–	X	7
Ribes cynosbati L.	–	X	x	X	x	51	–	X	5
SF***Ribes hirtellum*** Michx.	–	X	–	–	–	–	–	X	10
Robinia pseudoacacia L.	18	–	–	X	x	18	x	X	Ad
Rosa carolina L.	–	X	–	X	x	x	x	X	5
Rosa multiflora Thunb.	–	X	16	X	x	x	x	X	*
Rosa palustris Marshall	–	X	R	X	x	–	x	X	7
Rotala ramosior (L.) Koehne	–	–	–	–	–	54	–	N	10
Rubus allegheniensis Porter	–	X	x	X	–	117	–	X	3
Rubus flagellaris Willd.	x	X	–	X	–	x	–	X	3
Rubus flagellaris Willd. (SF***Rubus enslenii*** Tratt.)	–	–	–	–	–	119	x	X	10
Rubus hispidus L.	x	X	x	X	x	118, 119	x	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	–	X	x	X	–	R	–	X	3
Rubus occidentalis L.	–	X	–	X	x	x	x	X	2
Rubus pensilvanicus Poir.	–	–	–	–	x	x	x	X	3
SF***Rubus pubescens*** Raf.	–	X	x	X	x	–	–	X	10
Rudbeckia hirta L.	x	–	–	–	–	R	x	X	1
Rudbeckia laciniata L. var. *laciniata*	–	–	–	–	–	x	–	X	5
Rudbeckia triloba L.	–	–	–	–	–	x	–	X	3
SF***Ruellia humilis*** Nutt.	–	–	–	–	–	R	–	R	7
Rumex acetosella L.	x	X	–	X	–	44	–	X	*
Rumex crispus L.	–	–	–	X	–	x	–	X	*
Rumex obtusifolius L.	–	x	–	–	–	x	x	X	*
SF***Sabatia angularis*** (L.) Pursh	–	–	–	–	–	R	–	R	10
Salix discolor Muhl.	x	–	–	X	–	117	–	X	2
Salix humilis Marshall	x	–	–	–	–	–	–	X	6
Salix interior Rowlee	–	–	–	–	–	x	–	X	1
Salix petiolaris Sm.	–	–	–	–	–	x	–	X	7
SF***Salix sericea*** Marshall	–	x	–	X	–	–	–	X	10
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	–	x	–	X	x	x	x	X	1
Sambucus racemosa var. *pubens* (Michx.) Hulten (*Sambucus pubens* Michx.)	–	R	–	–	–	–	–	R	10
Sanguinaria canadensis L.	–	–	x	–	106	–	–	X	6
Sanicula canadensis L.	–	x	–	–	–	x	–	X	7
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	–	–	–	X	x	117	–	X	2
Saponaria officinalis L.	–	–	–	–	x	x	–	X	*

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF." .

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Sassafras albidum (Nutt.) Nees	x	x	x	X	x	44	x	X	3
Saururus cernuus L.	–	–	–	–	x	x	–	X	9
SF***Sceptridium dissectum*** (Spreng.) Lyon	79	–	X	40	x	x	X	X	6
SF***Sceptridium multifidum*** (S.G. Gmel.) M. Nishida (*Botrychium multifidum* (S.G. Gmelin) Rupr.; *Botrychium multifidum* (J. F. Gmel.) Rupr. var. *intermedium* (D.C. Eaton) Farw.)	116	–	–	–	–	–	–	X	10
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	–	–	–	–	–	x	x	X	*
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	x	–	X	x	69	x	X	5
SF***Schoenoplectiella hallii*** (A. Gray) Lye (*Schoenoplectus hallii* (A. Gray) S.G. Sm.; *Scirpus hallii* A. Gray)	–	–	–	–	–	25	–	N	10
SF***Schoenoplectiella purshiana*** (Fernald) Lye (*Schoenoplectus purshianus* (Fernald) M.T. Strong; *Scirpus purshianus* Fernald)	–	–	–	–	–	50	–	N	9
Scilla sibirica Andrews	–	–	–	–	23	–	–	X	*
Scirpus atrovirens Willd.	–	–	–	–	–	–	x	X	4
Scirpus cyperinus (L.) Kunth	–	–	–	–	–	118	84	N	6
SF***Scleria pauciflora*** Muhl. ex Willd. var. ***caroliniana*** (Willd.) Alph. Wood	–	96	–	–	–	–	–	N	10
Scleria triglomerata Michx.	–	110	–	–	–	–	–	N	10
SF***Scleria verticillata*** Muhl. ex Willd.	–	–	–	–	–	58	–	N	10
Scrophularia lanceolata Pursh	–	–	–	–	x	–	–	X	5
Scutellaria lateriflora L.	–	x	–	X	–	x	x	X	5
Sedum acre L.	–	–	–	–	–	–	73	N	*
Sedum sarmentosum Bunge	–	–	–	–	–	–	x	X	*
Senna hebecarpa (Fernald) H. S. Irwin & Barneby	–	–	–	–	–	159 rp	–	N	ad
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	–	–	–	–	–	x	–	X	*
Setaria viridis (L.) P. Beauv.	122	–	–	–	x	–	–	X	*
Silene coronaria (L.) Clairville (*Lychnis coronaria* (L.) Desr.)	–	–	–	–	–	x	–	X	*
Silene csereii Baumg.	–	–	–	–	–	R	–	R	*
Silene latifolia Poir. (*Lychnis alba* Mill.)	–	–	–	–	–	–	–	X	*
Silene stellata (L.) W. T. Aiton	–	79	–	–	–	–	–	N	6
Silphium var. *perfoliatum* L.	–	–	–	–	–	156	–	N	5
Sinapis arvensis L. (*Brassica kaber* (DC.) Wheeler)	–	–	–	–	–	R	–	R	0
SF***Sisyrinchium angustifolium*** Mill.	–	–	–	–	–	–	13	N	10
Sium suave Walter	–	x	x	X	–	R	–	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	–	–	–	–	–	R	–	R	5

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Smilax lasioneura Hook.	–	–	x	X	–	117	–	X	5
Smilax rotundifolia L.	x	x	x	X	–	x	x	X	7
Solanum carolinense L.	–	–	–	–	–	R	–	R	Ad
Solanum dulcamara L.	–	–	x	X	–	119	–	X	*
Solanum ptychanthum Dunal (*S. americanum* Mill.)	–	–	–	–	x	x	–	X	0
Solidago altissima L.	x	x	–	X	–	43	x	X	1
Solidago caesia L.	–	x	x	X	x	x	x	X	7
Solidago canadensis L.	–	–	–	–	–	117, 119	–	N	1
Solidago flexicaulis L.	–	–	–	–	x	–	–	X	7
Solidago gigantea Aiton	–	–	–	–	x	117, 119	x	X	4
Solidago juncea Aiton	–	–	–	–	–	x	–	X	5
Solidago nemoralis Aiton	x	x	–	X	–	–	–	X	4
Solidago patula Muhl. ex Willd	–	x	x	X	x	117	x	X	9
Solidago rigida L.	–	–	–	–	–	156	–	N	ad
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	x	x	–	X	–	x	x	X	6
Solidago sempervirens L.	–	–	–	–	–	x	–	X	Ad
SF***Solidago speciosa*** Nutt.	x	x	–	X	–	–	–	X	7
Solidago ulmifolia Muhl. ex Willd.	–	–	–	–	x	–	–	X	5
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	–	–	–	–	–	R	–	R	*
Sorghastrum nutans (L.) Nash	x	x	–	X	–	70	–	X	5
Spiraea alba Du Roi	–	–	–	X	–	–	–	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	x	–	–	–	–	118	x	X	9
Spiranthes cernua (L.) Rich.	x	x	–	–	–	–	–	X	7
SF***Stachys hyssopifolia*** Michx.	–	–	–	–	–	x	–	X	9
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	x	–	–	–	–	x	x	X	5
Staphylea trifolia L.	–	–	–	–	67	–	–	N	7
Stellaria media (L.) Vill.	–	–	–	–	–	x	x	X	*
Stylophorum diphyllum (Michx.) Nutt.	–	–	–	–	129	121	–	N	Ad
Symphoricarpos albus (L.) S.F. Blake var. *laevigatus* (Fernald) S.F. Blake	–	–	–	–	–	–	73	N	10
Symphoricarpos orbiculatus Moench	–	–	–	71	–	–	x	X	Ad
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	–	–	x	–	–	x	x	X	7
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	–	–	–	–	–	–	–	X	2

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit							Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*		
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	x	x	–	–	–	–	–	X	5
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	–	–	–	–	–	x	x	X	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	x	x	x	X	x	x	x	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	x	–	X	–	–	x	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	–	x	–	X	–	x	–	X	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)	–	–	–	–	x	x	–	X	9
Symphyotrichum urophyllum (Lindl.) G.L. Nesom (*Aster sagittifolius* Willd.)	–	–	–	–	–	x	x	X	5
Symplocarpus foetidus (L.) W. Salisb.	–	x	x	X	x	44	x	X	8
Syringa vulgaris L.	–	–	–	–	86	86	83	N	*
Taraxacum officinale F. H. Wiggers	–	x	–	X	–	117, 119	x	X	*
Taxus cuspidata Siebold & Zucc.	–	–	–	–	18	–	–	N	*
Tephrosia virginiana (L.) Pers.	–	x	–	X	–	–	–	X	8
Teucrium canadense L.	–	–	–	–	–	x	–	X	3
Thalictrum amphibolum Greene (*Thalictrum revolutum* DC.)	–	x	–	–	x	–	–	X	6
Thalictrum dioicum L.	–	–	–	–	x	117	x	X	7
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	–	–	x	–	x	132	–	X	7
SF***Thelypteris noveboracensis*** (L.) Nieuwl. (*Dryopteris noveboracensis* (L.) A. Gray)	–	–	x	X	x	119	x	X	10
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	x	x	x	X	–	R	x	X	6
Tilia americana L.	–	–	x	X	x	117	–	X	5
SF***Torreyochloa pallida*** (Torr.) G.L. Church var. ***pallida*** (*Glyceria pallida* (Torr.) Trin.)	–	–	x	–	–	–	151	X	10
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	X	x	X	x	x	x	X	2
SF***Toxicodendron vernix*** (L.) Kuntze (*Rhus vernix* L.)	–	–	–	–	–	x	–	X	10
Tradescantia ohiensis Raf.	x	x	–	X	x	44	x	X	2
SF***Tradescantia subaspera*** Ker Gawl.	–	x	–	–	–	–	–	X	10
SF***Trichostema dichotomum*** L.	–	–	–	81	–	–	–	N	5
Tridens flavus (L.) Hitchc. (*Triodia flava* (L.) Smyth)	–	–	–	–	–	x	x	X	Ad
SF***Trientalis borealis*** Raf.	–	–	79	43	–	4	x	X	10
Trifolium arvense L.	–	–	–	–	–	x	–	N	*
Trifolium repens L.	–	–	–	X	–	158	–	X	*

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
SF***Trillium erectum*** L.	–	–	–	–	x	–	–	X	10
Trillium flexipes Raf.	–	–	–	–	–	43	–	N	6
Trillium grandiflorum (Michx.) Salisb.	–	–	–	–	X	43	–	X	8
Trillium recurvatum L. C. Beck	–	x	x	–	–	44	–	X	5
Triodanis perfoliata (L.) Nieuwl. (*Specularia perfoliata* (L.) DC.)	–	–	–	–	–	x	–	X	4
Triplasis purpurea (Walter) Chapm.	R	–	–	–	–	3	–	X	7
Tsuga canadensis (L.) Carriere	–	–	–	–	–	124	–	N	Ad
SF***Turritis glabra*** L. (*Arabis glabra* (L.) Bernh.)	–	–	–	–	–	30	–	N	6
Typha angustifolia L.	–	–	–	–	–	–	73	N	1
Ulmus americana L.	–	x	x	X	x	x	–	X	3
Ulmus pumila L.	–	–	–	–	90	117	–	N	*
Ulmus rubra Muhl.	–	–	–	–	–	117	–	N	4
Ulmus × *notha* (in ed.) G. Wilh. & G. Ware [*U. pumila* × *U. rubra*]	–	–	–	–	–	128	–	N	*
Urtica dioica L. ssp. *gracilis* (Aiton) Selander (*Urtica procera* Willd.)	–	–	–	–	–	89	x	X	2
Uvularia grandiflora Sm.	–	–	x	–	x	–	–	X	7
Vaccinium angustifolium Aiton	x	x	x	X	x	130	x	X	5
Vaccinium corymbosum L.	R	–	–	40	–	–	x	X	8
Vaccinium pallidum Aiton	R	x	–	–	x	x	x	X	5
SF***Valerianella chenopodiifolia*** (Pursh) DC.	–	–	–	–	–	33	–	N	9
Verbascum thapsus L. ssp. *thapsus*	x	–	–	X	x	R	x	X	*
SF***Verbena simplex*** Lehm.	–	–	–	–	–	0	–	X	6
Verbena urticifolia L.	–	–	–	–	137	x	x	X	5
Verbesina alternifolia (L.) Britton ex Kearney (*Actinomeris alternifolia* (L.) DC.)	–	–	–	–	–	x	–	X	5
Vernonia fasciculata Michx.	–	–	–	–	–	R	–	R	5
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt. var. *taeniotricha* S.F. Blake)	–	–	–	–	–	x	–	X	5
Vernonia missurica Raf.	–	–	–	–	–	x	–	X	4
Veronica arvensis L.	–	–	–	X	–	–	–	X	*
SF***Veronica catenata*** Pennell (*Veronica comosa* Richt.)	–	–	–	–	–	–	x	X	10
Veronica scutellata L.	–	–	–	–	–	93	–	N	10
Veronicastrum virginicum (L.) Farw.	–	–	–	–	–	x	–	X	7
Viburnum acerifolium L.	–	x	x	X	x	43	x	X	9
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* Fernald)	–	–	–	–	–	X 119	x	X	Ad
Viburnum lentago L.	–	x	–	X	x	x	x	X	5
Viburnum opulus L. var. *opulus*	–	–	–	–	x	x	–	X	*

Table 30 (continued). Summary of species verified and reported at Furnessville Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 31. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*	*C*	*D*	*E*	*F*	*G*		
Viburnum prunifolium L.	–	–	–	–	x	x	x	X	5
Viburnum rafinesqueanum Schult.	–	x	–	–	–	–	–	X	5
Vinca minor L.	–	–	18	X	18	18	x	X	*
Viola arvensis Murray	–	–	–	–	–	x	–	X	*
SF***Viola blanda*** Willd. (*Viola incognita* var. *forbesii* Brainerd)	–	x	–	X	–	–	–	X	10
Viola cucullata Aiton	–	x	x	X	x	–	–	X	9
Viola labradorica Schrank (*Viola conspersa* Rchb.)	–	–	–	–	x	24	–	X	6
Viola lanceolata L.	x	–	–	–	–	82	–	X	7
SF***Viola macloskeyi*** F.E. Lloyd (*V. pallens* (Banks ex Ging.) Brainerd; *V. macloskeyi* ssp. *pallens* (Banks ex Ging.) M.S. Baker)	–	–	x	X	–	43	–	X	10
Viola pedata L. (*Viola pedata* L. *linearíloba* DC.)	–	x	–	X	–	–	–	X	9
Viola pubescens Aiton	–	x	x	X	–	x	–	X	5
SF***Viola sagittata*** Aiton var. ***ovata*** (Nutt.) Torr. & A. Gray (*Viola fimbriatula* Sm.)	–	x	–	–	–	–	–	X	6
Viola sagittata Aiton var. *sagittata*	x	x	–	X	–	–	x	X	7
Viola sororia Willd.	–	x	x	X	x	x	x	X	3
Viola striata Aiton	–	x	–	139	–	–	–	X	6
Vitis aestivalis Michx.	–	x	x	X	x	x	x	X	7
SF***Vitis labrusca*** L.	x	–	47	–	–	44	x	X	9
Vitis riparia Michx.	–	x	x	X	129	x	x	X	2
Vulpia myuros (L.) C.C. Gmel.	x	–	–	–	–	–	–	X	*
Vulpia octoflora (Walter) Rydb.	x	–	–	X	–	–	–	X	4
Yucca flaccida Haworth (*Yucca smalliana* Fernald)	–	–	–	–	16	–	x	X	Ad
Zanthoxylum americanum Mill. (*Xanthoxylum americanum* Mill.)	–	–	–	–	–	X	–	X	3
Zizia aurea (L.) W.D.J. Koch	–	–	–	43	–	44	–	X	7

Table 31. Sources of new species verified and reported from Furnessville.

Notes	Source(s)	Date	Species
1	S. Bagby and N.B. Pavlovic	1992	*Dendrolycopodium dendroideum*
2	N. Bergendahl	1983	*Platanthera clavellata*
3	K. Board	3 Dec 1995	*Aristida purpurascens*, *Bulbostylis capillaris*, *Carex muehlenbergii*, *Panicum rigidulum*, *Triplasis purpurea*
4	K. Board	16 Dec 1995	*Juniperus communis*, *Trientalis borealis*
5	K. Board	Dec 1995	*Calamagrostis canadensis*
6	K. Board	NO DATE	*Castanea dentata*
7	K. Board and B. Plampin	3 Dec 1995	*Dryopteris carthusiana*
8	L. Forste and L. Schelling	10 May 2002	*Pachysandra terminalis*
9	R. Hiebert	24 Mar 1982	*Crocus vernus*
10	R. Hiebert	25 Apr 1984	*Hyacinthoides non-scripta*
11	R. Johnson	26 Aug 1994	*Caulophyllum thalictroides*, *Lindernia dubia*, *Pseudognaphalium obtusifolium*
12	R. Johnson and B. Plampin	24 Aug 1994	*Lespedeza thunbergii*
13	R. Johnson and B. Plampin	4 June 1999	*Sisyrinchium angustifolium*
14	E. Kjellmark	22 July 1987	*Achillea ptarmica*
15	K. Klick	10 May 1989	*Prunus hortulana*
16	D. Mickey	12 Sept 2003	*Fallopia japonica*, *Rosa multiflora*, *Yucca flaccida*
17	D. Mickey	17 Sept 2003	*Acer platanoides*, *Pinus sylvestris*
18	D. Mickey	Fall 2003	*Ailanthus altissimus*, *Alliaria petiolata*, *Celastrus orbiculatus*, *Cirsium arvense*, *Commelina communis*, *Datura stramonium*, *Robinia pseudoacacia*, *Taxus cuspidata*, *Vinca minor*
19	M. Newgent	7 July 1992	*Lycopodium clavatum*
20	M. Newgent	30 Aug 1994	*Arisaema triphyllum*
21	M. Newgent	Aug 1994	*Proserpinaca palustris*
22	M. Newgent and B. Plampin	30 Aug 1994	*Hypericum kalmianum*, *Linum virginianum*
23	N.B. Pavlovic	19 Apr 1988	*Scilla sibirica*
24	N.B. Pavlovic	Apr 1988	*Viola labradorica*
25	N.B. Pavlovic	14 Oct 1993	*Eleocharis engelmannii*, *Schoenoplectiella hallii*
26	N.B. Pavlovic	31 May 1996 and earlier	*Ellisia nyctelea*
27	N.B. Pavlovic	Aug 1999	*Fallopia japonica*
28	N.B. Pavlovic	10 May 2001	*Euonymus europeaus*
29	N.B. Pavlovic	30 Apr 2002	*Aesculus glabra*
30	N.B. Pavlovic	14 July 2003	*Turritis glabra*
31	N.B. Pavlovic	Summer 2003	*Centaurea stoebe* ssp. *micranthos*
32	N.B. Pavlovic and S. Bagby	1992	*Diphasiastrum digitatum*
33	N.B. and S. Pavlovic	12 May 1998	*Valerianella chenopodiifolia*
34	Pavlovic et al. (Exotic Project)	26 May 1999	*Carex grayi*
35	Pavlovic et al. (Exotic Project)	26 May 1999	*Carex gracillima*
36	Pavlovic et al. (Exotic Project)	3 June 1999	*Equisetum arvense*
37	Pavlovic et al. (Exotic Project)	25 June 1999	*Potamogeton diversifolius*
38	Pavlovic et al. (Exotic Project)	8 July 1999	*Phryma leptostachya* var. *leptostachya*
39	E. Pitcher	Pre-1985	*Gentiana andrewsii*

Table 31 (continued). Sources of new species verified and reported from Furnessville.

Notes	Source(s)	Date	Species
40	B. Plampin	28 Apr 1992	*Betula papyrifera*, *Convallaria majalis*, *Floerkea proserpinacoides*, *Lilium michiganense*, *Maianthemum canadense*, *Panax trifolius*, *Sceptridium dissectum*, *Vaccinium corymbosum*
41	B. Plampin	30 Apr 1992	*Draba verna*
42	B. Plampin	Apr 1992	*Floerkea proserpinacoides*, *Goodyera pubescens*, *Ilex opaca*, *Opuntia cespitosa*
43	B. Plampin	12 May 1992	*Anemone americana*, *Cardamine pensylvanica*, *Cornus florida*, *Equisetum arvense*, *Gaultheria procumbens*, *Hamamelis virginiana*, *Krigia biflora*, *Liriodendron tulipifera*, *Luzula multiflora* ssp. *multiflora*, *Nyssa sylvatica*, *Osmundastrum cinnamomeum*, *Osmunda regalis* var. *spectabilis*, *Panax quinquefolius*, *Panicum virgatum*, *Solidago altissima*, *Trientalis borealis*, *Trillium flexipes*, *Trillium grandiflorum*, *Viburnum acerifolium*, *Viola macloskeyi*, *Zizia aurea*
44	B. Plampin	May 1992	*Circaea canadensis* ssp. *canadensis*, *Coreopsis tripteris*, *Fragaria virginiana*, *Krigia virginica*, *Lechea mucronata*, *Pteridium aquilinum* var. *latiusculum*, *Quercus alba*, *Quercus palustris*, *Quercus velutina*, *Rhus typhina*, *Rumex acetosella*, *Sassafras albidum*, *Symplocarpus foetidus*, *Tradescantia ohiensis*, *Trillium recurvatum*, *Vitis labrusca*, *Zizia aurea*
45	B. Plampin	5 July 1992	*Conopholis americana*
46	B. Plampin	7 July 1992	*Hylodesmum glutinosum*, *Pyrola americana*
47	B. Plampin	July 1992	*Diervilla lonicera*, *Hylodesmum glutinosum*, *Lathyrus latifolius*, *Polygala polygama*, *Pyrola elliptica*, *Vitis labrusca*
48	B. Plampin	1992	*Anemone quinquefolia* var. *quinquefolia*
49	B. Plampin	20 Aug 1993	*Alisma subcordatum*, *Glyceria canadensis*, *Liparis lilifolia*, *Mentha arvensis*
50	B. Plampin	14 Oct 1993	*Polygonum tenue*, *Schoenoplectiella purshiana*
51	B. Plampin	3 Apr 1994	*Ribes cynosbati*
52	B. Plampin	July 1994	*Callitriche heterophylla*
53	B. Plampin	20 Aug 1994	*Lobelia inflata*
54	B. Plampin	26 Aug 1994	*Agalinis purpurea, A. tenuifolia*, *Cyperus strigosus*, *Eleocharis melanocarpa*, *Fimbristylis autumnalis*, *Lipocarpha micrantha*, *Ludwigia alternifolia*, *Rhynchospora capitellata*, *Rotala ramosior*
55	B. Plampin	30 Aug 1994	*Potamogeton nodosus*
56	B. Plampin	1 Sept 1994	*Hudsonia tomentosa*
57	B. Plampin	14 Sept 1994	*Hieracium umbellatum*
58	B. Plampin	3 Sept 1994	*Dianthus armeria*, *Lespedeza capitata*, *Scleria verticillata*
59	B. Plampin	Sept 1994	*Asplenium platyneuron*, *Corallorhiza maculata*, *Eleocharis erythropoda*, *Crocanthemum canadense*, *Podophyllum peltatum*
60	B. Plampin	14 Oct 1994	*Ludwigia palustris*
61	B. Plampin	7 Nov 1994	*Hypopitys monotropa*
62	B. Plampin	28 June 1995	*Polygala polygama*
63	B. Plampin	14 Aug 1995	*Euthamia gymnospermoides*
64	B. Plampin	15 Aug 1995	*Lechea mucronata*, *Persicaria arifolia*, *Persicaria hydropiperoides*
65	B. Plampin	2 Dec 1995	*Pinus banksiana*, *Aristida tuberculosa*
66	B. Plampin	1995	*Aristida purpurascens*
67	B. Plampin	31 May 1996	*Ornithogalum umbellatum*, *Staphylea trifolia*
68	B. Plampin	May 1996	*Ellisia nyctelea*
69	B. Plampin	1 Sept 1996	*Schizachyrium scoparium*
70	B. Plampin	17 Sept 1996	*Liatris aspera*, *Monarda punctata*, *Oenothera clelandii*, *Sorghastrum nutans*
71	B. Plampin	31 Oct 1996	*Gentiana saponaria*, *Symphoricarpos orbiculatus*

Table 31 (continued). Sources of new species verified and reported from Furnessville.

Notes	Source(s)	Date	Species
72	B. Plampin	1996	*Alisma subcordatum*
73	B. Plampin	4 July 1997	*Artemisia biennis*, *Botrychium virginianum*, *Celastrus orbiculatus*, *Coreopsis tripteris*, *Fragaria virginiana*, *Leucanthemum vulgare*, *Lonicera tatarica*, *Maianthemum canadense*, *Pedicularis lanceolata*, *Phragmites australis* ssp. *australis*, *Podophyllum peltatum*, *Populus grandidentata*, *Sedum acre*, *Symphoricarpos albus* var. *laevigatus*, *Typha angustifolia*
74	B. Plampin	7 July 1997	*Dryopteris cristata*
75	B. Plampin	8 July 1997	*Carex lacustris*
76	B. Plampin	9 July 1997	*Asimina triloba*
77	B. Plampin	31 July 1997	*Caulophyllum thalictroides*
78	B. Plampin	Aug 1997	*Bartonia virginica*, *Carex folliculata*
79	B. Plampin	May 1998	*Galium lanceolatum*, *Osmunda claytoniana*, *Sceptridium dissectum*, *Silene stellata*, *Trientalis borealis*
80	B. Plampin and K. Board	16 July 1995	*Eragrostis spectabilis*
81	B. Plampin and K. Board	16 Dec 1995	*Trichostema dichotomum*
82	B. Plampin and R. Johnson	26 Aug 1994	*Asimina triloba*, *Ludwigia polycarpa*, *Viola lanceolata*
83	B. Plampin and R. Johnson	1 Aug 1997	*Hylotelephium telephium*, *Syringa vulgaris*
84	B. Plampin and R. Johnson	4 Aug 1997	*Elaeagnus angustifolium*, *Scirpus cyperinus*
85	B. Plampin and M. Newgent	30 Aug 1994	*Alisma subcordatum*, *Hypericum boreale*
86	B. Plampin and M. Newgent	Aug 1994	*Linum virginianum*, *Syringa vulgaris*
87	B. Plampin and S.W. Pavlovic	May 1992	*Juglans cinerea*
88	B. Plampin and T. Bonace	11 Oct 2004	*Dulichium arundinaceum*
89	K. Quinlan	30 May 2003	*Urtica dioica* ssp. *gracilis*
90	K. Quinlan and D. Mickey	13 Nov 2003	*Ulmus pumila*
91	K. Quinlan and D. Mickey	14 Nov 2003	*Pinus rigida*, *Rhodotypos scandens*
92	K. Quinlan and D. Mickey	Fall 2003	*Crataegus coccinea*
93	A. and D. Resetar	20 Aug 1993	*Pinus strobus*, *Platanthera clavellata*, *Veronica scutellata*
94	S. Young, K. Potts, and D. Zaya	24 May 2006	*Chaerophyllum procumbens*
95	D. Hamilla	26 Aug 2007	*Liparis liliifolia*
96	B. Plampin	9 Oct 2007	*Scleria pauciflora*
97	S. Young, K. Frohnapple, and N. Pavlovic	May 2008	*Alliaria petiolata*
98	B. Plampin	30 Sept 2008	*Corallorhiza odontorhiza*
99	D. Hamilla	30 Sept 2008	*Asplenium platyneuron*, *Juglans nigra*
100	D. Hamilla	16 Oct 2008	*Asplenium platyneuron*
101	B. Plampin and D. Hamilla	16 Oct 2008	*Aristida tuberculosa*
102	N.B. Pavlovic	3 July 2009	*Asclepias exaltata*
103	S. Namestnik	27 Aug 2010	*Eurybia furcata*
104	M. Hacker	Sep 2010	*Dioscorea oppositifolia*
105	N.B. and S.W. Pavlovic	22 Apr 2011	*Floerkea proserpinacoides*
106	N.B. and S.W. Pavlovic	22 Apr 2011	*Sanguinaria canadensis*
107	D. Hamilla	12 Oct 2010	*Eleocharis flavescens*, *Eleocharis obtusa*
108	N.B. Pavlovic	13 July 2011	*Lilium michiganense*

Table 31 (continued). Sources of new species verified and reported from Furnessville.

Notes	Source(s)	Date	Species
109	N.B. Pavlovic and L. Forste; N.B. Pavlovic and S. Leicht-Young	5 May 2002; 6 Dec 2005	*Calycanthus floridus*
110	B. Plampin and D. Hamilla	8 Oct 2007	*Corallorhiza odontorhiza*, *Rhynchospora capitellata*, *Scleria triglomerata*
111	B. Plampin	29 Oct 2007	*Eleocharis engelmannii*
112	N.B. Pavlovic	8 Nov 2011	*Pinus resinosa*
113	N.B. Pavlovic and S. Leicht-Young	Dec 2005	*Ilex opaca*
114	K. Quinlan and N.B. Pavlovic	29 June 2005	*Lamiastrum galeobdolon*
115	N.B. Pavlovic		*Caulophyllum thalictroides*
116	B. Plampin and D. Hamilla	23 Aug 2007	*Sceptridium multifidum*
117	L. Miramontes-Lloyd	2010	*Amphicarpaea bracteata*, *Acer saccharinum, Carex annectens*, *Carex bromoides*, *Carex crinita* var. *crinita*, *Carex lacustris*, *Carex radiata*, *Carex scoparia*, *Carex stricta, Carpinus caroliniana* ssp. *virginiana*, *Dichanthelium clandestinum*, *Doellingeria umbellata* var. *umbellata*, *Elymus villosus*, *Festuca subverticillata*, *Galium concinnum*, *Glyceria canadensis*, *Helianthus hirsutus*, *Ilex verticillata*, *Leersia oryzoides*, *Ostrya virginiana*, *Oxalis dillenii*, *Oxypolis rigidior*, *Poa trivialis*, *Rubus allegheniensis*, *Salix discolor*, *Sanicula odorata*, *Smilax lasioneura*, *Solidago canadensis*, *Solidago gigantea*, *Solidago patula*, *Taraxacum officinale*, *Thalictrum dioicum*, *Tilia americana*, *Ulmus pumila*, *Ulmus rubra*
118	D. Hamilla, B. Plampin, and M. Hacker	2010	*Amelanchier laevis*, *Apios americana*, *Betula nigra*, *Carex lupulina*, *Celastrus orbiculatus*, *Cyperus bipartitus*, *Dichanthelium clandestinum*, *Equisetum hyemale* ssp. *affine*, *Euonymus alatus*, *Euonymus atropurpureus*, *Eupatorium serotinum*, *Juncus acuminatus*, *Juncus scirpoides*, *Leersia oryzoides*, *Lysimachia ciliata*, *Ribes americanum*, *Rubus hispidus*, *Scirpus cyperinus*, *Spiraea tomentosa* var. *rosea*
119	M. Hacker, C. Satkoski, J. Dollard, and R. Langlie (Mason crew)	2010	*Amelanchier laevis*, *Athyrium filix-femina* var. *angustum*, *Carex debilis* var. *rudgei*, *Carpinus caroliniana* ssp. *virginiana*, *Celastrus orbiculatus*, *Cercis canadensis*, *Conopholis americana*, *Cornus alternifolia*, *Dichanthelium clandestinum*, *Doellingeria umbellata* var. *umbellata, Euonymus alatus*, *Euonymus atropurpureus*, *Euonymus fortunei*, *Fraxinus pennsylvanica*, *Hedera helix*, *Ilex opaca*, *Ilex verticillata*, *Lysimachia ciliata*, *Muhlenbergia schreberi*, *Poa trivialis*, *Rubus flagellaris*, *Rubus hispidus*, *Solanum dulcamara*, *Solidago canadensis*, *Solidago gigantea*, *Taraxacum officinale*, *Thelypteris noveboracensis*, *Viburnum dentatum*
120	M. Fortelka, C. Hoiland, K. Pitstick, and E. Neuffer	20 June 2012	*Ilex opaca*, *Ipomoea hederacea*
120	D. Hamilla	12 Mar 2012	*Abies concolor*, *Ipomoea hederacea*, *Picea abies*
121	N.B. Pavlovic	Late 1990s	*Heracleum sphondylium* ssp. *montanum*, *Stylophorum diphyllum*
122	W. Warner and K. Yoder	6 June 2013	*Setaria viridis*
123	M. Korte and N.B. Pavlovic	21 Aug 2013	*Heracleum sphondylium* ssp. *montanum*
124	N.B. and S.W. Pavlovic	2012	*Tsuga canadensis*
125	N.B. Pavlovic and S.A. Leicht-Young	2010	*Menispermum canadense*
126	G. Wilhelm	1 May 1993	*Narcissus poeticus*, *Narcissus* × *incomparabilis*
127	D.K. Otto	17 June 1982	*Poa nemoralis*
128	K. Cole and K. Klick	17 Apr 1989	*Ulmus* × *notha* (in ed.)

Table 31 (continued). Sources of new species verified and reported from Furnessville.

Notes	Source(s)	Date	Species
129	N.B. and S.W. Pavlovic	25 May 2014	*Acer platanoides*, *Allium tricoccum* var. *burdickii*, *Artemisia biennis*, *Asclepias syriaca*, *Asimina triloba*, *Conopholis americana*, *Convallaria majalis*, *Hackelia virginiana*, *Hesperis matronalis*, *Iris pseudacorus*, *Lupinus perennis* var. occidentalis, *Maianthemum racemosum* ssp. *racemosum*, *Matteuccia struthiopteris* var. *pensylvanica*, *Pachysandra terminalis*, *Populus deltoides*, *Stylophorum diphyllum*, *Vitis riparia*
130	D. Hamilla	29 July 2014	*Cephalanthus occidentalis*, *Dryopteris intermedia*, *Monotropa uniflora*, *Vaccinium angustifolium*
131	S.W. Pavlovic and students	30 Mar 2016	*Allium tricoccum* var. *burdickii*
132	N.B. and S.W. Pavlovic	7 May 2016	*Claytonia virginica*, *Impatiens capensis*, *Leucojum aestivum*, *Packera aurea*, *Thalictrum thalictroides*
133	S.W. and N.B. Pavlovic	2 Oct 2016	*Celtis occidentalis*
134	S. Erdelac and N.B. Pavlovic	3 Apr 2017	*Pachysandra terminalis*
135	N.B. Pavlovic	8 May 2017	*Ajuga reptans*
136	N.B. Pavlovic	27 June 2017	*Cichorium intybus*, *Impatiens pallida*
137	N.B. Pavlovic	18 Aug 2017	*Verbena urticifolia*
138	N.B. Pavlovic, J. Chapelle, and B. Struecker	28 Sept 2017	*Muhlenbergia schreberi*, restoration planting at USGS
139	N.B. Pavlovic	16 May 2018	*Viola striata*
140	S.W. and N.B. Pavlovic	20 Sept 2018	*Amphicarpaea bracteata*
141	D. Hamilla	25 Aug 2008	*Dryopteris cristata*
142	D. Otto (MOR)	13 July 1983	*Agrostis stolonifera*
143	K. Board (MOR)	6 Aug 1997	*Carex debilis*
144	S. von Oettingen (MOR)	12 July 1982	*Catalpa bignonoides*
145	N.B. and S. Pavlovic	15 Apr 2018	*Eranthis hyemalis*
146	F. Swink (MOR); K. Dritz (MOR)	20 Sept 1989; 27 June 1987	*Leontodon saxatilis*
147	H.R. Bennett (F)	18 May 1958	*Lepidium perfoliatum*
148	W.P. Cottam (Utah)	21 Apr 1930	*Myosurus minimus*
149	F. Swink (MOR)	1 May 1954	*Prunus persica*
150	G. Wilhelm and R. Betz (MOR)	13 May 1987	*Ranunculus hispidus* var. *caricetorum*
151	G. Wilhelm	7 June 1998	*Torreyochloa pallida*
152	N.B. Pavlovic	16 Oct 2019	*Rhus aromatica* var. *arenaria*
153	N.B. and S. Pavlovic	6 Apr 2020	*Anemone blanda*
154	N.B. and S. Pavlovic	22 May 2020	*Nuttallanthus canadensis*, *Elaeagnus umbellata*
155	N.B. Pavlovic	2019	*Fallopia japonica*
156	N.B. and S.W. Pavlovic	30 July 2020	*Chamaecrista fasciculata*, *Echinacea purpurea*, *Silphium perfoliatum*, *Solidago rigida*
157	Lyon; Sherff	1927; 30 May 1912	*Cypripedium parviflorum* var. *pubescens*
158	N.B. Pavlovic	25 Aug 2020	*Dipsacus fullonum*, *Trifolium repens*
159	B. Grube (son of P. Grube)	29 Aug 2020	*Senna hebecarpa*

Table 32. Summary of floristic statistics by subunit of Furnessville. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit							Entire Unit
	A	*B*	*C*	*D*	*E*	*F*	*G*	
Area (ha/acres)	39/96	64/159	64/157	125/309	80/197	214/529	20/49	606/1,499
Special flora total	24	32	24	46	21	49	34	106
Confirmed	17	28	21	28	13	8	31	80
New	5	3	3	15	7	31	3	20
Reported	2	1	0	1	0	8	0	5
Extirpated	0	0	0	2	1	2	0	1
Total taxa, FNA/ITIS	148	278	173	298	254	496	281	750
Total native taxa, FNA/ITIS	131	260	161	267	208	381	231	595
Native species, FNA/ITIS	129	251	157	257	202	373	226	576
Native variety, FNA/ITIS	2	8	3	9	5	8	4	18
Native hybrid, FNA/ITIS	0	1	1	1	1	0	1	1
Total adventive taxa, FNA/ITIS	2	0	1	3	10	21	8	30
Total adventive species, FNA/ITIS	2	0	1	3	10	21	8	30
Total adventive variety, FNA/ITIS	0	0	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0	0	0	0	0
Total exotic taxa, FNA/ITIS	15	18	11	28	36	94	42	125
Total exotic species, FNA/ITIS	15	18	11	27	35	90	42	122
Total exotic variety, FNA/ITIS	0	0	0	0	1	1	0	1
Total exotic hybrid, FNA/ITIS	0	0	0	1	0	3	0	2
Total Indiana-listed	10	14	3	24	9	25	11	50
Endangered	0	1	0	2	1	2	0	5
Threatened	6	5	1	9	5	12	3	23
Rare	0	0	0	0	0	0	0	0
Watch List	4	8	2	13	3	11	8	22
Extirpated	0	0	0	0	0	0	0	0
Sum CC	792	1,540	1,000	1,571	1,170	2,073	1,331	3,547
Sum CC adventive & invasive	776	1,522	989	1,542	1,127	1,967	1,284	3,403
Mean CoC	6	6	6	6	6	5	6	6
Mean CoC with adventive and invasive	5	5	6	5	4	4	5	5
FQI	69	95	79	96	81	106	87	145
FQI with adventive and invasive	63	91	75	89	71	88	76	124

reports of *Dendrolycopodium dendroideum*, we believe it is extirpated since searches have failed to find the original population. Other possibly extirpated species include *Betula papyrifera*, *Ruellia humilis*, *Sabatia angularis*, and *Trillium erectum*. The population of *Panax trifolius* in subunit F (record 40) was eliminated when the Dune Park Train Station parking lot was extended eastward.

Floristic summary

Furnessville has a total of 595 native taxa (578 in 1990), with a mean CoC of 5.9 and FQI of 145 (see Table 32). Furnessville is habitat for 750 total taxa comprising 576 native species, 30 adventive taxa, and 125 exotic taxa. Of the 595 native taxa, 576 are species, 18 are varieties, and one is a hybrid. Of the 50 Indiana-listed species known from Furnessville, five are endangered, 23

are threatened, 22 are watch list, and none are extirpated. New special flora discovered since 1990 include *Betula papyrifera*, *Callitriche heterophylla*, *Eleocharis melanocarpa*, *Hudsonia tomentosa*, *Juniperus communis*, *Panax quinquefolius*, *Pinus strobus*, *Schoenoplectiella hallii*, *S. purshiana*, *Scleria pauciflora* var. *caroliniana*, *S. verticillata*, *Sisyrinchium angustifolium*, *Trichostema dichotomum*, *Turritis glabra*, and *Valerianella chenopodiifolia*. The only new adventive species are *Abies concolor* and *Calycanthus floridus*. New exotic species include *Achillea ptarmica*, *Artemisia biennis*, *Centaurea stoebe* ssp. *micranthos*, *Crocus vernus*, *Dioscorea oppositifolia*, *Dipsacus fullonum*, *Draba verna*, *Elaeagnus angustifolia*, *Euonymus europeaus*, *E. fortunei*, *Euphorbia dentata*, *Fallopia japonica*, *Hedera helix*, *Hyacinthoides non-scripta*, *Hylotelephium telephium*, *Ipomoea hederacea*, *Iris pseudacorus*, *Lamiastrum galeobdolon*, *Lespedeza thunbergii*, *Narcissus poeticus*, *N.* × *incomparabilis*, *Pachysandra terminalis*, *Picea abies*, *Pinus sylvestris*, *Plantago lanceolata*, *Poa nemoralis*, *P. trivialis*, *Prunus hortulana*, *Rhodotypos scandens*, *Sedum acre*, *Syringa vulgaris*, *Taxus cuspidata*, *Trifolium arvense*, *Trifolium repens*, *Ulmus pumila*, and *U.* × *notha* (in ed.).

Peattie collected a specimen of *Cucurbita pepo* L. (pumpkin) at Tremont in 1925 (#2955, F), prior to the creation of the Dunes State Park. The authors attribute this specimen to the Tremont intersection in Furnessville F, but do not list it in the flora table because conditions for this species have long since disappeared due to the loss of human habitation at the intersection of U.S. 12 and Tremont Road. Swink's specimen of a peach tree (*Prunus persica*) a quarter-mile south of Tremont most likely was the same, then decadent, tree Pavlovic noted on the east side of Tremont Road, adjacent to a blowout. Pavlovic never identified it, and it has been deceased for at least 15 years. Cow parsnip (*Heracleum sphondylium* L. ssp. *montanum* (Schleich. ex Gaudin) Briq.) has spontaneously appeared along Furnessville Road and Tremont Road since the 1990s. We attribute the spontaneous arrival of this species to seed dispersal by Porter County or Town of Porter mowing along these roadsides. Redbud (*Cercis candensis* L.) has appeared along the east side of Tremont Road just south of U.S. 12. The even spacing of the trees along the roadside indicates the trees were mostly likely planted. While redbud is native to the southern and central portions of Porter County, we consider this species to be adventive to the Indiana Dunes.

Conservation issues

As can be seen from the vegetation map (see Figure 21), the Furnessville Unit is composed of mostly savanna complex and swamp complex, with a small area of mesophytic forest and mesophytic prairie. Nearly 60% of this unit has been converted to agriculture or residential land use since the late 1800s (Teale 1944). A small portion has been sand mined, probably for the construction of the Dunes Highway in the early 1920s (Schoon 2015).

The re-establishment of vegetation on abandoned land and razed homesites has been conducted by the NPS (Hiebert 1983, Hiebert and Pavlovic 1987), but the success of these efforts in the past thirty years (1990–2020) has not been qualitatively or quantitatively evaluated. Most of the species that occupy heavily abused areas are invasive exotic plants and aggressive native plants. Lawn removal and restoration of xeric lawns on sand was successfully demonstrated in Furnessville F, with soil nitrogen content being most important for restoring savanna diversity (Choi 1992, 1994, 1995; Choi and Pavlovic 1995, 1998).

The savanna complex has hardly been studied on the Calumet and Glenwood dunes except for the early work by Olson (1957). Some of the savanna complex, especially on the Glenwood Dunes, has gone so long without fire that the graminoid and herbaceous species have been shaded out by the proliferation of oak leaf litter after the closing over of the canopy (Pavlovic, personal observation). In some other areas, the graminoid fuels have been nearly grazed away or fire suppressed. In many of the areas designated as savanna complex in this unit, especially on the Calumet Dunes, attempts could be made to burn, and might be done as an adaptive management

approach since areas in the Keiser Unit that have been burned have resulted in dense oak and sassafras scrub. Plampin also notes, that in the areas near the former visitor center, burns have resulted in dense sassafras scrub. Perhaps use of herbicides after cutting could be tried, since these areas have many stems that would evade top-killing. Without fire, the current trend toward mesophication could continue to shade out the special flora and the special remnant vegetation (Nowacki and Abrams 2008). However, in some cases the fires can have a negative effect on special flora. One example, *Diphasiastrum tristachyum*, was over-collected in the past and consequently persisted as tiny patches that were unable to survive burning. A remaining question is to determine fire regime that existed before European settlement of the oak-dominated lands on the Glenwood dunes in comparison to the adjacent oak-hickory on the Lake Border Moraine.

While the swamp complex portions of this unit have been ditched, thinned for timber, and even clear-cut in years past, they still contain many special floristic elements. This is particularly true of the hydromesophytic forest portions of Furnessville B, C, D, and E. The restoration of original drainage patterns could be crucial to the long-term health of the swamp complex.

Wilhelm (1990) noted a small mesophytic wooded ravine in subunit E that is a portion of the headwaters of Dunes Creek between Hawleywood Road and Hadenfeld Road (mapped as bottomland). In the central and north portion of this subunit, there are several small but significant fen-like woods with many of the species known from the hydromesophytic swamp. A brief review of Table 30 reveals that the area is extremely rich in special flora. The Glenwood Trail extension crosses a ravine just east of Hadenfeldt Road, that has large tulip trees.

The portions of Furnessville A and B mapped as mesophytic prairie are sand prairie/savannas. They were mapped as mesophytic prairie to demonstrate that these areas are substantially different from the adjacent savanna complex areas. In 1971, according to Emma Pitcher, these sand prairies/savannas burned after having endured for a very long time without fire (Pitcher 1986). The accumulation of fuel had apparently been extensive, and large black oaks were mortally wounded during the fire. The proliferation of coppice sprouts from top-killed trees is a concern for the continuity of the prairies. These prairies remained unburned between 1971 and 1993, so the coppice sprouts had become quite dense, causing the decline of prairie/savanna herbaceous species. Since 1993, these prairies have been slowly invaded by quaking aspen and oak. The prescribed burn in 2014 was especially intense, with fire scars more than 6 feet above the ground in the tree bolls in the woods. Failure to reburn or mechanically thin could lead to another round of dense woody sprouts that will further shade out the understory flora.

It is striking that Wilhelm (1980, 1990; Wilhelm and Ladd 1988, Wilhelm and Rericha 2016) failed to mention Furnessville Woods, the high quality mesophytic forest that is just south of Furnessville Road in the northwest portion of Furnessville C between the higher Glenwood-aged dune complex (typical black oak dunes) and the swamp complex to the north. Not only are the trees tall (>10 m) for the dunes region, but they represent a mesic intermediate phase between oak forest and oak-hickory forest. Intact and highly diverse vernal flora is also present. This mesic intermediate ground flora may represent the original groundlayer vegetation in the mesic subdunes between the Calumet and Glenwood Dunes east of Indiana State Road 49. Much of this vegetation outside Furnessville Woods has been degraded by past land use (i.e., converted to human uses such as farms, residences and the like), as illustrated in a 1938–1939 land use map created from photographs of that era (Figure 22). This quality of Furnessville Woods persists despite the homesite that was placed in the middle of the woods. Restoration of these mesic forests south of U.S. Highway 12 could be a long-term priority but also could be a challenge given the long lifespans and slow maturity of the perennial spring ephemeral species.

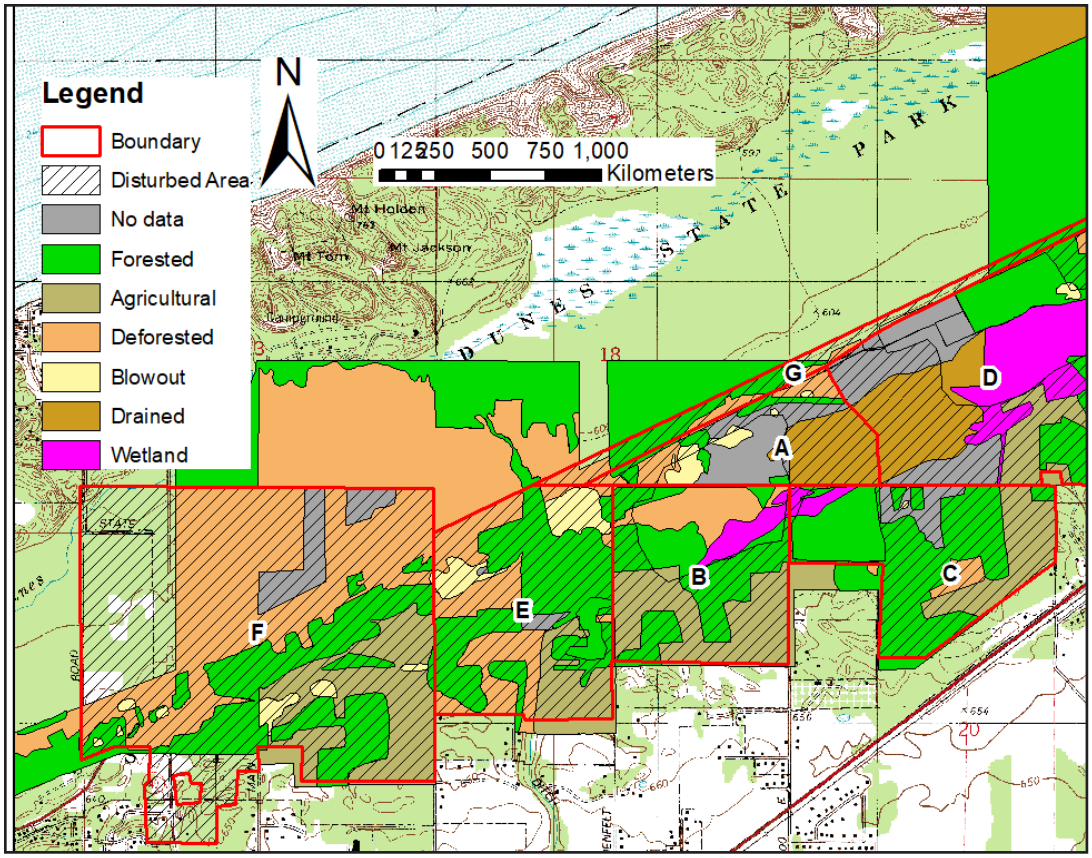


Figure 22. Mapped representation of land use in the Furnessville area based on 1939 aerial photograph. USGS/N.B. PAVLOVIC

Furnessville A

Furnessville A is 36 hectares (96 acres) and is bounded by U.S. 12 on the northwest, the abandoned Teale Drive on the east, and Furnessville Rd. on the south. There were at least four homesites in this subunit. The dune uplands may have been coppiced for firewood in the past. The central wetland was ditched nearest to Teale Drive (Pavlovic, personal observation) We catalogued 129 native species, two adventive species and 15 exotic species here. Mean CoC is 6 and the FQI is 69 (see Table 32).

Furnessville B

Furnessville B is 64 hectares (159 acres) in area and is bounded on the north by Furnessville Rd, Veden Rd. on the east and Hadenfeldt Rd. on the west. The south boundary does not follow any path or road. The west side of Furnessville B had homesites and one subdivision having roads bulldozed but never constructed. Of 251 native species in subunit B, the mean CoC value is 5.9, which represents an FQI of 95 (see Table 32). Furnessville B rates notably higher than Furnessville A because it includes two additional community types as well as a substantially greater area. However, the savanna complex portions have been both heavily grazed and long unburned, so its individual mean CoC is substantially lower than that of the Pitcher Prairie South.

Furnessville C

Furnessville C is 64 hectares (157 acres) in area and is bounded on the north by Furnessville Rd. on the west by Veden Rd. on the east by School House Rd. and on part of the south boundary by highway U.S. 20. Homesites were mostly along Furnessville Rd. and School House Rd. although there were two adjacent to Veden Rd. on the west side. In subunit C, we have catalogued a list of 157 native species, with a mean CoC value of 6.2 and representing an FQI of 79 (see Table 32). The Bagby house, where Susan Bagby grew up, was razed in 2018 when contaminated fill sand was used as backfill leading to the introduction of Japanese knotweed to the subunit.

Furnessville D

Furnessville D is 125 hectares (309 acres) in area and is bounded on the north by U.S. Highway 12, Kemil Road (N 300E) on the east, Furnessville Rd on the south and Teale Drive on the west. The swamp and savanna complexes of subunit D have areas of mixed quality (depending on vegetation cover and richness) vegetation depending on intensity of ditching and disturbance. Overall, however, the authors have registered 257 native species, with a mean CoC value of 5.8 and an FQI of 96 (see Table 32). There is a very large pin oak (42-inch DBH) along the north edge of the swamp complex, certainly the largest reported in INDU.

Furnessville E

Furnessville E is 80 hectares (197 acres) in area bounded by U.S. Highway 12 on the north, Hadenfeldt Rd. on the east, Hawleywood Rd. on the south and Tremont Rd. on the west. Twenty-four hectares (60 acres) of subunit E consist of savanna complex with mesophytic forest and ravine. At the north end of the ravine, there is a swampy fen rich in special floristic elements. The authors recorded 202 native species with a mean CoC of 5.6 and FQI of 81 (see Table 32). Areas with abandoned homesites, especially in the Potawatomie Trail area, have some of the densest infestations of oriental bittersweet, pachysandra, and periwinkle in the park. Other disturbed areas are dominated by multiflora rose, burning bush, and Japanese barberry. Interior portions of this subunit have more mature forest, lower abundance of invasives except multiflora rose, and better representation of the native flora. Again, in 2018, use of contaminated sand to provide fill when the Steiner cottage and the house to the south were razed has resulted in the introduction of Japanese knotweed.

Furnessville F

Furnessville F is 214 hectares (529 acres) in area and is bounded by South State Park Rd on the north, Tremont Rd. on the east, Canonize Drive for part of the south boundary, and Indiana Road 49 on the west. Despite earlier searches in subunit F by the "BP patrol" (Bickie Pitcher and Plampin), as Wilhelm (1990) called them, numerous finds by others since 1990 have greatly elevated the floristics for this subunit. In 1990, there were a total of 147 native species, but now the native species total more than doubled to 373. The mean CoC is 5.4 with an FQI of 106 (see Table 32). In addition, at 52 species, subunit F has the highest special flora richness of any subunit in Furnessville. The whole of this subunit has been impacted by logging, farming, local sand mining, pond creation, and residential development such that the native remnant flora reside in disturbed swamps, marshes, ditches, and droughty sands where agricultural weeds are not as competitive. In 2018–2019 the portion of the NIPSCO right-of-way and the Calumet Bike Trail was excavated to replace an aging natural gas pipeline (Kasarda 2017). The post-construction seed mix for restoration resulted in the introduction of several species not known from the dunes in general and so introduced to Furnessville F and Dunes State Park B including partridge pea, purple coneflower, stiff goldenrod, and wild senna (Pavlovic, personal observation, 2019–2020).

Furnessville G

Subunit G is a narrow strip of woods (20 hectares, 49 acres) located north of U.S. Highway 12 and south of the CSSSBR tracks west of Kemil Rd. (East State Park Rd. or N 300 E) and on the west where the land is constricted between U.S. 12 and the CSSBR railroad tracks at Dunes Creek. We verified 226 native species, yielding a mean CoC of 5.7 and FQI of 87 (see Table 32). These are quite impressive floristic statistics for a narrow strip between two transportation and utility corridors.

Furnessville Unit retains 576 native, 125 exotic, 30 adventive, and 106 special flora species, and has a mean CoC of 5.9 and an impressive FQI of 145. Special flora, native richness, and FQI are ranked similarly among subunits, except subunits G and B trade-off for the third and fourth rank positions. Despite past land use in Furnessville, this unit retains considerable floristic diversity.

Unit 10: Keiser

The future of the Indiana Dunes National Lakeshore will doubtless be influenced by national and international trends that emphasize environmental quality values. Resistance to implementation of a land ethic will continue, possibly for several decades. In the long term, however, ecological values are likely to prevail in public policy. Environmental restoration of ecologically degraded areas – such as the Calumet marshes – may ultimately become a public activity in which economic and ecological values will be reconciled.

—Lynton K. Caldwell (1997)

Keiser occupies 726 hectares (1,818 acres) in the west Beverly Shores region east of Kemil Road (East State Park Road or 300 East) in the heart of the Great Marsh (Figure 23). About 75% of this area has been altered by former residential development and other human activities. This unit of INDU is equivalent to the region identified by earlier botanists as Keiser, in reference to the Keiser Station along the Chicago South Shore & South Bend traction line (see Figure 2). Keiser spans from small portions of the Glenwood Dunes through the Calumet, Algoma, Tolleston, and recent dunes adjacent to Lake Michigan. The 210-hectare (520-acre) tract south of U.S. Highway 12, plus Keiser E and F, includes about 51 hectares (125 acres) of savanna and swamp complex that are primarily on Calumet Dunes. This southern tract evidently was unexplored by the early botanists, and only since the proposal of the Dunewood Campground in 1985 and its completion in 1995 have more serious explorations into its interior been made (Fox 1985). The floristics of the region north of U.S. Highway 12 have been treated to some extent in the literature (Keiser A, B, C, and D). The Keiser Unit was surveyed by Gerould Wilhelm previously (Wilhelm 1990), but areas south of the campground were surveyed by Pavlovic, Myrna Newgent, and Plampin on 11 September 1997 and 25 July 1998. Wilhelm surveyed these areas in Keiser F with Peg Mohr, Myrna Newgent, and Plampin.

Keiser A is the Tolleston-aged and more recent dune landscape that includes foredunes, secondary dunes, white pine and mesophytic lee slopes, and oak savanna/woodland complex. Much of the savanna has been recently invaded by oriental bittersweet and Japanese barberry, and uniform oak resprouting is occurring due to the lack of fire after high intensity wildfires followed with more recent high intensity prescribed burns. Keiser A contains the eastern portion of the Keiser Blowout which is bisected by East State Park Rd (N 300 E).

Keiser B is the Great Marsh that was degraded by the construction of Beverly Drive, ditching, peat removal, invasion of cattail and phragmites, and tree invasion. This subunit also includes the transitional forested fen, beech-maple forest, and swamp forests on the toe of the Calumet/Algoma-aged dune ridge.

Of Keiser's eight subunits, subunit C has the highest FQI and is often referred to as Keiser Woods. This tract nestles among three roads (Kemil Road/East State Park Road on the west, Beverly Drive on the north, and Lake Shore Drive on the east) and the Calumet Bike Trail on the south. The area was platted in 1927 as part of Bartlett's Beverly Shores development (Morrow 2001). Consequently, platted roadbeds cross the area from east to west and north to south. Additional abandoned roadways that were never paved crisscross the interior of Keiser Woods, visible as slightly raised, linear beds (Pavlovic, personal observation, 1985). Despite this disturbance, its vegetation and hydrology have remained relatively intact. There is one abandoned homesite along Kemil Road halfway between the Calumet Trail and Beverly Drive. The vegetation becomes more hydric as one proceeds northward and downward across the tilted plane formed by the recession of the Calumet beach ridge, progressing from

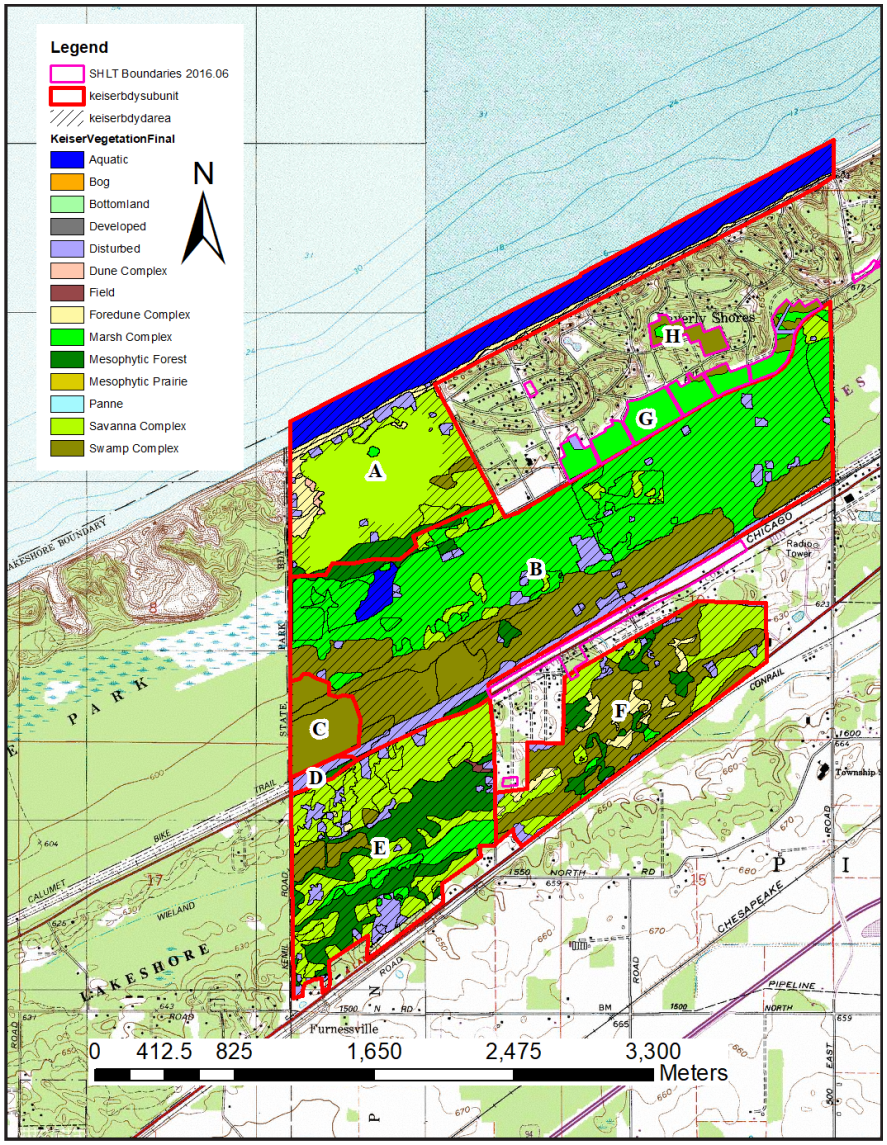


Figure 23. Vegetation of Keiser Unit. Letters indicate subunits. Cross-hatching indicates disturbed areas.

mesic, hydro-mesic, to hydric conditions. Thus, the southernmost mesic area consists of beech-maple forest, the middle as swamp white oak-dominated hydromesophytic forest, and the northern portion as black ash swamp. These hydromesophytic swamps appear to be all that remains of the "subdunal woods" at Keiser. The majority of Keiser B, to the east of Lake Shore Drive continuing to Broadway and onward to the east boundary at Lake Shore County Road (Brown Road), is more disturbed due to former ditching, residential development, and peat removal. It is being restored to marsh complex by the NPS as it was part of the formerly expansive Great Marsh. There is a remnant beech-maple forest in the south-central portion of Keiser B.

Low wet meadows historically occurred in the dunes but may have disappeared because of drainage and subsequent woody plant invasion. Early botanists referred to such habitats as "interdunal ponds" and "moist open subdunal ground" at Keiser (Cowles 1899b). These areas were like the moist meadows found in Keiser F adjacent to the campground, but the best example can be found along the moist sands of the Calumet Bike Trail east and west of Kemil Road. Because of the substantial numbers of special flora that grow in these moist meadows, this area is separately labeled Keiser D, though the area is scarcely more than an open ecotone along the south edge of the hydromesophytic swamps of Keiser C and part of the NIPSCO right-of-way.

Subunits Keiser E and F span the area from the Glenwood Dunes on the south to the Calumet Dunes on the north. While heavily ditched and drained there are still significant flora in these two subunits. There are examples of large ephemeral ponds in the northwest quadrant of Keiser E.

Subunits Keiser G and H are owned by the Shirley Heinze Land Trust and are respectively known as Great Marsh and McAllister Prairie. McAllister Prairie was surveyed by Ken Klick in the late 1980s. Property was added to both subunits G and H as adjacent land became available at tax sales or when owners wished to donate to the land trust.

Special flora summary

The Keiser Unit provides habitat for at least 133 of the INDU special flora (Table 33), an increase of 1.81-times compared to 1990 (74 species) (Wilhelm 1990). This special flora represents 83 confirmed, 41 new, six reported, and three extirpated. New special flora from new finds since 1990 include *Alnus serrulata*, *Botrychium matricariifolium*, *Brachyelytrum aristosum*, *Chamaecrista nictitans*, *Chamerion angustifolium*, *Chimaphila maculata*, *Cladium mariscoides*, *Coptis trifolia*, *Cystopteris tenuis*, *Dendrolycopodium dendroides*, *Deparia acrostichoides*, *Desmodium ciliare*, *Desmodium perplexum*, *Dichanthelium dichotomum*, *D. oligosanthes*,

Drosera rotundifolia, *Eleocharis flavescens olivacea*, *Euthamia caroliniana*, *Hydrocotyle umbellatum*, *Hypericum kalmianum*, *H. sphaerocarpon*, *Juglans cinerea*, *Lycopodium clavatum*, *Oenothera fruticosa glauca*, *Ophioglossum pusillum*, *Panax quinquefolia*, *Peltandra virginica*, *Pyrola americana*, *P. elliptica*, *Rhynchospora alba*, *R. macrostachya*, *R. scirpoides*, *Rubus flagellaris* (*R. enslenii*), *Salix sericea*, *Sanicula trifoliata*, *Sceptridium oneidense*, *Schizachyrium littorale*, *Scirpus expansus*, *S. georgianus*, *Scleria muehlenbergii*, *Selaginella eclipes*, *Spiranthes lucida*, *Spirodela polyrhiza*, *Torreyochloa pallida*, *Utricularia minor*, *Viola blanda*, *Viola* × *primulifolia*, *Woodwardia virginica*, and *Zizania aquatica*. Species that were added as new special flora include *Aletris farinosa*, *Carex atherodes*, *Carex bebbii*, *Celastrus scandens*, *Clinopodium vulgare*, *Fraxinus americana*, *F. nigra*, *F. pensylvanica*, *Platanthera lacera*, *Schoenoplectus purshianus*, and *Viola pubescens*. Of these, more than 90% were seen in Keiser C and D. Only *Alnus serrulata*, *Hypericum sphaerocarpon*, *Rhexia mariana* var. *mariana*, *Selaginella eclipes*, and *Trillium cernuum* are known exclusively from Keiser and no other unit. The *Hypericum sphaerocarpum* occurrence may be an error in Wilhelm's survey list since he did not list it in the summary of special flora found in the campground. Species that are probably extirpated include *Alnus serrulata*, *Dendrolycopodium dendroides*, and *Selaginella eclipes*.

Table 33. Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Acer negundo L.	x	9	–	–	x	x	–	–	X	0
Acer nigrum F. Michx.	–	–	–	–	–	–	–	x	X	5
Acer rubrum L.	x	x	x	x	x	x	–	x	X	7
Acer saccharinum L.	–	x	–	–	–	5	–	–	X	0
Acer saccharum Marshall	–	–	x	–	–	–	–	–	X	3
Achillea millefolium L.	–	x	–	x	–	x	–	–	X	*
Actaea pachypoda Elliott	–	–	x	–	x	–	–	–	X	7
Adiantum pedatum L.	–	–	x	–	–	–	–	–	X	10
Aesculus hippocastanum L.	4	–	–	–	–	–	–	–	N	*
Agalinis purpurea (L.) Pennell	–	–	–	x	–	x	–	–	X	6
Agalinis purpurea (L.) Pennell var. *parviflora* (Benth.) B. Boivin	–	–	–	–	–	x	–	–	X	7
Agalinis tenuifolia (Vahl) Raf.	–	–	–	x	–	–	–	–	X	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	–	–	–	–	–	x 5	–	–	X	4
Agrimonia gryposepala Wallr.	–	–	–	–	x	–	–	–	X	2
Agrimonia parviflora Aiton	–	9	–	–	x	x	–	x	X	7
Agrostis gigantea Roth (*Agrostis alba* L.)	–	x	–	x	x	x	–	x	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	x	–	–	x	x	–	–	X	1
Agrostis perennans (Walter) Tuck.	–	–	x	–	–	5	–	–	X	3

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Agrostis scabra Willd.	–	–	–	x	–	–	–	–	X	5
Ailanthus altissimus (Mill.) Swingle	11	9	–	–	–	5	–	–	X	*
Akebia quinata (Houtt.) Decne.	–	–	–	–	115	–	–	–	N	*
SF***Aletris farinosa*** L.	–	–	–	R	–	–	–	–	R	10
Alisma subcordatum Raf.	–	x	–	x	82	x 90	–	–	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	11	x	x	–	77	73	–	–	X	*
Allium tricoccum Solander (*Allium tricoccum* Aiton)	–	–	x	–	–	–	–	–	X	7
Allium tricoccum Solander var. *burdickii* Hanes (*Allium tricoccum* Aiton var. *burdickii* Hanes)	–	–	x	–	–	–	–	–	X	6
Alnus glutinosa (L.) Gaertn.	–	94	–	–	–	–	–	–	N	*
SF***Alnus incana*** (L.) Moench ssp. ***rugosa*** (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng.)	–	x	x	x	64	x 90	–	–	X	8
SF***Alnus serrulata*** (Aiton) Willd.	–	139	–	–	–	–	–	–	N	10
Alopecurus carolinianus Walter	–	–	–	–	–	–	–	–	X	0
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	–	x	–	x	x	x	–	–	X	0
Ambrosia trifida L.	–	x	–	–	–	–	–	–	X	0
Amelanchier arborea (F. Michx.) Fernald	x	–	x	–	–	x	–	–	X	8
Amelanchier humilis Wiegand	x	–	–	–	–	–	–	–	X	9
Amelanchier interior E. L. Nielsen	x	–	–	–	x	x	–	–	X	8
Amelanchier laevis Wiegand	–	–	x	x	x	–	–	–	X	8
SF***Ammophila breviligulata*** Fernald	x	–	–	–	–	–	–	–	X	7
Amphicarpaea bracteata (L.) Fernald	x	x	x	–	–	5	–	–	X	4
Andropogon gerardii Vitman	–	142	–	x	–	x	–	–	X	5
Andropogon virginicus L.	–	–	–	–	–	x	–	–	X	ad
Anemone americana (DC.) H. Hara (*Hepatica americana* (DC.) Ker Gawl.)	x	59	R 96	–	–	–	–	–	X	9
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	–	44	x	–	–	–	–	–	X	7
Angelica atropurpurea L.	–	8	–	–	–	–	–	–	N	7
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	–	–	–	–	–	–	–	X	3
Apios americana Medik.	–	96	x	x	–	x	–	–	X	7
Apocynum androsaemifolium L.	x	–	–	–	x	5	–	–	X	5
Apocynum cannabinum L.	–	–	–	–	–	5	–	–	N	4
Apocynum cannabinum L. (*Apocynum sibiricum* Jacq.)	–	x	–	–	x	x	–	–	X	2

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Aquilegia canadensis L.	x	–	x	–	–	–	–	–	X	6
Arabidopsis thaliana (L.) Heynh.	–	–	–	–	–	–	–	–	X	*
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	x	–	–	–	x	–	–	–	X	5
Aralia nudicaulis L.	x	–	x	–	x	5	–	–	X	8
SF***Aralia racemosa*** L.	–	–	R	–	–	–	–	–	R	10
Arctium minus (Hill) Bernhardi (*Arctium minus* Schkuhr)	–	x	–	–	x	–	–	–	X	*
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald & J. F. Macbr.)	x	–	–	–	–	–	–	–	X	10
Arenaria serpyllifolia L.	–	–	–	–	–	–	–	–	X	*
Arisaema triphyllum (L.) Schott	–	x	x	–	x	x	–	–	X	4
SF***Aristida longespica*** Poir. var. ***geniculata*** (Raf.) Fernald (*Aristida intermedia* Scribn. & Ball)	–	–	–	–	x	–	–	–	X	5
Aristida purpurascens Poir.	–	–	–	–	x	91	–	–	X	5
SF***Aristida tuberculosa*** Nutt.	–	–	–	–	x	86	–	–	X	9
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocar*pa × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	–	x	x	x	x	x	–	x	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	x	–	–	–	–	–	–	–	X	5
Asclepias incarnata L.	–	96	–	x	–	x 90	–	–	X	4
Asclepias syriaca L.	x	x	–	–	–	x	–	x	X	0
Asclepias tuberosa L.	–	–	–	–	x	x 5	–	–	X	7
Asimina triloba (L.) Dunal	–	–	x	–	73	5	–	–	X	9
Asparagus officinalis L.	–	–	–	–	–	–	–	–	X	*
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	–	x	x	–	–	–	–	–	X	8
Aureolaria flava (L.) Farw.	–	–	–	–	–	5	–	–	N	9
Aureolaria pedicularia (L.) Raf. ex Pennell (*Aureolaria pedicularia* (L.) Raf. var. *ambigens* (Fernald) Farw.)	–	–	–	–	x	–	–	–	X	7
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	–	142	–	–	–	5	–	–	N	8
Barbarea vulgaris W.T. Aiton	–	x	x	x	–	5	–	–	X	*
SF***Bartonia virginica*** (L.) Britton, Sterns & Poggenburg	–	41	x	–	–	x	–	–	X	10

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Berberis thunbergii DC.	x	x	–	–	–	x 5	–	–	X	*
Berteroa incana (L.) DC.	x	–	–	–	–	–	–	–	X	*
Betula nigra L.	–	35	x	–	–	–	–	–	X	ad
SF***Betula papyrifera*** L.	–	–	–	–	62	5	–	x	X	10
Bidens cernua L.	–	–	x	–	–	–	–	–	X	5
Bidens connata Muhlenberg ex Willdenow	–	–	–	–	–	–	–	x	X	
SF***Bidens discoidea*** (Torr. & A. Gray) Britton	–	–	x	–	–	–	–	x	X	9
Bidens frondosa L.	–	x	x	x	–	x	–	x	X	1
Bidens trichosperma (Michx.) Britton	–	96	–	–	–	–	–	x	N	5
Boehmeria cylindrica (L.) Sw.	–	x	x	–	x	x	–	x	X	2
Boehmeria cylindrica (L.) Sw. var. *drummondiana* Wedd.	–	–	–	–	–	5	–	–	N	5
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	–	x	–	–	–	–	–	–	X	4
SF***Botrychium matricariifolium*** (Döll) A. Braun ex W.D.J. Koch (*Botrychium matricariifolium* (Döll) ***matricariifolium*** A. Braun ex Koch)	–	–	–	–	89	1, 111	–	–	N	10
Botrychium virginianum (L.) Sw. (*Botrychium virginianum* (L.) Sw.)	–	x	x	–	x	1	–	x	X	6
SF***Brachyelytrum aristosum*** (Michx.) P. Beauv. ex Branner & Coville (*Brachyelytrum aristosum* (Michx.) Trel.)	–	–	–	104	–	–	–	–	N	10
SF***Brachyelytrum erectum*** (Schreb.) P. Beauv.	–	–	x	x	–	–	–	–	X	10
Bromus inermis Leyss.	–	x	–	–	–	5	–	–	X	*
Bromus japonicus Thunb.	–	x	–	–	–	–	–	–	X	*
Bromus secalinus L.	–	R	–	–	–	–	–	–	R	*
Bromus squarrosus L.	–	–	–	x	–	–	–	–	X	*
Bromus tectorum L.	–	x	–	–	–	x	–	–	X	*
Bulbostylis capillaris (L.) C.B. Clarke	–	–	–	–	52	–	–	–	N	4
Calamagrostis canadensis (Michx.) P. Beauv.	–	x	R 96	x	x	x 5	–	x	X	3
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. magna Scribn. & Merr.	x	–	–	x	x	–	–	–	X	5
Caltha palustris L.	–	x	x	–	–	–	–	–	X	5
Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	–	–	–	–	–	x 5	–	–	X	1
Campanula americana L.	–	9	x	–	–	–	–	–	X	3

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Campanula aparinoides Pursh	–	R	–	–	–	–	–	–	R	8
SF***Campanula rotundifolia*** L.	x	–	–	–	–	–	–	–	X	10
Capsella bursa-pastoris (L.) Medik.	x	–	–	–	–	–	–	–	X	*
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	–	x	x	–	x	–	–	–	X	6
Cardamine concatenata (Michx.) O. Schwarz (*Dentaria laciniata* Willd.)	–	–	x	–	–	–	–	–	X	5
Cardamine douglassii Britton	–	9	R	–	–	–	–	–	N	7
Cardamine hirsuta L.	–	131	–	–	–	x	–	–	X	*
Cardamine pensylvanica Muhl. ex Willd.	–	x	x	–	–	–	–	–	X	4
SF***Carex alata*** Torr.	–	97	–	x	–	x	–	x	X	10
Carex albicans Willd. ex Spreng. var. *albicans*	–	–	–	–	107	–	–	–	N	5
Carex albicans Willd. ex Spreng. var. *emmonsii* (Dewey ex Torr.) Rettig (*Carex emmonsii* Torr.)	–	–	x	–	x	x	–	x	X	5
Carex albolutescens Schwein.	–	–	–	x	–	x	–	–	X	8
Carex annectens (E.P. Bicknell) E.P. Bicknell (Carell (*Carex annectens* E.P. Bicknell)	–	8	–	–	–	–	–	–	N	5
Carex aquatilis Wahlenb. var. *substricta* Kukenth. (*Carex aquatilis* Wahlenb. var. *altior* (Rydb.) Fernald)	–	96	–	–	–	–	–	–	N	5
SF***Carex atherodes*** Spreng.	–	8	–	–	–	–	–	–	N	5
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	–	x 29	–	–	–	x 5	–	–	X	6
SF***Carex bromoides*** Schkuhr ex Willd. (*Carex bromoides* Willd.)	–	x	x	–	–	–	–	–	X	10
Carex comosa Boott	–	x	–	–	–	x	–	–	X	5
Carex crinita Lam. var. *crinita*	–	x	x	–	x	x	–	–	X	10
Carex cristatella Britton	–	x	–	–	–	5	–	–	X	4
SF***Carex cryptolepis*** Mack.	–	–	–	x	–	–	–	–	X	9
Carex debilis Michx.	–	133	–	–	–	–	–	–	N	10
SF***Carex debilis*** Michx. var. ***rudgei*** L.H. Bailey	–	–	x	x	–	–	–	–	X	10
Carex festucacea Schkuhr ex Willd.	–	–	–	–	–	5	–	–	N	8
SF***Carex folliculata*** L.	–	9	x	x	–	–	–	–	X	10
Carex gracillima Schwein.	–	–	x	–	x	5	–	–	X	10
Carex hystericina Muhl. ex Willd.	–	142	–	–	–	–	–	–	N	5
SF***Carex intumescens*** Rudge	–	9	x	–	–	x	–	–	X	10
Carex lacustris Willd.	–	9	–	–	x	–	–	x	X	6

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Carex lasiocarpa Ehrh. ssp. *americana* (Fernald) Hulten (*Carex lasiocarpa* Ehrh. var. *americana* Fernald)	–	142	–	–	–	x	–	–	X	10
Carex laxiflora Lam.	–	x	x	–	x	–	–	–	X	10
SF***Carex leptonervia*** (Fernald) Fernald	–	–	x	–	–	–	–	–	X	10
Carex longii Mack.	–	–	–	–	–	x	–	x	X	6
Carex lupulina Willd.	–	96	–	–	–	–	–	–	N	7
Carex lurida Wahlenb.	–	8	–	x	–	x	–	–	X	8
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.)	x	–	–	x	x	x	–	–	X	5
SF***Carex oligosperma*** (Michx.)	–	–	–	–	–	–	–	x	N	10
Carex pellita Willd.	–	8	–	–	–	x	–	–	X	4
Carex pensylvanica Lam.	–	–	–	–	x	x	–	–	X	5
Carex projecta Mack.	–	8	–	–	–	–	–	–	N	4
Carex rosea Schkuhr ex Willd.	–	–	–	–	x	–	–	–	X	4
Carex sartwellii Dewey	–	–	–	–	–	5	–	–	N	6
Carex scoparia Schkuhr ex Willd. var. *scoparia*	–	8	–	–	–	x	–	–	X	7
SF***Carex seorsa*** Howe	–	x	x	x	–	–	–	–	X	10
Carex squarrosa L.	–	142	–	–	–	–	–	–	N	10
Carex stipata Muhl. ex Willd.	–	8	R 96	–	–	x	–	–	X	3
Carex stricta Lam.	–	8	–	–	–	–	–	–	N	5
Carex swanii (Fernald) Mack.	–	9	–	x	x	x	–	–	X	8
SF***Carex tonsa*** (Fernald) E.P. Bicknell	–	–	–	–	x	x	–	–	X	7
SF***Carex tonsa*** (Fernald) E.P. Bicknell var. ***rugosperma*** (Mackenzie) Crins (*Carex rugosperma* Mack.)	–	–	–	–	107	–	–	–	N	10
Carex tribuloides Wahlenb.	–	x 96	–	x	–	–	–	–	X	3
Carex umbellata Schkuhr ex Willd.	–	–	–	–	107	–	–	–	N	9
Carex utriculata Boott	–	142	–	–	–	–	–	–	N	10
Carex viridula Michx. spp *viridula*	–	–	127	–	–	–	–	–	N	5
Carex virescens Muhl. ex Willd.	–	–	x	–	–	–	–	–	X	10
Carex vulpinoidea Michx.	–	9	–	x	–	x 65	–	–	X	2
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow (*Carpinus caroliniana* Walter var. *virginiana* (Marshall) Fernald)	–	9	x	–	–	–	–	–	X	8
Carya cordiformis (Wangenh.) K. Koch	–	–	x	–	x	x	–	–	X	7

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Carya laciniosa (Michx.) Loudin	–	96	–	–	–	–	–	–	N	10
Catalpa speciosa Teas	10	9	–	–	–	–	–	–	X	ad
Caulophyllum thalictroides (L.) Michx.	–	–	R 96	–	79	–	–	–	N	8
Celastrus orbiculatus Thunb.	N	9	x	N	11	N	–	x	X	*
SF***Celastrus scandens*** L.	x	x	–	–	x	x	–	–	X	4
Celtis occidentalis L.	–	92	–	–	–	–	–	–	N	3
Cenchrus longispinus (Hack.) Fernald	–	–	–	–	x	–	–	–	X	0
Cephalanthus occidentalis L.	–	x	–	–	x	x 83	–	x	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L.)	–	x	–	–	x	–	–	–	X	*
Chaerophyllum procumbens (L.) Crantz	–	–	x	–	–	–	–	–	X	5
SF***Chamaecrista nictitans*** (L.) Moench ssp. ***nictitans*** var. ***nictitans*** (*Cassia nictitans* L.)	–	–	–	–	110	–	–	–	N	7
SF***Chamaedaphne calyculata*** (L.) Moench (*Chamaedaphne calyculata* (L.) Moench var. *angustifolia* (Aiton) Rehder)	–	?	–	–	–	–	–	x	X	10
Chelone glabra L.	–	x	X	–	–	–	–	–	X	8
SF***Chimaphila maculata*** (L.) Pursh	39	–	–	–	–	39	–	–	N	10
SF***Chrysosplenium americanum*** Schwein. ex Hooker	–	x	x	–	–	–	–	–	X	10
Cichorium intybus L.	–	–	–	–	–	–	–	–	X	*
Cicuta bulbifera L.	–	9	x	–	–	–	–	–	X	8
Cicuta maculata L.	–	x	x	–	x	x	–	–	X	6
Cinna arundinacea L.	–	x	x	–	–	x	–	–	X	5
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	x	–	–	x	x 5	–	–	X	1
Cirsium arvense (L.) Scop.	–	9	–	–	–	–	–	–	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	–	–	–	–	–	5	–	–	N	2
Cirsium muticum Michx.	–	8	–	–	–	x 5	x	–	X	10
SF***Cirsium pitcheri*** (Torr. ex Eaton) Torr. & A. Gray	x	–	–	–	–	–	–	–	X	10
Cirsium vulgare (Savi) Ten.	–	x	–	x	–	–	–	–	X	*
Citrullus lanatus (Thunb.) Matsum. & Nakai	134	–	–	–	–	–	–	–	N	*
SF***Cladium mariscoides*** (Muhl.) Torr.	–	–	–	–	–	x	–	–	X	10
Claytonia virginica L.	–	–	x	–	–	–	–	–	X	2

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Clematis virginiana L.	–	x	–	–	37	x	–	–	X	4
SF***Clinopodium vulgare*** L. (*Satureja vulgaris* (L.) Fritsch var. *neogaea* Fernald)	x	9	–	–	–	–	–	x	X	6
Collinsia parviflora Lindl.	–	–	–	–	–	135	–	–	N	ad
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	–	–	–	x	5	–	x	X	7
Commelina communis L.	–	9	–	–	–	–	–	–	X	*
SF***Comptonia peregrina*** (L.) J. M. Coult.	–	–	–	x	84	–	–	–	X	9
Conoclinium coelestinum L. (*Eupatorium coelestinum* L.)	–	121	–	–	–	–	–	–	N	ad
SF***Conopholis americana*** (L.) Wallr.	47	–	x	–	54	–	–	–	X	10
Convallaria majalis L.	x	–	–	–	–	69	–	–	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	–	–	–	x	–	x	–	–	X	0
SF***Coptis trifolia*** (L.) Salisb.	–	101	–	–	–	–	–	–	N	10
SF***Corallorhiza maculata*** (Raf.) Raf.	–	–	R 36	–	45	–	–	–	N	10
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	x	–	x	–	x	–	–	–	X	9
Coreopsis lanceolata L.	–	142	–	–	–	–	–	–	N	5
Coreopsis palmata Nutt.	–	142	–	–	–	–	–	–	N	6
Coreopsis tripteris L.	–	142	–	x	x	–	–	–	X	5
Corispermum americanum (Nutt.) Nutt. (*Corispermum hyssopifolium* L.)	x	–	–	–	–	–	–	–	X	5
Cornus alternifolia L. f.	–	–	x	–	x	x	–	–	X	9
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	–	x	R 96	–	x	x	–	–	X	6
Cornus florida L.	x	–	x	–	76	5	–	–	X	8
Cornus racemosa Lam.	x	x	x	x	x	x	–	x	X	1
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	x	x	x	–	–	18	–	–	X	6
Corylus americana Walter	–	x	x	x	–	x	–	–	X	5
Crataegus coccinea L.	–	–	R	–	–	–	–	–	R	4
Crataegus crus-galli L.	–	–	–	–	–	x	–	–	X	2
Cryptotaenia canadensis (L.) DC.	–	–	x	–	x	x	–	–	X	2
Cuscuta glomerata Choisy	–	x	–	–	–	–	–	–	X	7
Cuscuta gronovii Willd. ex Schult.	–	–	x	–	–	–	–	–	X	4
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	–	–	–	–	–	x 56	–	–	X	4
Cyperus esculentus L.	–	96	–	–	–	–	–	–	N	0

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus*. (*Cyperus filiculmis* Vahl)	–	–	–	–	x	x 5	–	–	X	5
Cyperus schweinitzii Torr.	x	–	–	–	–	–	–	–	X	5
Cyperus strigosus L.	–	9	–	x	–	x 5	–	–	X	1
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	–	–	x	–	–	–	–	–	X	6
SF***Cystopteris tenuis*** (Michx.) Desv. (*Cystopteris fragilis* (L.) Bernh. var. *mackayi* G. Lawson)	–	–	95	–	–	–	–	–	N	10
Dactylis glomerata L.	–	–	–	–	–	–	–	–	X	*
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	–	–	–	x	123	x	–	x	X	3
Datura stramonium L.	–	–	–	–	–	–	–	–	X	ad
Daucus carota L.	–	x	–	x	–	x	–	x	X	*
Decodon verticillatus (L.) Elliot	–	126	–	–	–	–	–	–	N	8
SF***Dendrolycopodium dendroideum*** Michx. (L.) A. Haines (*Lycopodium obscurum* L.)	–	–	104, 102	–	–	–	–	–	N	10
SF***Deparia acrostichoides*** (Sw.) M. Kato (*Athyrium thelypterioides* (Michx.) Desv.)	–	–	100	–	–	–	–	–	N	10
SF***Desmodium ciliare*** (Muhl. ex Willd.) DC.	–	R 125	–	–	–	–	–	–	N	10
Desmodium paniculatum (L.) DC.	–	–	–	–	–	5	–	–	N	6
SF***Desmodium perplexum*** B.G. Schub.	–	R 125	–	–	–	–	–	–	N	5
Dianthus armeria L.	–	–	–	–	–	–	–	–	X	*
Dianthus barbatus L.	–	–	–	–	–	–	–	–	X	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *columbianum* (Scribn.) Freckmann & Lelong (*Panicum columbianum* Scribn.)	–	–	–	–	–	5	–	–	N	7
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	–	–	x	x	–	x 5	–	–	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	–	–	–	–	–	x	–	x	X	9
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *spretum* (Schultes) Freckmann & Lelong (*Panicum spretum* Schult.)	–	–	–	x	–	5	–	x	X	9

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Dichanthelium clandestinum (L.) Gould (*Panicum clandestinum* L.)	–	x	x	x	–	x	–	–	X	6
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	–	–	–	–	–	x	–	–	X	7
SF***Dichanthelium dichotomum*** (L.) Gould ssp. ***dichotomum*** (*Panicum dichotomum* L.)	–	–	–	–	–	x 30	–	–	X	10
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	x	–	x	–	x	x	–	–	X	5
SF***Dichanthelium oligosanthes*** (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	–	–	x	–	x 5	–	–	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	x	–	–	–	–	x	–	–	X	7
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	–	–	–	–	–	x	–	–	X	8
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	–	–	–	x	–	x 5	–	–	X	8
SF***Diervilla lonicera*** Mill.	x	–	–	–	–	–	–	–	X	9
Digitaria cognata (J.A. Schultes) Pilger (*Leptoloma cognatum* (Schult.) Chase)	x	–	–	–	–	–	–	–	X	3
Digitaria sanguinalis (L.) Scop.	–	–	–	–	–	–	–	–	X	*
Dioscorea villosa L.	–	x	x	x	x	–	–	–	X	7
Diphasiastrum digitatum (Dill. ex A. Braun) Holub (*Lycopodium complanatum* L. var. *flabelliforme* Fern).	–	–	–	–	62	–	–	–	N	8
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	–	8	x	x	x	x	–	–	X	9
Draba verna L.	–	–	–	–	–	13	–	–	N	*
SF***Drosera intermedia*** Hayne	–	–	–	R	–	–	–	x	R	10
SF***Drosera rotundifolia*** L.	–	–	–	–	–	x 58	–	–	X	10
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O. F. Müll.) Watt)	–	42	x	–	x	68	–	–	X	8
Dryopteris cristata (L.) A. Gray	–	2	x	–	–	5	–	–	X	10
Dryopteris intermedia (Muhl. ex Willd.) A. Gray	–	x	–	–	–	x	–	–	X	8
Dulichium arundinaceum (L.) Britton	–	142	–	–	–	–	–	x	N	9

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Echinocystis lobata (Michx.) Torr. & A. Gray	–	x	–	–	–	–	–	–	X	5
Eleocharis compressa Sull.	–	–	–	–	–	5	–	–	N	8
Eleocharis elliptica Kunth	–	–	–	x	–	x 68	–	–	X	8
Eleocharis engelmannii Steud.	–	–	–	–	–	69	–	–	N	9
Eleocharis erythropoda Steud.	–	8	–	x	–	x	–	–	X	2
Eleocharis obtusa (Willd.) Schult.	–	8	–	x	–	–	–	x	X	3
SF***Eleocharis flavescens*** (Poir.) Urb. var. *olivacea* (Torr.) Gleason (*Eleocharis olivacea* Torr.)	–	–	–	–	–	–	–	x	N	10
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis palustris* (L.) Roem. & Schult. var. *major* Sond.)	–	142	–	–	–	–	–	–	N	10
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis smallii* Britton)	–	x	–	–	–	–	–	–	X	5
SF***Eleocharis rostellata*** (Torr.) Torr.	–	142	–	–	–	–	–	–	N	10
Elymus canadensis L.	x	–	–	–	–	–	–	–	X	4
Elymus hystrix L. (*Hystrix patula* Moench)	–	–	x	–	–	–	–	–	X	5
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	74	x	–	–	–	5	–	–	X	*
Elymus villosus Muhl. ex Willd.	–	–	R	–	–	–	–	–	R	5
Epifagus virginiana (L.) W.P.C. Barton	–	–	x	–	–	–	–	–	X	10
Epilobium coloratum Biehler	–	x	–	–	–	x	–	–	X	3
Epilobium hirsutum L.	–	128	–	–	–	–	–	–	N	*
Epipactis helleborine (L.) Crantz	–	–	–	–	–	–	–	–	X	*
Equisetum arvense L.	–	x	x	x	–	5	–	–	X	0
Equisetum fluviatile L.	–	–	–	–	–	x	–	–	X	7
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	–	–	–	–	–	x 5	–	x	X	3
Equisetum laevigatum A. Braun	–	–	–	–	–	5	–	–	N	2
Equisetum × *ferrissii* Clute *[E. hyem*ale × *E. la*evigatum]	–	–	–	x	–	x	–	–	X	2
Eragrostis minor Host (*Eragrostis poaeoides* Roem. & Schult.)	–	–	–	–	x	–	–	–	X	*
Eragrostis pectinacea (Michx.) Nees	x	–	–	–	–	x	–	–	X	0
Eragrostis spectabilis (Pursh) Steud.	–	–	–	–	x	x	–	x	X	3
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	–	8	–	x	–	x	–	–	X	2
Erigeron annuus (L.) Pers.	–	8	–	–	x	5	–	x	X	0
Erigeron philadelphicus L.	–	x	–	–	–	–	–	–	X	4

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Erigeron strigosus Muhl. ex Willd.	–	–	–	–	–	x 5	–	–	X	5
Erodium cicutarium (L.) L'Her. ex Aiton	–	38	–	–	–	–	–	–	N	*
Eryngium yuccifolium Michx.	–	142	–	–	–	–	–	–	N	9
Erythronium americanum Ker Gawl.	–	–	x	–	–	–	–	–	X	8
Eupatorium perfoliatum L.	–	9	x	x	x	x	–	x	X	4
Eupatorium serotinum Michx.	–	96	–	–	–	x 5	–	–	X	0
Euphorbia corollata L.	–	–	–	x	x	x 5	–	x	X	2
Euphorbia dentata Michx.	–	–	–	–	–	–	–	–	X	*
Euphorbia maculata L. (*Euphorbia supina* Raf.)	–	–	–	–	x	–	–	–	X	0
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	–	–	–	x	–	–	–	–	X	0
SF***Euphorbia polygonifolia*** L.	x	–	–	–	–	–	–	–	X	10
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	x	–	x	–	x	x 26	–	–	X	8
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	–	–	x	–	x	–	x	X	3
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	–	–	–	–	–	x 5	–	x	X	5
Eutrochium fistulosum (Barratt) E.E. Lamont (*Eupatorium fistulosum* Barratt)	–	–	x	x	x	x	–	–	X	9
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	–	x	x	–	–	x 5	–	–	X	4
Fagus grandifolia Ehrh.	16	42	x	–	x	x 5	–	–	X	5
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	–	8	–	–	–	–	–	–	N	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	–	96	–	x	–	–	–	–	X	1
Festuca ovina L.	–	–	–	–	x	x	–	–	X	*
Festuca rubra L.	–	–	–	–	–	x	–	–	X	*
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	–	x	x	–	–	–	–	–	X	5
Fimbristylis autumnalis (L.) Roem. & Schult.	–	–	–	x	51	x 56	–	x	X	5
Floerkea proserpinacoides Willd.	–	–	–	–	80	–	–	–	N	8
Fragaria virginiana Miller	x	9	–	x	x	x 5	–	–	X	1

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Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Frangula alnus Mill. (*Rhamnus frangula* L.)	–	48	–	–	–	x	–	x	X	*
Fraxinus americana L.	x	x	x	–	x	x	–	–	X	5
SF***Fraxinus americana*** L. (*Fraxinus americana* L. var. *biltmoreana* (Beadle) Fernald)	–	–	x	–	–	–	–	–	X	9
SF***Fraxinus nigra*** Marshall	–	x	x	–	x	–	–	–	X	10
SF***Fraxinus pennsylvanica*** Marshall	–	x	x	–	x	x	–	–	X	5
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	–	x	x	x	x	x	–	–	X	1
Galinsoga quadriradiata Ruiz & Pavón	–	–	–	x	–	–	–	–	X	*
Galium aparine L.	x	x	x	–	x	x	–	–	X	1
Galium circaezans Michx. var. *hypomalacum* Fernald	x	–	–	–	x	x	–	–	X	7
Galium concinnum Torr. & A. Gray	x	–	–	–	–	–	–	–	X	5
Galium obtusum Bigelow	–	x	–	–	–	x	–	–	X	5
Galium pilosum Aiton	x	–	–	–	–	–	–	–	X	10
Galium tinctorium L.	–	–	–	x	–	–	–	–	X	8
Galium triflorum Michx.	x	9	x	–	x	x 5	–	–	X	5
Gaultheria procumbens L.	–	–	–	–	37	5	–	–	N	9
Gaylussacia baccata (Wangenh.) K. Koch	–	–	x	–	–	5	–	–	X	9
Gentiana andrewsii Griseb.	–	129	–	–	–	–	–	–	N	9
SF***Gentiana saponaria*** L.	–	–	–	–	x	–	–	–	X	8
Geranium maculatum L.	–	x	x	–	–	–	–	–	X	4
Geum canadense Jacq.	–	x	x	–	x	x 5	–	x	X	1
Geum laciniatum Murray var. *trichocarpum* Fernald	–	x	–	–	x	–	–	–	X	5
Glechoma hederacea L.	x	9	–	–	–	–	–	–	X	*
Glyceria canadensis (Michx.) Trin.	–	–	x	x	–	x	–	–	X	10
Glyceria septentrionalis Hitchc.	–	x 33	–	–	–	–	–	–	X	8
Glyceria striata (Lam.) Hitchc.	–	x	x	x	x	x	–	x	X	4
SF***Goodyera pubescens*** (Willd.) R. Br.	–	–	R 49	–	21	65	–	–	N	9
Gratiola neglecta Torr.	–	–	55	x	–	–	–	–	X	7
Gratiola virginiana L.	–	–	R	–	–	–	–	–	R	10
Hackelia virginiana (L.) I. M. Johnst.	–	x	–	–	–	x 5	–	–	X	0
Hamamelis virginiana L.	x	x	x	–	x	x	–	–	X	8

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Helenium autumnale L.	–	R	–	–	–	–	–	–	R	5
Helenium flexuosum Raf.	–	x	–	–	–	x 5	–	–	X	ad
Helianthemum canadense (L.) Michx.	–	–	–	–	–	x	–	–	X	8
Helianthus divaricatus L.	x	–	–	–	x	x 5	–	–	X	5
Helianthus grosseserratus M. Martens	–	x	–	x	–	–	–	–	X	2
Helianthus maximiliani Schrader	–	122	–	–	–	–	–	–	N	ad
Helianthus occidentalis Riddell	–	–	–	–	–	5	–	–	N	10
Helianthus petiolaris Nutt. ssp. *petiolaris*	–	–	–	–	–	–	–	–	X	ad
Helianthus tuberosus L.	–	–	–	–	–	x	–	–	X	3
Hemerocallis fulva (L.) L.	–	–	34	–	x	–	–	–	X	*
Hesperis matronalis L.	–	–	–	–	–	–	–	–	X	*
Hibiscus moscheutos L. ssp. *moscheutos* (*Hibiscus palustris* L.)	–	142	–	–	88	–	–	–	N	9
Hieracium aurantiacum L.	–	–	–	–	–	5	–	–	N	*
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fernald)	–	–	–	–	–	–	–	x	N	
Hieracium gronovii L.	–	–	–	x	x	x	–	–	X	6
Holcus lanatus L.	–	8	–	–	–	–	–	–	N	*
Holosteum umbellatum L.	–	–	–	–	–	–	–	–	X	*
Humulus lupulus L.	–	–	–	–	x	–	–	–	X	5
SF***Huperzia lucidula*** (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	14	–	x	–	62	–	–	–	X	10
SF***Hydrocotyle umbellata*** L.	–	96	–	–	93	–	–	–	N	10
SF***Hypericum boreale*** (Britton) E.P. Bicknell	–	–	–	–	–	69	–	–	N	10
SF***Hypericum canadense*** L.	–	–	–	x	–	5	–	x	X	10
Hypericum gentianoides (L.) Britton, Sterns & Poggenburg	–	–	–	–	–	x 69	–	–	X	7
SF***Hypericum kalmianum*** L.	–	–	–	–	–	x 5	–	x	X	10
Hypericum majus (A. Gray) Britton	–	–	–	–	–	x	–	x	X	6
Hypericum mutilum L.	–	–	–	x	–	–	–	x	X	8
Hypericum perforatum L.	–	–	–	x	–	5	–	–	X	*
Hypericum punctatum Lam.	–	R 8	–	–	–	23	–	–	X	4
SF***Hypericum sphaerocarpon*** Michx.	–	–	–	–	–	X 138	–	–	X	7
SF***Hypopitys monotropa*** Crantz (*Monotropa hypopitys* L.)	–	–	x	–	21	–	–	–	N	10

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
SF***Ilex mucronata*** (L.) M. Powell, V. Savolainen, S. Andrews (*Nemopanthus mucronata* (L.) Trel.)	–	–	x	–	–	–	–	–	X	10
Ilex opaca Aiton (*Ilex opaca* L.)	–	–	–	–	99	–	–	–	N	ad
Ilex verticillata (L.) A. Gray	x	96	x	–	x	x 85	–	x	X	9
Impatiens capensis Meerb.	–	x	x	–	x	x 5	–	–	X	3
Iris pseudacorus L.	–	–	–	–	–	–	–	–	X	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	–	x	x	–	x	x 23	–	–	X	5
SF***Juglans cinerea*** L.	–	–	12	–	–	–	–	–	N	8
Juglans nigra L.	–	–	–	–	x	–	–	–	X	5
Juncus acuminatus Michx.	–	–	–	x	–	x 5	–	–	X	6
Juncus anthelatus (Wiegand) R. E. Brooks	–	–	–	–	–	136	–	–	N	6
Juncus brachycarpus Engelm.	–	R	–	–	–	5	–	–	X	9
Juncus bufonius L.	–	–	–	–	–	x	–	–	X	5
Juncus canadensis J. Gay ex Laharpe	–	–	–	x	–	x 56	–	x	X	7
Juncus dudleyi Wiegand	–	–	–	x	–	x 5	–	–	X	4
Juncus effusus L.	–	9	x	x	x	x 5	–	–	X	7
Juncus greenei Oakes & Tuck.	–	–	–	–	51	5	–	–	N	8
Juncus interior Wiegand	–	–	–	–	–	x 5	–	–	X	6
Juncus marginatus Rostk.	–	–	–	x	–	x	–	–	X	9
Juncus nodosus L.	–	–	–	x	–	–	–	–	X	6
SF***Juncus scirpoides*** Lam.	–	–	–	–	51	–	–	–	N	9
Juncus tenuis Willd.	–	9	–	x	x	x 5	–	–	X	0
SF***Juniperus communis*** L. var. *depressa* Pursh	x	–	–	–	–	–	–	–	X	10
Juniperus virginiana L. var. *virginiana* (*Juniperus virginiana* L. var. *crebra* Fernald & Griscom)	x	9	–	–	–	–	–	–	X	2
Krigia biflora (Walter) S.F. Blake	–	–	–	–	–	5	–	–	N	7
Krigia virginica (L.) Willd.	–	–	–	–	x	x	–	–	X	6
Lactuca canadensis L.	x	x	–	–	–	x	–	–	X	2
Lactuca serriola L.	–	–	–	–	–	5	–	–	N	*
Lamium purpureum L.	–	x	–	–	–	–	–	–	X	*

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Laportea canadensis (L.) Wedd.	–	–	x	–	–	5	–	–	X	3
SF***Larix laricina*** (Du Roi) K. Koch	–	R	–	–	–	–	–	–	R	10
SF***Lathyrus japonicus*** Willd. var. ***maritimus*** (L.) Kartesz & Gandhi (*Lathyrus japonicus* Willd. var. *glaber* (Ser.) Fernald)	R	–	–	–	–	–	–	–	R	10
Lathyrus palustris L. (*Lathyrus palustris* L. var. *myrtifolius* (Willd.) A. Gray)	–	x	–	–	–	–	–	–	X	6
Lechea mucronata Raf. (*Lechea villosa* Elliott)	–	–	–	–	–	5	–	–	N	6
Leersia oryzoides (L.) Sw.	–	x	x	–	–	x	–	–	X	4
Leersia virginica Willd.	–	9	x	–	–	5	–	–	X	7
Lemna minor L.	–	x	–	–	x	–	–	–	X	5
Lemna trisulca L.	–	–	–	–	x	–	–	–	X	7
Leonurus cardiaca L.	–	8	–	–	–	–	–	–	N	*
Lepidium densiflorum Schrad.	–	–	–	–	–	–	–	–	X	*
Lepidium virginicum L.	x	–	–	–	–	x	–	–	X	0
Lespedeza capitata Michx.	–	142	–	–	x	x	–	–	X	4
Lespedeza hirta (L.) Hornem.	–	–	–	–	99, 8	5	–	–	N	6
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte)	–	–	–	–	–	x	–	–	X	*
Leucojum aestivum L.	–	107, 105	–	–	–	–	–	–	N	*
Liatris aspera Michx.	–	142	–	–	x	x 5	–	x	X	6
Liatris spicata (L.) Willd.	–	–	–	–	–	5	–	–	N	6
Ligustrum vulgare L.	x	x	–	–	x	x 5	–	–	X	*
Lilium michiganense Farw.	–	x	x	x	37	–	–	–	X	6
Linaria vulgaris Mill	–	133, 130	–	–	–	–	–	–	N	*
Lindera benzoin (L.) Blume	–	x	x	–	x	x 5	–	–	X	7
Lindernia dubia (L.) Pennell	–	–	–	x	–	–	–	–	X	5
Lindernia dubia (L.) Pennell (*Lindernia anagallidea* (Michx.) Pennell)	–	–	–	–	–	69	–	–	N	6
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	R	–	R	–	73	x 85	–	–	X	6
SF***Liparis loeselii*** (L.) Rich.	–	–	–	–	R	x 20	–	–	X	7
Liriodendron tulipifera L.	–	x	x	–	x	–	–	–	X	5

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Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Lithospermum canescens (Michx.) Lehm.	–	–	–	–	x	–	–	–	X	8
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	–	–	–	x	–	–	–	X	8
Lobelia cardinalis L.	–	96	x	x	45	x 56	–	–	X	7
Lobelia inflata L.	–	–	–	x	45	5	–	–	X	4
Lobelia kalmii L.	–	–	–	–	–	5	–	–	N	10
Lobelia siphilitica L.	–	x	x	x	–	x	–	–	X	6
SF***Lonicera dioica*** L.	x	–	x	–	–	–	–	–	X	10
Lonicera japonica Thunb.	–	–	x	–	–	–	–	–	X	*
Lonicera ruprechtiana Regel (*Lonicera* × *muscaviensis* Rehder)	–	–	–	x	–	–	–	–	X	*
Lonicera tatarica L.	–	96	–	–	–	5	–	–	X	*
Lonicera × *bella* Zabel [*L. tartari*ca × *L. m*orrowii]	–	–	–	–	x	x	–	–	X	*
Lonicera × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides*] (*Lonicera* × *muendeniensis* Rehder)	–	–	–	–	x	–	–	–	X	*
Ludwigia alternifolia L.	–	–	–	x	–	x 5	–	–	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	–	8	–	x	45	x 65	–	–	X	5
Ludwigia polycarpa Short & R. Peter	–	–	–	–	–	x	–	–	X	6
Lunaria annua L.	–	–	x	–	–	–	–	–	X	*
Lupinus perennis L. var. *occidentalis* S. Watson	x	–	–	–	x	–	–	–	X	7
SF***Lycopodiella inundata*** (L.) Holub (*Lycopodium inundatum* L.)	–	–	–	–	–	x 19, 59	–	–	X	10
SF***Lycopodium clavatum*** L.	–	60	–	–	63	–	–	–	N	10
Lycopus americanus Muhl. ex W.P.C. Barton	–	x	–	x	–	x 5	–	x	X	5
Lycopus uniflorus Michx.	–	96	x	x	–	x	–	–	X	7
Lycopus virginicus L.	–	–	–	x	–	–	–	x	X	9
Lysimachia ciliata L.	–	–	–	–	x	–	–	–	X	4
Lysimachia terrestris (L.) Britton	–	97	–	x	–	x 5	–	–	X	8
Lysimachia thyrsiflora L.	–	–	x	–	–	–	–	–	X	9
Lythrum alatum Pursh	–	–	–	–	–	65	–	–	N	7
Lythrum salicaria L.	–	8	–	–	–	–	–	–	X	*
SF***Maianthemum canadense*** Desf.	–	x	x	–	–	–	–	–	X	10

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	x	x	–	x	x	–	–	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	x	–	x	x	–	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	x	x	–	x	x	–	–	X	5
Malus domestica Mill.	–	–	–	–	–	5	–	–	X	*
Medeola virginiana L.	–	–	x	–	–	–	–	–	X	10
Medicago lupulina L.	–	9	–	x	77	5	–	–	X	*
Melilotus alba Medik.	–	x	–	x	–	5	–	–	X	*
Melilotus officinalis (L.) Lam.	–	x	–	–	–	–	–	–	X	*
Menispermum canadense L.	x	–	R	–	–	–	–	–	X	6
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	–	x	–	–	–	–	–	–	X	5
Mentha × *piperita* L. (pro. Sp.) [M. *aquatica* × *M. spicata*]	–	96	–	–	–	–	–	–	N	*
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	–	70	x	–	–	–	–	–	X	10
SF***Milium effusum*** L. ssp. ***cisatlanticum*** (Fernald) A. Haines	–	–	x	–	–	–	–	–	X	10
Mimulus ringens L.	–	9	–	x	–	–	–	–	X	6
Miscanthus sinensis Andersson	112, 109	–	–	–	–	–	–	–	N	*
SF***Mitchella repens*** L.	x	41	x	–	77	–	–	–	X	10
Mitella diphylla L.	–	96	x	–	–	–	–	–	X	10
Monarda didyma L.	–	–	x	–	–	–	–	–	X	ad
Monarda fistulosa L.	x	9	–	–	–	5	–	–	X	4
Monarda punctata L.	x	9	–	–	x	x	–	–	X	5
SF***Monotropa uniflora*** L.	46	–	x	–	–	–	–	x	X	10
Morus alba L.	–	9	–	–	x	5	–	–	X	*
Muhlenbergia frondosa (Poir.) Fernald	–	96	x	–	–	x 5	–	–	X	3
Muhlenbergia mexicana (L.) Trin.	–	–	x	–	–	x	–	x	X	5
Muhlenbergia schreberi J. F. Gmel.	–	–	–	–	x	–	–	–	X	0
Myosotis stricta Link ex Roem. & J.A. Schultes	–	–	–	–	–	x	–	–	X	*
Myosoton aquaticum (L.) Moench.	–	106, 108	–	–	–	–	–	–	N	*
Nasturtium officinale W.T. Aiton	–	x	–	–	–	–	–	–	X	*
Nepeta cataria L.	–	8	–	–	–	–	–	–	N	*

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Nepeta racemosa Lam.	140, 137	–	–	–	–	–	–	–	N	*
Nuphar advena (Aiton) W. t. Aiton	–	–	–	–	–	–	–	x	N	5
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	–	–	–	–	–	x	–	–	X	6
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist (*Nymphaea tuberosa* Paine)	–	R	–	–	–	–	–	–	R	7
Nyssa sylvatica Marshall	–	x	x	–	x	x	–	x	X	8
Oenothera biennis L.	–	x	–	x	–	5	–	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	x	–	–	–	x	x	–	–	X	7
SF***Oenothera fruticosa*** L. ssp. ***glauca*** (Michx.) Straley (*Oenothera tetragona* Roth var. *longistipata* (Pennell) Munz)	–	–	–	–	–	20	–	–	N	9
Oenothera laciniata Hill	R	–	–	–	–	–	–	–	R	3
Onoclea sensibilis L.	–	x	x	x	x	x 5	–	x	X	8
Onopordum acanthium L.	122, 119	–	–	–	–	–	–	–	N	*
SF***Ophioglossum pusillum*** Raf. (*Ophioglossum vulgatum* L. var. *pseudopodum* (S.F. Blake) Farw.)	–	–	–	–	–	x	–	–	X	9
Opuntia cespitosa Raf. (*Opuntia humifusa* (Raf.) Raf.)	–	–	–	–	x	x	–	–	X	5
Ornithogalum umbellatum L.	–	–	–	–	x	–	–	–	X	*
Osmorhiza claytonii (Michx.) C.B. Clarke	x	x	x	–	x	5	–	–	X	3
Osmorhiza longistylis (Torr.) DC.	x	x	–	–	–	–	–	–	X	3
Osmundastrum cinnamomeum (L. .) C. Presl (*Osmunda cinnanomea* L.)	–	x	x	x	x	5	–	–	X	7
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	–	x	x	x	x	x	–	x	X	8
Ostrya virginiana (Mill.) K. Koch	–	–	x	–	–	–	–	–	X	5
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	–	8	–	–	–	x	–	–	X	0
Oxalis stricta L. (*Oxalis europaea* Jord.)	–	x	–	–	x	x	–	x	X	0
SF***Oxalis violacea*** L.	–	96	–	–	–	–	–	–	N	9
Oxypolis rigidior (L.) Raf.	–	–	x	x	–	–	–	–	X	7
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	–	x	x	–	–	–	–	–	X	7
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	–	–	–	–	–	x 5	–	–	X	6
Packera plattensis (Nutt.) W.A. Weber & A. Löve (*Senecio plattensis* Nutt.)	x	–	–	–	–	–	–	–	X	6

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
SF***Panax quinquefolius*** L.	–	–	–	–	53	–	–	–	N	9
SF***Panax trifolius*** L.	–	x	x	–	–	–	–	–	X	10
Panicum capillare L.	–	–	–	–	–	x	–	–	X	1
Panicum rigidulum Bosc ex Nees	–	–	–	x	–	5	–	–	X	5
Panicum virgatum L.	x	8	–	x	–	x	–	–	X	5
Parthenium integrifolium L.	–	142	–	–	–	–	–	–	N	8
Parthenocissus quinquefolia (L.) Planch.	x	x	x	–	x	x	–	–	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	x	x	–	x	–	–	–	–	X	1
Paspalum setaceum Michx. var. *stramineum* (Nash) D.J. Banks (*Paspalum ciliatifolium* Michx. var. *stramineum* (Nash) Fernald)	–	–	–	–	–	x	–	–	X	4
Pedicularis canadensis L.	–	–	–	–	x	–	–	–	X	9
SF***Peltandra virginica*** (L.) Schott	–	7	–	–	–	–	–	–	N	10
Penthorum sedoides L.	–	R	–	–	–	–	–	–	R	5
Persicaria amphibia (L.) A. Gray (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman and *P. coccineum* Willd.)	121, 118	8	–	–	–	x	–	x	X	4
Persicaria amphibia (L.) A. Gray (*Polygonum coccineum* Willd.)	121	x	–	–	–	–	–	x	X	4
SF***Persicaria arifolia*** (L.) Haroldson (*Polygonum arifolium* L. var. *pubescens* (Keller) Fernald)	–	41	x	x	73	–	–	–	X	9
SF***Persicaria careyi*** (Olney) Greene (*Polygonum careyi* Olney)	–	–	–	x	–	–	–	–	X	9
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	–	9	x	–	–	x	–	–	X	7
SF***Persicaria hydropiperoides*** (Michx.) Small (*Polygonum opelousanum* Riddell var. *adenocalyx* Stanford)	–	96	–	–	–	–	–	x	N	6
Persicaria longiseta (Bruijn) Kitagawa (*Polygonum caespitosum* Blume var. *longisetum* (Bruijn) Stewart)	x 28	–	–	–	–	–	–	–	X	*
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	–	8	–	–	–	–	–	–	N	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	–	–	–	–	x	x 22	–	–	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	–	x	–	–	–	–	–	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	–	x	x	x	73	x	–	–	X	8

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Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	–	x	R 9, 76	–	–	x	–	–	X	2
Petunia × *atkinsiana* D. Don ex Loud. [*P. axillaris* × *P. integrifolia*] (*Petunia* × *hybrida* A. Vilm.)	–	–	–	–	–	–	–	–	X	*
Phalaris arundinacea L.	–	x	–	x	–	–	–	–	X	*
SF***Phegopteris hexagonoptera*** (Michx.) Fee (*Dryopteris hexagonoptera* (Michx.) C. Chr.)	–	–	x	–	–	–	–	–	X	10
Philadelphus coronarius L.	–	–	–	–	–	–	–	–	X	*
Phleum pratense L. ssp. *pretense*	–	x	–	–	–	–	–	–	X	*
Phlox divaricata L.	–	–	x	–	–	–	–	–	X	5
Phlox paniculata L.	–	–	–	–	–	–	–	–	X	ad
Phlox pilosa L.	x	–	–	–	–	–	–	–	X	7
Phragmites australis (Cav.) Steud. (KC = native genotype)	–	x	6	x	–	56	–	–	X	1
Phragmites australis ssp. *americanus* Saltonstall, Peterson & Soreng	–	x	6	x	–	56	–	–	N	3
Physalis heterophylla Nees	–	–	–	–	–	x	–	–	X	3
Physostegia virginiana (L.) Benth.	–	142	–	–	–	–	–	–	N	6
Phytolacca americana L.	x	9	–	–	–	x 5	–	–	X	1
Pilea fontana (Lunell) Rydb.	–	119, 116	–	–	–	–	–	–	N	7
Pilea pumila (L.) A. Gray	–	96	x	–	–	5	–	x	X	5
SF***Pinus strobus*** L.	x	x	–	–	–	–	–	–	X	9
Plantago lanceolata L.	–	x	–	–	–	–	–	x	X	*
Plantago major L.	–	–	–	–	x	–	–	–	X	*
Plantago rugelii Decne.	–	x	–	–	–	x	–	–	X	0
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	–	41	x	63	45	58	–	–	X	10
SF***Platanthera flava*** (L.) Lindl. var. *herbiola* (R. Br.) Luer (*Habenaria flava* (L.) R. Br. var. *herbiola* (R. Br.) Ames & Correll)	–	–	R	–	–	–	–	–	R	10
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* (Michx.) Lodd.)	–	–	x	–	–	85	–	–	X	10
SF***Platanthera psycodes*** (L.) Lindl. (*Habenaria psycodes* (L.) Spreng.)	–	–	R 3	–	–	–	–	–	N	10
Platanus occidentalis L.	–	9	x	–	–	–	–	–	X	9
Poa annua L.	–	–	–	–	x	–	–	–	X	*
Poa compressa L.	x	–	–	x	x	x	–	x	X	*

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Poa palustris L.	–	96	–	–	–	–	–	–	N	9
Poa pratensis L.	x	x	–	x	x	x	–	x	X	*
Podophyllum peltatum L.	–	x	x	–	x	20	–	–	X	4
Polanisia dodecandra (L.) DC. ssp. *dodecandra* (*Polanisia graveolens* Raf.)	–	–	–	x	–	–	–	–	X	0
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	15	–	–	–	x	x 65	–	–	X	9
Polygala sanguinea L.	–	–	–	x	–	x 5	–	–	X	6
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	x	–	–	x	x	–	–	X	3
Polygonatum pubescens (Willd.) Pursh	–	x	x	–	x	x 5	–	–	X	7
Polystichum acrostichoides (Michx.) Schott	–	–	x	–	–	–	–	–	X	9
Pontederia cordata L.	–	8	–	–	–	–	–	–	N	10
Populus alba L.	x	–	–	–	–	–	–	–	X	*
SF***Populus balsamifera*** L.	x	–	–	–	–	–	–	–	X	10
Populus deltoides W. Bartram ex Marshall	x	x	x	–	x	5	–	–	X	2
Populus grandidentata Michx.	–	–	x	–	x	5	–	–	X	6
Populus tremuloides Michx.	–	x	x	x	x	x	–	x	X	4
Potentilla argentea L.	R	–	–	–	–	–	–	–	R	*
Potentilla norvegica L.	–	x	–	–	–	–	–	–	X	0
Potentilla recta L.	–	x	–	–	–	x	–	–	X	*
Potentilla simplex Michx.	–	9	x	x	x	x	–	–	X	4
Prenanthes alba L.	x	x	–	–	x	x 5	–	–	X	5
Prenanthes altissima L.	x	–	x	–	–	–	–	–	X	8
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	–	–	–	–	–	5	–	–	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	–	9	–	x	–	x 5	–	x	X	0
Prunus americana Marshall	–	–	x	x	x	x	–	–	X	5
SF***Prunus pensylvanica*** L. f.	–	x	x	x	x	5	–	–	X	5
Prunus pumila L.	x	–	–	–	–	–	–	–	X	8
Prunus serotina Ehrh.	x	x	x	x	x	x	–	x	X	1
Prunus virginiana L.	x	x	x	–	x	x 5	–	–	X	3

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	–	–	–	–	–	x	–	–	X	2
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	x	9	–	–	–	–	x	–	X	7
Ptelea trifoliata L. ssp. *trifoliata* var. *mollis* Torr. & A. Gray	x	–	–	–	–	–	–	–	X	8
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	x	x	–	x	x	–	x	X	5
Pycnanthemum tenuifolium Schrad.	–	–	–	–	–	x 5	–	–	X	7
SF***Pyrola americana*** Sweet (*Pyrola rotundifolia* L. *americana* (Sweet) Fernald)	17	–	–	–	–	–	–	–	N	10
SF***Pyrola elliptica*** Nutt.	–	–	–	–	24	–	–	–	N	10
Quercus alba L.	x	–	x	–	x	x	–	x	X	5
Quercus bicolor Willd.	–	9	x	–	x	–	–	–	X	6
Quercus palustris Munchh.	–	x	x	–	x	x	–	x	X	8
Quercus rubra L.	x	x	x	x	–	5	–	–	X	7
Quercus velutina Lam.	x	–	x	–	x	x	–	x	X	6
Ranunculus abortivus L.	x	x	x	–	x	5	–	–	X	0
Ranunculus flabellaris Raf.	–	8	–	–	x	–	–	–	X	7
Ranunculus hispidus Michx.	–	9	x	–	–	–	–	–	X	8
Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan (*Ranunculus septentrionalis* Poir.)	–	x	x	–	–	–	–	–	X	5
Ranunculus recurvatus Poir.	–	x	x	–	–	–	–	–	X	5
Ranunculus sceleratus L.	–	R 9	–	–	–	–	–	–	N	6
Ratibida pinnata (Vent.) Barnhart	–	142	–	–	–	–	–	–	N	4
Rhamnus cathartica L.	–	–	–	–	–	–	–	–	X	*
SF***Rhexia mariana*** L. var. ***mariana*** (*Rhexia mariana* L.)	–	120, 117	–	–	–	–	–	–	N	10
SF***Rhexia virginica*** L.	–	–	–	x	–	x 5	–	x	X	10
Rhus aromatica Aiton	x	–	–	–	–	–	–	–	X	10
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	–	–	x	x	x	x	–	–	X	6
Rhus typhina L.	x	x	x	x	–	x	–	–	X	1
SF***Rhynchospora alba*** (L.) Vahl	–	–	–	–	–	5	–	–	N	10
Rhynchospora capitellata (Michx.) Vahl	–	–	–	x	–	x 5	–	–	X	8

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[SF]***Rhynchospora macrostachya*** Torr. ex A. Gray	–	–	–	–	–	–	–	x	N	10
[SF]***Rhynchospora scirpoides*** (Torr.) Grisebach (*Psilocarya scirpoides* Torr.)	–	–	–	–	–	–	–	x	N	10
Ribes americanum Mill.	–	–	x	–	–	–	–	–	X	7
Ribes cynosbati L.	x	x	x	–	x	5	–	–	X	5
Ribes missouriense Nutt.	–	x	x	–	–	–	–	–	X	5
Robinia hispida L.	x	–	–	–	–	–	–	–	X	ad
Robinia neomexicana A. Gray var. *neomexicana* (*Robinia luxurians* (Dieck) C. K. Schneid.)	x 114	–	–	–	–	–	–	–	X	ad
Robinia pseudoacacia L.	–	9	–	–	–	x	–	–	X	ad
Rorippa palustris (L.) Besser ssp. *palustris* (*Rorippa palustris* (L.) Besser var. *fernaldiana* (Butters & Abbe) Stuckey)	–	R	–	–	–	–	–	–	R	4
Rosa carolina L.	x	–	–	x	x 32	x	–	x	X	5
Rosa multiflora Thunb.	–	x	–	–	x	5	–	–	X	*
Rosa palustris Marshall	–	x	–	–	x	x 5	–	x	X	7
Rotala ramosior (L.) Koehne	–	–	–	–	69	97	–	–	N	10
Rubus allegheniensis Porter	–	x	x	–	x	–	–	–	X	3
Rubus flagellaris Willd.	–	–	–	x	x	x	–	–	X	3
Rubus flagellaris Willd. ([SF]***Rubus enslenii*** Tratt.)	–	–	–	–	–	x	–	–	X	10
Rubus hispidus L.	–	x	x	x	x	x 5	–	x	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	x	x	x	x	x	x	–	–	X	3
Rubus occidentalis L.	–	–	x	x	x	5	–	–	X	2
Rubus pensilvanicus Poir.	–	x	x	x	x	x	–	x	X	3
[SF]***Rubus pubescens*** Raf.	–	–	x	–	x	–	–	–	X	10
Rudbeckia hirta L.	–	142	–	x	–	5	–	–	X	1
Rumex acetosella L.	–	–	–	–	x	x	–	–	X	*
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	–	x	–	–	–	x	–	–	X	8
Rumex crispus L.	–	x	–	–	x	–	–	–	X	*
Rumex obtusifolius L.	–	x	–	–	–	–	–	–	X	*
Rumex verticillatus L.	–	R	–	–	–	–	–	–	R	6
Sagittaria latifolia Willd.	–	8	–	–	–	65	–	–	N	4
Salix amygdaloides Andersson	–	8	x	x	–	–	–	–	X	5

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	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Salix babylonica L.	–	8, 96	–	–	–	–	–	–	N	*
Salix bebbiana Sarg.	–	–	x	–	–	x	–	–	X	8
Salix discolor Muhl.	–	x	x	x	x	x	–	x	X	2
Salix humilis Marshall	–	8	–	–	–	x	–	–	X	6
Salix interior Rowlee	–	96	–	x	–	5	–	x	X	1
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	–	–	–	x	51	–	–	–	X	7
Salix nigra Marshall	–	96	x	x	–	x	–	–	X	4
Salix petiolaris Sm.	–	–	–	x	–	–	–	–	X	7
SF***Salix sericea*** Marshall	–	–	–	–	–	–	–	x	N	10
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	x	x	x	x	5	–	–	X	1
Sambucus racemosa var. *pubens* (Michx.) Koehne	–	–	R	–	–	–	–	–	R	10
Sanicula canadensis L.	–	–	–	–	–	5	–	–	N	7
Sanicula marilandica L.	–	–	–	–	–	5	–	–	N	6
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	–	–	x	–	–	–	–	–	X	2
SF***Sanicula trifoliata*** E.P. Bicknell	–	–	–	–	–	5	–	–	N	10
Saponaria officinalis L.	x	x	–	–	–	5	–	–	X	*
Sassafras albidum (Nutt.) Nees	x	x	x	x	x	x	–	x	X	3
Saururus cernuus L.	–	42	x	x	45	–	–	–	X	9
SF***Sceptridium dissectum*** Spreng. (*Botrychium dissectum* Spreng.)	–	61	x	–	x	x 57	–	–	X	6
SF***Sceptridium multifidum*** (S.G. Gmel.) M. Nishida (*Botrychium* ***multifidum*** (S.G. Gmelin) Rupr. (*Botrychium multifidum* (J. F. Gmel.) Rupr. var. *intermedium* (D.C. Eaton) Farw.))	–	–	x	7	–	–	–	–	N	10
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	–	x	–	–	–	–	–	–	X	*
SF***Schizachyrium littorale*** (Nash) E.P. Bicknell	x	–	–	–	–	–	–	–	N	10
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	87	–	x	x	x	–	x	X	5
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	–	8	–	x	–	x	–	–	X	6
Schoenoplectus pungens (Vahl) Palla (*Scirpus pungens* Vahl)	–	8	–	–	–	–	–	–	N	5
SF***Schoenoplectus purshianus*** (Fernald) M.T. Strong (*Scirpus purshianus* Fernald)	–	–	–	x	–	–	–	–	X	9

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Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl var. *creber* Fernald)	–	8	x	–	–	–	–	–	X	5
Scirpus atrovirens Willd.	–	8, 96	2	x	–	x 83	–	–	X	4
Scirpus cyperinus (L.) Kunth	–	x	–	x	–	x 5	–	x	X	6
SF***Scirpus expansus*** Fernald	–	–	–	67	–	–	–	–	N	9
SF***Scirpus georgianus*** R. M. Harper	–	x	–	–	–	x	–	–	X	5
Scirpus pendulus Muhl.	–	8	–	–	–	–	–	–	N	4
Scleranthus annuus L.	–	–	–	–	–	x	–	–	X	*
SF***Scleria reticularis*** Michx.	–	–	–	–	–	–	–	x	N	10
Scrophularia lanceolata Pursh	–	9	R	–	–	–	–	–	N	5
Scutellaria galericulata L. (*Scutellaria epilobiifolia* A. Ham.)	–	x	–	–	–	–	–	–	X	5
Scutellaria lateriflora L.	–	96	x	–	–	–	–	–	X	5
Sedum sarmentosum Bunge	x	–	–	–	–	–	–	–	X	*
SF***Selaginella eclipes*** W. R. Buck (*Selaginella apoda* (L.) Fernald)	–	–	–	84	–	–	–	–	N	10
Setaria viridis (L.) P. Beauv.	–	8	–	–	x	–	–	–	X	*
Silene antirrhina L.	x	–	–	x	–	–	–	–	X	1
Silene armeria L.	–	–	–	–	–	–	–	x	X	*
Silene latifolia Poir. (*Lychnis alba* Mill.)	115, 112	x	–	–	–	–	–	–	X	*
Silphium integrifolium Michx.	–	142	–	–	–	–	–	–	N	5
Silphium laciniatum L.	–	142	–	–	–	–	–	–	N	5
Silphium perfoliatum L. var. *perfoliatum*	–	142	–	–	–	–	–	–	N	5
SF***Sisyrinchium angustifolium*** Mill.	–	9	–	R	–	–	–	–	N	10
Sium suave Walter	–	x	–	–	x	–	–	–	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson	x	–	x	–	x	–	–	–	X	5
Smilax lasioneura Hook.	x	–	x	–	x	–	–	–	X	5
Smilax rotundifolia L.	x	x	x	–	x	5	–	x	X	7
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	x	–	–	–	–	–	–	–	X	5
Solanum carolinense L.	–	9	–	–	x	5	–	–	X	Ad
Solanum dulcamara L.	x	x	–	–	x	5	–	–	X	*
Solidago altissima L.	–	x	–	x	–	x 5	–	x	X	1
Solidago caesia L.	x	–	x	–	x	x 5	–	–	X	7
Solidago gigantea Aiton	–	x	x	–	x	x	–	–	X	4

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Solidago juncea Aiton	–	–	–	x	x	5	–	x	X	5
Solidago nemoralis Aiton	x	–	–	–	–	x	–	–	X	4
Solidago patula Muhl. ex Willd	–	42	x	x	–	–	–	–	X	9
Solidago riddellii Frank	–	142	–	–	–	–	–	–	N	7
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	–	96	x	x	x	x 5	–	x	X	6
SF***Solidago simplex*** Kunth ssp. ***randii*** (Porter) Ringius var. ***gillmanii*** (A. Gray) G.L. Nesom (*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald)	x	–	–	–	–	–	–	–	X	10
SF***Solidago speciosa*** Nutt.	–	96	–	–	–	x 5	–	–	X	7
Solidago uliginosa Nutt.	–	–	–	x	–	–	–	–	X	10
Solidago ulmifolia Muhl. ex Willd.	–	96	x	x	–	–	–	x	X	5
Sonchus oleraceus L.	–	–	–	–	–	5	–	–	N	*
Sorghastrum nutans (L.) Nash	–	142	–	x	–	x	–	x	X	5
SF***Sparganium americanum*** Nutt.	–	x	–	–	–	20	–	–	X	10
Sparganium emersum Rehmann (*Sparganium chlorocarpum* Rydb.)	–	x	–	–	–	–	–	–	X	10
Sparganium eurycarpum Engelm.	–	8	–	–	–	–	–	–	N	6
Spartina pectinata Link	–	8	–	x	–	68	–	–	X	4
Sphenopholis intermedia (Rydb.) Rydb.	–	–	x	–	–	–	–	–	X	4
Spiraea alba Du Roi	–	x	–	x	–	x 5	–	x	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	–	x	–	x	–	x	–	x	X	9
Spiranthes cernua (L.) Rich.	–	–	–	–	75	x 19	–	–	X	7
SF***Spiranthes lucida*** (H. H. Eaton) Ames	–	–	8	–	–	–	–	–	N	10
SF***Spirodela polyrhiza*** (L.) Schleid.	–	–	123, 120	–	–	–	–	–	N	7
Sporobolus clandestinus (Biehler) Hitchc.	–	–	–	–	–	x	–	–	X	9
Sporobolus cryptandrus (Torr.) A. Gray	–	–	x	x	–	x	–	–	X	7
Sporobolus heterolepis (A. Gray) A. Gray	–	142	–	–	–	–	–	–	N	10
Sporobolus vaginiflorus (Torr.) Alph. Wood	–	–	–	–	x	x	–	–	X	0
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida* (Pursh) Fernald)	–	96	–	x	–	x	–	–	X	5
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	–	–	x	x	x	–	–	–	X	5
Stellaria graminea L.	–	x	–	–	–	–	–	–	X	*
Stellaria longifolia Muhl. ex Willd.	–	x	–	–	–	–	–	–	X	8

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Stellaria media (L.) Vill.	–	–	–	–	x	–	–	–	X	*
Stuckenia pectinata (L.) Boerner (*Potamogeton pectinatus* L.)	–	8	–	–	–	–	–	–	N	5
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve (*Aster borealis* Prov.)	–	R	–	–	–	–	–	–	R	10
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	–	–	x	–	–	–	–	–	X	7
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	–	–	–	–	–	x	–	–	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	–	–	–	–	–	5	–	–	N	5
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	–	x	–	x	–	x 5	–	–	X	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	–	–	x	–	–	x 5	–	–	X	4
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	–	142	–	R	–	–	–	–	R	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	–	–	–	x	–	–	–	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	–	–	–	–	–	–	–	x	N	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)	–	–	–	x	–	x 5	–	–	X	9
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	–	–	–	–	–	x	–	–	X	7
Symphyotrichum racemosum (Elliott) G.L. Nesom (*Aster vimineus* Lam.)	–	–	x	–	–	–	–	–	X	5
Symplocarpus foetidus (L.) Salisb. ex W.P.C. Barton	–	x	x	–	x	x	–	–	X	8
Syringa vulgaris L.	11	9	–	–	–	–	–	–	X	*
Taraxacum erythrospermum Andrz. ex Besser	–	–	–	–	–	x	–	–	X	*
Taraxacum officinale F. H. Wiggers	x	x	–	–	x	x	–	–	X	*
Taxodium distichum (L.) Rich.	–	x	–	–	–	–	–	–	X	ad
Teesdalia nudicaulis (L.) W. T. Aiton	–	–	–	–	–	x	–	–	X	*
Tephrosia virginiana (L.) Pers.	–	–	–	–	–	5	–	–	N	8
SF***Thelypteris noveboracensis*** (L.) Nieuwl. (*Dryopteris noveboracensis* (L.) A. Gray)	–	x	x	–	–	–	–	–	X	10

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	–	9	x	x	x	x 5	–	x	X	6
Thlaspi arvense L.	–	–	–	x	–	–	–	–	X	*
Tilia americana L.	x	96	x	–	x	–	–	–	X	5
SF***Torreyochloa pallida*** (Torr.) G.L. Church var. *pallida* (*Glyceria pallida* (Torr.) Trin.)	–	–	–	–	–	–	141	–	n	10
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	x	–	x	x	–	–	X	2
SF***Toxicodendron rydbergii*** (Small ex Rydb.) Greene	140	–	–	–	–	–	–	–	N	
SF***Toxicodendron vernix*** (L.) Kuntze (*Rhus vernix* L.)	–	41	R	–	–	66	–	–	N	10
Tradescantia ohiensis Raf.	x	9	–	x	–	x	–	–	X	2
Tragopogon dubius Scop.	x	x	–	x	–	x	–	–	X	*
Tragopogon pratensis L.	–	–	–	–	–	5	–	–	X	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald)	–	–	–	–	–	–	–	x	N	
SF***Trientalis borealis*** Raf.	–	42	x	–	81	–	–	–	X	10
Trifolium aureum Pollich	–	–	–	–	–	–	–	–	X	*
Trifolium dubium Sibth.	–	–	–	–	–	9	–	–	N	*
Trifolium pratense L.	–	–	–	–	–	–	–	–	X	*
Trifolium repens L.	–	96	–	–	–	x	–	–	X	*
SF***Trillium cernuum*** L. (*Trillium cernuum* L. var. *macranthum* Wiegand)	–	–	–	–	x	78	–	–	X	10
Trillium flexipes Raf.	–	–	R	–	–	–	–	–	R	6
Trillium recurvatum L. C. Beck	–	–	R	–	x	–	–	–	X	5
Triplasis purpurea (Walter) Chapm.	x	–	–	–	–	–	–	–	X	7
Triticum aestivum L.	–	x	–	–	–	–	–	–	X	*
Typha angustifolia L.	–	x	–	x	–	–	–	–	X	1
Typha latifolia L.	–	x	–	x	–	x 5	–	–	X	1
Ulmus americana L.	–	x	x	–	x	x	–	–	X	3
Ulmus pumila L.	x	9	–	–	–	x	–	–	X	*
Ulmus rubra Muhl.	–	96	x	–	x	5	–	–	X	4
Urtica dioica L.	–	–	96	–	43	–	–	–	N	*
Urtica dioica L. ssp. *gracilis* (Aiton) Seland. (*Urtica procera* Willd.)	–	x	x	–	x	–	–	–	X	2
SF***Utricularia minor*** L.	–	97	–	–	–	–	–	–	N	10

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen (*Utricularia vulgaris* L.)	–	97	–	–	x	–	–	–	X	9
Uvularia grandiflora Sm.	x	–	x	–	x	–	–	–	X	7
Vaccinium angustifolium Aiton	x	–	–	–	–	x	–	x	X	5
Vaccinium corymbosum L.	–	–	x	–	–	843	–	x	X	8
Vaccinium pallidum Alton	–	–	–	–	–	x 5	–	–	X	5
Verbascum blattaria L.	–	50	–	–	–	x	–	–	X	*
Verbascum thapsus L. ssp. *thapsus*	x	x	–	x	–	5	–	–	X	*
Verbena hastata L.	–	96	–	x	–	5	–	–	X	4
Verbena × *rydbergii* Moldenke	–	116, 113	–	–	–	–	–	–	N	4
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt.)	–	–	–	–	–	x	–	–	X	3
Vernonia gigantea (Walter) Branner & Coville (*Vernonia altissima* Nutt. var. *taeniotricha* S.F. Blake)	–	–	–	–	–	x	–	–	X	5
Veronica arvensis L.	–	x	–	–	–	–	–	–	X	*
Veronica scutellata L.	–	R	–	–	–	–	–	–	R	10
Veronica verna L.	–	–	–	–	–	x	–	–	X	*
Viburnum acerifolium L.	–	–	x	–	–	–	–	–	X	9
Viburnum dentatum L. (*Viburnum recognitum* Fernald)	–	–	–	–	–	x	–	–	X	*
Viburnum lentago L.	–	x	x	–	–	x	–	x	X	5
Viburnum opulus L. var. *opulus*	–	–	–	–	x	–	–	–	X	*
Viburnum prunifolium L.	–	–	–	–	–	5	–	–	N	5
Viburnum rafinesquianum Schult.	–	–	–	–	x 31	–	–	–	X	5
Vinca minor L.	11	8	–	–	11	–	–	–	N	*
Viola arvensis Murray	–	135, 132	–	–	–	–	–	–	N	*
SF***Viola blanda*** Willd., s.l. (*Viola incognita* var. *forbesii* Brainerd)	–	–	–	–	78	–	–	–	N	10
Viola cucullata Aiton	–	–	x	–	x	–	–	–	X	9
Viola labradorica Schrank (*Viola conspersa* Rchb.)	–	–	x	–	37	72	–	–	X	6
Viola lanceolata L.	–	–	–	x	–	x	–	x	X	7
SF***Viola macloskeyi*** Lloyd ssp. ***pallens*** (Banks ex Ging) M.S. Baker (*Viola pallens* (Banks) Brainerd	–	–	x	–	37	71	–	–	X	10
Viola pedata L. (*Viola pedata* L. *linearíloba* DC.)	–	–	–	–	x	5	–	–	X	9
Viola pubescens Aiton	–	x	x	–	40	–	–	–	X	5

Table 33 (continued). Summary of species verified and reported at Keiser Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 34. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit								Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*		
Viola sagittata Aiton var. *sagittata*	–	–	–	–	–	x	–	–	X	7
Viola sororia Willd.	–	x	x	–	x	–	–	–	X	3
Viola striata Aiton	–	–	–	–	124	–	–	–	N	4
SF***Viola* × *primulifolia*** L. (pro sp.) [*V. lanceolata* × *V. macloskeyi* ssp. *pallens*] (*Viola primulifolia* L.).	–	105, 103	–	–	–	–	–	–	N	10
Vitis aestivalis Michx.	x	x	x	–	x	x	–	–	X	7
SF***Vitis labrusca*** L.	–	42	x	x	–	x 5	–	–	X	9
Vitis riparia Michx.	x	x	x	x	x	x	–	–	X	2
Vitis vulpina L.	–	–	–	–	–	x	–	–	X	9
Wisteria frutescens (L.) Poir. (*Wisteria macrostachya* Nutt.)	–	–	x	–	–	–	–	–	X	*
SF***Woodwardia virginica*** (L.) Sm.	–	–	–	–	–	–	–	x	N	10
Xanthium strumarium L.	–	x	–	–	–	–	–	–	X	*
SF***Xyris torta*** Sm.	–	–	–	x	–	x 27	–	–	X	10
Yucca flaccida Haworth (*Yucca smalliana* Fernald)	–	–	–	x	–	–	–	–	X	ad
Zanthoxylum americanum Mill. (*Xanthoxylum americanum* Mill.)	–	–	R	–	–	–	–	–	R	3
SF***Zizania aquatica*** L. var. *aquatica*	110, 108	142	–	–	–	–	–	–	N	10

Table 34. Sources of new species verified and reported from Keiser.

Notes	Source(s)	Date	Species
1	P. Benjamin et al.	29 June 1995	*Botrychium matricariifolium*, *Botrychium virginianum*
2	K. Board	Aug 1990	*Carex bebbii*, *Dryopteris cristata*, *Scirpus atrovirens*
3	K. Board and B. Plampin	3 Aug 1990	*Platanthera psycodes*
4	C. Fox	6 June 1984	*Aesculus hippocastanum*, *Conoclinium coelestinum*
5	C. Fox	1 Feb 1985	*Acer saccharinum*, *Ageratina altissima*, *Agrostis perennans*, *Ailanthus altissimus*, *Amphicarpaea bracteata*, *Apocynum androsaemifolium*, *Apocynum cannabinum*, *Aralia nudicaulis*, *Asclepias tuberosa*, *Asimina triloba*, *Aureolaria flava*, *Baptisia lacteal*, *Barbarea vulgaris*, *Berberis thunbergii*, *Betula papyrifera*, *Boehmeria cylindrica* var. *drummondiana*, *Bromus inermis*, *Calamagrostis canadensis*, *Calystegia sepium* ssp. *sepium*, *Carex bebbii*, *Carex cristatella*, *Carex festucacea*, *Carex gracillima*, *Carex sartwellii*, *Circaea canadensis* ssp. *canadensis*, *Cirsium discolor*, *Cirsium muticum*, *Comandra umbellata* ssp. *umbellata*, *Cornus florida*, *Cyperus lupulinus* ssp. *lupulinus*, *Cyperus strigosus*, *Desmodium paniculatum*, *Dichanthelium acuminatum* ssp. *columbianum*, *Dichanthelium acuminatum* ssp. *fasciculatum*, *Dichanthelium acuminatum* ssp. *spretum*, *Dichanthelium oligosanthes* ssp. *scribnerianum*, *Dichanthelium sphaerocarpon*, *Dryopteris cristata*, *Eleocharis compressa*, *Elymus repens*, *Equisetum arvense*, *Equisetum hyemale* ssp. *affine*, *Equisetum laevigatum*, *Erigeron annuus*, *Erigeron strigosus*, *Eupatorium serotinum*, *Euphorbia corollata*, *Euthamia gymnospermoides*, *Eutrochium maculatum*, *Fagus grandifolia*, *Fragaria virginiana*, *Galium triflorum*, *Gaultheria procumbens*, *Gaylussacia baccata*, *Geum canadense*, *Hackelia virginiana*, *Helenium flexuosum*, *Helianthus divaricatus*, *Helianthus maximiliani*, *Helianthus occidentalis*, *Hieracium aurantiacum*, *Hypericum canadense*, *Hypericum kalmianum*, *Hypericum perforatum*, *Impatiens capensis*, *Juncus acuminatus*, *Juncus brachycarpus*, *Juncus dudleyi*, *Juncus effusus*, *Juncus greenei*, *Juncus interior*, *Juncus tenuis*, *Krigia biflora*, *Lactuca serriola*, *Laportea canadensis*, *Lechea mucronata*, *Leersia virginica*, *Lespedeza hirta*, *Liatris aspera*, *Liatris spicata*, *Ligustrum vulgare*, *Lindera benzoin*, *Lobelia inflate*, *Lobelia kalmii*, *Lonicera tatarica*, *Ludwigia alternifolia*, *Lycopus americanus*, *Lysimachia terrestris*, *Malus domestica*, *Medicago lupulina*, *Melilotus alba*, *Monarda fistulosa*, *Morus alba*, *Muhlenbergia frondosa*, *Oenothera biennis*, *Onoclea sensibilis*, *Osmorhiza claytonii*, *Osmundastrum cinnamomeum*, *Packera paupercula*, *Panicum rigidulum*, *Phytolacca americana*, *Pilea pumila*, *Polygala sanguinea*, *Polygonatum pubescens*, *Populus deltoides*, *Populus grandidentata*, *Prenanthes alba*, *Proserpinaca palustris*, *Prunella vulgaris* ssp. *lanceolata*, *Prunus pensylvanica*, *Prunus virginiana*, *Pycnanthemum tenuifolium*, *Quercus rubra*, *Ranunculus abortivus*, *Rhexia virginica*, *Rhynchospora alba*, *Rhynchospora capitellata*, *Ribes cynosbati*, *Rosa multiflora*, *Rosa palustris*, *Rubus hispidus*, *Rubus occidentalis*, *Rudbeckia hirta*, *Salix interior*, *Sambucus nigra* ssp. *canadensis*, *Sanicula canadensis*, *Sanicula marilandica*, *Sanicula trifoliata*, *Saponaria officinalis*, *Scirpus cyperinus*, *Silene latifolia*, *Smilax rotundifolia*, *Solanum carolinense*, *Solanum dulcamara*, *Solidago altissima*, *Solidago caesia*, *Solidago juncea*, *Solidago rugosa*, *Solidago speciosa*, *Sonchus oleraceus*, *Spiraea alba*, *Symphyotrichum ericoides*, *Symphyotrichum lanceolatum* var. *lanceolatum*, *Symphyotrichum lateriflorum*, *Symphyotrichum praealtum*, *Tephrosia virginiana*, *Thelypteris palustris* var. *pubescens*, *Tragopogon pratensis*, *Typha latifolia*, *Ulmus rubra*, *Vaccinium pallidum*, *Verbascum thapsus* ssp. *thapsus*,

Table 34 (continued). Sources of new species verified and reported from Keiser.

Notes	Source(s)	Date	Species
5	C. Fox *(continued)*	1 Feb 1985	*Verbena hastata*, *Viburnum prunifolium*, *Viola pedata*, *Vitis labrusca*
6	E. Greiner and K. Quinlan	Sep 2003	*Phragmites australis* (Cav.) Steud. (KC = native genotype)
7	D. Hamilla and B. Plampin	26 Aug 2007	*Peltandra virginica*, *Sceptridium multifidum*
8	L. Rericha, D. Mason, and L. Miramontes	July 2003	*Angelica atropurpurea* L., *Carex annectens*, *Carex atherodes*, *Carex lurida*, *Carex pellita*, *Carex projecta*, *Carex scoparia* var. *scoparia*, *Carex stipata*, *Carex stricta*, *Cirsium muticum*, *Doellingeria umbellata* var. *umbellata*, *Eleocharis erythropoda*, *Eleocharis obtuse*, *Erechtites hieraciifolius* var. *hieraciifolius*, *Erigeron annuus*, *Fallopia japonica*, *Holcus lanatus*, *Hypericum punctatum*, *Leonurus cardiac*, *Ludwigia palustris*, *Lythrum salicaria*, *Nepeta cataria*, *Oxalis dillenii*, *Panicum virgatum*, *Persicaria amphibia*, *Persicaria maculosa*, *Pontederia cordata*, *Ranunculus flabellaris*, *Sagittaria latifolia*, *Salix amygdaloides*, *Salix babylonica*, *Salix humilis*, *Schoenoplectus acutus* var. *acutus*, *Schoenoplectus pungens*, *Schoenoplectus tabernaemontani*, *Scirpus atrovirens*, *Scirpus pendulus*, *Setaria viridis*, *Sparganium eurycarpum*, *Spartina pectinata*, *Spiranthes lucida*, *Stuckenia pectinata*, *Vinca minor*
9	D. Mason and G. Tonkovich	May–Aug 2000	*Acer negundo*, *Agrimonia parviflora*, *Ailanthus altissimus*, *Asclepias incarnata*, *Campanula americana*, *Cardamine douglassii*, *Carex folliculata*, *Carex intumescens*, *Carex lacustris*, *Carex lupulina*, *Carex swanii*, *Carex vulpinoidea*, *Carpinus caroliniana* ssp. *virginiana*, *Catalpa speciosa*, *Celastrus orbiculatus*, *Cicuta bulbifera*, *Cirsium arvense*, *Clinopodium vulgare*, *Commelina communis*, *Cyperus strigosus*, *Eupatorium perfoliatum*, *Fragaria virginiana*, *Galium triflorum*, *Glechoma hederacea*, *Juncus effusus*, *Juncus tenuis*, *Juniperus virginiana* var. *virginiana*, *Leersia virginica*, *Lobelia cardinalis*, *Medicago lupulina*, *Mimulus ringens*, *Monarda fistulosa*, *Monarda punctata*, *Morus alba*, *Persicaria hydropiperoides*, *Phytolacca americana*, *Pilea pumila*, *Platanus occidentalis*, *Potentilla simplex*, *Prunella vulgaris* ssp. *lanceolata*, *Ptelea trifoliata* ssp. *trifoliata*, *Quercus bicolor*, *Ranunculus hispidus*, *Ranunculus sceleratus*, *Robinia pseudoacacia*, *Salix nigra*, *Scrophularia lanceolata*, *Sisyrinchium angustifolium*, *Solanum carolinense*, *Syringa vulgaris*, *Thelypteris palustris* var. *pubescens*, *Tilia americana*, *Tradescantia ohiensis*, *Trifolium dubium*, *Ulmus pumila*, *Verbena hastata*
10	D. Mickey	17 Sept 2003	*Catalpa speciosa*
11	D. Mickey	Fall 2003	*Ailanthus altissimus*, *Alliaria petiolata*, *Celastrus orbiculatus*, *Syringa vulgaris*, *Vinca minor*
12	Morton Arboretum hiker	23 June 1993	*Juglans cinerea*
13	M. Newgent	16 Apr 1992	*Draba verna*
14	M. Newgent	9 July 1992	*Huperzia lucidula*
15	M. Newgent	July 1992	*Polygala polygama*
16	M. Newgent	Dec 1992	*Fagus grandifolia*
17	M. Newgent	7 Jan 1993	*Pyrola americana*
18	M. Newgent	5 Aug 1994	*Cornus sericea*
19	M. Newgent and B. Plampin	16 Aug 1994	*Lycopodiella inundata*, *Spiranthes cernua*
20	M. Newgent	29 June 1995	*Liparis loeselii*, *Oenothera fruticosa* ssp. *glauca*, *Podophyllum peltatum*, *Sparganium americanum*
21	B. Plampin and M. Newgent	25 Feb 1995	*Goodyera pubescens*, *Hypopitys monotropa*
22	M. Newgent and B. Plampin	16 Aug 1995	*Persicaria pensylvanica*
23	M. Newgent et al.	5 Aug 1994	*Hypericum punctatum*, *Iris virginica*
24	L. Olsen	May 1993	*Pyrola elliptica*

Table 34 (continued). Sources of new species verified and reported from Keiser.

Notes	Source(s)	Date	Species
25	N.B. Pavlovic	1985	*Betula papyrifera*
26	N.B. Pavlovic	1 May 1991	*Eurybia macrophylla*
27	N.B. Pavlovic	5 July 1995	*Xyris torta*
28	Pavlovic et al. (Exotic Project)	10 Aug 1998	*Persicaria longiseta*
29	Pavlovic et al. (Exotic Project)	11 Aug 1998	*Carex bebbii*
30	Pavlovic et al. (Exotic Project)	12 Aug 1998	*Dichanthelium dichotomum* ssp. *dichotomum*
31	Pavlovic et al. (Exotic Project)	18 Aug 1998	*Viburnum rafinesquianum*
32	Pavlovic et al. (Exotic Project)	24 Aug 1998	*Rosa carolina*
33	Pavlovic et al. (Exotic Project)	14 July 2000	*Glyceria septentrionalis*
34	B. Plampin	1985	*Hemerocallis fulva*
35	B. Plampin	Pre-1992 (no date)	*Betula nigra*
36	B. Plampin	1989	*Corallorhiza maculata*
37	B. Plampin	May 1990	*Clematis virginiana*, *Gaultheria procumbens*, *Lilium michiganense*, *Viola labradorica*, *Viola macloskeyi* ssp. *pallens*
38	B. Plampin	7 July 1990	*Erodium cicutarium*
39	B. Plampin	1990	*Chimaphila maculata*
40	B. Plampin	Apr 1991	*Viola pubescens*
41	B. Plampin	23 July 1991	*Bartonia virginica*, *Mitchella repens*, *Persicaria arifolia*, *Platanthera clavellata*, *Toxicodendron vernix*
42	B. Plampin	July 1991	*Dryopteris carthusiana*, *Fagus grandifolia*, *Saururus cernuus*, *Solidago patula*, *Trientalis borealis*, *Vitis labrusca*
43	B. Plampin	May 1992	*Urtica dioica*
44	B. Plampin	10 June 1992	*Anemone quinquefolia* var. *quinquefolia*
45	B. Plampin	Aug 1992	*Corallorhiza maculata*, *Lobelia cardinalis*, *Lobelia inflata*, *Ludwigia palustris*, *Platanthera clavellata*, *Saururus cernuus*
46	B. Plampin	Dec 1992	*Monotropa uniflora*
47	B. Plampin	Jan 1993	*Conopholis americana*
48	B. Plampin	May 1993	*Rhamnus frangula*
49	B. Plampin	21 June 1993	*Goodyera pubescens*
50	B. Plampin	July 1993	*Verbascum blattaria*
51	B. Plampin	24 Oct 1993	*Fimbristylis autumnalis*, *Juncus greenei*, *Juncus scirpoides*, *Salix myricoides*
52	B. Plampin	29 Oct 1993	*Bulbostylis capillaris*
53	B. Plampin	16 May 1994	*Panax quinquefolius*
54	B. Plampin	June 1994	*Conopholis americana*
55	B. Plampin	25 July 1994	*Gratiola neglecta*
56	B. Plampin	16 Aug 1994	*Cyperus bipartitus*, *Fimbristylis autumnalis*, *Juncus canadensis*, *Lobelia cardinalis*, *Phragmites australis* (Cav.) Steud. (KC = native genotype)
57	B. Plampin	17 Aug 1994	*Sceptridium dissectum*
58	B. Plampin	18 Aug 1994	*Drosera rotundifolia*, *Platanthera clavellata*
59	B. Plampin	2 Dec 1994	*Anemone americana*, *Lycopodiella inundata*
60	B. Plampin	3 Dec 1994	*Lycopodium clavatum*
61	B. Plampin	4 Dec 1994	*Sceptridium dissectum*
62	B. Plampin	23 Feb 1995	*Betula papyrifera*, *Diphasiastrum digitatum*, *Huperzia lucidula*
63	B. Plampin	25 Feb 1995	*Lycopodium clavatum*, *Platanthera clavellata*

Table 34 (continued). Sources of new species verified and reported from Keiser.

Notes	Source(s)	Date	Species
64	B. Plampin	12 Mar 1995	*Alnus incana* ssp. *rugosa*
65	B. Plampin	29 June 1995	*Carex vulpinoidea*, *Goodyera pubescens*, *Ludwigia palustris*, *Lythrum alatum*, *Polygala polygama*, *Sagittaria latifolia*
66	B. Plampin	5 July 1995	*Toxicodendron vernix*
67	B. Plampin	20 Sept 1995	*Scirpus expansus*
68	B. Plampin	23 Oct 1995	*Dryopteris carthusiana*, *Eleocharis elliptica*, *Spartina pectinata* Link
69	B. Plampin	29 Aug 1996	*Convallaria majalis*, *Eleocharis engelmannii*, *Hypericum boreale*, *Hypericum gentianoides*, *Lindernia dubia*, *Rotala ramosior*
70	B. Plampin	2 Dec 1996	*Micranthes pensylvanica*
71	B. Plampin	25 Apr 1997	*Viola macloskeyi* ssp. *pallens*
72	B. Plampin	23 May 1997	*Viola labradorica*
73	B. Plampin	14 June 1997	*Alliaria petiolata*, *Asimina triloba*, *Liparis liliifolia*, *Persicaria arifolia*, *Persicaria sagittata*
74	B. Plampin	1997	*Elymus repens*
75	B. Plampin	24 Oct ????	*Spiranthes cernua*
76	B. Plampin and M. Newgent	1 May 1990	*Cornus florida*
77	B. Plampin and M. Newgent	May 1990	*Alliaria petiolata*, *Medicago lupulina*, *Mitchella repens*
78	B. Plampin and M. Newgent	21 Apr 1991	*Trillium cernuum*, *Viola blanda*
79	B. Plampin and M. Newgent	25 Sept 1991	*Caulophyllum thalictroides*
80	B. Plampin and M. Newgent	Apr 1992	*Floerkea proserpinacoides*
81	B. Plampin and M. Newgent	25 May 1992	*Trientalis borealis*
82	B. Plampin and M. Newgent	Aug 1992	*Alisma subcordatum*
83	B. Plampin and M. Newgent	16 Aug 1994	*Cephalanthus occidentalis*, *Scirpus atrovirens*, *Vaccinium corymbosum*
84	B. Plampin and M. Newgent	May 1995	*Comptonia peregrina*, *Selaginella eclipes*
85	B. Plampin and M. Newgent	29 June 1995	*Ilex verticillata*, *Liparis liliifolia*, *Platanthera lacera*
86	B. Plampin and M. Newgent	23 Oct 1995	*Aristida tuberculosa*
87	B. Plampin and M. Newgent	n.d.	*Schizachyrium scoparium*
88	B. Plampin and A. Resetar	9 Aug 1993	*Hibiscus moscheutos* ssp. *moscheutos*
89	B. Plampin and S. Whisler	May 1992	*Botrychium matricariifolium*
90	B. Plampin et al.	29 June 1995	*Alisma subcordatum*, *Alnus incana* ssp. *rugosa*, *Asclepias incarnata*
91	B. Plampin et al.	23 Oct 1995	*Aristida purpurascens*
92	T. Post	31 Aug 1994	*Celtis occidentalis*
93	R. Scribailo and P.M. Stewart	1995	*Hydrocotyle umbellata*
94	S. von Oettingen	24 Aug 1982	*Alnus glutinosa*
95	S. von Oettingen	30 Sept 1982	*Cystopteris tenuis*
96	C. Wolfe and N. Kalkbrenner	1993, 1994	*Anemone americana*, *Apios americana*, *Asclepias incarnata*, *Bidens coronata*, *Calamagrostis canadensis*, *Carex aquatilis*, *Carex lupulina*, *Carex stipata*, *Carex tribuloides*, *Carya laciniosa*, *Caulophyllum thalictroides*, *Cornus obliqua*, *Cyperus esculentus*, *Eupatorium serotinum*, *Fallopia scandens*, *Hydrocotyle umbellata*, *Ilex verticillata*, *Lobelia cardinalis*, *Lonicera tatarica*, *Lycopus uniflorus*, *Mentha* × *piperita*, *Mitella diphylla*, *Muhlenbergia frondosa*, *Oxalis violacea*, *Persicaria hydropiperoides*, *Persicaria virginiana*, *Pilea pumila*, *Poa palustris*, *Salix babylonica*, *Salix interior*, *Salix nigra*, *Scirpus atrovirens*, *Scutellaria lateriflora*, *Solidago rugosa*, *Solidago speciosa*, *Solidago ulmifolia*,

Table 34 (continued). Sources of new species verified and reported from Keiser.

Notes	Source(s)	Date	Species
96	C. Wolfe and N. Kalkbrenner (*continued*)	1993, 1994	*Stachys hispida*, *Tilia americana*, *Trifolium repens*, *Ulmus rubra*, *Urtica dioica*, *Verbena hastata*
97	Mason	21 June 2007	*Carex alata*, *Lysimachia terrestris*, *Rotala ramosior*, *Utricularia minor*, *Utricularia vulgaris* ssp. *macrorhiza*
98	N.B. Pavlovic	30 June 2011	*Lespedeza hirta*
99	A. Peterkin	28 Nov 2011	*Ilex opaca*
100	D. Hamilla	23 Sept 2007	*Deparia acrostichoides*
101	B. Plampin	14 July 2004	*Coptis trifolia*
102	G. Wilhelm	12 Oct 1991	*Dendrolycopodium dendroideum*
103	B. Plampin	5 May to 21 Sept 2002, 30 Aug 2004	*Viola* × *primulifolia* [*V. lanceolata* × *V. macloskeyi* ssp. *pallens*]
104	G. Wilhelm and K. Dritz	27 Aug 1988	*Brachyelytrum aristosum*
105	D. Mason	1999	*Leucojum aestivum*
106	M. Huft	11 Aug 2012	*Myosoton aquaticum*
107	J. Thomas	20 June 2013	*Carex albicans* var. *albicans*, *Carex tonsa* var. *rugosperma*, *Carex umbellata*
108	T. Bonace and B. Plampin	19 Aug 2012	*Zizania aquatica* var. *aquatica*
109	L. Brenan	4 Sept 2013	*Miscanthus sinensis*
110	M. Medley	4 Oct 1975	*Chamaecrista nictitans* ssp. *nictitans* var. *nictitans*
111	B. Plampin and D. Hamilla	1 May 2012	*Botrychium matricariifolium*
112	N.B. Pavlovic	16 May 1985	*Silene latifolia*
113	G. Wilhelm and L. Wetstein	28 Aug 1992	*Verbena* × *rydbergii*
114	D. Otto	17 June 1983	*Robinia neomexicana* var. *neomexicana*
115	J. Kwilosz	2012, herbicided	*Akebia quinata* (Houtt.) Decne.
116	G. Tonkovich	2011	*Pilea fontana*
117	S. Namestnik	6 Sept 2014	*Rhexia mariana* var. *mariana*
118	N.B. Pavlovic and M. Fisher-Dunham	29 Apr 2015	*Persicaria amphibia*
119	L. Brennan and S. Erdelac	18 July 2015	*Onopordum acanthium*
120	T. Troche	31 Aug 2015	*Spirodela polyrhiza*
121	T. Bonace	28 Sept 2013	*Conoclinium coelestinum*
122	M. Huft	7 Aug 2017	*Helianthus maximiliani*
123	T. Bassett and N.B. Pavlovic	12 July 2017	*Danthonia spicata*
124	N.B. Pavlovic	16 May 2018	*Viola striata*
125	S. Glassman	19 Aug 1956	*Desmodium ciliare* and *D. perplexum*
126	N. Pilla	n.d.	*Decodon verticillatus*
127	N. Pilla and D. Hamilla	4 Aug 2017	*Carex viridula* spp *viridula*
128	N. Pilla	5 Aug 2015	*Epilobium hirsutum*
129	N. Pilla and A. Balzer	28 Sept 2015	*Gentiana andrewsii*
130	N. Pilla	n.d.	*Linaria vulgaris*
131	N. Pavlovic	25 Apr 1985	*Cardamine hirsuta*
132	F. Swink	4 May 1947	*Viola arvensis*
133	G. Wilhelm and K. Dritz (MOR)	26 May 1979	*Carex debilis*
134	M. Bowles	26 Sept 1988	*Citrullus lanatus*
135	S. Namestnik	15 May 2009	*Collinsia parviflora*
136	L. Rericha and G. Wilhelm (F)	11 July 2002	*Juncus anthelatus*

Table 34 (continued). Sources of new species verified and reported from Keiser.

Notes	Source(s)	Date	Species
137	G. Wilhelm and L. Rericha	7 Oct 2013	*Nepeta racemosa*
138	G. Wilhelm	25 July 1998	*Hypericum sphaerocarpon*
139	C. Deam	17 June 1911	*Alnus serrulata*
140	C. Deam	20 Sept 1937	*Toxicodendron rydbergii*
141	N. Pilla and A. Balzar	10 June 2020	*Torreyochloa pallida*, *Wolffia brasiliensis*
142	D. Mason; species planted in restoration in Keiser B	12 Jan 2012	*Andropogon gerardii*, *Baptisia lactea*, *Carex hystericina*, *Carex lasiocarpa* ssp. *americana*, *Carex squarrosa*, *Carex utriculata*, *Coreopsis lanceolata*, *Coreopsis palmata*, *Coreopsis tripteris*, *Dulichium arundinaceum*, *Eleocharis palustris*, *Eleocharis rostellata*, *Eryngium yuccifolium*, *Hibiscus moscheutos* ssp. *moscheutos*, *Lespedeza capitata*, *Liatris aspera*, *Parthenium integrifolium*, *Physostegia virginiana*, *Ratibida pinnata*, *Rudbeckia hirta*, *Silphium integrifolium*, *Silphium laciniatum*, *Silphium perfoliatum* var. *perfoliatum*, *Solidago riddellii*, *Sorghastrum nutans*, *Sporobolus heterolepis*, *Symphyotrichum novae-angliae*, *Zizania aquatica* var. *aquatica*

Floristic summary

The Keiser Unit has an overall mean CoC of 6.1, representing an FQI of 159 (Table 35). Overall, there are 813 taxa comprising 656 native taxa, 22 adventive taxa, and 135 exotic taxa. Of the 783 total species found in the unit, 630 are native species, 22 are adventive species, and 131 are exotic species. Of the 656 native taxa, 21 are varieties, five are hybrids, and 630 are native species. Of the 71 Indiana-listed plant species, nine are endangered, 37 are threatened, 25 are watch list, and none are extirpated. *Ilex opaca* is the only new adventive species, and the only new invasive species is *Leucojum aestivum* L. The relatively low mean C-value suggests that few native species of high conservativism coefficients remain in the unit.

Conservation issues

The Keiser Unit is composed largely of dune complex, marsh complex, savanna complex, swamp complex, and a small area of foredune complex. The foredunes are remains of the easternmost portion of the Keiser blowout and foredunes that developed in 2000 after Lake Michigan dropped 1.29 meters (4.33 feet) from 177.16 meters (581.33 feet) above sea level in August 1997 to 175.87 meters (577 feet) above sea level in February 2000 (U.S. Army Corps of Engineers 2021). Since 2014, increasing lake levels, major storms with north winds off the beach, and the absence of a frozen shoreline have eroded portions of the dunes. These events resulted in the loss of Lake Front Drive just west of the Lake View parking lot in 2020, and precipitated erosion mitigation by park staff and the Town of Beverly Shore further east in Keiser. South of U.S. Highway 12 lie tracts of savanna and swamp complex that have received considerable anthropogenic disturbance. Ditching, fire suppression, and residential development have greatly altered Keiser subunits E and F. While this southern portion is mapped as disturbed, occasionally small, local, high-quality native vegetation can be found (see Figure 23). The low wetlands in Keiser subunit F adjacent to the Dunewood Campground still contain numbers of special flora within this disturbed matrix.

Keiser A

Keiser A occupies about 154 hectares (380 acres) of mostly wooded dunes west of Beverly Shores. Intervals of fire suppression punctuated by intense wildfires have influenced the structure and composition of these dunes by allowing an accumulation of thick beds of oak leaf litter that diminished the groundlayer vegetation. Intense fires top-killed woody plants and produced an abundance of dense oak sprouts. Nevertheless, scattered pockets of floristic diversity remain. The high Dune Ridge Trail traverses the site of an intense wildfire in the

Table 35. Summary of floristic statistics by subunit of Keiser. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

	Subunits								
Category	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	Entire Unit
Area (ha/acres)	154/380	304/750	18/45	4/9	129/319	95/235	28/68	5/13	726/1,818
Special flora total	22	49	52	23	35	42	1	15	133
Confirmed	15	18	40	16	13	26	0	15	83
New	8	26	9	4	21	16	1	0	41
Reported	1	4	3	3	1	0	0	0	6
Extirpated	0	1	0	1	0	0	0	0	3
Total taxa, FNA/ITIS	156	398	264	179	254	399	4	102	813
Total native taxa, FNA/ITIS	125	319	253	159	222	343	4	94	656
Native species, FNA/ITIS	120	312	245	152	219	329	4	92	630
Native variety, FNA/ITIS	4	4	7	5	2	12	0	2	21
Native hybrid, FNA/ITIS	1	3	1	2	1	2	0	1	5
Total adventive taxa, FNA/ITIS	3	9	3	1	3	6	0	0	22
Total adventive species, FNA/ITIS	3	9	3	1	3	6	0	0	22
Total adventive variety, FNA/ITIS	0	0	0	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0	0	0	0	0	0
Total exotic taxa, FNA/ITIS	28	70	8	19	29	50	0	8	135
Total exotic species, FNA/ITIS	28	69	8	19	26	49	0	8	131
Total exotic variety, FNA/ITIS	0	0	0	0	1	0	0	0	1
Total exotic hybrid, FNA/ITIS	0	1	0	0	2	1	0	0	3
Total Indiana-listed	15	24	21	14	18	17	0	9	71
Endangered	3	1	2	2	1	1	0	0	9
Threatened	7	16	11	6	5	7	0	6	37
Rare	0	0	0	0	0	0	0	0	0
Watch List	5	7	8	6	12	9	0	3	25
Extirpated	0	0	0	0	0	0	0	0	0
Sum CC	717	1,787	1,637	885	1,302	1,909	33	562	4,095
Sum CC adventive & invasive	687	1,714	1,629	867	1,272	1,857	33	554	3,949
Mean CoC	6	6	6	5	6	5	8	6	6
Mean CoC with adventive and invasive	4	4	6	5	5	5	8	5	5
FQI	63	99	102	70	87	102	17	56	159
FQI with adventive and invasive	54	85	100	64	79	92	17	53	138

1970s that produced prodigious sassafras resprouting in the following period of fire suppression. An escaped campfire in 1981 opened a small area in the east portion of the formerly burned area (Norman Henderson, former INDU biologist, pers. comm. with Pavlovic, 1983). The savanna groundlayer is depauperate, with sparse and scattered forbs that could be augmented by reintroducing missing species. Norman Henderson installed 25 permanent plots in 1981, which have been sampled occasionally to document the changes in tree density and structure over time and are now part of the INDU fire monitoring program. Prescribed fires in 2006 and 2010, meant to restore the oak savanna, were too intense, top-killing trees and initiating oak resprouting that has resulted in another thicket of oak and sassafras (Pavlovic, personal observation). Another effect of the fires has been increased expansion of oriental bittersweet (*Celastrus orbiculatus*)(Pavlovic et al. 2016). On 19 August 2009, a tornado

that struck Chesterton continued northeast and made its last landward impact in the northeast portion of this subunit, taking the tops off many black oaks in a linear swath (Nevers 2009). This canopy disturbance could accelerate the invasion and expansion of oriental bittersweet, similar to the occurrence at the Kintzele Ditch area in the Tamarack Unit. If the tornado had not skipped over the last dune before Lake Michigan, it would have damaged some of the 1933 Century of Progress homes (Pavlovic, personal observation of tornado path, 2010). A prescribed fire in spring 2017 burned the entire subunit above the Great Marsh but may have been less intense than the previous fires.

The vegetation of the Keiser Blowout, bisected by Kemil Road and donut-holed by the public parking lot, has rapidly been invaded by woody species, a successional pattern that is occurring throughout coastal dunes in southern Lake Michigan (Pavlovic, personal observation). Patches of Pitcher's thistle (*Cirsium pitcheri*) in the interior portions of this subunit have declined and been locally extirpated. The steep, high dune that faces the lake north of the parking lot has a declining population of Pitcher's thistle that is likely inbred (Fant et al. 2013, 2014), which is corroborated by low seed set (McEachern and Pavlovic 2013). The National Park Service removed many of the exotic trees and shrubs around the parking lot. To prevent visitors from ascending the high dune to the north, suitable native species including poison ivy, wafer ash, fragrant sumac, and cottonwood could replace the trees and shrubs. In addition, fencing and educational signage could be used to reduce unintended use. In 2020, the NPS replaced the retaining wall along the west side of the road and inadvertently destroyed patches of American bittersweet.

Keiser A has 120 native species, with a mean CoC of 5.6 and a floristic quality of 63. Keiser A has a total of 22 special flora species and 15 state-listed species.

Keiser B

Virtually all of what was once the Great Marsh—304 hectares (750 acres) of Keiser B—has been altered by drainage, cultivation, and introduction of invasive plants. The land is "marsh-like" in character, dominated by hybrid cattail, giant reed, reed canary grass, and wool grass in some areas, or by "dog-hair" woody growth. Some restoration efforts have been made by Dan Mason south of Beverly Drive. Special flora remain here and there throughout the vast area, but their occurrences in the disturbed matrix are remote and rare. Since 1995, efforts by the NPS, including planned modification of the hydrology, removal of inappropriate woody plants, use of herbicide on invasive plants, and reintroduction of wetland species, have led to partial restoration of the eastern portion between Broadway and Lake Shore County Road (Brown Road). Spillway construction and invasive species removal have restored the hydrology west of Broadway up to Derby Ditch. The portion of the unit south of Beverly Drive, north of Service Road and west of Broadway and east of Keiser Woods was burned on 15 October 2005 and again in 2021 for sedge meadow restoration. The eastern three-quarters has undergone hydrological modification by the NPS with a resulting recovery of both flora and avian fauna. Removal of hybrid cattail, *Phragmites*, and reed canary grass, and planting of native wetland species were included in the restoration process. While less rich than Keiser Woods (see below), there is another beech-maple forest remnant halfway between Broadway and Kemil Road, upslope and south of the seepage zone. Another smaller area, closer to Broadway, of hydromesophytic woodland with small seep-streams and low hummocks occurs at the east end of subunit B north of the Calumet Bike Trail (Tonkovich, personal observation). Keiser B has a total of 312 native species, with a mean CoC of 5.5 and a floristic quality of 99, the third highest of the eight subunits. Keiser B has a total of 49 special flora and 24 state-listed plant species.

Keiser C

The most species-rich and least human-disturbed hydromesophytic swamp complex in the park is restricted to the 18 hectares (45 acres) of Keiser C. This subunit is an old growth forest (Wilhelm 1990) that contains at its southeastern edge one of the largest

paper birch (*Betula papyrifera*) populations in the Chicago Region, and the largest in INDU. This stand has declined with forest succession since 1990 (Pavlovic, personal observation).

There are 75 species of deciduous woody plants in Keiser C alone, which is an exceptional diversity for north temperate interiors (Wilhelm 1990). The coincidence of species typical of both minerotrophic and ombrotrophic conditions (*Fraxinus nigra*, *Cornus alternifolia*, and *Quercus bicolor* with *Ilex mucronata*, *Toxicodendron vernix*, and *Vaccinium corymbosum*) is notable locally and is a testament to the seepage across a hummocky surface. This forest still exists despite platting of the north-south and east-west roads in the 1920s as part of Bartlett's Beverly Shores development. The roadbeds were never paved because the Depression ended land speculation for a time, except along Lake Shore County Road (Cook and Jackson 1978). However, Plampin has found traces of pavement in a few places. The black and green ash trees have declined due to the emerald ash borer.

Wilhelm (1990) noted of this area that "it is one of the most interesting remnant natural areas we have ever experienced."

When Ken Dritz and Wilhelm surveyed Keiser C in 1979, they recorded 171 native species, and Wilhelm had noted another 48 species by 1990, raising the total species to 249. Keiser C now has 245 native species, the second highest of any subunit, with a mean CoC of 6.4 and floristic quality of 102. The latter two statistics are the highest for the eight Keiser subunits. In terms of regional floristic significance, this rating reflects that Keiser C is in league with other small areas such as Cowles Bog (*sensu strictu*), Pinhook Bog, Howes Prairie, and the pannes at the Miller Unit.

Keiser D

Keiser D is approximately 4 hectares (9 acres) and has experienced considerable disturbance, as it is adjacent to U.S. Highway 12, the CSSSBR, and the NIPSCO right-of-way. Keiser D is a short tract of moist meadow along the Calumet Bike Trail east of Kemil Road between powerline towers 8427 and 8428. Formerly hydromesophytic forest in transition to uplands, this small area is mostly non-forested and invaded by oriental bittersweet. Special flora represent a mix of open habitat species and those found growing within the hydromesophytic forest: *Aletris farinosa*, *Alnus incana* ssp. *rugosa*, *Sceptridium multifidum*, *Brachyelytrum aristosa*, *B. erectum*, *Carex cryptolepis*, *C. debilis rudgei*, *C. folliculata*, *C. seorsa*, *Comptonia peregrina*, *Drosera intermedia*, *Eutrochium fistulosum*, *Platanthera clavellata*, *Persicaria arifolia*, *P. careyi*, *Prunus pensylvanica*, *Scirpus expansus*, *S. purshianus*, *Selaginella eclipes*, and *Xyris torta*. Wilhelm (1990) felt there were numerous treasures yet to be discovered in this subunit earlier in the growing season. We are aware of 152 native species, the mean CoC of which is 5.5 and an FQI of 70 (see Table 35). When Keiser D is combined with Keiser C, the overall FQI is 117.

Keiser E

Occupying 129 hectares (319 acres) south of U.S. Highway 12 and east of Kemil Road, Keiser E has been impacted by numerous disturbances over much of its area including logging, agriculture, fire suppression, grading, water level alterations, and ancillary effects from these impacts. The swamp complex of Keiser E is not of the same remnant quality in terms of special richness and structural integrity (diversity and representation of vegetation strata) as its counterpart west of Kemil Road. In Keiser subunit E, the forested areas lack the rich savanna or spring ephemeral flora typical of the sand savannas and the swamp to mesophytic forests. Wilhelm (1990) wrote:

> *There is an interesting area just east of Kemil Road, opposite the old Dorothy Buell Visitor Center on the sparsely vegetated east-facing sandy grade south of the blowout area. Here, there is a field of terricolous lichens where an uncommonly diverse population of Cladoniae holds forth. It is dominated by* Cladonia cristatella, *but occasional to frequent also are* C. rei, C. grayi, C. polycarpoides, C. pleurota, C. piedmontensis, C. strepsilis, C. robbinsii, C. cervicornis

ssp. verticillata*, and* Cladina subtenuis. Cladonia chlorophaea *and* C. coniocraea *are also present on old stumps and logs. I realize that lichens generally are unappreciated, but a dispassionate assessment would have to allow as how such a site is quite an amenity for this region where lichens are rare and populations are comprised primarily of corticolous weeds such as* Candelaria concolor, Physcia millegrana, P. stellaris, *and* Arthonia caesia.

Keiser E has a total of 219 native plant species, with a mean CoC of 5.8 and a floristic quality of 87.

Keiser F

Keiser F is the 95-hectare (135-acre) tract between 375 East Road and 475 East Road. A portion of Keiser F was an abandoned golf course, but this subunit was found to have significant flora and wet meadows when surveyed prior to the construction of the Dunewood Campground in 1992–1993 (Fox 1985). Preconstruction survey errors prompted Pavlovic to explore Keiser F in 1991–1992, finding a meadow west of the access road to U.S. 20. It had a peaty substrate with sphagnum and *Drosera rotundifolia*. The wetland explored by Myrna Newgent is east of the campground dump station and Barbara's wetland is further southeast of Myrna's. Wilhelm found that these two wetlands shared 43% of their flora based on the Sorenson coefficient of similarity (Wilhelm 1997). During one survey, Wilhelm collected *Veronica verna*, a speedwell that was unknown from the Chicago Region, and Ken Klick collected *Capsella gracilis* nearby, another weed new to our flora. Though locally rare, *Collinsia parviflora* Lindl., is excluded from the special flora since is probably a waif. Maiden blue-eyed Mary is diminutive compared to *C. verna* (blue-eyed Mary). Scott Namestnik found maiden blue-eyed Mary growing at the Mather Loop of the Dunewood Campground in 2009 (Namestnik, S., #713, 15 May 2009, Porter, Co., MOR). This could be a waif introduced by construction or campers since the nearest populations are in the Upper Peninsula of Michigan.

In 1990, Wilhelm (1990) turned up only 82 species, with a mean CoC of 4.96 and an FQI of 45. Except for *Carex tonsa*, no special flora was noted. Keiser F has a total of 329 native species, a mean CoC of 5.5, and an FQI of 102, representing quite an increase in 30 years.

Keiser G

Keiser G is the 28-hectare (68-acre) tract north of Beverly Drive, east of Broadway, and west of Lake Shore County Road that is owned by the Shirley Heinze Land Trust. This subunit consists largely of remnants of the Great Marsh and is comprised of six smaller areas surrounded by roads. These degraded habitats have not been well surveyed and attempts to restore them have not been successful (Eric Bird, SHLT, pers. comm. with Pavlovic, 2020). Consequently, only 92 native species and four exotic species have been reported from Keiser G. This area has a mean CoC of 8.3 and its floristic quality of 17 is the lowest of any subunit in Keiser.

Keiser H

The Keiser H subunit also is called the McAllister Prairie. It is a 5-hectare (13-acre) tract north of the Great Marsh in the town of Beverly Shores and is also owned by the SHLT. Plampin has surveyed the vegetation in this subunit extensively. A total of 92 native plant species has been found on this property, with a mean CoC of 5.7 and an FQI of 57. This attests to the high quality of the small insular tract.

With the fire suppression that has occurred in the Keiser Unit and the degradation of the Great Marsh, it is surprising that this unit ranks third in floral richness among all the units in the national park . We have documented a total native flora of 630 species, with a mean CoC of 6.1 and an FQI of 159. The Keiser Unit has a total of 133 special flora, representing 28% of the special flora found at the Indiana Dunes. Perhaps this richness is the result of Keiser Unit spanning the complete dune successional gradient from the beach to the Glenwood Dunes.

Unit 11: Tamarack and Shirley Heinze Land Trust Tracts

The Indiana Dunes State Park harbors the most ferns, both in species and numbers. All of the species and varieties reported for the Region are found in the State Park. There is a greater range of ecological conditions here than elsewhere and there have been fewer fires and less "improvement." Most of the area is "barren," the ferns being found in a few choice localities: Tamarack Station on the South Shore Railroad, Memorial Park in Michigan City, woods on Beverly Shores just east of the State Park, valley of Silver Creek at Tremont, woods at Port Chester, the Cowles Tamarack Swamp at Mineral Springs, pine swamps at Dune Park, and the wooded ravines at Mineral Springs, Ogden Dunes and Miller. The meadows, swales, dry woods and interdunal swamps usually harbor only a few of the commoner species.

—Rolla Tryon (1936)

The Tamarack Unit, including the SHLT tracts, occupies about 690 hectares (1,684 acres), nearly 60% of which has been highly disturbed or destroyed from a natural area perspective (Figure 24). The southwestern portion of the Tamarack Unit is equivalent to the region identified by earlier botanists and writers as Tamarack, in reference to the Tamarack Station along the CSSSBR (see Figure 2). The station received its name from the bog to which Cressey (1928) referred to as "just north of Tamarack". The early land surveyors referred to this as a "pine swamp" (Bowles et al. 2015b). Much of the rest of the unit may have been ignored by earlier botanists, presumably because it marked the eastern extent of the "Indiana Dunes and vicinity." The Tamarack Unit spans the Calumet-aged dunes to the current shore of Lake Michigan. It is dominated by the Great Marsh that formerly contained bogs, marshes, fens, and lakes prior to the ditching and draining of the system through Kintzele Ditch and the blocking of the natural drainage northeast to Trail Creek in Michigan City. The Tolleston-aged and younger dunes have been greatly modified by homesites that pre-date the establishment of INDU. Gerould Wilhelm surveyed Crescent Dune (see subunit C discussion below) with Ken Dritz on 26 June 1997. Additional surveys by Plampin, Myrna Newgent, and Lydia Miramontes contributed to the flora in early 2000 to 2003.

The Tamarack Unit consists of five subunits. Subunit A encompasses the swamp and hydromesophytic forests on the southwest corner, east of Lake Shore County Road (Brown Road) and north of the Calumet Bike Trail and NIPSCO right-of-way. This is part of what formerly was a white pine and tamarack swamp (Tamarack Woods), for which the Tamarack Station and this unit are named. Subunit B is predominantly the Great Marsh south of Beverly Drive, north of the CSSSBR, east of Lake Shore County Road, and west of U.S. 12. There is an isolated portion south of Mt. Baldy between U.S. 12 on the west and the South Shore Line on the south (Figure 24). Additional tamarack stands occurred in this subunit based on the Public Land Survey data (Bowles et al. 2015b). Subunit C is primarily the dunes north of Beverly Drive, including Central Avenue Beach, Mt. Baldy, and Crescent Dune. Mt. Baldy is the massive open dune west of Michigan City that has been a popular recreational site. Crescent Dune is east of Mt. Baldy and west of the NIPSCO Michigan City power generating station. Subunit D is east of U.S. 12, south of the CSSSBR, west of the Indiana State Prison, and north of a residential area along Woodland Avenue (the former east continuation of U.S. 12 east of County Line Road). Subunit E is composed of three SHLT units: Hiawatha Meadow, Montana, and Drexwood. This subunit is north of Beverly Drive and south of the high dunes. Due to the proximity of these units to Tamarack, it is reasonable to include them here. The

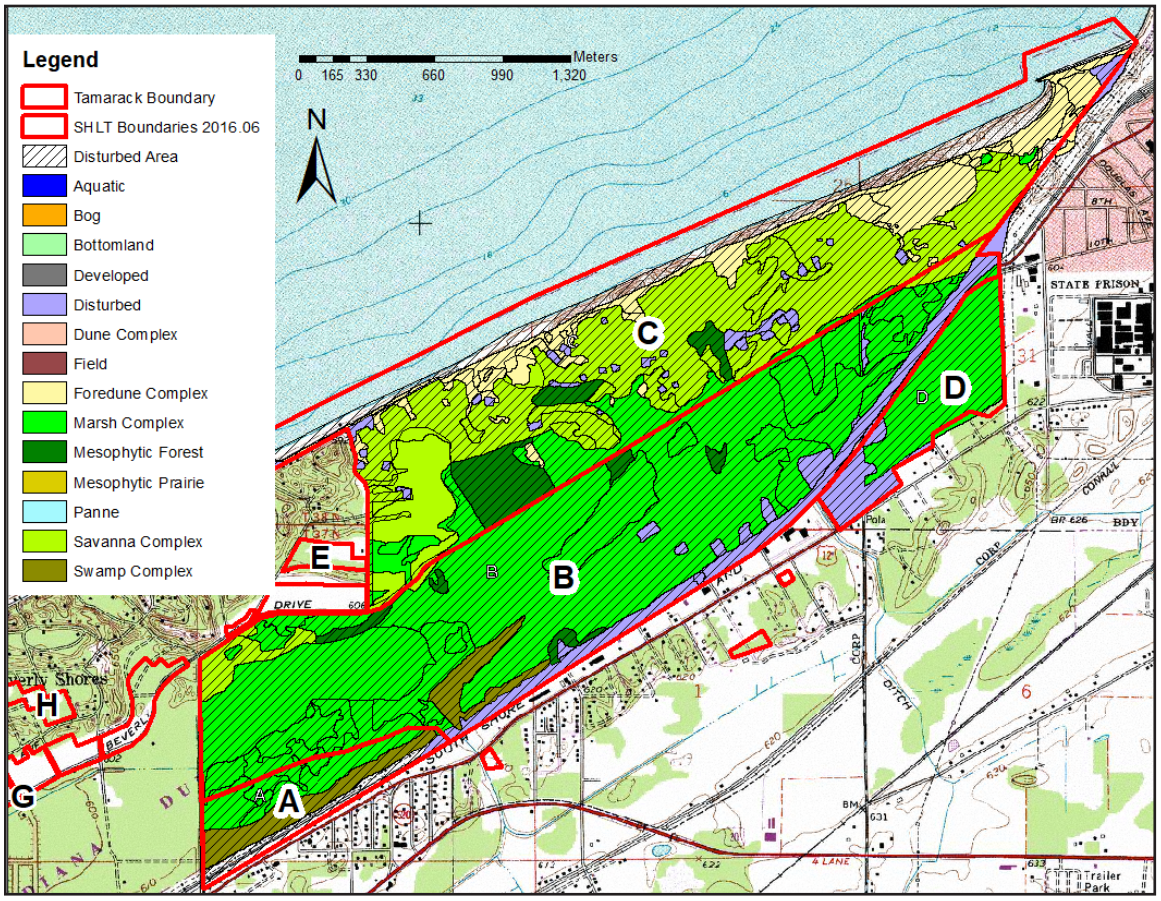


Figure 24. Vegetation of Tamarack Unit. Letters indicate subunits. (Note that subunits G and H in the figure are located in Keiser, not Tamarack unit.) Cross-hatching indicates disturbed areas.

complete flora of Tamarack is presented below (Table 36).

Special flora summary

Tamarack provides habitat for 133 special flora of INDU, up from 86 reported by Wilhelm (1990). Of these, 78 have been seen in the modern era (i.e., 31 have not been seen in modern times). Of the 133 special flora species, 60 are confirmed, 35 are new, 33 are reported, and four are believed to be extirpated. New species found since 1990 include *Agastache nepetoides*, *Betula papyrifera*, *Botrychium matricariifolium*,

Table 36. Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Acalypha rhomboidea Raf.	–	–	x	–	–	X	0
Acer negundo L.	x	x	x	–	–	X	0
Acer nigrum F. Michx.	–	–	67	–	–	N	5
Acer rubrum L.	x	x	x	x	x	X	7
Acer saccharinum L.	x	x	x	–	–	X	0
Acer saccharum Marshall	–	62	–	–	–	N	5

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Achillea millefolium L.	–	x	x	x	–	X	*
SF***Adiantum pedatum*** L.	–	–	29	–	–	N	10
Aesculus glabra Willd.	–	62	–	–	–	N	ad
Agalinis purpurea (L.) Pennell	–	–	28	x	–	X	6
Agalinis purpurea (L.) Pennell var. *parviflora* (Benth.) B. Boivin	–	R	–	–	–	R	7
SF***Agastache nepetoides*** (L.) Kuntze	–	62	–	–	–	N	5
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	x	–	x	–	–	X	4
Agrimonia gryposepala Wallr.	–	–	x	–	–	X	2
Agrimonia parviflora Aiton	–	x	–	x	–	X	7
Agrostis gigantea Roth (*Agrostis alba* L.)	x	x	x	–	–	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	–	–	–	x	–	X	1
Agrostis perennans (Walter) Tuck.	x	–	–	–	–	X	3
Agrostis scabra Willd.	–	x	–	–	–	X	5
Ailanthus altissimus (Mill.) Swingle	–	–	x	–	–	X	*
Alisma subcordatum Raf.	–	–	67	x	–	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	–	–	7	–	–	X	*
Allium vineale L.	–	–	x	–	–	X	*
SF***Alnus incana*** (L.) Moench ssp. ***rugosa*** (Du Roi) Clausen (*Alnus rugosa* (Du Roi) Spreng.)	x	x	x	–	–	X	8
Amaranthus tuberculatus (Moq.) J.D. Sauer (*Acnida altissima* Riddell)	–	60	–	–	–	N	1
Ambrosia artemisiifolia L.	x	x	x	–	–	X	0
Ambrosia trifida L.	x	x	–	–	–	X	0
Amelanchier arborea (F. Michx.) Fernald	–	–	x	–	–	X	8
Amelanchier interior E. L. Nielsen	–	–	x	–	–	X	8
Amelanchier laevis Wiegand	–	x	–	–	–	X	8
SF***Ammophila breviligulata*** Fernald	–	–	x	–	–	X	7
Amphicarpaea bracteata (L.) Fernald	x	–	x	x	–	X	4
Amphicarpaea bracteata (L.) Fernald var. *comosa* (L.) Fernald	x	–	–	–	–	X	5
Andropogon virginicus L.	–	–	x	x	–	X	ad
Anemone americana (DC.) H. Hara (*Hepatica americana* (DC.) Ker Gawl.)	–	–	x	–	–	X	9
Anemone cylindrica A. Gray	–	–	x	–	–	X	6
Anemone virginiana L. var. *virginiana* (*Anemone virginiana* L.)	–	–	x	–	–	X	5
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	–	–	x	x	–	X	3
Anthemis cotula L.	–	x	–	–	–	X	*
Apios americana Medik.	x	x	x	x	–	X	7
Apocynum androsaemifolium L.	–	x	x	–	–	X	5
Apocynum cannabinum L.	R	–	x	–	–	X	4
Apocynum cannabinum L. (*Apocynum sibiricum* Jacq.)	–	x	–	–	–	X	2

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Aquilegia canadensis L.	–	–	x	–	–	X	6
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	–	–	x	–	–	X	5
Aralia nudicaulis L.	–	–	x	–	–	X	8
SF***Aralia racemosa*** L.	x	–	–	–	–	X	10
Arctium minus (Hill) Bernhardi (*Arctium minus* Schkuhr)	–	–	x	–	–	X	*
Arctium lappa L.	–	61	–	–	–	N	*
SF***Arctostaphylos uva-ursi*** (L.) Spreng. (*Arctostaphylos uva-ursi* (L.) Spreng. var. *coactilis* Fernald & J. F. Macbr.)	–	–	19	–	–	X	10
Arenaria serpyllifolia L.	–	–	x	–	–	X	*
Arisaema triphyllum (L.) Schott	x	–	–	–	–	X	4
Aristida purpurascens Poir.	–	–	–	x	–	X	5
Arnoglossum atriplicifolium (L.) H. Rob. (*Cacalia atriplicifolia* L.)	–	–	x	–	–	X	8
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocar*pa × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	x	x	x 12	x	x	X	6
Artemisia absinthium L.	–	–	x	–	–	X	*
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	–	–	x	–	–	X	5
Artemisia ludoviciana Nutt. ssp. *ludoviciana* (*Artemisia ludoviciana* Nutt.)	–	–	x	–	–	X	*
Asclepias incarnata L.	–	–	x	21	–	X	4
Asclepias syriaca L.	–	x	x	21	–	X	0
Asclepias tuberosa L.	–	–	x	21	–	X	7
Asclepias verticillata L.	–	–	x	–	–	X	1
Asimina triloba (L.) Dunal	R	–	–	–	–	R	9
Asparagus officinalis L.	–	–	–	–	–	X	*
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	–	–	x	21	–	X	4
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	x	–	–	–	–	X	8
Aureolaria flava (L.) Farw.	–	–	x	–	–	X	9
Aureolaria pedicularia (L.) Raf. ex Pennell (*Aureolaria pedicularia* (L.) Raf. var. *ambigens* (Fernald) Farw.)	–	–	x	–	–	X	7
Barbarea vulgaris W.T. Aiton	x	x	x	–	–	X	*
SF***Bartonia virginica*** (L.) Britton, Sterns & Poggenburg	R	–	–	x	–	X	10
Berberis thunbergii DC.	–	–	x	21	–	X	*
SF***Betula papyrifera*** Marshall	29	29	–	–	–	N	10
Bidens connata Muhl. ex Willd. (*Bidens connata* Muhl.)	–	R	–	–	–	R	5
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	–	R	–	–	x	R	9
Bidens tripartita L. (*Bidens comosa* (A. Gray) Wiegand)	–	R	–	–	–	R	5
Boechera canadensis (L.) Al-Shehbaz (*Arabis canadensis* L.)	–	–	x	–	–	X	10

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Boechera laevigata (Muhl. ex Willd.) Al-Shehbaz (*Arabis laevigata* (Willd.) Poir.	–	–	x	–	–	X	5
Boehmeria cylindrica (L.) Sw.	x	x	x	–	–	X	2
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	–	–	x	–	–	X	4
SF***Botrychium matricariifolium*** (Retz.) A. Braun ex W.D.J. Koch (*Botrychium matricariifolium* (Döll) A. Braun ex Koch)	–	–	8 49	–	–	N	10
Botrychium virginianum (L.) Sw.	–	x	x	21	–	X	6
SF***Brasenia schreberi*** J. F. Gmel.	–	R	–	–	–	R	10
Brickellia eupatorioides (L.) Shinners var. *corymbulosa* (Torr. & A. Gray) Shinners (*Kuhnia eupatorioides* L. var. *corymbulosa* Torr. & A. Gray)	–	–	x	–	–	X	6
Bromus inermis Leyss.	–	62	–	–	–	N	*
Bromus japonicus Thunb.	–	x	x	–	–	X	*
Bromus tectorum L.	–	x	x	–	–	X	*
SF***Cakile edentula*** (Bigelow) Hook. ssp. ***edentula*** var. ***lacustris*** Fernald	–	–	x	–	–	X	9
Calamagrostis canadensis (Michx.) P. Beauv.	–	x	x	x	–	X	3
Calamagrostis stricta (Timm) Koeler ssp. *inexpansa* (A. Gray) C.W. Greene (*Calamagrostis inexpansa* A. Gray var. *brevior* (Vasey) Stebbins)	–	–	–	x	x	X	5
Calamovilfa longifolia (Hook.) Hack. ex Scribn. & Southw. var. *magna* Scribn. & Merr.	–	–	x	–	–	X	5
SF***Calla palustris*** L.	–	R	–	–	–	R	10
SF***Calopogon tuberosus*** (L.) Britton, Sterns & Poggenburg var. ***tuberosus*** (*Calopogon tuberosus* (L.) Britton, Sterns & Poggenburg)	R	–	–	–	–	R	10
Caltha palustris L.	x	–	x	–	–	X	5
Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	–	–	x	–	–	X	1
Campanula americana L.	x	–	–	–	–	X	3
Campanula rapunculoides L.	–	62	–	–	–	N	*
SF***Campanula rotundifolia*** L.	–	–	x	–	–	X	10
Campsis radicans (L.) Bureau	–	–	x	–	–	X	ad
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	x	–	–	x	–	X	6
Cardamine hirsuta L.	–	–	59	–	–	N	*
Cardamine pensylvanica Muhl. ex Willd.	x	–	x	–	–	X	4
SF***Carex alata*** Torr.	–	–	–	x	–	X	10
Carex albicans Willd. ex Spreng. var. *emmonsii* (Dewey ex Torr.) Rettig (*Carex emmonsii* Torr.)	–	–	–	x	–	X	9
Carex albolutescens Schwein.	–	–	–	x	–	X	8
Carex annectens (E.P. Bicknell) E.P. Bicknell (Carex *annectens* E.P. Bicknell var. *xanthocarpa* (E.P. Bicknell) Wiegand)	–	–	–	x	–	X	7
SF***Carex aurea*** Nutt.	–	–	53 67	–	–	N	9
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	–	40	–	–	–	N	6
Carex brevior (Dewey) Mackenzie ex Lunell	–	–	x	–	–	X	4

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Carex bromoides*** Schkuhr ex Willd. (*Carex bromoides* Willd.)	x	–	–	–	–	X	10
Carex cephalophora Muhl. ex Willd.	–	–	x	–	–	X	3
Carex comosa Boott	–	R	–	–	–	R	5
Carex crinita Lam. var. *crinita*	x	x 37	–	–	–	X	10
Carex cristatella Britton	–	x	–	–	–	X	4
SF***Carex debilis*** Michx. var. ***rudgei*** L.H. Bailey	–	–	–	x	–	X	10
SF***Carex folliculata*** L.	R	–	–	x	–	X	10
Carex granularis Muhl. ex Willd.	–	62	–	–	–	N	3
Carex hystericina Muhl. ex Willd.	–	–	x	–	–	X	5
SF***Carex interior*** L.H. Bailey	R	–	–	–	–	X	10
SF***Carex intumescens*** Rudge	R	–	–	x	–	X	10
Carex lacustris Willd.	–	x	–	–	–	X	6
SF***Carex laevivaginata*** (Kük.) Mack.	–	–	–	x	–	X	8
Carex laxiflora Lam.	x	–	–	–	–	X	10
SF***Carex leptalea*** Wahlenberg	65	–	–	–	–	N	10
Carex lupulina Willd.	–	x	–	–	–	X	7
Carex lurida Wahlenb.	–	R	–	–	–	R	8
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.)	–	–	x	x	–	X	5
Carex normalis Mack.	–	–	x	–	–	X	5
Carex pensylvanica Lam.	–	–	x	x	–	X	5
Carex projecta Mack.	–	–	x	–	–	X	4
Carex sparganioides Muhl. ex Willd.	–	62	–	–	–	N	5
Carex stipata Muhl. ex Willd.	–	x	–	–	–	X	3
Carex suberecta (Olney) Britton	–	62	–	–	–	N	8
Carex swanii (Fernald) Mack.	R	x	–	x	–	X	8
SF***Carex tonsa*** (Fernald) E.P. Bicknell	–	–	–	x	–	X	7
Carex tribuloides Wahlenb.	–	x	–	–	–	X	3
Carex umbellata Schkuhr ex Willd.	–	–	x	–	–	X	9
Carex utriculata Boott	–	–	–	x	–	X	10
Carex vesicaria L. (*Carex vesicaria* L. var. *monile* (Tuck.) Fernald)	–	x	–	–	–	X	10
Carex virescens Muhl. ex Willd.	R	–	–	–	–	R	10
Carex viridula Michx. ssp. *viridula*	–	–	67	–	–	N	10
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow	–	62	–	–	–	N	8
Catalpa speciosa Teas	–	–	x	–	–	X	ad
Ceanothus americanus L.	–	–	x	–	–	X	6
Celastrus orbiculatus Thunb.	N	N	x	N	–	X	*
SF***Celastrus scandens*** L.	–	–	x	–	–	X	4

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Celtis occidentalis L.	–	–	x	–	–	X	3
SF***Celtis tenuifolia*** Nutt.	–	–	29	–	–	N	10
Cenchrus longispinus (Hack.) Fernald	–	x	x	–	–	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	–	–	x	–	–	X	*
Cephalanthus occidentalis L.	–	–	–	–	x	N	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartm.) Greuter & Burdet	–	62	–	–	–	N	*
Cerastium semidecandrum L.	–	x	x	–	–	X	*
Chaenorhinum minus (L.) Lange	–	–	x	–	–	X	*
SF***Chamaedaphne calyculata*** (L.) Moench (*Chamaedaphne calyculata* (L.) Moench var. *angustifolia* (Aiton) Rehder)	–	R	–	–	–	R	10
Chenopodium album L.	–	–	x	–	–	X	*
Chenopodium pratericola Rydb. (*Chenopodium leptophyllum* Nutt.)	–	–	x	–	–	X	5
SF***Chimaphila maculata*** (L.) Pursh	–	–	28	–	–	N	10
SF***Chimaphila umbellata*** (L.) W.P.C. Barton ssp. ***umbellata*** (*Chimaphila umbellata* (L.) Barton var. *cisatlantica* S.F. Blake)	–	–	1	–	–	N	10
SF***Chrysosplenium americanum*** Schwein. ex Hooker	R 28	–	–	–	–	X	10
Cicuta bulbifera L.	–	R	–	x	–	X	8
Cicuta maculata L.	–	R	–	x	–	X	6
Cinna arundinacea L.	x	–	–	–	–	X	5
SF***Circaea alpina*** L.	R	–	–	–	–	R	10
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	–	x	21	–	X	1
Cirsium arvense (L.) Scop.	–	–	x	–	–	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	–	x	x	–	–	X	2
SF***Cirsium pitcheri*** (Torr. ex Eaton) Torr. & A. Gray	–	–	R	–	–	R	10
Cirsium vulgare (Savi) Ten.	–	x	x	–	–	X	*
Cladium mariscoides (Muhl.) Torr.	–	–	68	–	–	N	10
Claytonia virginica L.	–	31	–	–	–	N	2
Clematis virginiana L.	x	x	x	x	–	X	4
Comandra umbellata (L.) Nutt. ssp. *umbellata*	–	–	x	x	–	X	7
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	–	R	–	–	–	R	10
Commelina communis L.	–	–	x	21	–	X	*
Convallaria majalis L.	–	–	x	21	–	X	*
Convolvulus arvensis L.	–	–	x	–	–	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	–	–	R	x	–	X	0
SF***Coptis trifolia*** (L.) Salisb.	R	–	–	–	–	R	10
SF***Corallorhiza maculata*** (Raf.) Raf.	–	29	28	–	–	N	10
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	–	29	x	–	–	X	9

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Corispermum americanum (Nutt.) Nutt. (*Corispermum hyssopifolium* L.)	–	–	x	–	–	X	5
Cornus florida L.	–	–	x	–	–	X	8
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	–	x	x	x	–	X	6
Cornus racemosa Lam.	–	x	x	x	–	X	1
SF***Cornus rugosa*** Lam.	–	–	29	–	–	N	10
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	x	x	x	x	–	X	6
Corylus americana Walter	x	–	–	–	–	X	5
Cotinus coggygria Scop.	–	–	20	–	–	N	*
Crocanthemum canadense (L.) Britton (*Helianthemum canadense* (L.) Michx.)	–	–	x	–	–	X	8
Croton capitatus Michx.	–	–	–	–	–	X	ad
Croton glandulosus L. var. *septentrionalis* Müll. Arg.	–	–	x	–	–	X	ad
Cryptotaenia canadensis (L.) DC.	x	x	x	–	–	X	2
Cuscuta glomerata Choisy	x	–	–	–	–	X	7
Cuscuta gronovii Willd. ex Schult.	–	R	–	–	–	R	4
SF***Cuscuta pentagona*** Engelm.	–	–	–	R	–	R	9
Cycloloma atriplicifolium (Spreng.) J. M. Coult.	–	–	x	–	–	X	7
Cynoglossum officinale L.	–	x	R	–	–	X	*
Cyperus bipartitus Torr.	–	–	59	–	–	N	3
Cyperus esculentus L.	–	–	59	–	–	N	0
SF***Cyperus houghtonii*** Torr.	–	–	–	x	–	X	2
Cyperus schweinitzii Torr.	–	62	x	–	–	X	5
Cyperus strigosus L.	–	–	59	–	–	N	1
SF***Cypripedium acaule*** Aiton	R	–	–	–	–	R	10
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	–	31	–	–	–	N	6
Dactylis glomerata L.	–	x	x	–	–	X	*
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	–	–	x	x	–	X	3
Daucus carota L.	–	x	x	x	–	X	*
SF***Dendrolycopodium dendroideum*** (Michx.) A. Haines (*Lycopodium obscurum* L.)	–	–	47	–	–	N	10
Decodon verticillatus (L.) Elliott	–	R	59	–	–	N	8
Desmodium glabellum (Michx.) DC.	–	62	–	–	–	N	10
Desmodium paniculatum (L.) DC.	–	x	x	–	–	X	6
SF***Desmodium perplexum*** B.G. Schub.	–	–	54	–	–	N	5
Desmodium sessilifolium (Torr.) Torr. & A. Gray	–	–	x	–	–	X	8
Dianthus armeria L.	–	–	x	–	–	X	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	x	x	x	–	X	2

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

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	A	*B*	*C*	*D*	*E*		
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *implicatum* (Scribn.) Freckmann & Lelong (*Panicum meridionale* Ashe)	–	x	–	–	–	X	8
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong (*Panicum lindheimeri* Nash)	–	–	–	–	x	N	9
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *spretum* (Schultes) Freckmann & Lelong (*Panicum spretum* Schult.)	–	–	–	–	x	N	9
Dichanthelium clandestinum (L.) Gould (*Panicum clandestinum* L.)	x	x	x	x	–	X	6
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	–	x	–	x	–	X	7
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	–	–	x	–	–	X	5
SF***Dichanthelium linearifolium*** (Scribn. ex Nash) Gould (*Panicum linearifolium* Scribn.)	–	–	x	–	–	X	8
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	–	–	x	x	–	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash var. *pseudopubescens* (Nash) Fernald)	–	–	x	x	–	X	7
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	–	–	–	x	–	X	8
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	–	–	–	x	–	X	8
SF***Diervilla lonicera*** Mill.	–	–	x	–	–	X	9
Digitaria ischaemum (Schreb.) Muhl.	–	x	x	x	–	X	*
Digitaria sanguinalis (L.) Scop.	–	–	59	–	–	N	*
Dioscorea villosa L.	x	–	–	x	–	X	7
Diphasiastrum digitatum (Dill. ex A. Braun) Holub (*Lycopodium complanatum* L. var. *flabelliforme* Fernald)	–	–	50	–	–	N	8
SF***Diphasiastrum tristachyum*** (Pursh) Holub (*Lycopodium tristachyum* Pursh)	–	–	27	–	–	N	10
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	–	–	x	x	x	X	9
SF***Drosera rotundifolia*** L.	–	R	–	–	–	R	10
Dryopteris carthusiana (Vill.) H. P. Fuchs	–	–	59	–	–	N	8
Dryopteris intermedia (Muhl. ex Willd.) A. Gray	x	–	–	–	–	X	8
Echinochloa crusgalli (L.) P. Beauv.	–	–	59	–	–	N	*
Echinocystis lobata (Michx.) Torr. & A. Gray	–	x	–	–	–	X	5
Elaeagnus angustifolia L.	–	–	–	–	–	X	*
Elaeagnus umbellata Thunb.	–	–	x	–	–	X	*
Eleocharis erythropoda Steud.	–	–	x	–	–	X	2
SF***Eleocharis geniculata*** (L.) Roem. & Schult.	–	R	–	–	–	R	10
Eleocharis obtusa (Willd.) Schult.	–	R	–	–	x	R	3
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis palustris* (L.) Roem. & Schult. var. *major* Sond.)	–	R	–	–	–	R	10

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Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Eleocharis tenuis*** (Willd.) Schult. var. ***verrucosa*** (Svenson) Svenson	–	–	–	66	–	N	10
Elymus canadensis L.	–	–	x	–	–	X	4
Elymus hystrix L. (*Hystrix patula* Moench)	–	–	x	–	–	X	5
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	R	x	–	–	X	*
Elymus riparius Wiegand	–	62	–	–	–	N	5
Elymus virginicus L.	–	–	x	–	–	X	4
SF***Epigaea repens*** L.	–	–	19	x	–	X	10
Epilobium coloratum Biehler	–	R	x	–	–	X	3
Epilobium hirsutum L.	–	x	–	–	–	X	*
Epilobium leptophyllum Raf.	–	–	x	–	–	X	10
Epipactis helleborine (L.) Crantz	–	–	x	–	–	X	*
Equisetum arvense L.	x	x	x	x	–	X	0
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	–	–	x	–	–	X	3
Equisetum laevigatum A. Braun	–	–	x	–	–	X	2
Equisetum × *ferrissii* Clute [*E. hyem*ale × *E. la*evigatum]	–	–	x	–	–	X	2
Eragrostis cilianensis (All.) Vignolo ex Janchen	–	–	x	–	–	X	*
Eragrostis pectinacea (Michx.) Nees	–	x	–	–	–	X	0
Eragrostis spectabilis (Pursh) Steud.	–	–	x	–	–	X	3
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	–	R	–	–	x	N	2
Erigeron annuus (L.) Pers.	–	x	x	x	–	X	0
Erigeron philadelphicus L.	–	–	x	–	–	X	4
Erigeron strigosus Muhl. ex Willd.	–	x	x	x	–	X	5
Euonymus alatus (Thunb.) Siebold	–	–	x	–	–	X	*
Euonymus fortunei (Turcz.) Hand.-Mazz.	–	–	59	–	–	N	*
Euonymus obovatus Nutt.	–	–	x	–	–	X	7
Eupatorium altissimum L.	–	–	x	–	–	X	0
Eupatorium perfoliatum L.	x	R	x	x	x	X	4
Eupatorium serotinum Michx.	–	–	x	–	–	X	0
Euphorbia corollata L.	–	–	x	x	–	X	2
Euphorbia cyparissias L.	–	–	x	–	–	X	*
Euphorbia maculata L. (*Euphorbia supina* Raf.)	–	–	–	–	–	X	0
SF***Euphorbia polygonifolia*** L.	–	–	x	–	–	X	10
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	x	–	x	–	–	X	8
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	–	–	x	–	–	X	3
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* (Greene) Fernald)	–	–	x	x	x	X	5

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	A	*B*	*C*	*D*	*E*		
Eutrochium fistulosum (Barratt) E.E. Lamont (*Eupatorium fistulosum* Barratt)	x	x	x	–	–	X	10
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	–	R	x 28	–	–	X	4
Eutrochium purpureum (L.) E. E. Lamont (*Eupatorium purpureum* L.)	–	62	–	–	–	N	6
Fagus grandifolia Ehrh.	21	–	–	–	–	N	5
Fallopia convolvulus (L.) A. Löve (*Polygonum convolvulus* L.)	–	–	–	–	–	X	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	–	R	x	–	–	X	1
Festuca ovina L.	–	–	x	–	–	X	*
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	x	–	–	–	–	X	5
Fimbristylis autumnalis (L.) Roem. & Schult.	–	R	67	–	x	R	5
Fragaria virginiana Miller	–	x	x	x	–	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	–	R	x	x	x	X	*
SF***Fraxinus americana*** L.	x	–	x	–	–	X	5
SF***Fraxinus nigra*** Marshall	x	–	–	–	–	X	10
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	x	62	–	x	–	X	1
Galium circaezans Michx. var. *hypomalacum* Fernald	–	–	x	–	–	X	7
Galium concinnum Torr. & A. Gray	x	–	x	–	–	X	5
Galium mollugo L.	–	–	2	–	–	N 2	*
Galium obtusum Bigelow	–	–	x	–	–	X	5
Galium pilosum Aiton	–	–	x	–	–	X	10
Galium tinctorium L.	–	R	–	–	–	R	8
Galium triflorum Michx.	–	x	–	x	–	X	5
Gaultheria procumbens L.	–	–	x	–	–	X	9
Gaylussacia baccata (Wangenh.) K. Koch	x	–	–	–	–	X	9
Gentiana andrewsii Griseb.	–	29	29	–	–	N	8
SF***Gentiana saponaria*** L.	–	–	–	x	–	X	8
Geum aleppicum Jacq.	–	62	–	–	–	N	3
Geum canadense Jacq.	x	x	x	–	–	X	1
Geum laciniatum Murray (*Geum laciniatum* Murray var. *trichocarpum* Fernald)	–	–	–	x	–	X	2
Glechoma hederacea L.	–	–	x	21	–	X	*
Gleditsia triacanthos L.	R	–	4	–	–	X	2
SF***Glyceria borealis*** (Nash) Batch.	–	R	–	–	–	R	10
Glyceria canadensis (Michx.) Trin.	–	R	–	–	x	R	10
Glyceria striata (Lam.) Hitchc.	x	x	x	–	–	X	4
SF***Goodyera pubescens*** (Willd.) R. Br.	–	–	18	–	–	N	9
Gratiola neglecta Torr.	–	x	–	–	–	X	7

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Hackelia virginiana (L.) I. M. Johnst.	x	–	x	–	–	X	0
Hamamelis virginiana L.	x	–	x	21	–	X	8
Hedera helix L.	–	–	59	–	–	N	*
Helianthus annuus L.	–	–	–	–	–	X	ad
Helianthus divaricatus L.	–	–	x	–	–	X	5
Helianthus petiolaris Nutt. ssp. *petiolaris*	–	–	R	–	–	R	ad
Hemerocallis fulva (L.) L.	–	–	x	–	–	X	*
Hesperis matronalis L.	–	–	x	–	–	X	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	–	–	x	–	–	X	7
Heterotheca subaxillaris (Lam.) Britton & Rusby ssp. *latifolia* (Buckley) Semple)	–	–	41	–	–	N	ad
Hibiscus moscheutos L. ssp. *moscheutos* (*Hibiscus palustris* L.)	–	–	28	–	–	N	9
Hibiscus trionum L.	–	–	x	–	–	X	*
Hieracium gronovii L.	–	x	x	x	–	X	6
SF***Huperzia lucidula*** (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	–	–	28	–	–	N	10
Hydrangea arborescens L. var. *sterilis* Torr. & A. Gray	–	–	58	–	–	N	ad
SF***Hydrocotyle umbellata*** L.	–	–	40	–	–	N	10
SF***Hypericum boreale*** (Britton) E.P. Bicknell	–	R	–	–	–	R	10
Hypericum gentianoides (L.) Britton, Sterns & Poggenburg	–	–	x	x	–	X	7
SF***Hypericum kalmianum*** L.	–	–	29	x	–	X	10
Hypericum majus (A. Gray) Britton	–	R	–	–	–	R	6
Hypericum mutilum L.	–	R 67	–	–	–	N	8
Hypericum perforatum L.	–	x	x	–	–	X	*
Hypericum punctatum Lam.	–	–	x	21	–	X	4
Hypochaeris radicata L.	–	–	x	–	–	X	*
SF***Hypopitys monotropa*** Crantz (*Monotropa hypopitys* L.)	–	29	28	–	–	N	10
Ilex verticillata (L.) A. Gray	x	–	x	–	x	X	9
Impatiens capensis Meerb.	x	x	x	x	–	X	3
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	–	–	x	–	–	X	10
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	x	x	21	–	X	5
SF***Juglans cinerea*** L.	28	–	x	–	–	X	8
Juglans nigra L.	–	–	29	–	–	N	5
Juncus acuminatus Michx.	–	62	–	–	–	N	4
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	–	–	–	x	–	X	7
SF***Juncus arcticus*** Willd. var. ***balticus*** (Willd.) Trautvetter (*Juncus balticus* Willd. var. *littoralis* Engelm.)	–	–	x	–	–	X	6
SF***Juncus articulatus*** L.	–	–	x	–	–	X	7
Juncus brachycephalus (Engelm.) Buchenau	–	–	x	–	–	X	9

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Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Juncus canadensis J. Gay ex Laharpe	–	R	28	21	x	X	7
Juncus dudleyi Wiegand	–	–	x	–	–	X	4
Juncus effusus L.	–	x	x	x	x	X	7
Juncus marginatus Rostk.	–	–	–	x	–	X	9
Juncus marginatus Rostk. (*Juncus biflorus* Elliott)	–	–	–	x	–	X	10
Juncus nodosus L.	–	–	67	–	–	N	6
Juncus tenuis Willd.	–	x	–	21	–	X	0
Juncus torreyi Coville	–	–	67	–	–	N	4
SF***Juniperus communis*** L. (*J. communis* var. *depressa* Pursh)	–	–	x	–	–	X	10
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	–	–	x	–	–	X	7
Krigia biflora (Walter) S.F. Blake	–	–	x	x	–	X	7
Krigia virginica (L.) Willd.	–	–	x	x	–	X	6
Lactuca biennis (Moench) Fernald	–	–	x	–	–	X	4
Lactuca canadensis L.	x	x	x	–	–	X	2
SF***Lactuca hirsuta*** Muhl. ex Nutt.	–	–	x	–	–	X	10
Lactuca serriola L.	–	–	–	–	–	X	*
Laportea canadensis (L.) Wedd.	x	–	x	–	–	X	3
SF***Larix laricina*** (Du Roi) K. Koch	–	34	–	–	–	R	10
SF***Lathyrus japonicus*** Willd. var. ***maritimus*** (L.) Kartesz & Gandhi (*Lathyrus japonicus* Willd. var. *glaber* (Ser.) Fernald)	–	–	29	–	–	N	10
Lathyrus palustris L. (*Lathyrus palustris* L. var. *myrtifolius* (Willd.) A. Gray)	–	R	–	–	–	R	6
Lechea mucronata Raf. (*Lechea villosa* Elliott)	–	–	–	x	–	X	6
Leersia oryzoides (L.) Sw.	x	R	–	–	–	X	4
Leersia virginica Willd.	R	–	–	–	–	R	7
Lemna minor L.	–	R	–	–	–	R	5
SF***Lemna turionifera*** Landolt	–	–	59	–	–	N	2
Leonurus cardiaca L.	–	–	x	–	–	X	*
Lepidium campestre (L.) W.T. Aiton	–	–	x	–	–	X	*
Lepidium virginicum L.	–	–	x	–	–	X	0
Lespedeza capitata Michx.	–	–	x	x	–	X	4
Lespedeza frutescens (L.) Hornem. (*Lespedeza intermedia* (S. Watson) Britton)	–	–	–	x	–	X	8
Lespedeza hirta (L.) Hornem.	–	–	x	21	–	X	6
Liatris aspera Michx.	–	–	x	x	–	X	6
Ligustrum obtusifolium Siebold & Zucc.	–	–	x 20	–	–	X	*
Ligustrum vulgare L.	–	39	x	–	–	X	*
Lilium michiganense Farw.	R	–	–	–	–	R	6
Linaria vulgaris Mill.	–	62	–	–	–	N	*
Lindera benzoin (L.) Blume	x	–	–	–	–	X	7

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Linum virginianum*** L.	28	28	–	–	–	N	10
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	–	29	x	–	–	X	6
SF***Liparis loeselii*** (L.) Rich.	–	–	35	–	–	N	7
Liriodendron tulipifera L.	–	62	–	–	–	N	5
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	–	–	x	–	–	X	8
Lobelia cardinalis L.	R 28	–	–	–	–	X	7
Lobelia inflata L.	–	62	–	–	–	N	5
Lobelia siphilitica L.	–	–	56	–	–	N	6
SF***Lonicera dioica*** L.	–	x	–	–	–	X	10
Lonicera japonica Thumb	–	–	–	–	x	N	*
Lonicera maackii (Rupr.) Maxim.	–	–	x	–	–	X	*
Lonicera tatarica L.	–	–	–	–	–	X	*
Lonicera × *bella* Zabel [*L. tartarica* × *L. morrowii*]	–	x	–	–	–	X	*
Lonicera × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides*] (*Lonicera* × *muendeniensis* Rehder)	–	–	x	–	–	X	*
Lonicera × *xylosteoides* Tausch. [*L. tatarica* × *L. xylosteum*]	–	–	x	–	–	X	*
Ludwigia alternifolia L.	–	–	–	x	x	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	–	R	–	x	x	X	5
Lupinus perennis L. var. *occidentalis* S. Watson	–	x	x	x	–	X	7
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	–	–	–	x	–	X	7
SF***Lycopodiella subapressa*** J. G. Bruce, W. H. Wagner & Beitel (*Lycopodium inundatum* L.)	–	–	27 67	–	–	N	10
Lycopus americanus Muhl. ex W.P.C. Barton	–	x	x	x	–	X	5
Lycopus rubellus Moench	R	–	–	–	–	R	10
Lycopus uniflorus Michx.	–	R	x	–	x	X	7
Lysimachia nummularia L.	–	–	59	–	–	N	
Lysimachia terrestris (L.) Britton, Sterns & Poggenb.	–	–	–	x	x	X	8
Lysimachia thyrsiflora L.	–	R	–	–	–	R	9
Lythrum salicaria L.	–	R	x	–	–	X	*
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	–	x	21	–	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	x	21	–	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	–	x	x	–	–	X	5
Malus ioensis (Alph. Wood) Britton	–	62	–	–	–	N	4
Malus prunifolia (Willd.) Borkh.	–	–	59	–	–	N	*
Matricaria discoidea DC. (*Matricaria matricarioides* (Less.) Porter)	–	–	x	–	–	X	*
Medeola virginiana L.	25	–	23	–	–	N	10

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	A	*B*	*C*	*D*	*E*		
Medicago lupulina L.	–	–	x 15	–	–	N	*
SF***Melampyrum lineare*** Desr.	–	–	x	–	–	X	10
Melilotus alba Medik.	–	x	x	–	–	X	*
Melilotus officinalis (L.) Lam.	–	x	x	–	–	X	*
Menispermum canadense L.	–	62	–	–	–	N	5
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	–	–	x 28	–	–	X	5
SF***Menyanthes trifoliata*** L. (*Menyanthes trifoliata* L. var. *minor* Fernald)	–	R	–	–	–	R	10
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	–	–	28	28	–	N	10
Mimulus ringens L.	–	R	28	x	–	X	6
SF***Minuartia michauxii*** (Fenzl) Farw. (*Arenaria stricta* Michx.)	–	–	R	–	–	R	10
SF***Mitchella repens*** L.	–	–	33	–	–	N	10
Mitella diphylla L.	R	–	–	–	–	R	10
Mollugo verticillata L.	–	x	–	–	–	X	ad
Monarda didyma L.	–	–	42	–	–	N	ad
Monarda fistulosa L.	–	x	x	–	–	X	4
Monarda punctata L.	–	–	x	–	–	X	5
SF***Monotropa uniflora*** L.	–	29	x	–	–	X	10
Morus alba L.	–	–	x	–	–	X	*
Muhlenbergia frondosa (Poir.) Fernald	x	–	–	–	–	X	3
Muhlenbergia mexicana (L.) Trin.	–	–	x	–	–	X	5
Muhlenbergia schreberi J. F. Gmel.	–	–	x	–	–	X	0
SF***Myosotis laxa*** Lehm.	–	–	x 28	–	–	X	10
Myosoton aquaticum (L.) Moench	–	–	59	–	–	N	*
Nasturtium officinale W.T. Aiton	–	–	59	–	–	N	*
Nepeta cataria L.	–	62	–	–	–	N	*
Nuttallanthus canadensis (L.) D.A. Sutton (*Linaria canadensis* (L.) Dum. Cours.)	–	–	x	–	–	X	6
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist (*Nymphaea tuberosa* Paine)	–	R	–	–	–	R	7
Nyssa sylvatica Marshall	x	x	x	x	x	X	8
Oenothera biennis L.	x	x	x	–	–	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner	–	–	x	–	–	X	7
Onoclea sensibilis L.	x	x	x	x	–	X	8
SF***Ophioglossum pusillum*** Raf. (*Ophioglossum vulgatum* L. var *pseudopodum* (S.F. Blake) Farw.)	–	–	53 67	–	–	N	9
Opuntia cespitosa Raf. (*Opuntia humifusa* (Raf.) Raf.)	–	–	29	–	–	N	5
SF***Oryzopsis asperifolia*** Michx.	–	–	–	x	–	X	10

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Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Osmorhiza claytonii (Michx.) C.B. Clarke	x	x	x	–	–	X	3
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	x	–	x	x	x	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	x	x	x	x	–	X	7
Ostrya virginiana (Mill.) K. Koch	–	62	–	–	–	N	5
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	–	–	x	–	–	X	0
Oxalis stricta L. (*Oxalis europaea* Jord.)	x	x	x	–	–	X	0
Oxypolis rigidior (L.) Raf.	–	–	–	x	–	X	7
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	x	x	x	–	–	X	7
SF***Panax trifolius*** L.	x	–	–	–	–	X	10
Panicum capillare L.	–	x	–	–	–	X	1
Panicum dichotomiflorum Michx. (*P. dichotomiflorum* ssp. *puritanorum* (Svenson) Freckmann & Lelong)	64	–	–	–	–	N	10
Panicum rigidulum Bosc ex Nees	–	–	–	x	–	X	5
Panicum virgatum L.	–	–	x	x	–	X	5
Parietaria pensylvanica Muhl. ex Willd.	–	–	x	–	–	X	3
Parthenocissus quinquefolia (L.) Planch.	x	x	x	–	–	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	–	–	x	–	–	X	1
Pedicularis canadensis L.	–	–	x	–	–	X	9
Penstemon digitalis Nutt. ex Sims	–	–	x	21	–	X	4
Persicaria amphibia (L.) Delarbre (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman and P. coccineum Willd.)	–	R	x	x	x	X	4
Persicaria amphibia (L.) Delarbre (*Polygonum coccineum* Willd.)	–	R	–	–	x	R	4
SF***Persicaria arifolia*** (L.) Haroldson (*Polygonum arifolium* L. var. *pubescens* (Keller) Fernald)	–	x	–	–	–	X	9
Persicaria hydropiper (L.) Spach (*Polygonum hydropiper* L.)	–	–	–	–	x	N	2
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	–	x 14	–	–	–	X	7
Persicaria lapathifolia (L.) Delarbre (*Polygonum lapathifolia* L.)	–	–	59	–	–	N	0
Persicaria longiseta (Bruijn) Kitagawa	–	–	59	–	–	N	*
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	–	–	–	–	–	X	*
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	x 14	–	–	–	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	x	x	x	x	–	X	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	x	–	–	–	–	X	2
Phalaris arundinacea L.	–	x	–	–	–	X	*
Phlox bifida L.C. Beck	–	–	x	–	–	X	8
Phlox paniculata L.	–	–	–	x	–	X	ad
Phlox pilosa L.	–	–	x	–	–	X	7
Phragmites australis ssp. *americanus* Saltonstall, P.M. Peterson & Soreng	–	x	–	–	–	N	1

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Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis* (*Phragmites australis* (Cav.) Steud.)	x	x	x	–	–	X	*
Phryma leptostachya L. var. *leptostachya*	–	–	x 17	–	–	N	4
Physalis virginiana Mill.	–	–	x	–	–	X	4
Physocarpus opulifolius (L.) Maxim.	–	–	32	–	–	N	8
SF***Physostegia virginiana*** (L.) Benth. ssp. ***praemorsa*** (Shinners) P.D. Cantino (*P. virginiana* var. *arenaria* Shimek)	–	34	–	–	–	N	6
Phytolacca americana L.	–	x	x	–	–	X	1
Picea abies (L.) H. Karst.	–	62	–	–	–	N	*
Pilea fontana (Lunell) Rydb.	–	R	–	–	–	N	7
Pilea pumila (L.) A. Gray	x	–	–	–	–	X	5
SF***Pinus strobus*** L.	–	–	28	–	–	N	9
SF***Piptochaetium avenaceum*** (L.) Parodi (*Stipa avenacea* L.)	–	–	x	–	–	X	9
Plantago lanceolata L.	–	x	x	–	–	X	*
Plantago major L.	–	–	–	–	–	X	*
Plantago rugelii Decne.	–	x	x	–	–	X	0
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	R	–	–	–	–	R	10
SF***Platanthera flava*** (L.) Lindl. var. ***herbiola*** (R. Br.) Luer (*Habenaria flava* (L.) R. Br. var *herbiola* (R. Br.) Ames & Correll)	55	–	–	46	–	N	10
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* (Michx.) Lodd.)	R	29	–	x 44	–	X	10
SF***Platanthera psycodes*** (L.) Lindl. (*Habenaria psycodes* (L.) Spreng.)	R	–	–	–	–	R	10
Poa compressa L.	–	x	x	x	–	X	*
Poa palustris L.	–	x	–	–	–	X	9
Poa pratensis L.	x	x	x	x	–	X	*
Poa trivialis L.	–	–	–	x	–	X	*
Podophyllum peltatum L.	x	–	x	–	–	X	4
Polygala cruciata L. var. *aquilonia* Fernald & B. G. Schub.	–	–	–	x	x	X	10
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	–	–	–	21	–	N	9
Polygala sanguinea L.	R	–	–	x	–	X	6
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	x	x	–	–	X	3
Polygonatum pubescens (Willd.) Pursh	–	–	x	–	x	X	7
SF***Polygonum articulatum*** L. (*Polygonella articulata* (L.) Meisn.)	–	–	48	–	–	X	10
Polygonum aviculare L.	–	x	–	–	–	X	*
Polygonum tenue Michx.	–	–	29	–	–	N	7
SF***Polypodium virginianum*** L.	–	–	R	–	–	R	9
Polystichum acrostichoides (Michx.) Schott	–	–	x	–	–	X	9

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Pontederia cordata L.	–	R	–	–	–	R	10
Populus deltoides W. Bartram ex Marshall	–	x	x	–	–	X	2
Populus grandidentata Michx.	–	–	–	x	–	X	6
Populus nigra L. (*Populus nigra* L. var. *italica* Moench)	–	x	–	–	–	X	*
Populus tremuloides Michx.	–	x	x	x	x	X	4
SF***Potentilla anserina*** L.	–	–	R 43	–	–	X	6
Potentilla argentea L.	–	–	x	–	–	X	*
Potentilla recta L.	–	x	x	–	–	X	*
Potentilla simplex Michx.	–	x	x	x	–	X	4
Prenanthes alba L.	x	–	x	–	–	X	5
Prenanthes altissima L.	–	–	59	–	–	N	7
Proserpinaca palustris L. (*Proserpinaca palustris* L. var. *crebra* Fernald & Griscom)	–	R	–	–	–	R	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	–	–	x	–	–	X	0
SF***Prunus pensylvanica*** L. f.	–	x	–	–	–	X	5
Prunus serotina Ehrh.	x	x	x	x	–	X	1
Prunus virginiana L.	x	x	x	x	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	–	–	x	–	–	X	2
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	–	–	x	–	–	X	7
Ptelea trifoliata L. ssp. *trifoliata* var. *mollis* Torr. & A. Gray	–	–	x	–	–	X	8
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	–	–	x	21	–	X	5
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	–	–	28	–	–	N	5
SF***Pyrola elliptica*** Nutt.	–	–	x	–	–	X	10
Quercus alba L.	x	–	x	21	–	X	5
Quercus coccinea Munchh.	–	–	x	–	–	X	4
Quercus palustris Munchh.	–	x	28	x	x	X	8
Quercus rubra L.	x	–	x	–	–	X	7
Quercus velutina Lam.	–	x	x	x	x	X	6
Ranunculus abortivus L.	x	–	x	–	–	X	0
Ranunculus pensylvanicus L. f.	–	R	x 10	x	–	X	6
Ranunculus recurvatus Poir.	x	–	–	–	–	X	5
Rhamnus davurica Pall. ssp. *nipponica* (Makino) Kartesz & Gandhi	–	–	x	–	–	X	*
SF***Rhexia virginica*** L.	–	R	–	x	–	X	10
Rhus aromatica Aiton	–	29	x	–	–	X	10
SF***Rhus aromatica*** Aiton var. ***arenaria*** (Greene) Fernald	–	–	x	–	–	X	9

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Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	–	x	x	x	–	X	6
Rhus typhina L.	–	x	x	–	–	X	1
Rhynchospora capitellata (Michx.) Vahl	–	–	68	x	x	X	8
SF***Rhynchospora macrostachya*** Torr. ex A. Gray	–	R	–	–	–	R	10
SF***Rhynchospora recognita*** (Gale) Kral (*Rhynchospora globularis* (Chapm.) Small var. *recognita* Gale)	–	R	–	–	–	R	10
SF***Rhynchospora scirpoides*** (Torr.) Grisebach (*Psilocarya scirpoides* Torr.)	–	R	–	–	x	R	10
Ribes cynosbati L.	x	–	x	–	–	X	5
Robinia pseudoacacia L.	–	–	x	–	–	X	ad
Rorippa palustris (L.) Besser ssp. *palustris* (*Rorippa palustris* (L.) Besser var. *fernaldiana* (Butters & Abbe) Stuckey)	–	x 16	x	–	–	X	4
SF***Rorippa sessiliflora*** (Nutt.) Hitchc.	–	–	–	x	–	X	4
Rosa carolina L.	–	–	x	–	–	X	5
Rosa multiflora Thunb.	–	x	x	x	–	X	*
Rosa palustris Marshall	–	x	x	x	x	X	7
Rubus allegheniensis Porter	x	x	x	–	–	X	3
Rubus flagellaris Willd. (*Rubus enslenii* Tratt.)	–	x	x	x	–	X	3
Rubus hispidus L.	–	–	–	x	x	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	x	x	x	21	–	X	3
Rubus occidentalis L.	–	x	x	21	–	X	2
Rubus pensilvanicus Poir.	–	x	x	x	x	X	3
SF***Rubus pubescens*** Raf.	R	–	–	–	–	R	10
Rudbeckia hirta L.	–	x	x	x	–	X	1
Rudbeckia triloba L.	–	–	x	–	–	X	3
Rumex acetosella L.	–	–	x	x	–	X	*
Rumex britannica L. (*Rumex orbiculatus* A. Gray)	–	x	x	–	–	X	8
Rumex obtusifolius L.	x	x	–	–	–	X	*
Sagittaria graminea Michx.	–	R	–	x	–	X	9
Salix alba L.	–	–	x	x	–	X	*
Salix amygdaloides Andersson	–	R	x	–	–	X	5
Salix bebbiana Sarg.	–	x	–	–	–	X	8
Salix discolor Muhl.	–	x	x	x	–	X	2
Salix eriocephala Michx.	–	x	x	–	–	X	5
Salix humilis Marshall	–	R	x	–	–	X	6
Salix interior Rowlee	–	x	x	x	–	X	1
SF***Salix lucida*** Muhl.	–	x	x	–	–	X	10
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	–	x	x	–	–	X	7
Salix nigra Marshall	–	x	x	x	–	X	4

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
SF***Salix pedicellaris*** Pursh (*Salix pedicellaris* Pursh var. *hypoglauca* Fernald)	R	–	–	–	–	R	10
Salix petiolaris Sm. (includes *Salix* × *subsericea* (Andersson) C. K. Schneid.)	–	R	52	–	x	R	7
SF***Salix sericea*** Marshall	–	–	–	x	x	X	10
Salix × *fragilis* L. [*S. alba* × *S. euxina*] (*Salix* × *rubens* Schrank)	–	–	x	–	–	X	*
Salix × *glatfelteri* C. K. Schneid. [*S. amygdaloides* × *S. nigra*]	–	–	59	–	–	N	*
Salsola tragus L. (*Salsola kali* L. var. *tenuifolia* Tausch)	–	–	x	–	–	X	*
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	x	x	x	–	X	1
Sambucus racemosa L. ssp. *pubens* (Michx.) Hulten (*Sambucus pubens* Michx.)	R	–	–	–	–	R	10
Sanicula canadensis L.	–	–	x	–	–	X	7
Sanicula marilandica L.	–	62	–	–	–	N	5
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	–	–	x	–	–	X	2
SF***Sanicula trifoliata*** E.P. Bicknell	–	62	–	–	–	N	10
Saponaria officinalis L.	x	–	x	21	–	X	*
Sassafras albidum (Nutt.) Nees	x	x	x	–	x	X	3
Saururus cernuus L.	R	–	–	–	–	R	9
SF***Sceptridium dissectum*** (Spreng.) Lyon (*Botrychium dissectum* Spreng.)	R	29	28	29	–	X	6
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	–	R	x	–	–	X	*
SF***Scheuchzeria palustris*** L. (*Scheuchzeria palustris* L. var. *americana* Fernald)	–	R	–	–	–	R	10
SF***Schizachyrium littorale*** (Nash) E.P. Bicknell	–	–	x	–	–	N	10
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	–	–	x	x	–	X	5
SF***Schoenoplectiella purshiana*** (Fernald) Lye (*Schoenoplectus purshianus* (Fernald) M.T. Strong; *Scirpus purshianus* Fernald)	–	R	–	–	–	R	9
Schoenoplectus pungens (Vahl) Palla (*Scirpus pungens* Vahl)	–	–	x	–	–	X	5
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl) var. *creber* Fernald)	x	–	x	–	–	X	5
Scirpus atrovirens Willd.	–	–	59	–	–	N	4
Scirpus cyperinus (L.) Kunth	–	x	x	x	x	X	6
SF***Scirpus georgianus*** R.M. Harper	–	63	–	–	–	N	3
Scirpus pendulus Muhl.	–	–	59	–	–	N	2
SF***Scleria pauciflora*** Muhl. ex Willd. var. ***caroliniana*** (Willd.) Alph. Wood	–	–	–	x	–	X	10
Scrophularia marilandica L.	–	–	59	–	–	N	4
Scutellaria galericulata L.	–	67	–	–	–	N	5
Scutellaria lateriflora L.	–	R	59	–	–	N	4
Sedum sarmentosum Bunge	–	–	x	–	–	X	*
Setaria faberi R.A.W. Herrm.	–	–	x	–	–	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila*	–	62	–	–	–	N	*
Setaria viridis (L.) P. Beauv.	–	–	x	–	–	X	*

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Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Silene antirrhina L.	–	x	x	–	–	X	1
Silene armeria L.	–	–	x	–	–	X	*
Silene latifolia Poir. (*Lychnis alba* Mill.)	–	x	–	–	–	X	*
Sinapis arvensis L. (*Brassica kaber* (DC.) Wheeler)	–	–	–	–	–	X	0
Sium suave Walter	–	R	24	–	–	N	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	–	–	x	–	–	X	5
Smilax lasioneura Hook.	–	–	x	–	–	X	5
Smilax rotundifolia L.	x	–	x	–	–	X	7
Smilax tamnoides L. (*S. hispida*)	–	–	59	–	–	N	6
Solanum ptychanthum Dunal (*S. americanum* Mill.)	–	X 62	x	–	–	X	0
Solanum carolinense L.	–	x	x	–	–	X	ad
Solanum dulcamara L.	–	x	x	x	–	X	*
Solidago altissima L.	–	x	x	–	–	X	1
Solidago caesia L.	x	–	x	–	–	X	7
Solidago flexicaulis L.	–	–	59 61	–	–	N	7
Solidago gigantea Aiton	x	x	x	–	–	X	4
Solidago juncea Aiton	–	–	x	x	–	X	5
Solidago nemoralis Aiton	–	–	x	x	–	X	4
Solidago patula Muhl. ex Willd.	–	x	x	–	–	X	9
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	–	x	x	x	x	X	6
SF***Solidago simplex*** Kunth ssp. ***randii*** (Porter) Ringius var. ***gillmanii*** (A. Gray) G.L. Nesom (*Solidago racemosa* Greene var. *gillmanii* (A. Gray) Fernald)	–	–	x	–	–	X	10
SF***Solidago speciosa*** Nutt.	–	–	x	–	–	X	7
Solidago uliginosa Nutt.	–	R	–	–	–	R	10
Solidago ulmifolia Muhl. ex Willd.	R	–	x	–	–	X	5
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	–	–	x	–	–	X	*
Sonchus oleraceus L.	–	–	–	–	–	X	*
Sorghastrum nutans (L.) Nash	–	–	x	x	–	X	5
SF***Sparganium americanum*** Nutt.	–	–	59	–	–	N	10
Sphenopholis intermedia (Rydb.) Rydb.	–	x	–	–	–	X	4
Spiraea alba Du Roi	–	x	x	x	x	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	–	–	–	x	x	X	9
Spiranthes cernua (L.) Rich.	–	–	28	–	–	N	7
Sporobolus cryptandrus (Torr.) A. Gray	–	–	x	–	–	X	7
Stachys hispida Pursh	–	62	–	–	–	N	5

Table 36 (continued). Summary of species verified and reported at Tamarack Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 37. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit					Entire Unit Species Status	CoC
	A	*B*	*C*	*D*	*E*		
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	–	x	x	–	–	X	5
Stellaria graminea L.	–	x	–	–	–	X	*
Stellaria media (L.) Vill.	x	x	–	–	–	X	*
Strophostyles helvola (L.) Elliott	–	–	68	–	–	N	7
Stuckenia pectinata (L.) Boerner (*Potamogeton pectinatus* L.)	–	–	x	–	–	X	5
SF***Symphyotrichum boreale*** (Torr. & A. Gray) A. Löve & D. Löve (*Aster borealis* Prov.)	–	R	–	–	–	R	10
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	–	–	–	x	–	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	–	–	x	–	–	X	5
Symphyotrichum firmum (Nees) G.L. Nesom (*Aster puniceus* L. var. *firmus* (Nees) Torr. & A. Gray)	–	R	–	–	–	R	7
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	–	R	–	–	–	R	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	x	–	–	–	–	X	4
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	–	–	28	3	–	N	4
SF***Symphyotrichum ontarionis*** (Wiegand) G. L. Nesom (*Aster ontarionis* Wiegand)	–	–	59	–	–	N	5
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	–	–	X	x	–	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	–	x	x	x	–	X	0
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	–	–	–	x	–	X	8
Symplocarpus foetidus (L.) W. Salisb. ex W.P.C. Barton	x	29	x	–	–	X	8
Syringa vulgaris L.	–	–	5	–	–	N	*
Taraxacum officinale F. H. Wiggers	–	x	x	–	–	X	*
Taxus cuspidata Siebold & Zucc.	–	6	–	–	–	N	*
Tephrosia virginiana (L.) Pers.	–	–	x	–	–	X	8
Teucrium canadense L.	–	–	43	–	–	N	3
Thalictrum dasycarpum Fisch. & Avé-Lall.	–	–	x	–	–	X	5
SF***Thelypteris noveboracensis*** (L.) Nieuwl. (*Dryopteris noveboracensis* (L.) A. Gray)	x	–	–	–	–	X	10
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	–	R	x	x	x	X	6
Thlaspi arvense L.	–	–	x 13	–	–	X	*
SF***Thuja occidentalis*** L.	–	R	–	–	–	R	10
Tilia americana L.	–	–	x	–	–	X	5
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	x	–	–	X	2
SF***Toxicodendron vernix*** (L.) Kuntze (*Rhus vernix* L.)	–	R 22	28	–	–	X	10
Tradescantia ohiensis Raf.	–	–	x	–	–	X	2

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	A	*B*	*C*	*D*	*E*		
Tragopogon dubius Scop.	x	x	x	–	–	X	*
Triadenum virginicum (L.) Raf. (*Hypericum virginicum* L.)	–	R	–	–	x	R	10
Tridens flavus (L.) Hitchc. (*Triodia flava* (L.) Smyth)	–	–	–	x	–	X	ad
SF***Trientalis borealis*** Raf.	–	30	–	–	–	N	10
Trifolium pratense L.	–	–	–	–	–	X	*
Triplasis purpurea (Walter) Chapm.	–	–	R 45	–	–	N	7
Tsuga canadensis (L.) Carriere	–	–	38	–	–	N	ad
SF***Turritis glabra*** L. (*Arabis glabra* (L.) Bernh.)	–	x	36	–	–	X	6
Typha angustifolia L.	–	x	x	–	–	X	1
Typha latifolia L.	–	x	x	x	–	X	1
Typha × *glauca* Godr. [*T. angustifol*ia × *T. lat*ifolia]	–	R	x	–	–	X	1
Ulmus americana L.	x	x	x	–	–	X	3
Ulmus pumila L.	–	–	x	–	–	X	*
Ulmus rubra Muhl.	–	x	–	–	–	X	4
Urtica dioica L. ssp. *gracilis* (Aiton) Selander (*Urtica procera* Willd.)	x	x	x	–	–	X	2
SF***Utricularia gibba*** L.	–	R	–	–	–	R	10
SF***Utricularia minor*** L.	–	–	9	–	–	N	10
SF***Utricularia purpurea*** Walter	–	R	–	–	–	R	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen	–	57	45	–	–	N	9
SF***Uvularia sessilifolia*** L.	26	–	–	–	–	N	10
Vaccinium angustifolium Aiton	–	x	x	x	x	X	5
Vaccinium corymbosum L.	–	x	29	x	–	X	8
SF***Vaccinium macrocarpon*** Aiton	–	R	–	–	–	R	10
Vaccinium pallidum Aiton	–	–	x	x	–	X	5
Verbascum blattaria L.	–	–	59	–	–	N	*
Verbascum thapsus L. ssp. *thapsus*	–	–	x	–	–	X	*
Verbena hastata L.	–	x	x	x	–	X	4
Verbena stricta Vent.	–	–	x	–	–	X	4
Verbena urticifolia L.	–	R	–	–	–	R	5
Verbena × *rydbergii* Moldenke [*V. hastata* × *V. stricta*]	–	–	51	–	–	N	4
Vernonia missurica Raf.	–	–	–	x	–	X	4
Veronica arvensis L.	–	–	x	–	–	X	*
Veronica peregrina L.	–	x	–	–	–	X	0
Viburnum acerifolium L.	–	–	x	–	–	X	9
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* Fernald)	–	52	x 11	–	–	X	ad
Viburnum lentago L.	–	x	x	–	–	X	5
Viburnum opulus L. var. *opulus*	–	x	x	–	–	X	*

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	A	*B*	*C*	*D*	*E*		
Viburnum prunifolium L.	–	x	–	–	–	X	5
Viburnum rafinesqueanum Schult.	–	x	x 11	–	–	X	5
SF***Viburnum trilobum*** Marshall (*Viburnum opulus* L. var. *americanum*)	–	0	–	0	–	E	10
Vinca minor L.	–	–	x	–	–	X	*
SF***Viola blanda*** Willd. (*Viola incognita* var *forbesii* Brainerd)	R	–	–	–	–	R	10
Viola cucullata Aiton	R	x 11	x 11	–	–	X	9
Viola lanceolata L.	–	–	–	x	–	X	7
SF***Viola macloskeyi*** F.E. Lloyd (*V. macloskeyi* ssp. *pallens* (Banks ex Ging.) M.S. Baker; *Viola pallens* (Banks) Brainerd)	R	–	–	–	–	R	10
Viola pedata L. (*Viola pedata* L. *linearilob*a DC.)	–	–	x	–	–	X	9
Viola primulifolia L.	–	0	–	–	–	N	10
Viola pubescens Aiton	x	–	x	–	–	X	5
SF***Viola sagittata*** Aiton var. ***ovata*** (Nutt.) Torr. & A. Gray (*Viola fimbriatula* Sm.)	–	–	–	x	–	X	6
Viola sagittata Aiton var. *sagittata*	–	–	–	x	–	X	7
Vitis aestivalis Michx.	x	x	x	–	–	X	7
SF***Vitis labrusca*** L.	x	R	x	21	x	X	9
Vitis riparia Michx.	x	x	x	21	–	X	2
Vulpia octoflora (Walter) Rydb.	–	–	x	x	–	X	4
Xanthium strumarium L.	–	–	x	–	–	X	*
SF***Xyris torta*** Sm.	–	R	–	–	–	R	10
Yucca flaccida Haworth (*Yucca smalliana* Fernald)	–	–	x	–	–	X	ad

Table 37. Sources of new species verified and reported from Tamarack.

Notes	Source(s)	Date	Species
1	K. Board	1993	*Chimaphila umbellata* ssp. *umbellata*
2	E. Kjellmark	19 June 1989	*Galium mollugo*
3	D. Mason and G. Tonkovich	July 1999–Oct 2000	*Symphyotrichum novae-angliae*
4	D. Mickey	17 Sept 2003	*Gleditsia triacanthos*
5	D. Mickey	Fall 2003	*Syringa vulgaris*
6	D. Mickey and K. Quinlan	21 Nov 2003	*Taxus cuspidata*
7	D. Mickey and K. Quinlan	24 Nov 2003	*Alliaria petiolata*
8	L. Miramontes	29 July 2004	*Botrychium matricariifolium*
9	L. Miramontes, B. Plampin, and M. Newgent	20 June 2002	*Utricularia minor*
10	Pavlovic et al. (Exotic Project)	17 July 1998	*Ranunculus pensylvanicus*

Table 37 (continued). Sources of new species verified and reported from Tamarack.

Notes	Source(s)	Date	Species
11	Pavlovic et al. (Exotic Project)	27 July 1998	*Viola cucullata*, *Viburnum dentatum* var. *lucidum*, *Viburnum rafinesqueanum*
12	Pavlovic et al. (Exotic Project)	30 July 1998	*Aronia* × *prunifolia* [*A. melanocarpa* × *A. arbutifolia*]
13	Pavlovic et al. (Exotic Project)	31 July 1998	*Thlaspi arvense*
14	Pavlovic et al. (Exotic Project)	21 Aug 2000	*Persicaria hydropiperoides*, *Persicaria punctata*, *Thlaspi arvense*
15	Pavlovic et al. (Exotic Project)	5 Aug 1998	*Medicago lupulina*
16	Pavlovic et al. (Exotic Project)	1 Sept 1998	*Rorippa palustris* ssp. *palustris*
17	Pavlovic et al. (Exotic Project)	29 July 1998	*Phryma leptostachya* var. *leptostachya*
18	N.B. Pavlovic and K. Cole	1986	*Goodyera pubescens*
19	N.B. Pavlovic	1983	*Arctostaphylos uva-ursi*, *Epigaea repens*
20	N.B. Pavlovic	16 Oct 1991	*Cotinus coggygria*, *Ligustrum obtusifolium*
21	B. Plampin	1990	*Asclepias incarnata*, *Asclepias syriaca*, *Asclepias tuberosa*, *Asplenium platyneuron*, *Berberis thunbergii*, *Botrychium virginianum*, *Circaea canadensis* ssp. *canadensis*, *Commelina communis*, *Convallaria majalis*, *Fagus grandifolia*, *Glechoma hederacea*, *Hamamelis virginiana*, *Hypericum punctatum*, *Iris virginica*, *Juncus canadensis*, *Juncus tenuis*, *Lespedeza hirta*, *Maianthemum canadense*, *Maianthemum racemosum* ssp. *racemosum*, *Penstemon digitalis*, *Polygala polygama*, *Pteridium aquilinum* var. *latiusculum*, *Quercus alba*, *Rubus idaeus* ssp. *strigosus*, *Rubus occidentalis*, *Saponaria officinalis*, *Vitis labrusca*, *Vitis riparia*
22	B. Plampin	1992	*Toxicodendron vernix*
23	B. Plampin	1994	*Medeola virginiana*
24	B. Plampin	2002	*Sium suave*
25	B. Plampin	13 May 1993	*Medeola virginiana*
26	B. Plampin	13 May 1993 and earlier	*Uvularia sessilifolia*
27	B. Plampin and L. Miramontes	18 Oct 2002	*Diphasiastrum tristachyum*, *Lycopodiella subapressa*
28	B. Plampin and M. Newgent	1992	*Agalinis purpurea*, *Chimaphila maculata*, *Chrysosplenium americanum*, *Corallorhiza maculata*, *Eutrochium maculatum*, *Hibiscus moscheutos* ssp. *moscheutos*, *Huperzia lucidula*, *Hypopitys monotropa*, *Juncus canadensis*, *Juglans cinerea*, *Linum virginianum*, *Lobelia cardinalis*, *Mentha arvensis*, *Micranthes pensylvanica*, *Mimulus ringens*, *Myosotis laxa*, *Pinus strobus*, *Pycnanthemum virginianum*, *Quercus palustris*, *Sceptridium dissectum*, *Spiranthes cernua*, *Symphyotrichum novae-angliae*, *Toxicodendron vernix*
29	B. Plampin and M. Newgent	1993	*Adiantum pedatum*, *Betula papyrifera*, *Celtis tenuifolia*, *Corallorhiza maculata*, *Corallorhiza odontorhiza*, *Cornus rugosa*, *Gentiana andrewsii*, *Hypericum kalmianum*, *Hypopitys monotropa*, *Juglans nigra*, *Lathyrus japonicus* var. *maritimus*, *Liparis liliifolia*, *Monotropa uniflora*, *Opuntia cespitosa*, *Platanthera lacera*, *Polygonum tenue*, *Rhus aromatica*, *Sceptridium dissectum*, *Symplocarpus foetidus, Vaccinium corymbosum*
30	B. Plampin and M. Newgent	1995	*Trientalis borealis*
31	B. Plampin and M. Newgent	10 May 1993	*Claytonia virginica*, *Cystopteris protrusa*
32	B. Plampin and M. Newgent	30 June 1993	*Physocarpus opulifolius*
33	B. Plampin and M. Newgent	15 June 2003	*Mitchella repens*

Table 37 (continued). Sources of new species verified and reported from Tamarack.

Notes	Source(s)	Date	Species
34	B. Plampin, M. Klein, M. Wagner, L. Hanson-Lucas, W. Robinson, and K. Robinson	3 Sept 2004	*Larix laricina*, *Physostegia virginiana* ssp. *praemorsa*
35	B. Plampin, M. Newgent, and L. Miramontes	20 June 2002	*Liparis loeselii*
36	B. Plampin, M. Newgent, and L. Miramontes	25 June 2002	*Turritis glabra*
37	B. Plampin, M. Newgent, and N.B. Pavlovic	1993	*Carex crinita* var. *crinita*
38	K. Quinlan	3 Feb 2004	*Tsuga canadensis*
39	K. Quinlan and D. Mickey	Fall 2003	*Ligustrum vulgare*
40	R. Scribailo and P.M. Stewart	1995	*Carex bebbii*, *Hydrocotyle umbellata*
41	N.B. Pavlovic, S. Leicht-Young, and K. Frohnapple	10 Sept 2008	*Heterotheca subaxillaris* ssp. *latifolia*
42	S. Leicht-Young and N.B. Pavlovic	6 July 2009	*Monarda didyma*
43	K. Kangas and N.B. Pavlovic	29 Aug 2011	*Potentilla anserina*, *Teucrium canadense*
43	M. Bowles and M. DeMauro	10 July 1984	*Potentilla anserina*
44	B. Plampin	7 July 1990	*Platanthera lacera*
45	NIRMI plots	2012, 2013	*Triplasis purpurea*
46	B. Plampin	2 Sept 2010	*Platanthera flava* var. *herbiola*
47	M. Newgent	24 Aug 1992	*Dendrolycopodium dendroideum*
48	N.B. Pavlovic and S. Leicht-Young	2006	*Polygonum articulatum*
49	K. and S. Dove	22 July 2009	*Botrychium matricariifolium*
50	D. Hamilla and B. Plampin	25 Nov 2010	*Diphasiastrum digitatum*
51	L. Rericha and G. Wilhelm	15 July 2003	*Verbena* × *rydbergii* [*V. hastata* × *V. stricta*]
52	G. Wilhelm	9 June 1979	*Salix petiolaris*, *Viburnum dentatum lucidum*
53	M. Hacker and D. Hamilla, and revisited by G. Tonkovich and D. Hamilla	2014 and 2015	*Carex aurea*, *Ophioglossum pusillum*
54	G. Wilhelm, E. Shimp, and F.A. Swink	25 Aug 1987	*Desmodium perplexum*
55	D. Hamilla	2012	*Platanthera flava* var. *herbiola*
56	E. Palmquist	n.d.	*Lobelia siphilitica*
57	B. Plampin	21 June 2013	*Utricularia vulgaris* ssp. *macrorhiza*
58	N. Pilla	17 Aug 2017	*Hydrangea arborescens* var. *sterilis*
59	N. Pilla	2017	*Cardamine hirsuta*, *Cyperus bipartitus*, *Cyperus esculentus*, *Cyperus strigosus*, *Decodon verticillatus*, *Digitaria sanguinalis*, *Dryopteris carthusiana*, *Echinochloa crusgalli*, *Euonymus fortunei*, *Hedera helix*, *Lemna turionifera*, *Lysimachia nummularia*, *Malus prunifolia*, *Myosoton aquaticum*, *Nasturtium officinale*, *Persicaria lapathifolia*, *Persicaria longiseta*, *Prenanthes altissima*, *Salix* × *glatfelteri*, *Scirpus atrovirens*, *Scirpus pendulus*, *Scrophularia marilandica*, *Scutellaria lateriflora*, *Smilax tamnoides*, *Solidago flexicaulis*, *Sparganium americanum*, *Symphyotrichum ontarionis*, *Verbascum blattaria*
60	N. Pilla	3 Oct 2017	*Amaranthus tuberculatus*
61	N. Pilla		*Arctium lappa*, *Bidens frondosa*, *Carex scoparia*, *Carex vulpinoidea*, *Cyperus lupulinus*, *Desmodium canadense*, *Malus domestica*, *Penstemon calycosus*, *Pinus sylvestris*, *Prenanthes racemosa*, *Rumex crispus*, *Solidago flexicaulis*, *Symphyotrichum laeve*, *Symphyotrichum praealtum*

Table 37 (continued). Sources of new species verified and reported from Tamarack.

Notes	Source(s)	Date	Species
62	N. Pilla and N. Dell	19–30 Aug 2017	*Acer saccharum*, *Aesculus glabra*, *Agastache nepetoides*, *Bromus inermis*, *Campanula rapunculoides*, *Carex granularis*, *Carex sparganioides*, *Carex suberecta*, *Carpinus caroliniana* ssp. *virginiana*, *Cerastium fontanum*, *Cyperus schweinitzii*, *Desmodium glabellum*, *Elymus riparius*, *Eutrochium purpureum*, *Geum aleppicum*, *Juncus acuminatus*, *Linaria vulgaris*, *Liriodendron tulipifera*, *Lobelia inflata*, *Malus ioensis*, *Menispermum canadense*, *Nepeta cataria*, *Ostrya virginiana*, *Picea abies*, *Sanicula marilandica*, *Sanicula trifoliata*, *Setaria pumila*, *Stachys hispida*
63	N. Pilla		*Scirpus georgianus*
64	G. Wilhelm	11 Oct 1978	*Panicum dichotomiflorum* (ssp. *puritanorum*)
65	C. Deam (IU)	17 June 1911	*Carex leptalea*
66	N.B. Pavlovic	27 June 1988	*Eleocharis tenuis verrucosa*
67	G. Tonkovich	2014	*Hypericum mutilum*, *Scutellaria galericulata*
68	Tonkovich and Hamilla	20 Aug 2015	*Cladium mariscoides*, *Acer nigrum*, *Alisma subcordatum*, *Anemone cylindrica*, *Arnoglossum atriplicifolium*, *Asplenium platyneuron*, *Carex aurea*, *C. hystericina*, *C. viridula viridula*, *Catalpa speciosa*, *Cladium mariscoides*, *Clematis virginiana*, *Cyperus bipartitus*, *Elaeagnus umbellata*, *Epilobium leptophyllum*, *Eragrostis spectabilis*, *Euthamia graminifolia* (*nuttallii*), *Fimbristylis autumnalis*, *Impatiens capensis*, *Iris virginica*, *Juncus brachycephalus*, *J. nodosus*, *J. torreyi*, *Juniperus communis*, *Liparis loeselii*, *Lobelia siphilitica*, *Lycopodiella subapressa*, *Lythrum salicaria*, *Myosotis laxa*, *Onoclea sensibilis*, *Ophioglossum pusillum*, *Osmunda regalis spectabilis*, *Packera aurea*, *Phragmaties australis australis*, *Populus termuloides*, *Potamogeton*, *Potentilla anserina*, *Prunella vulgaris lanceolata*, *Quercus alba*, *Rhynchospora capitellata*, *Sagittaria*, *Solidago altissima*, *S. rugosa*, *Spiranthes cernua*, *Strophystyles helvola*, *Thelypteris palustris pubescens*, Typha × *glauca*, *Utricularia minor*, *Utricularia vulgaris macrorhiza*

Carex aurea, *C. bebbii*, *C. interior*, *C. leptalea*, *Celtis tenuifolia*, *Chimaphila maculata*, *C. umbellata*, *Cladium mariscoides*, *Corallorhiza maculata*, *Cornus rugosa*, *Cuscuta pentagona*, *Dendrolycopodium dendroideum*, *Desmodium perplexum*, *Diphasiastrum tristachyum*, *Eleocharis tenuis verrucosa*, *Goodyera pubescens*, *Huperzia lucidula*, *Hydrocotyle umbellata*, *Hypopitys monotropa*, *Juglans cinerea*, *Juncus arcticus balticus*, *J. articulatus*, *Lathyrus japonicus maritimus*, *Lemna turionifera*, *Linum virginianum*, *Liparis loeselii*, *Lycopodiella inundata*, *Matteuccia struthiopteris*, *Mitchella repens*, *Myosotis laxa*, *Ophioglossum pusillum*, *Physostegia virginiana praemorsa*, *Pinus strobus*, *Platanthera aquilonis*, *P. flava herbiola*, *Rhexia mariana*, *Rubus flagellaris* (*R. enslenii*), *Sceptridium oneidense*, *Schizachyrium littorale*, *Symphyotrichum ontarionis*, *Trientalis borealis*, *Utricularia minor*, *Uvularia sessilifolia*, *Viburnum trilobum*, and *Viola pubescens*. Species added to the special flora include *Aletris farinosa*, *Celastrus scandens*, *Cyperus houghtonii*, *Fraxinus americana*, *F. nigra*, *F. pennsylvanica*, *Larix laricina*, *Rorippa sessiliflora*, and *Thelypteris noveboracensis*. The hydromesophytic swamp forests, bogs, and marshes of Tamarack A and B have been degraded, with their once rich floras now depauperate and many species locally extirpated.

Five percent of the special flora of the

Tamarack Unit are only found therein. These special flora include *Desmodium perplexum*, *Carex interior*, *Circaea alpina* (extirpated), *Dichanthelium linearifolium*, *Lactuca hirsuta*, *Rorippa sessilifolia*, and *Uvularia sessilifolia*. Additional flora noted by Lyon (1927, 1930) from this area may have been observed in the area of McAllister Prairie (Keiser Unit) in Beverly Shores, owned by the SHLT. These species include *Chamaedaphne calyculata*, *Rhynchospora macrostachya*, *Rhynchospora scirpoides*, *Scleria reticularis*, and *Woodwardia virginica*. Species that have been likely extirpated due to not having been seen for a long time include *Brasenia schreberi*, *Calla palustris*, *Calopogon tuberosus*, *Carex bromoides*, *C. leptalea*, *Chamaedaphne calyculata*, *Circaea alpina*, *Cirsium pitcheri*, *Comarum palustre*, *Cypripedium acaule*, *Drosera rotundifolia*, *Eleocharis geniculata*, *Glyceria borealis*, *Menyanthes trifoliata*, *Minuartia michauxii*, *Oryzopsis asperifolia*, *Platanthera clavellata*, *P. psycodes*, *Polypodium virginianum*, *Rhynchospora recognita*, *R. scirpoides*, *Rubus pubescens*, *Salix pedicellaris*, *Sceptridium dissectum*, *Scheuchzeria palustris*, *Schoenoplectiella purshiana*, *Symphyotrichum boreale*, *Thuja occidentalis*, *Utricularia gibba*, *U. purpurea*, *Vaccinium macrocarpon*, *Viburnum trilobum*, *Viola blanda*, *V. macloskeyi*, *V. primulifolia*, and *Xyris torta*.

Floristic summary

Tamarack is the home to 570 native (535 in 1990), 120 exotic, and 19 adventive plant species (Table 38). Tamarack has an overall mean CoC of 5.98 and an FQI of 147. Of the 737 taxa known from Tamarack, 593 are native, 19 are adventive, and 125 are exotic. Of the 593 native taxa, 570 are native species, 17 are varieties, and six are hybrids. Of the 78 Indiana state-listed species 16 are endangered, 36 threatened, 25 watch list, and one is listed as extirpated. Species unique to Tamarack include *Desmodium perplexum*, *Carex interior*, *Circaea alpina*, *Dichanthelium linearifolium*, *Lactuca hirsuta*, *Rorippa sessiliflora*, and *Uvularia sessilifolia*. Newly discovered native species are *Carex aurea*, *Desmodium perplexum*, and *Ophioglossum pusillum*. New adventive species include *Heterotheca subaxillaris*, *Hibiscus moscheutos* ssp. *moscheutos*, *Monarda didyma*, and *Tsuga canadensis*. New exotic species include *Cotinus coggygria*, *Galium mollugo*, *Medicago lupulina*, *Syringa vulgaris*, and *Taxus cuspidata*.

We catalogued 133 native species for Tamarack A, with a mean CoC of 5.77 and representing a Floristic Quality Index of 68 (Table 38).

Survey area B occupies the vast area once known to include the second bog in the unit—the "Boomerang Bog"—and the Great Marsh with all its ponds and sloughs, marshy prairies, and sedge meadows (Plampin and Hamilla 2011, 2014). After ditching, draining, farming, residential development, and other activities, it is dominated by invasive exotic plants and has low native species richness. We have catalogued 242 native species (formerly 135) from our surveys and from herbarium records at INDU. They render a mean CoC of 5.50 and an FQI of 88.

Tamarack C is of mixed natural area significance due to a mosaic of areas varying in native and invasive plant relative abundances. Overall, from our surveys and from herbarium records, we have catalogued 362 native floristic elements (compared to 254 in Wilhelm (1990)), with a mean CoC value of 5.40 and an FQI of 106 (Table 38).

We recorded 159 native species in Tamarack D (compared to 144 in the past), with a mean CoC of 5.65 and an FQI of 74 (Table 38). Tamarack D should be further surveyed to determine the impacts of invasive plants on this rarely visited tract and the native plants associated with the 592 ditch south of the CSSSBR.

SHLT has recorded 45 native species in Tamarack E, with a mean CoC of 6.52 and a very low FQI of 45.

Conservation issues

As can be seen from the vegetation map (see Figure 24), the natural area portions of Tamarack are composed largely of a foredune complex, a dune complex, a marsh complex, and a swamp complex. The Calumet Bike Trail, considered as a separate subunit in the Furnessville and Keiser units,

Table 38. Summary of floristic statistics by subunit of Tamarack. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit					Entire Unit
	A	*B*	*C*	*D*	*E*	
Area (ha/acres)	34/82	287/708	320/791	39/95	11/27	690/1,684
Special flora total	29	45	63	24	3	133
Confirmed	8	6	27	18	3	61
New	5	16	32	4	0	35
Reported	16	21	3	1	0	33
Extirpated	0	2	1	1	0	4
Total taxa, FNA/ITIS	147	299	483	187	49	737
Total native taxa, FNA/ITIS	138	249	375	167	47	593
Native species, FNA/ITIS	133	242	362	159	45	570
Native variety, FNA/ITIS	4	5	8	7	1	17
Native Hybrid, FNA/ITIS	1	2	5	1	1	6
Total adventive taxa, FNA/ITIS	0	3	14	3	0	19
Total adventive species, FNA/ITIS	0	3	14	3	0	19
Total adventive variety, FNA/ITIS	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0	0	0
Total exotic taxa, FNA/ITIS	9	47	94	17	2	125
Total exotic species, FNA/ITIS	9	45	90	17	2	120
Total exotic variety, FNA/ITIS	0	1	1	0	0	1
Total exotic hybrid, FNA/ITIS	0	1	3	0	0	4
Total Indiana-listed	13	23	42	11	1	78
Endangered	1	6	7	3	0	16
Threatened	6	11	21	2	1	36
Rare	0	0	0	0	0	0
Watch List	5	6	14	6	0	25
Extirpated	1	0	0	0	0	1
Sum CC	5.74	5.50	5.44	5.65	6.52	5.97
Sum CC adventive & invasive	5.33	4.43	4.02	4.96	6.22	4.64
Mean CoC	810	1,387	2,052	966	313	3,595
Mean CoC with adventive and invasive	800	1,338	1,950	948	311	3,460
FQI	68	87	106	74	45	147
FQI with adventive and invasive	65	77	89	69	44	127

has not been thoroughly surveyed aside from the records kept by Plampin, Emma Pitcher, Nathanael Pilla, and Scott Namestnik (see Table 37).

Tamarack A

Once the "subdunal woods at Tamarack", or "wet woods", Tamarack A is now 38 hectares (82 acres) of second-growth trees growing on a ditched and drained substrate (Wilhelm 1990). Bowles et al. (2015b) examined the public land survey records for vegetation patterns and showed there were two bogs in Tamarack, the above cited Tamarack Bog for which the unit is named and another in Tamarack B. A review of the floristic quality assessment provides evidence of past drainage, peat fires, and cutting. Tamarack A is of lower quality in terms of species diversity and community composition/structure compared to Keiser Woods (Keiser C) and the far southwest corner of Keiser

B (Pavlovic, personal observation, 2000). As Wilhelm (1990) noted, "Without the ecological players, one cannot produce an ecological and evolutionary play."

Tamarack B

This former Great Marsh wetland complex that once contained marshes, ponds, bogs, and the estimated 300-acre Fish Lake, has been an area with few species and without fire for a long time. The western portion was recently restored by Dan Mason and crew. Historically, the marsh complex continued east into Tamarack subunit D. The second Tamarack Bog, south of Kansas Avenue and Beverly Drive, we refer to as the boomerang bog due to its shape on the Public Land Survey plat maps (Bowles et al. 2015b, Plampin and Hamilla 2011). In 2015, Dan Mason found adjacent or at the location of the boomerang bog a soil type that indicated the presence of tamarack (Mason, pers. comm. with Pavlovic). Both bogs were drained and fires occurred here in the 1920s and early 1950s. Historical records also show that shortly before the Civil War, Michigan City entrepreneur Chauncey Blair drained the area west of Michigan City, including part of Tamarack D and at least the eastern part of Tamarack B, including Fish Lake (Plampin and Hamilla 2011, 2014). In parts of Tamarack subunits B and D, he had five commercial cranberry marshes constructed. There was no Highway 12 north until 1934, though there may have been a dirt track or road between subunits B and D (Sheridan Avenue) to prevent the water used for flooding the cranberries from entering Michigan City. After Blair's death in 1890, a 30- to 40-acre cranberry enterprise remained west of where U.S. Highway 12 curves north (but south of Beverly Drive), according to Willis Grieger (remarks during a talk by Kay Franklin at the Westchester Public Library, 4 February 1990). The land was leased between 1918 and 1926 to the Indiana State Prison for farming. The State Prison may have had a "lease of ground" in the 1880s, but the records are too shadowy for us to determine what was leased (Plampin and Hamilla 2011, 2014). The leasee between 1918 and 1926 was a holding company. This eastern portion of the Great Marsh, including Fish Lake, was ditched and drained for agriculture via Kintzele Ditch prior to 1918. Johnsfield ditch, which drains to the south, was created prior to 1918. At that time the Prison Farm raised mint commercially. In 1927, Frederick Bartlett bought the farm and adjacent land to plat Beverly Shores. He drained everything and platted 10,000 lots. He maintained and may have increased the drainage (Plampin and Hamilla 2011). The parts of subunits B and D explored by Plampin and Hamilla today have neither cranberries nor mint.

Although subject to the above disturbances, the area is large and many species are still present in the interior portions, providing restoration potential. Invasion of woody species and exotic shrubs has made some areas nearly impassable. Further, patches of hybrid cattail (*Typha* × *glauca*) and nonnative common reed (*Phragmites australis* ssp. *australis*) are prevalent throughout the marsh complex. In other areas adjacent to dune uplands, small pockets of sedge meadow persist and could serve as core areas for restoration of the system. Restoration of this portion of the Great Marsh could be an important step in conserving native plant diversity. Daniel Mason began to apply herbicide to nonnative *Phragmites* and *Typha* × *glauca* in 2013 (Dan Mason, personal communication with Pavlovic, 2017).

Beaver have been active recently in both Tamarack B and D. They were removed from subunit D shortly before 2011 but have since returned After a microburst storm in 2007 blew down many trees adjacent to the intersection of Central Avenue and Beverly Drive, water levels increased, partly due to beaver activity, and a semblance of Fish Lake reappeared. Fish Lake naturally drained eastward to Trail Creek, but much of that land has been filled to expand Michigan City.

Tamarack C

The foredune complex in this subunit receives heavy human traffic and is impacted by dwellings, trails, shoreline erosion, and various other anthropogenic disturbances. Even with these disturbances, this subunit provides the only habitat for certain special flora because there are occasional undisturbed foredune and savanna areas

such as the Kansas Avenue area adjacent to the east end of the Town of Beverly Shores. Northwest of the Central Avenue parking lot is a high sand blowout with a diversity of prairie elements. The large valley adjacent to that blowout contains a population of flowering dogwood.

The dune complex portion of Tamarack C is quite variable in vegetation. The black oak savanna and prairie areas have received fire in recent years. In spring 1980, a fire swept over the western portion of Tamarack C in an area that is called the Kansas Avenue site. On the dry southwest slopes where tree invasion was minimized, the remnant savanna groundlayer vegetation recovered and bloomed (Pavlovic, personal observation, June 1984). Elsewhere on north and east slopes, rampant tree growth and oak leaf litter accumulation killed or greatly reduced the savanna elements of the groundlayer vegetation. Thus, these slopes hardly responded to the fire. Subsequent burns were too intense, thus causing a decline in fire-sensitive boreal species such as bearberry and trailing arbutus (Pavlovic, personal observation, 1984–2000). Of course, these species were in decline already from shade, buildup of leaf litter, and, possibly, overharvesting. Nevertheless, this illustrates the importance of minimizing fire intensity when initiating restoration burns to allow remnant herbs to persist. As Wilhelm (1990) wrote,

> *That is the way a savanna can die, ... not with a bang, but a whimper. Once the root mass of the ground cover vegetation has been annihilated because of decreasing light and increasing litter cover, the system is of course rendered vulnerable to exaggerated soil erosion, associated depletion of seed bank,* [over-abundant deer trampling,] *and ultimate collapse and irrecoverability.*

Between the Kansas Avenue site on the west end of Tamarack C and west of Mt. Baldy in the dune complex, oriental bittersweet, in concert with and without the application of prescribed fire, has invaded and dominated the dune complex. With fire, oriental bittersweet pervades the dunes through root sprouts and suckering to shade out native species and become a continuous sward of ground cover and canopy lianas (Pavlovic et al. 2016; Pavlovic, personal observation, 1983 to 2021).

The eastern portion of Tamarack C includes a tourist attraction in a moving dune, known locally as "Mount Baldy". Great Lakes dunes move in response to 150-year cycles of lake level decline and natural disturbance that have provided bursts of inland moving sand just after high stands of the lake over the last 4,000 ybp (Arbogast and Loope 1999, Loope and Siterlet 2000), but the origin of Mt. Baldy is largely the result of human activity (Davis and Wood 1980, Kilibarda and Shillinglaw 2015). Movable train track construction for the sand mining of "Hoosier Slide" and other dunes east of Mt. Baldy initiated the disturbance. Concurrently, the early (1830s) lengthening of the Trail Creek harbor break walls has greatly depleted the sand supply and resulted in shoreline erosion to the west (Wood 1987, Wood and Davis 1987). Further hardening of the shoreline from the NIPSCO power station contributed to the shoreline erosion west of Crescent Dune and in front of Mt. Baldy (Davis and Wood 1980). The origin of this open dune is a combination of construction of the harbor at Michigan City, the adjacent mining of the "Hoosier Slide" east of Mt. Baldy and sand further west, human disturbance, shoreline erosion, the natural forces of wind, and beach sand nourishment (Kilibarda and Shillinglaw 2015).

There is a buried soil layer, paleosol, on the north face of Mount Baldy that dips southward. This attests to the lakeside portion of the dune being the former south face of a dune north of the present Mt. Baldy that has migrated past itself because of the before-mentioned shoreline impacts (Argyilan et al. 2015). The original land surveyors classified the "Mount Baldy" area as "barrens", a term that translates today into "savanna" (Bowles, pers. comm. with Pavlovic, 2016; Pavlovic, personal observation). A 1922 oblique photograph of the area (Figure 25) shows an oak savanna spacing of black oaks on the dunes adjacent to Mt. Baldy (Applied Ecological Services



Figure 25. A northeast and southwest view of Mt. Baldy showing the savanna physiognomy of the dune vegetation and the ditching and farming of the Great Marsh in 1922. USGS/N.B. PAVLOVIC

1984). Today, by contrast, less vegetation grows on Mt. Baldy, even in comparison to the earliest impacts of hang gliding (Davis and Wood 1980). The expansion of the Mt. Baldy parking lot by the NPS, the decline in lake levels by one meter between 1997 and 2000 (U.S. Army Corps of Engineers 2021), and the concurrent but reduced beach nourishment by the Army Corps of Engineers may all have contributed to the rapid rate of landward movement of the lee face toe of Mt. Baldy (Kilibarda and Shillinglaw 2015).

Even as late as 1980, Mt. Baldy was essentially a transverse dune, even though it had migrated landward (Kilibarda and Shillinglaw 2015). Only since then, and especially in the last two decades, has Mt. Baldy converted into a parabolic dune system (Pavlovic, pers. observation, 2000). This conversion means late fall storm winds cause the wind velocity to increase, which introduces greater sand movement (Olson 1958a, 1958b, 1958c, 1997; Olson and Van der Maarel 1997). With this increase in rate of movement, the NPS has closed off the lee slope, a portion of which visitors have traditionally run down, yet the rapid rate of dune movement has not been confined to that portion (Pavlovic, personal observation, 1983 to 2021). The NPS has employed a slightly effective snow fence at the crest of Mt. Baldy to capture some sand and has closed off extensive north slope areas. The native foredune vegetation has invaded these less disturbed areas. In addition, access has been rerouted to the west on trails in the oak woods. Nevertheless, we believe that Mt. Baldy will continue to migrate inland until wind velocity decreases or beach grass invades the lakeward face and lee slope of Mt. Baldy (Doering 1995). The vegetation recovery in the fenced zone at the toe of Mt. Baldy has been rapid (Pavlovic, personal observation). With all this sand movement, Mt. Baldy would be a great site for the reintroduction of Pitcher's thistle (Jolls et al. 2015, McEachern 1992, U.S. Fish and Wildlife Service 2002).

On 13 July 2013, a young boy fell into a hole in Mt. Baldy and was buried for several hours before being rescued. Since then, Mt. Baldy has been closed to the public. Erin Argyilan, Todd Thompson, and others have discovered that the holes in the dune were created by the fast-moving dune burying trees that then decayed. In the process of decay, salts accumulated in the bark zone of the tree and produced an open cylinder under the sand dune. This was what the young boy fell into (Argyilan et al. 2015).

The 1996 addition of Crescent Dune (authorized in 1992, deeded on 10 August 1996) to the national park has added numerous plant species to the Tamarack C flora list (see Table 36). This area contains both a panne and clay seeps, some permanent and some temporary, at the landward end of the storm beach. Significant flora here includes *Carex aurea*, *Cladium mariscoides*, *Diphasiastrum tristachyum*, *Huperzia lucidula*, *Lycopodiella inundata*, *Myosotis laxa*, *Potentilla anserina*, and *Utricularia minor*. The Army Corps' road for trucking in beach nourishment sand divides the *Potentilla anserina* colony into two parts, and their snow fence may not adequately prevent driving over or placing too much sand on the plants on either side. Further threats at Crescent Dune include vast stands of common reed (*Phragmites*) and numerous colonies of *Lythrum salicaria*. Colonies of the lycopod *Diphasiastrum tristachyum* have diminished and may disappear, probably because shrubs are encroaching as well.

Tamarack D

The Tamarack D subunit is a valuable addition to INDU. It is just east of the former Johnsfield South Shore Station (Figure 5). Several special flora, once known from the old Tamarack Stop, may still be alive since being noted during surveys by Marlin Bowles, Marci DeMauro, and Pavlovic in 1985. *Scleria pauciflora* var. *caroliniana*, found by Bowles and DeMauro, is rare in the dunes and in Indiana. It grows there in an assemblage of moist acid sands with rises of xeric sand prairie and swales of shaded and partly shaded swamps. Treatment and removal of extensive stands of *Phragmites* and hybrid cattail may reveal additional flora from this subunit.

Tamarack E

The Hiawatha Meadow, Montana, and Drexwood parcels, owned by the SHLT, are small areas of marsh adjacent to INDU and nestled between private property in the Town of Beverly Shores. Except for Plampin, the authors have spent little time searching for plants here. This subunit has only three special flora, the lowest of any Tamarack subunit. A total of 45 native plant species have been recorded. Tamarack E has a mean CoC of 6.52 and a FQI of 45.

Unit 12: Heron Rookery

While much of the Little Calumet River has been dredged and straightened, certain stretches bear enough semblance to a natural stream to be prized by some of the local canoeists. The best of the stream was included (for its canoeing waters, floodplain and heron rookeries), as a non-contiguous part in the Indiana Dunes National Lakeshore as conceived by the National Park Service, Save the Dunes Council, Rep. Edward Roush, Rep. Ray Madden and Senator Paul Douglas.

—Alton A Lindsey, Damian V. Schmelz, and Stanley A. Nichols (1969)

The Heron Rookery occupies approximately 257 hectares (387 acres), about 65% of which have been highly disturbed by grazing, agriculture, or logging (Figure 26). The Heron Rookery Unit is embedded in the Lake Border Moraine and is now considered part of the east branch of the Little Calumet River since the river was eviscerated by Burns Ditch.

See Wilhelm (1990) for survey dates prior to 1990. Wilhelm and Ken Dritz explored the north side of the Little Calumet River on 26 June 1997. Other visits include those of

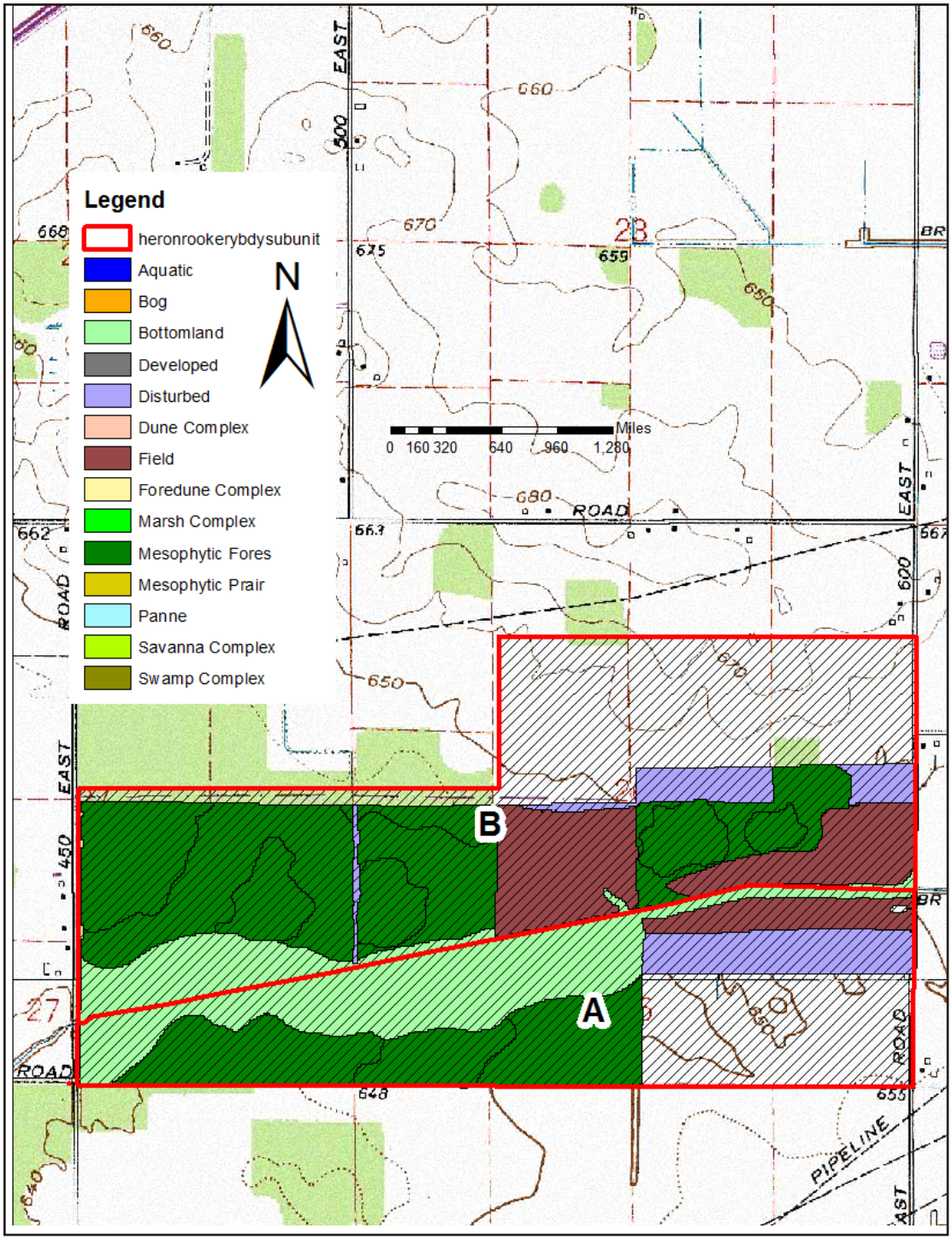


Figure 26. Vegetation of Heron Rookery Unit. Letters indicate subunits. Cross-hatching indicates highly disturbed areas.

Keith Board and Plampin on 10 December 1990; Plampin and Myrna Newgent on 7 and 27 April 1995; Plampin on 27 May 1995; Barbara Bolesch, Plampin, and others with the sponsorship of the Illinois Native Plant Society on 20 May 2000; Plampin on 6 May 2002; Hamilla and Naida Lehmann on 8 October 2006; Hamilla, Lehmann, and Plampin on 18 October 2006; Hamilla and Plampin on 13 September 2007; Krystal Frohnapple and Stacey Leicht-Young on 5 May 2009; and the National Geographic-sponsored BioBlitz leaders Hamilla and Plampin on 15 May 2009. Further visits, especially to the north side where access is restricted, could lead to the discovery

of more plant species and provide better insights into the Rookery's ecology.

Heron Rookery A (99 ha, 245 acres) lies south of the Little Calumet River. On the west end, the vegetation within the beech maple, oak hickory, and other forest types have a rich groundlayer vegetation. The understory is diverse with scattered patches of white trillium and other spring ephemerals that draw people to the Heron Rookery in the spring. Deer populations have not increased enough to reduce the seed production of the determinant spring wildflowers (Pavlovic et al. 2014). The east end is old-field, and the east-central portion is forested with a low diversity understory.

Heron Rookery B (158 ha, 391 acres) is north of the Little Calumet River and much of it is forested. The west end is wet to wet-mesic swamp forest. The middle portion is a beech-maple forest that has a diverse and rich groundlayer vegetation and has several special flora species. The east third is a mosaic of beech-maple forest, successional old fields and young forests. The beech-maple forest was damaged in the 1980s and 1990s by the presence of great blue herons (*Ardea herodias*). The defecation from the birds eventually killed the trees housing the nests, and so the herons abandoned the rookery (Randy Knutson, wildlife biologist, personal communication with Pavlovic, 2010).

Between the two units is the ditched and entrenched Little Calumet River; there is a legally designated drain called Kemp Ditch. After construction of the drain, the drainage bed cut down into the substrate, lowering the river, as evidenced by the vertical sides of the ditch. However, the natural tendency of rivers to take a sinuous course has resulted in erosion on the sides, loss of trees through undercutting, and erosion of mesophytic spring forest herbs into the river (Pavlovic, personal observation, 1983–2021). The complete flora of the Heron Rookery is listed below (Table 39).

Table 39. Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Acer nigrum F. Michx.	x	x	X	5
Acer rubrum L.	x	x	X	7
Acer saccharinum L.	x	x	X	0
Acer saccharum Marshall	x	x	X	3
Actaea pachypoda Elliott	x	–	X	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	x	x	X	4
Alliaria petiolata (M. Bieb.) Cavara & Grande	x	x	X	*
Allium canadense L. var. *canadense* (*Allium canadense* L.)	x	x	X	2
Allium tricoccum Aiton	x	x	X	7
Ambrosia trifida L.	x	x	X	0
Amphicarpaea bracteata (L.) Fernald	x	x	X	4
Anemone acutiloba (DC.) G. Lawson (*Hepatica acutiloba* DC.)	x	x	X	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	x	–	X	7

Table 39 (continued). Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Arisaema dracontium (L.) Schott	–	1	N	7
Arisaema triphyllum (L.) Schott	17	17	N	4
Asarum canadense L. (*A. canadense* var. *reflexum* (E.P. Bicknell) B. L. Rob. Based on J. Paton specimen)	x	x	X	7
Asimina triloba (L.) Dunal	x	x	X	9
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	–	x	X	8
Betula pendula Roth	15	–	N	*
Blephilia hirsuta (Pursh) Benth.	R	–	R	8
Botrychium virginianum (L.) Sw.	x	–	X	6
SF***Brachyelytrum erectum*** (Schreb.) P. Beauv.	x	x	X	10
Bromus pubescens Spreng.	R	–	R	5
Caltha palustris L.	–	6	N	5
Calystegia sepium (L.) R. Br. ssp. *sepium* (*Convolvulus sepium* L.)	–	x	X	1
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	x	–	X	6
Cardamine concatenata (Michx.) O. Schwarz (*Dentaria laciniata* Willd.)	x	–	X	5
Cardamine douglassii Britton	x	x	X	7
Carex albursina E. Sheld.	x	x	X	7
Carex blanda Dewey	–	17	N	1
SF***Carex bromoides*** Schkuhr ex Willd. (*Carex bromoides* Willd.)	x	x	X	10
SF***Carex communis*** L.H. Bailey	x	–	X	8
SF***Carex digitalis*** Willd.	–	17	N	10
Carex gracilescens Steud.	x	–	X	10
Carex gracillima Schwein.	x	x	X	10
Carex grayi J. Carey	–	x	X	7
Carex grisea Wahlenb.	17	17	N	2
Carex hirtifolia Mack.	x	x	X	5
SF***Carex hitchcockiana*** Dewey	x	–	X	10
SF***Carex hyalinolepis*** Steud.	16	–	N	5
SF***Carex intumescens*** Rudge	x	x	X	10
Carex jamesii Schwein.	–	x	X	5
Carex laxiflora Lam.	x	–	X	10
SF***Carex leptonervia*** (Fernald) Fernald	x	–	X	10
SF***Carex muskingumensis*** Schwein.	–	17	N	8
SF***Carex oligocarpa*** Schkuhr ex Willd.	x	–	X	9
SF***Carex pedunculata*** Muhl. ex Willd.	x	x	X	10
SF***Carex prasina*** Wahlenb.	x	–	X	10
Carex radiata (Wahlenb.) Small	–	x	X	6

Table 39 (continued). Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Carex rosea Schkuhr ex Willd.	x	x	X	4
Carex vulpinoidea Michx.	–	x	X	2
SF***Carex woodii*** Dewey	–	17	N	10
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow (*Carpinus caroliniana* Walter var. *virginiana* (Marshall) Fernald)	x	x	X	8
Carya cordiformis (Wangenh.) K. Koch	x	x	X	7
SF***Carya laciniosa*** (F. Michaux) G. Don	x	x	X	10
Caulophyllum thalictroides (L.) Michx.	x	x	X	8
Celtis occidentalis L.	x	x	X	3
Chaerophyllum procumbens (L.) Crantz	x	–	X	5
Chelone glabra L.	x	–	X	8
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	x	X	1
Cirsium arvense (L.) Scop.	x	–	X	*
Claytonia virginica L.	x	–	X	2
SF***Collinsia verna*** Nutt.	x	x	X	10
Cornus alternifolia L. f.	11	–	N	9
Cornus florida L.	x	–	X	8
Cornus racemosa Lam.	–	x	X	1
Crataegus calpodendron (Ehrh.) Medik.	–	x	X	7
SF***Crataegus chrysocarpa*** Ashe	–	17	N	6
Crataegus coccinea L.	x	–	X	4
Crataegus macrosperma Ashe (*Crataegus flabellata* Ashe)	–	17	N	5
Crataegus mollis (Torr. & A. Gray) Scheele var. *mollis*	x	x	X	2
Crataegus punctata Jacq.	x	x	X	2
SF***Crataegus succulenta*** Schrad. ex Link	–	15	X N	5
Cryptotaenia canadensis (L.) DC.	x	x	X	2
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	x	x	X	6
SF***Deparia acrostichoides*** (Sw.) M. Kato (*Athyrium thelypterioides* (Michx.) Desv.)	–	9	N	10
Dicentra canadensis (Goldie) Walp.	x	–	X	8
Dicentra cucullaria (L.) Bernh.	x	–	X	6
Dryopteris cristata (L.) A. Gray	–	x	X	10
SF***Dryopteris goldiana*** (Hook. ex Goldie) A. Gray	–	2	N	10
Dryopteris intermedia (Muhl. ex Willd.) A. Gray	x	–	X	8
Echinocystis lobata (Michx.) Torr. & A. Gray	x	x	X	5
Elymus hystrix L. (*Hystrix patula* Moench)	x	x	X	5
Elymus riparius Wiegand	x	–	X	5

Table 39 (continued). Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Elymus villosus Muhl. ex Willd.	x	x	X	5
Elymus virginicus L.	x	x	X	4
Enemion biternatum Raf. (*Isopyrum biternatum* (Raf.) Torr. & A. Gray)	x	–	X	8
Epifagus virginiana (L.) W.P.C. Barton	x	–	X	10
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor (*Equisetum hyemale* L.)	x	–	X	3
Equisetum laevigatum A. Braun	–	17	N	2
Erigenia bulbosa (Michx.) Nutt.	x	–	X	10
Erythronium albidum Nutt.	x	–	X	5
Erythronium americanum Ker Gawl.	x	–	X	8
Euonymus atropurpureus Jacq.	x	–	X	8
Euonymus obovatus Nutt.	x	–	X	7
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	–	x	X	8
Fagus grandifolia Ehrh.	x	x	X	5
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	x	–	X	5
Floerkea proserpinacoides Willd.	x	6	X	8
SF***Fraxinus americana*** L.	x	x	X	5
SF***Fraxinus americana*** L. (*Fraxinus americana* L. var. *biltmoreana* (Beadle) Fernald)	x	–	X	9
SF***Fraxinus nigra*** Marshall	–	x	X	10
SF***Fraxinus pennsylvanica*** Marshall	x	–	X	5
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	x	x	X	1
Galium aparine L.	x	x	X	1
Galium concinnum Torr. & A. Gray	x	x	X	5
Galium obtusum Bigelow	x	–	X	5
Galium triflorum Michx.	x	–	X	5
Geranium maculatum L.	x	x	X	4
Geum canadense Jacq.	x	x	X	1
Geum laciniatum Murray (*Geum laciniatum* Murray var. *trichocarpum* Fernald)	x	–	X	5
Glechoma hederacea L.	x	–	X	*
Glyceria striata (Lam.) Hitchc.	x	x	X	4
SF***Gymnocladus dioicus*** (L.) K. Koch	x	–	X	8
Hamamelis virginiana L.	x	x	X	8
Heracleum sphondylium L. ssp. *montanum* (Schleich. ex Gaudin) Briq.	x	x	X	5
Humulus lupulus L.	8	–	N	5
SF***Huperzia lucidula*** (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	x	–	X	10
Hydrophyllum virginianum L.	x	x	X	5
Impatiens capensis Meerb.	x	x	X	3

Table 39 (continued). Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Impatiens pallida Nutt.	x	x	X	6
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	x	X	5
SF***Juglans cinerea*** L.	x	–	X	8
Laportea canadensis (L.) Wedd.	x	x	X	3
Leersia virginica Willd.	x	–	X	7
Lemna minor L.	x	–	X	5
Ligustrum vulgare L.	x	–	X	*
Lilium michiganense Farw.	x	x	X	6
Lindera benzoin (L.) Blume	x	x	X	7
Liriodendron tulipifera L.	x	x	X	5
Lysimachia ciliata L.	14	–	N	7
SF***Maianthemum canadense*** Desf.	x	–	X	10
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	–	x	X	5
SF***Matteuccia struthiopteris*** (L.) Tod. var. ***pensylvanica*** (Willd.) C.V. Morton	–	17	N	10
Menispermum canadense L.	–	x	X	6
SF***Milium effusum*** L. ssp. ***cisatlanticum*** (Fernald) A. Haines	x	–	X	10
SF***Mimulus alatus*** Aiton	x	–	X	7
SF***Mitchella repens*** L.	x	x	X	10
Mitella diphylla L.	x	–	X	10
SF***Monotropa uniflora*** L.	7	–	N	10
Onoclea sensibilis L.	x	–	X	8
Osmorhiza claytonii (Michx.) C.B. Clarke	x	–	X	3
Osmorhiza longistylis (Torr.) DC.	x	x	X	3
Ostrya virginiana (Mill.) K. Koch	x	x	X	5
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	x	6	X	7
SF***Panax trifolius*** L.	x	x	X	10
Parthenocissus quinquefolia (L.) Planch.	x	x	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	R	–	R	1
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	x	x	X	2
SF***Phegopteris hexagonoptera*** (Michx.) Fee (*Dryopteris hexagonoptera* (Michx.) C. Chr.)	x	–	X	10
Phlox divaricata L.	x	x	X	5
Phryma leptostachya L. var. *leptostachya*	x	–	X	4
Phytolacca americana L.	x	–	X	1
Pilea pumila (L.) A. Gray	x	x	X	5
Plantago rugelii Decne.	x	–	X	0

Table 39 (continued). Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Platanus occidentalis L.	x	x	X	9
SF***Poa alsodes*** A. Gray	x	x	X	10
Podophyllum peltatum L.	x	x	X	4
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	x	X	3
Polygonatum pubescens (Willd.) Pursh	x	–	X	7
SF***Polypodium virginianum*** L.	–	x	N	9
Polystichum acrostichoides (Michx.) Schott	x	x	X	9
Populus deltoides W. Bartram ex Marshall	x	x	X	2
Prenanthes alba L.	R	–	R	5
Prenanthes altissima L.	x	x	X	8
SF***Prenanthes crepidinea*** Michx.	x	–	X	8
Prunus cerasus L.	13	–	N	*
Prunus nigra Aiton	x	x	X	9
Prunus serotina Ehrh.	x	x	X	1
Prunus virginiana L.	x	x	X	3
Quercus alba L.	–	x	X	5
Quercus bicolor Willd.	x	–	X	6
Quercus macrocarpa Michx.	–	x	X	5
Quercus palustris Munchh.	–	x	X	8
Quercus rubra L.	x	x	X	7
Ranunculus abortivus L.	x	6	X	0
Ranunculus acris L.	4	–	N	*
Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan (*Ranunculus septentrionalis* Poir.)	x	x	X	5
Ribes americanum Mill.	x	–	X	7
Ribes cynosbati L.	x	x	X	5
Robinia pseudoacacia L.	x	–	X	ad
Rosa multiflora Thunb.	x	x	X	*
Rosa palustris Marshall	x	–	X	7
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	x	–	X	3
Rubus occidentalis L.	x	–	X	2
Rudbeckia laciniata L. var. *laciniata*	R	–	R	5
Rumex obtusifolius L.	x	–	X	*
Salix amygdaloides Andersson	–	x	X	5
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	x	X	1
Sambucus racemosa L. ssp. *pubens* (Michx.) Hulten (*Sambucus pubens* Michx.)	x	–	X	10
Samolus parviflorus Raf.	–	10	N	6

Table 39 (continued). Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Sanguinaria canadensis L.	x	–	X	6
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	x	x	X	2
Saururus cernuus L.	–	6	N	9
SF***Sceptridium dissectum*** (Spreng.) Lyon (*Botrychium dissectum* Spreng.)	x	x	X	6
Scrophularia marilandica L.	R	–	R	4
Sicyos angulatus L.	R	–	R	5
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	x	x	X	5
Smilax lasioneura Hook.	x	x	X	5
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	x	x	X	5
Solidago caesia L.	x	x	X	7
Solidago flexicaulis L.	x	x	X	7
Solidago gigantea Aiton	x	x	X	4
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	x	–	X	*
Staphylea trifolia L.	x	x	X	7
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	x	x	X	7
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	x	x	X	4
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	–	x	X	0
Symplocarpus foetidus (L.) W. Salisb.	–	3	N	8
Taraxacum officinale F. H. Wiggers	x	–	X	*
Thalictrum dasycarpum Fisch. & Avé-Lall.	x	x	X	5
Thalictrum dioicum L.	x	x	X	7
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	x	–	X	7
SF***Thelypteris noveboracensis*** (L.) Nieuwl. (*Dryopteris noveboracensis* (L.) A. Gray)	x	x	X	10
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	–	x	X	6
Tilia americana L.	x	x	X	5
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	X	2
Trillium flexipes Raf.	x	–	X	6
Trillium grandiflorum (Michx.) Salisb.	x	–	X	8
Trillium recurvatum L. C. Beck including forma *shayii* E.J. Palmer & Steyermark (see note 12 and page 155 in Homoya (2012)).	X 12	x	X	5
Ulmus americana L.	x	x	X	3
Ulmus rubra Muhl.	x	x	X	4
Urtica dioica L. ssp. *gracilis* (Aiton) Selander (*Urtica procera* Willd.)	R	x	X	2
SF***Valerianella chenopodiifolia*** (Pursh) DC.	–	x	X	9
Viburnum acerifolium L.	x	x	X	9

Table 39 (continued). Summary of species verified and reported at Heron Rookery Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 40. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Viburnum lentago L.	x	x	X	5
Viburnum prunifolium L.	x	x	X	5
SF***Viburnum trilobum*** Marshall (*Viburnum* ***opulus*** L. var. ***americanum*** Aiton)	0	0	E	0
SF***Viola canadensis*** L.	5	–	N	9
Viola pubescens Aiton (*V. pubescens* var. *scabriuscula* Torr. & A. Gray)	x	x	X	5
SF***Viola rostrata*** Pursh	x	x	X	10
Viola sororia Willd.	x	–	X	3
Viola striata Aiton	x	x	X	6
Vitis riparia Michx.	x	x	X	2
Zanthoxylum americanum Mill. (*Xanthoxylum americanum* Mill.)	x	x	X	3

Table 40. Sources of new species verified and reported from Heron Rookery.

Notes	Source	Date	Species
1	B. Bolesch and B. Plampin	20 May 2000	*Arisaema dracontium*
2	D. Hamilla and N. Lehmann	8 Oct 2006	*Dryopteris goldiana*
3	M. Newgent	27 Apr 1993	*Symplocarpus foetidus*
4	B. Plampin	27 Apr 1993	*Ranunculus acris*
5	B. Plampin	27 May 1995	*Viola canadensis*
6	B. Plampin	20 May 2000	*Caltha palustris*, *Floerkea proserpinacoides*, *Packera aurea*, *Ranunculus abortivus*, *Saururus cernuus*
7	B. Plampin and K. Board	9 Dec 1990	*Monotropa uniflora*
8	K. Frohnapple and S. Leicht-Young	5 May 2009	*Humulus lupulus*
9	D. Hamilla	9 Sept 2007	*Deparia acrostichoides*
10	N. Lehmann and B. Plampin (northside)	18 Oct 2006	*Samolus parviflorus*
11	B. Plampin	6 May 2002	*Cornus alternifolia*
12	K. Board. Plampin has copy of photograph taken by Keith, but Keith does not remember who found the plants (Plampin pers. comm.).	Aug 1999	*Trillium recurvatum* L.C. Beck including forma *shayii* E.J. Palmer & Steyermark
13	E. Kjellmark	23 Apr 1987	*Prunus cerasus*
14	N. Pilla and D. Hamilla	4 July 2016	*Lysimachia ciliata*
15	E. Kjellmark	31 May 1987	*Betula pendula*
16	S. Namestnik and N. Pilla	11 May 2018	*Carex hyalinolepis*
17	G. Wilhelm and K. Dritz	26 June 1997	*Carex blanda*, *C. digitalis digitalis*, *C. grisea*, *C. muskingumensis*, *C. woodii*, *Crataegus chrysocarpa*, *C. macrospermum*, *C. succulenta*, *Equisetum laevigatum*, *Matteuccia struthiopteris*,

Special flora summary

Forty-four special flora are recorded from the Heron Rookery, representing a 90% increase from the 22 known in 1990. Twenty-nine special flora are confirmed, thirteen are new, none are reported, and two are extirpated. New species to the Heron Rookery include *Carex digitalis*, *C. hyalinolepis*, *C. muskingumensis*, *C. woodii*, *Crataegus chrysocarpa*, *Deparia acrostichoides*, *Dryopteris goldiana*, *Fraxinus nigra*, *F. pennsylvanica*, *Matteuccia struthiopteris*, *Monotropa uniflora*, *Polypodium virginianum*, *Viburnum trilobum*, and *Viola canadensis*. Two of the 40 species (5%), namely *Maianthemum canadense* and *Panax trifolius*, have boreal affinities. Twelve (30%) of these special floristic elements are known from nowhere else in the Indiana Dunes. These include *Carex communis*, *C. muskingumensis*, *C. oligocarpa*, *C. prasina*, *C. woodii*, *Collinsia verna*, *Crataegus chrysocarpa*, *Dryopteris goldiana*, *Gymnocladus dioicus*, *Matteuccia struthiopteris* var. *pensylvanica*, *Prenanthes crepidinea*, and *Viola rostrata*. Possibly extirpated species include *Collinsia verna* and *Viburnum trilobum*.

Table 41. Summary of floristic statistics by subunit of Heron Rookery. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

	Subunit		
Category	*A*	*B*	Entire Unit
Area (ha/acres)	99/245	158/391	257/636
Special flora total	32	25	44
Confirmed	26	14	29
New	4	9	13
Reported	0	0	0
Extirpated	2	2	2
Total taxa, FNA/ITIS	198	149	236
Total native taxa, FNA/ITIS	186	147	224
Native species, FNA/ITIS	182	144	220
Native variety, FNA/ITIS	4	3	4
Native hybrid, FNA/ITIS	0	0	0
Total adventive taxa, FNA/ITIS	1	0	1
Total adventive species, FNA/ITIS	1	0	1
Total adventive variety, FNA/ITIS	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0
Total exotic taxa, FNA/ITIS	11	2	11
Total exotic species, FNA/ITIS	11	2	11
Total exotic variety, FNA/ITIS	0	0	0
Total exotic hybrid, FNA/ITIS	0	0	0
Total Indiana-listed	9	9	15
Endangered	2	2	3
Threatened	3	3	5
Rare	0	0	0
Watch List	4	4	7
Extirpated	0	0	0
Sum CC	1,082	818	1,327
Sum CC adventive & invasive	1,071	816	1,316
Mean CoC	6	6	6
Mean CoC with adventive and invasive	5	5	6
FQI	79	67	88
FQI with adventive and invasive	76	67	85

Floristic summary

Of the 236 taxa from the Heron Rookery, 224 are native, one is adventive, and 11 are exotic. The Heron Rookery has a total of 220 native species, one adventive, and 11 exotics (Table 41). Four native varieties are known from the Heron Rookery. Of the 15 Indiana state-listed species, three are endangered, five are threatened, and seven are on the watch list. The ten newly reported species from the Heron Rookery include *Arisaema dracontium*, *Athyrium thelypterioides*, *Caltha palustris*, *Dryopteris goldiana*, *Humulus lupulus*, *Monotropa uniflora*, *Samolus parviflorus*, *Saururus cernuus*, *Symplocarpus foetidus*, and *Viola canadensis*. The only newly reported exotic species is *Ranunculus acris*.

The mean C is 5.9, but the FQI is 88 (Table

41). Subunit A has a total native flora of 182 species, with a mean C of 5.7 and an FQI of 79. Subunit B has a total 144 native species, with a mean CoC of 5.5 and an FQI of 67.

Conservation issues

The Heron Rookery consists of mesophytic and bottomland forest. It is the largest and perhaps the highest quality and most typical mesophytic forest in INDU (see Figure 26) (Wilhelm 1990). However, all of it has been logged in years past. The southwest half (subunit A) seems to have been logged at a much earlier time than most of the portion north of the Little Calumet River (subunit B). The southwestern area also seems to have escaped the intense grazing to which the northern portions were subjected. This is evidenced by the rich and continuous flora of the southwest portion that would be unlikely if grazing had occurred (Pavlovic and White 1989). Most of the 85 hectares (210 acres) of the new acquisition to the east and south are old farmland that was once leased to the Indiana State Prison. According to Emma Pitcher, part of Heron Rookery A was used for Boy Scout camping, as was evidenced by the presence of old barbecue grills among the beech trees (Pitcher, personal communication with Plampin, 2004).

Forest restoration at the Heron Rookery could include addressing old field succession and desired forest composition (beech maple and floodplain forest) as well as herbaceous vegetation reintroduction to restore ground layer plant diversity. The NPS has been able to control garlic mustard in the southwest portion of A, an area with a spring ephemeral layer and flora (Laura Brenan, resource management specialist, personal communication with Pavlovic, 2016). Elsewhere, garlic mustard appears to be in decline, perhaps due to evolution and equilibration with the native flora (Blossey et al. 2021). Trillium growth data collected by INDU biologists Randy Grass and Randy Knutson indicate that deer populations increased around 2005–2006 and caused declining growth in prairie trillium (*Trillium recurvatum*) (Pavlovic et al. 2014). Despite evidence of increasing deer impacts at the Heron Rookery, white trillium continues to bloom, but the plants are decreasing in size.

In 2021, Pavlovic and NPS personnel installed permanent Whittaker-type tenth-hectare vegetation plots in the beech-maple forest in anticipation of an invasion of beech bark disease in the next decade (McCullough et al. 2005, Cale et al. 2017).

In presettlement times the riverbed of the Little Calumet River was at the level of the surrounding landscape, as demonstrated by the occasional oxbows and creek bends in the adjacent land near the down-graded riverbed. Although now entrenched, the proclivity of the river to meander is evidenced by the occasional bends in the ditch where the river has cut into the bank, taking out canopy trees and high-quality ground flora (Pavlovic, personal observation, 1984 to 2020). Restoring the hydrology of the Little Calumet River may require raising the riverbed to the level of the surrounding floodplain.

Recent acquisition of Little Calumet River lands downstream of the Heron Rookery—Dale B. Engquist, Keith Richard Walner, and Wykes-Plampin Nature Preserves by the SHLT—may make it possible to restore the watershed.

In summary, the Heron Rookery stands out for its examples of floodplain and beech-maple forests and rich spring ephemeral flora. The Heron Rookery is home to 220 native plant species, one adventive species, 11 exotic plant species, 15 state-listed species, 44 special flora, and a few boreal relic species. The Heron Rookery has a mean CoC of 5.9 and FQI of 88.

Unit 13: Hobart Prairie Grove

The plant diversity of the Hobart Prairie Grove is high. As Dr. Gerould Wilhelm pointed out in his August 20 letter on this to you, Senator Bumpers, it has at least 267 native plant species with at least five rare, threatened or endangered plant species. Three species are not found anywhere else in the National

Lakeshore; side oats grama grass, leafy-bracted tick trefoil, and wood vetch. Scientifically, it has a natural area rating index of 83 which is about the same as the Miller Woods Unit of the Lakeshore, which is higher than some units but not as high as the really botanically outstanding Dune Acres and Dunes State Park units.

The uniqueness and rarity of the tallgrass savanna of the Hobart Prairie Grove is very important. Tallgrass savanna is what botanists call the open oak woodland with many prairie plants under the trees which was very common in the Midwest. What pioneers called "prairie grove" blended with the tallgrass prairie in presettlement days when the Native Americans kept fire going through annually. Lack of fire since settlement, usefulness of the tallgrass savanna's fertile "black" soil for agriculture, plus development of subdivisions, mowed parks, etc., have nearly caused the demise of the tallgrass savanna and the plants and animals within it.

—Sandy O'Brien, 19 Sept 1990 letter to Senator Dale Bumpers

The Hobart Prairie Grove is a remnant silt loam, bur oak savanna and white oak flatwoods perched above an impounded wetland complex known as Lake George (Figure 27). This 134-hectare (330-acre) parcel was protected largely through the single-handed effort of Sandy O'Brien of Hobart, who brought the significance of the unit to the attention of Representative Peter Visclosky (former 1st Congressional District representative). Rep. Visclosky was drafting an expansion bill for the National Lakeshore at the time (Federal Statutes 1992, National Park Service 2016). Dale Engquist (former superintendent of INDU) and Pavlovic toured the property with Sandy O'Brien in 1991, prior to its being introduced into the 1992 park expansion bill.

Bur oak savannas, sometimes called tallgrass savannas, are the rarest and least known type of Midwestern oak savanna because they were largely destroyed for their rich soil, which was favored for farming (Leach and Givnish 1999). The Hobart Prairie Grove is situated on the southwest edge of the Hobart Island, a lens of glacial material deposited by the Wisconsin Glacier (Schoon 2003). This material was an island about 11,000 years ago, when the Glenwood Dune was formed to the south by glacial Lake Chicago. Deep River to the south and east formed later, when Lake Chicago receded to the Calumet Stage and headwater drainage in the area was created (Thompson 1992, Chrzastowski and Thompson 1994). Today, Turkey Creek, Hobart Lake, and the Deep Creek River form the south and east perimeters of the Hobart Prairie Grove. Much of this property is owned by INDU; however, there are several private holdings within the national park boundaries. The 2015 purchase of the Peddicord Property by Save The Dunes has protected the east portion of Hobart Prairie Grove (included in subunit A since the north portion was transferred to INDU) and segments south of the whole unit (subunit B) (Save The Dunes 2016). The flora of the forested uplands in the southeast corner of the subunit B, south of the main parcel and Lake George, has not been surveyed except by Nathanael Pilla.

Hobart Prairie Grove consists of a slightly undulating moraine surface indented with several narrow drainage ravines to the south and east. The upper reaches of most of the ravines have similar vegetation consisting of *Quercus rubra* with occasional *Quercus alba* and *Carya ovata*. The largest central ravine on the west slope that faces north and northeast has a complement of mesophytic species including *Acer saccharum*, *Tilia americana*, and *Prunus serotina*. The wet ravine bottoms are dominated by *Fraxinus pensylvanica*, *Populus deltoides*,

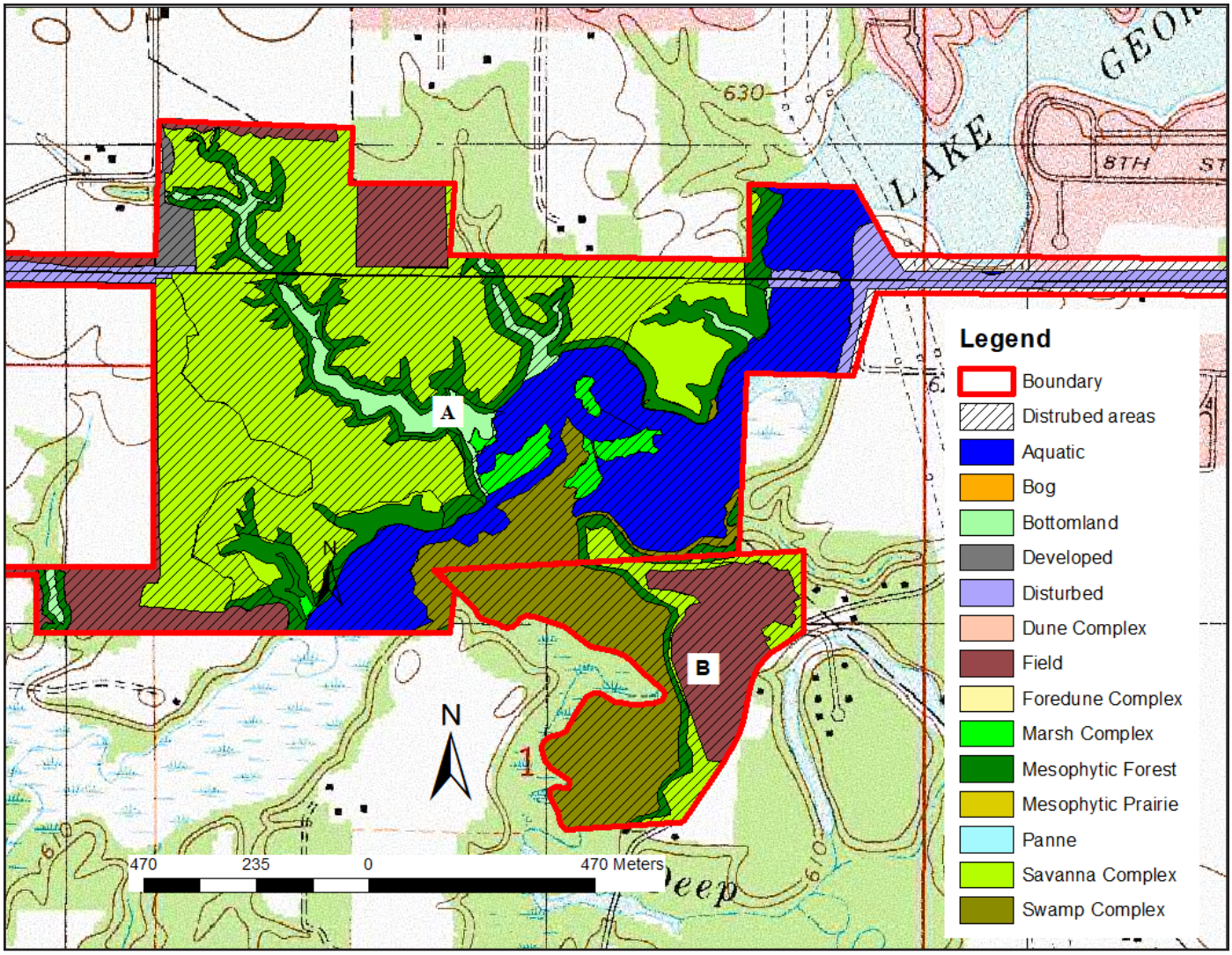


Figure 27. Vegetation of Hobart Prairie Grove Unit. Letters indicate subunits. Cross-hatching indicates disturbed areas.

Ulmus rubra, *Prunus serotina*, and *Quercus palustris*. Wet prairies and sedge meadows occur at the lowest extent of the ravines adjacent to Lake George. The uplands are dominated throughout by *Quercus alba* and occasional *Q. macrocarpa*, *Q. rubra*, and *Juglans cinerea*, with younger *Carya ovata* and *C. cordiformis*. Slightly lower positions on the moraine plane have occasional *Quercus palustris*. The west end of the subunit A is dominated by *Q. macrocarpa* with occasional *Q. alba*. The uplands in many places are quite closed due to fire suppression, which has permitted the invasion of *Carya ovata*, *C. cordiformis*, *Fraxinus americana*, and *Prunus serotina*. The east end of subunit A has had the most frequent fire and shows the recovery potential of the site if frequent fire were reintroduced. Many of the persisting oak savanna plants are confined to the more open south slopes of the bluffs, adjacent to a few old homesites and along the old railroad line. The flora of Hobart Prairie Grove is listed below (Table 42).

Special flora summary

Hobart Prairie Grove has a total of 34 special flora including *Acorus americanus*, *Adiatum pedatum*, *Aralia racemosa*, *Aristolochia serpentaria*, *Asclepias purpurascens*, *Bouteloua curtipendula*, *Calystegia spithamaea*, *Carex crus-corvi*, *Carex hitchcockiana*, *Carex muskingumensis*, *Carex shortiana*, *Carex tonsa*, *Celastrus scandens*, *Crateagus succulenta*, *Cystopteris tenuis*, *Dalea candida*, *Desmodium cuspidatum*, *Erigeron pulchellis*, *Fraxinus americana*, *F. pennsylvanica*, *Gentiana puberulenta*, *Juglans cinerea*, *Lathyrus venosus*, *Mimulus*

Table 42. Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Acalypha rhomboidea Raf.	5	18	N	0
Acer negundo L.	x	18	X	0
Acer saccharinum L.	x	18	X	0
Acer saccharum Marshall	x	–	X	3
Achillea millefolium L.	x	–	X	*
SF***Acorus americanus*** (Raf.) Raf. (*Acorus calamus* L.)	x	–	X	7
Actaea pachypoda Elliott	x	18	X	7
SF***Adiantum pedatum*** L.	7	–	N	10
Aesculus glabra Willd.	–	18	N	ad
Agastache scrophulariifolia (Willd.) Kuntze	X 2	–	N	5
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	X 4	18	X	N
Agrimonia gryposepala Wallr.	x	–	X	2
Agrimonia parviflora Aiton	x	–	X	7
Agrimonia pubescens Wallr.	x	–	X	5
Agrostis perennans (Walter) Tuck.	X 5	–	N	3
Alisma triviale Pursh	–	18	N	3
Alliaria petiolata (M. Bieb.) Cavara & Grande	–	18	N	*
Allium canadense L. var. *canadense* (*Allium canadense* L.)	x	18	X	2
Allium tricoccum Aiton var. *burdickii* Hanes	x	–	X	6
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	18	X	0
Ambrosia trifida L.	–	18	N	0
Amelanchier arborea (F. Michaux) Fernald	19	–	N	9
Amorpha canescens Pursh	x	–	X	9
Amphicarpaea bracteata (L.) Fernald	x	–	X	4
Andropogon gerardii Vitman	x	–	X	5
Anemone acutiloba (DC.) G. Lawson (*Hepatica acutiloba* DC.)	15	18	N	8
Anemone cylindrica A. Gray	x	–	X	6
Anemone virginiana L. var. *virginiana* (*Anemone virginiana* L.)	x	–	X	5
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	–	X	3
Apios americana Medik.	x	–	X	7
Apocynum androsaemifolium L.	x	–	X	5
Apocynum cannabinum L.	–	18	N	6
Aquilegia canadensis L.	–	18	N	6
Aralia nudicaulis L.	x	–	X	8
SF***Aralia racemosa*** L.	X 4	–	N	10

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Arctium minus (Hill) Bernhardi (*Arctium minus* Schkuhr.)	X 5	–	N	*
Arisaema dracontium (L.) Schott	x	–	X	7
Arisaema triphyllum (L.) Schott	x	18	X	4
SF***Aristolochia serpentaria*** L.	x	–	X	10
Asarum canadense L.	x	18	X	7
Asclepias exaltata L.	x	–	N	9
Asclepias incarnata L.	x	18	X	4
SF***Asclepias purpurascens*** L.	X 2	–	N	8
SF***Asclepias sullivantii*** Engelm. ex A. Gray (*Asclepias sullivantii* Engelm.)	x	–	X	8
Asclepias syriaca L.	x	18	X	0
Asclepias verticillata L.	x	–	X	1
Asplenium platyneuron (L.) Britton, Sterns & Poggenb.	–	18	N	3
Baptisia lactea (Raf.) Thieret (*Baptisia leucantha* Torr. & A. Gray)	x	–	X	8
Berberis thunbergii DC.	–	18	N	*
Bidens cernua L.	X 5	–	X	N
Bidens frondosa L.	x	–	5	1
Bidens polylepis S.F. Blake	x	–	X	3
Bidens tripartita L. (*Bidens comosa* (A. Gray) Weigand)	15	18	N	3
Blephilia hirsuta (Pursh) Benth.	X 1	–	N	8
Boechera canadensis (L.) Al-Shehbaz (*Arabis canadensis* L.)	x	–	X	10
Boechera laevigata (Muhl. ex Willd.) Al-Shehbaz (*Arabis laevigata* (Willd.) Poir.)	x	18	X	5
Boehmeria cylindrica (L.) Sw.	x	–	X	2
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	15	18	N	3
SF***Bouteloua curtipendula*** (Michx.) Torr. var. ***curtipendula***	x	–	X	8 ad
Bromus pubescens Spreng.	x	–	X	5
Calamagrostis canadensis (Michx.) P. Beauv.	15	18	N	6
Caltha palustris L.	x	–	X	5
SF***Calystegia spithamaea*** (L.) Pursh	14	–	N	10
Campanula americana L.	x	–	X	3
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	x	18	X	6
Cardamine concatenata (Michx.) O. Schwarz (*Dentaria laciniata* Willd.)	x	–	X	5
Cardamine douglassii Britton	x	–	X	7
Cardamine pensylvanica Muhl. ex Willd.	x	–	X	4

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Carex annectens (E.P. Bicknell) E.P. Bicknell (*Carex annectens* E.P. Bicknell var. *xanthocarpa* (E.P. Bicknell) Wiegand)	x	–	X	7
Carex blanda Dewey	15	18	N	1
Carex cristatella Britton	x	–	X	4
SF***Carex crus-corvi*** Kunze.	–	16	N	10
Carex granularis Muhl. ex Willd.	x	–	X	4
Carex grayi J. Carey	x	18	X	7
Carex grisea Wahlenb.	x	18	X	2
Carex hirsutella Mack.	x	–	X	4
SF***Carex hitchcockiana*** Dewey	x	–	X	10
Carex laxiflora Lam.	x	–	X	10
Carex lupulina Willd.	x	18	X	7
Carex meadii Dewey	x	–	X	9
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.).	x	18	X	5
SF***Carex muskingumensis*** Schwein.	–	18	N	9
Carex pellita Willd.	x	–	X	4
Carex pensylvanica Lam.	–	18	N	5
Carex rosea Schkuhr ex Willd.	x	18	X	4
SF***Carex shortiana*** Dewey	x	–	N	10
Carex stipata Muhl. ex Willd.	x	18	X	3
Carex stricta Lam.	x	–	X	5
Carex swanii (Fernald) Mack.	X 5	–	N 5	8
SF***Carex tonsa*** (Fernald) E.P. Bicknell	x	–	X	7
Carex tribuloides Wahlenb.	–	18	N	7
Carex vulpinoidea Michx.	x	–	X	2
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow	15	18	N	8
Carya cordiformis (Wangenh.) K. Koch	x	–	X	7
Carya ovata (Mill.) K. Koch	x	18	X	5
Caulophyllum thalictroides (L.) Michx.	x	18	X	8
Ceanothus americanus L.	x	–	X	6
Celastrus orbiculatus Thunb.	x	18	X	*
SF***Celastrus scandens*** L.	x	–	X	4
Cephalanthus occidentalis L.	x	18	X	5
Ceratophyllum demersum L.	x	18	N	2
Cercis canadensis L.	–	18	N	5
Chaerophyllum procumbens (L.) Crantz	x	–	X	5
Chelone glabra L.	x	–	X	8

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Cinna arundinacea L.	x	18	X	5
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.).	x	–	X	1
Cirsium altissimum (L.) Spreng.	x	–	X	6
Cirsium arvense (L.) Scop.	5	–	N	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	x	–	X	2
Cirsium vulgare (Savi) Ten.	X 5	–	N 5	*
Claytonia virginica L.	x	18	X	2
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	–	X	7
Coreopsis tripteris L.	x	–	X	5
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	x	–	X	6
Cornus racemosa Lam.	x	–	X	1
Corylus americana Walter	x	–	X	5
Crataegus coccinea L.	x	–	X	4
Crataegus crus-galli L.	X 5	–	N 5	2
Crataegus mollis (Torr. & A. Gray) Scheele var. *mollis*	x	–	X	2
SF***Crataegus succulenta*** Schrader ex Link	20	–	N	4
Cryptotaenia canadensis (L.) DC.	x	–	X	2
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	x	–	X	6
SF***Cystopteris tenuis*** (Michx.) Desv. (*Cystopteris fragilis* (L.) Bernh. var. *mackleyii* Weath.)	10	18	10 N	10
Dactylis glomerata L.	15	18	N	*
SF***Dalea candida*** Willd. (*Petalostemon candidus (Willd.) M*ichx.)	x	–	X	9
Dalea purpurea Vent. var. *purpurea* (*Petalostemum purpureum* (Vent.) Rydb.)	x	–	X	9
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	x	–	X	3
Desmodium canadense (L.) DC.	x	–	X	4
SF***Desmodium cuspidatum*** (Muhl. ex Willd.) DC. ex G. Don	x	–	X	8
Desmodium paniculatum (L.) DC.	x	–	X	6
Dicentra cucullaria (L.) Bernh.	x	–	X	6
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	X 15	18	X	2
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	x	–	X	5
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	–	X	4
Digitaria cognata (J.A. Schultes) Pilger (*Leptoloma cognatum* (Schult.) Chase)	x	–	X	3

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Dioscorea villosa L.	x	–	X	7
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O. F. Müll.) Watt)	x	18	X	8
Duchesnea indica (Andrews) Teschem.	15	18	N	*
Echinocystis lobata (Michx.) Torr. & A. Gray	x	18	N	4
Eleocharis erythropoda Steud.	x	–	X	2
Elodea canadensis Michx.	13	18	N	2
Elymus canadensis L.	X	–	X	4
Elymus hystrix L. (*Hystrix patula* Moench)	X	18	X	5
Elymus virginicus L.	X	18	X	4
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor	X	–	X	3
Erigeron annuus (L.) Pers.	5	–	N5	0
Erigeron philadelphicus L.	15	18	N	4
SF***Erigeron pulchellus*** Michx.	X	18	X	10
Euonymus alatus (Thunb.) Siebold	15	18	N	*
Eupatorium serotinum Michx.	X 5	–	N 5	0
Euphorbia corollata L.	x	–	X	2
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	x	–	X	4
Eutrochium purpureum (L.) E.E. Lamont (*Eupatorium purpureum* L.)	x	–	X	7
Fagus grandifolia Ehrh.	15	18	N	5
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	x	–	X	5
Floerkea proserpinacoides Willd.	x	18	X	8
Fragaria virginiana Miller	x	–	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	x	–	X	*
SF***Fraxinus americana*** L. (*Fraxinus americana* L. var. *biltmoreana* (Beadle) Fernald)	x	–	X	9
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald	x	18	X	1
Galium aparine L.	x	–	X	1
Galium boreale L.	x	–	X	7
Galium circaezans Michx. var. *hypomalacum* Fernald	X 5	–	N 5	7
Galium concinnum Torr. & A. Gray	x	18	X	5
Galium obtusum Bigelow	x	–	X	5
Galium triflorum Michx.	x	–	X	5
Gaylussacia baccata (Wangenh.) K. Koch	x	–	X	9
SF***Gentiana puberulenta*** J.S. Pringle	X 1	–	N 1	10
Geranium maculatum L.	x	18	X	4

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Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Geum canadense Jacq.	x	18	X	1
Glyceria striata (Lam.) Hitchc.	x	–	X	4
Hackelia virginiana (L.) I. M. Johnst.	x	–	5	0
Helenium autumnale L.	x	–	X	5
Helianthus divaricatus L.	x	–	X	5
Helianthus grosseserratus M. Martens	x	–	X	2
Helianthus occidentalis Riddell	x	–	X	10
Heliopsis helianthoides (L.) Sweet	x	–	X	5
Heuchera richardsonii R. Br.	x	–	X	8
Hibiscus moscheutos L. ssp. *moscheutos* (*Hibiscus palustris*)	15	18	N	7 ad?
Hieracium gronovii L.	x	–	X	6
Houstonia caerulea L.	x	–	X	9
Hydrophyllum virginianum L.	x	–	X	5
Hylodesmum glutinosum (Muhl. ex Willd.) H. Ohashi & R. R. Mill (*Desmodium glutinosum* (Willd.) Alph. Wood)	x	18	X	5
Hylodesmum nudiflorum (L.) H. Ohashi & R. R. Mill (*Desmodium mudiflorum* (L.) DC.)	x	–	X	9
Hypericum mutilum L.	x	–	X	8
Hypoxis hirsuta (L.) Coville	x	–	X	9
Impatiens capensis Meerb.	x	18	X	3
Impatiens pallida Nutt.	x	–	X	6
Iris pseudacorus L.	x	18	N	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	x	18	X	5
SF***Juglans cinerea*** L.	X 3	–	N 3	8
Juglans nigra L.	x	18	X	5
Juncus tenuis Willd.	15	18	N	0
Krigia biflora (Walter) S.F. Blake	x	18	X	7
Laportea canadensis (L.) Wedd.	x	18	X	3
SF***Lathyrus venosus*** Muhl. ex Willd. (*Lathyrus venosus* Willd.)	x	–	X	9
Leersia oryzoides (L.) Sw.	x	18	X	4
Leersia virginica Willd.	x	–	X	7
Lemna minor L.	15	18	N	5
Lespedeza capitata Michx.	x	–	X	4
Lespedeza frutescens (L.) Hornem. (*Lespedeza intermedia* (S. Watson) Britton)	x	–	X	8
Lespedeza virginica (L.) Britton	x	–	X	4
Liatris spicata (L.) Willd.	x	–	X	6
Lilium michiganense Farw.	x	–	X	6

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	x	–	X	6
Lithospermum canescens (Michx.) Lehm.	X 9	–	N 9	8
Lobelia cardinalis L.	x	–	X	7
Lobelia siphilitica L.	x	–	X	6
Lonicera maackii (Rupr.) Maxim.	–	18	N	*
Lonicera reticulata Raf. (*Lonicera prolifera* (Kirchn.) Rehder)	x	–	X	7
Lonicera × *minutiflora* Zabel [*L. morrow*ii × *L. xylosteo*i*des] (Lo*n*icera* × *muenden*iensis Rehder))	x	–	X	*
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	x	–	X	7
Lycopus americanus Muhl. ex W.P.C. Barton	x	–	X	5
Lycopus rubellus Moench	x	–	X	10
Lysimachia ciliata L.	x	18	X	4
Lysimachia nummularia L.	x	18	X	*
Lysimachia thyrsiflora L.	x	–	X	9
Lythrum alatum Pursh	x	–	X	7
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	18	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	–	X	5
Malus ioensis (Alph. Wood) Britton	x	–	X	3
Menispermum canadense L.	x	–	X	6
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	x	–	X	5
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	x	–	X	10
SF***Mimulus alatus*** Aiton	x	–	X	7
Mimulus ringens L.	x	–	X	6
Moehringia lateriflora (L.) Fenzl (*Arenaria lateriflora* L.).	x	18	X	8
Monarda fistulosa L.	x	–	X	4
SF***Monotropa uniflora*** L.	x	–	X	10
Morus alba L.	x	18	N	*
Muhlenbergia mexicana (L.) Trin.	x	–	X	5
Myriophyllum spicatum L.	15	18	N	*
Najas flexilis (Willd.) Rostk. & W.L.E. Schmidt	15	18	N	1
Nuphar advena (Aiton) W. T. Aiton	x	18	X	7
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist	–	18	N	5
Oenothera biennis L.	x	18	X	0
SF***Oenothera gaura*** W. L. Wagner & Hoch (*Gaura biennis* L.)	x	–	X	2
Oenothera pilosella Raf.	x	–	X	10
Onoclea sensibilis L.	x	–	X	8
Osmorhiza claytonii (Michx.) C.B. Clarke	15	18	N	4

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	A	*B*		
Osmorhiza longistylis (Torr.) DC.	x	–	X	3
Ostrya virginiana (Mill.) K. Koch	x	18	X	5
Oxalis stricta L. (*Oxalis europaea* Jord.)	X 5	18	N 5	0
SF***Oxalis violacea*** L.	x	–	X	9
Oxypolis rigidior (L.) Raf.	X 1	–	N 1	7
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.).	x	–	X	6
Packera glabella (Poir) C. Jeffrey (*Senecio glabellus* Poir.)	–	18	N	ad
Panicum capillare L.	x	–	X	1
Panicum rigidulum Bosc ex Nees	x	–	X	5
Panicum virgatum L.	x	–	X	5
Parthenium integrifolium L.	x	–	X	8
Parthenocissus quinquefolia (L.) Planch.	x	18	X	2
Pastinaca sativa L.	x	–	X	*
Pedicularis canadensis L.	x	–	X	9
Pedicularis lanceolata Michx.	x	–	X	9
Penstemon calycosus Small	x	–	X	7
Penthorum sedoides L.	x	–	X	5
Persicaria amphibia (L.) Delarbre (*Persicaria amphibia* var. *stipulacea*)	15	18	N	4
Persicaria hydropiper (L.) Spach (*Polygonum hydropiper* L.)	x	–	X	2
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	x	–	X	7
Persicaria lapathifolia (L.) Delarbre (*Polygonum lapathifolium* L.)	15	18	N	0
Persicaria longiseta (Bruijn) Kitagawa (*Polygonum caespitosum* Blume var. *longisetum* (Bruijn) Stewart)	X 3	–	N 3	*
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	x	–	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	x	–	X	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	x	18	X	2
Phalaris arundinacea L.	x	18	X	*
Phleum pratense L. ssp. *pratense*	x	–	X	*
Phlox divaricata L.	x	18	X	5
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis*	–	18	N	*
Phryma leptostachya L. var. *leptostachya*	x	–	X	4
SF***Phyla lanceolata*** (Michx.) Greene (*Lippia lanceolata* Michx.)	x	18	X	6
Physalis heterophylla Nees	X 1	–	N 1	3
Physostegia virginiana (L.) Benth.	x	18	X	6
Pilea pumila (L.) A. Gray	x	18	X	5

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	A	*B*		
Plantago major L.	X 5	–	N 5	*
Poa compressa L.	x	–	X	*
Poa pratensis L.	x	–	X	*
Podophyllum peltatum L.	X 5	18	N 5	4
Polygala senega L.	x	–	X	8
Polygala verticillata L. var. *isocycla* Fernald	x	–	X	7
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.).	x	–	X	3
Polygonatum pubescens (Willd.) Pursh	x	–	X	7
Polystichum acrostichoides (Michx.) Schott	X 1	–	N 1	9
Pontederia cordata L.	x	18	X	10
Populus deltoides W. Bartram ex Marshall	x	18	X	2
Populus grandidentata Michx.	x	–	X	6
Populus tremuloides Michx.	x	–	X	4
Potamogeton crispus L.	15	18	N	*
Potamogeton nodosus Poir.	–	18	N	3
Potentilla simplex Michx.	x	–	X	4
Prenanthes alba L.	x	–	X	5
Primula meadia (L.) A. R. Mast & Reveal (*Dodecatheon meadia* L.)	x	18	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	x	–	X	0
Prunus americana Marshall	x	–	X	5
Prunus serotina Ehrh.	x	18	X	1
Prunus virginiana L.	x	–	X	3
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L.)	x	–	X	7
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	–	X	5
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	x	–	X	5
Quercus alba L.	x	18	X	5
Quercus bicolor Willd.	x	–	X	6
Quercus macrocarpa Michx.	x	–	X	5
Quercus palustris Munchh.	x	–	X	8
Quercus rubra L.	x	18	X	7
Quercus velutina Lam.	x	18	X	6
Ranunculus abortivus L.	x	–	X	0
Ranunculus fascicularis Muhl. ex Bigelow	x	–	X	6

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	A	*B*		
Ranunculus hispidus Michx. var. *nitidus* (Chapm.) T. Duncan (*Ranunculus septentrionalis* Poir.).	x	18	X	5
Ratibida pinnata (Vent.) Barnhart	x	–	X	4
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.).	x	–	X	6
Rhus glabra L.	x	–	X	1
Ribes americanum Mill.	17	–	N	4
Ribes cynosbati L.	15	18	N	5
Robinia pseudoacacia L.	x	–	X	ad
Rosa carolina L.	x	–	X	5
Rosa multiflora Thunb.	x	18	X	*
Rubus allegheniensis Porter	X 5	–	N 5	3
Rubus flagellaris Willd.	X 6	–	N 6	3
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke	15	18	N	1
Rubus occidentalis L.	x	–	X	2
Rubus pensilvanicus Poir.	X 5	–	N 5	3
SF***Rubus pubescens*** Raf.	15	18	N	10
Rudbeckia hirta L.	x	–	X	1
Rudbeckia laciniata L. var. *laciniata*	x	18	X	5
Rumex crispus L.	x	–	X	*
Rumex verticillatus L.	x	18	X	6
SF***Sabatia angularis*** (L.) Pursh	x	–	X	10
Sagittaria latifolia Willd.	x	–	X	4
Salix bebbiana Sarg.	x	–	X	8
Salix humilis Marshall	x	–	X	6
Salix interior Rowlee	15	18	N	2
Salix nigra Marshall	x	18	X	4
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	–	X	1
Sanguinaria canadensis L.	x	18	X	6
Sanicula marilandica L.	X 1	–	N 1	6
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	x	–	X	2
Sassafras albidum (Nutt.) Nees	X 5	–	N 5	3
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	x	–	X	*
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	–	X	5

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	x	–	X	6
Scirpus cyperinus (L.) Kunth	x	–	X	6
Scrophularia lanceolata Pursh	x	–	5	5
Scrophularia marilandica L.	x	–	X	4
Scutellaria lateriflora L.	x	–	X	5
SF***Sedum ternatum*** Michx.	X 1	–	N 1	10
Silene stellata (L.) W. T. Aiton	x	18	X	6
Silphium integrifolium Michx.	x	–	X	5
Silphium terebinthinaceum Jacq. var. *terebinthinaceum*	x	–	X	5
Sisyrinchium albidum Raf.	x	–	X	7
Sium suave Walter	15	18	N	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	X	–	X	5
Smilax illinoensis Mangaly	X	–	8	5
Smilax lasioneura Hook.	X	–	X	5
Smilax tamnoides L. (*Smilax tamnoides* L. var. *hispida* (Torr.) Fernald)	X 5	18	N 5	5
Solanum dulcamara L.	X 5	–	N 5	*
Solidago altissima L.	X	18	X	1
Solidago caesia L.	X	18	X	7
Solidago gigantea Aiton	X	–	X	4
Solidago juncea Aiton	X	–	X	5
Solidago nemoralis Aiton	X	–	X	4
SF***Solidago speciosa*** Nutt.	X	–	X	7
Solidago ulmifolia Muhl. ex Willd.	X	–	X	5
Sorghastrum nutans (L.) Nash	X	–	X	5
Sparganium eurycarpum Engelm.	X	–	X	6
Spartina pectinata Link	X	–	X	4
Spiraea alba Du Roi	X	–	X	7
Spiranthes cernua (L.) Rich.	X	–	X	7
SF***Spiranthes magnicamporum*** Sheviak	X	–	X	8
SF***Spirodela polyrhiza*** (L.) Schleid.	11	–	11 N	4 N
Sporobolus compositus (Poir.) Merr. var. *compositus* (*Sporobolus asper* (Michx.) Kunth)	X	–	X	ad
Sporobolus heterolepis (A. Gray) A. Gray	X	–	X	10
Stachys pilosa Nutt. var. *pilosa* (Nutt.) Fernald (*Stachys palustris* L. var. *homotricha* Fernald)	X	–	X	5

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Staphylea trifolia L.	X	–	X	7
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	X	18	X	7
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	X	–	X	2
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	X	–	X	5
Symphyotrichum laeve (L.) A. Löve & D. Löve var. *laeve* (*Aster laevis* L.)	X	–	X	9
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	X	–	X	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	X	–	X	4
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	X	–	X	4
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	X	–	X	0
Symphyotrichum shortii (Lindl.) G.L. Nesom (*Aster shortii* Lindl.)	X	–	X	8
Symphyotrichum urophyllum (Lindl.) G.L. Nesom (*Aster sagittifolius* Willd.)	X	–	X	5
Taenidia integerrima (L.) Drude	X	–	X	9
Taraxacum officinale F. H. Wiggers	X	–	X	*
Teucrium canadense L.	15	18	N	3
Thalictrum amphibolum Greene (*Thalictrum revolutum* DC.)	x	–	X	6
Thalictrum dasycarpum Fisch. & Ave-Lall. (*Thalictrum dasycarpum* Fisch. & Avé-Lall. var. *hypoglaucum* (Rydb.) Boivin)	X	–	X	5
Thalictrum dioicum L.	x	–	X	7
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	x	18	X	7
Thaspium barbinode (Michx.) Nutt.	X 6	–	N 6	8
Tilia americana L.	x	18	X	5
Torilis japonica (Houtt.) DC.	x	–	X	*
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	18	X	2
Tradescantia ohiensis Raf.	x	–	X	2
Trifolium pratense L.	X 5	–	N 5	*
Trillium recurvatum L. C. Beck	x	–	X	5
Triosteum aurantiacum E.P. Bicknell	x	–	X	5
Typha latifolia L.	x	–	X	1
Typha × *glauca* Godr. [*T. angustifolia* × *T. latifolia*]	–	18	N	*
Ulmus americana L.	x	–	X	3
Ulmus rubra Muhl.	x	–	X	4
Uvularia grandiflora Sm.	x	–	X	7
Vaccinium angustifolium Aiton	x	–	X	5
Verbena hastata L.	x	–	X	4
Verbena urticifolia L.	x	–	X	5

Table 42 (continued). Summary of species verified and reported at Hobart Prairie Grove Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 43. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Vernonia missurica Raf.	x	–	X	4
Veronicastrum virginicum (L.) Farw.	x	–	X	7
Viburnum dentatum L. var. *lucidum* Aiton (*Viburnum recognitum* Fernald)	X 6	–	N 6	*
Viburnum lentago L.	x	–	X	5
Viburnum opulus L. var. *opulus*	x	–	X	*
Viburnum prunifolium L.	–	18	N	5
Viburnum rafinesqueanum Schult.	x	–	X	5
Vicia americana Muhl. ex Willd.	x	–	X	7
SF***Vicia caroliniana*** Walter	x	–	X	10
Viola pedata L. (*Viola pedata* L. *linearilobа* DC.)	x	–	X	9
Viola pubescens Aiton	x	–	X	5
SF***Viola sagittata*** Aiton var. ***ovata*** (Nutt.) Torr. & A. Gray (*Viola fimbriatula* Sm.)	x	–	X	6
Viola sagittata Aiton var. *sagittata*	x	–	X	7
Viola sororia Willd.	x	18	X	3
Vitis riparia Michx.	x	–	X	2

Table 43. Sources of new species verified and reported from Hobart Prairie Grove.

Note	Source(s)	Date	Species
1	S. O'Brien	Fall 2003	*Blephilia hirstuta*, *Gentiana puberulenta*, *Oxypolis rigidior*, *Physalis heterophylla*, *Polystichum acrostichoides*, *Sanicula marilandica*, *Sedum ternatum*
2	S. O'Brien	2003	*Agastache scrophulariifolia*, *Asclepias purpurascens*
3	N.B. Pavlovic, S. Leicht-Young, and K. Frohnapple	2005	*Juglans cinerea*, *Persicaria longiseta*
4	K. Quinlan, S. O'Brien, N.B. Pavlovic, and R. Shields Moose	24 Aug 2004	*Aralia racemosa*
5	K. Quinlan, S. O'Brien, and R. Shields Moose	Aug 2004	*Acalypha rhomboidea*, *Agrostis perennans*, *Arctium minus*, *Bidens frondosa*, *Carex swanii*, *Cirsium arvense*, *Cirsium vulgare*, *Crataegus crus-galli*, *Erigeron annuus*, *Eupatorium serotinum*, *Galium circaezans*, *Hackelia virginiana*, *Oxalis stricta*, *Plantago major*, *Podophyllum peltatum*, *Rubus allegheniensis*, *Rubus pensilvanicus*, *Sassafras albidum*, *Scrophularia lanceolata*, *Smilax tamnoides*, *Solanum dulcamara*, *Trifolium pratense*
6	Shirley Heinze Land Trust hike	26 May 1990	*Rubus flagellaris*, *Thaspium barbinode*, *Viburnum dentatum lucidum*
7	G. Livovitch	14 June 2012	*Adiantum pedatum*
8	L. Rericha and G. Wilhelm	15 June 2003	*Smilax illinoensis*
9	N. Pilla, N.B. Pavlovic, J. Kwilosz, and S. Pecararo	26 Apr 2016	*Lithospermum canescens*

Table 43 (continued). Sources of new species verified and reported from Hobart Prairie Grove.

Note	Source(s)	Date	Species
10	N. Pilla and D. Hamilla	3 June 2017	*Cystopteris tenuis*
12	N. Pilla	18 July 2017	*Carex muskingumensis*
11	N. Pilla	2 Aug 2017	*Spirodela polyrhiza*
13	N. Pilla	2 Aug 2017	*Elodea canadensis*
14	N. Pilla and A. Balzer	3 June 2017	*Calystegia spithamaea*
15	N. Pilla		*Anemone acutiloba*, *Bidens tripartita*, *Bolboschoenus fluviatilis*, *Calamagrostis canadensis*, *Carex blanda*, *Carpinus caroliniana* ssp. *virginiana*, *Dactylis glomerata*, *Dichanthelium acuminatum* ssp. *fasciculatum*, *Duchesnea indica*, *Erigeron philadelphicus*, *Euonymus alatus*, *Fagus grandifolia*, *Hibiscus moscheutos* ssp. *moscheutos*, *Juncus tenuis*, *Lemna minor*, *Myriophyllum spicatum*, *Najas flexilis*, *Osmorhiza claytonii*, *Persicaria amphibia* (*Persicaria amphibia* var. *stipulacea*), *Persicaria lapathifolia*, *Potamogeton crispus*, *Ribes cynosbati*, *Rubus pubescens* (in the riparian area near the ravine upslope), *Rubus idaeus* ssp. *strigosus*, *Salix interior*, *Sium suave*, *Spirodela polyrhiza*, *Teucrium canadense*
16	N. Pilla	18 July 2017	*Carex crus-corvi*
17	N. Pilla	26 Apr 2016	*Ribes americanum*
18	N. Pilla	2017	*Acalypha rhomboidea*, *Acer negundo*, *Acer saccharinum*, *Actaea pachypoda*, *Aesculus glabra*, *Ageratina altissima*, *Alisma triviale*, *Alliaria petiolata*, *Allium canadense*, *Ambrosia artemisiifolia*, *Ambrosia trifida*, *Anemone acutiloba*, *Apocynum cannabinum*, *Aquilegia canadensis*, *Arisaema triphyllum*, *Asarum canadense*, *Asclepias incarnata*, *Asclepias syriaca*, *Asplenium platyneuron*, *Berberis thunbergii*, *Bidens tripartita*, *Boechera laevigata*, *Bolboschoenus fluviatilis*, *Calamagrostis canadensis*, *Cardamine bulbosa*, *Carex blanda*, *Carex crus-corvi*, *Carex grayi*, *Carex grisea*, *Carex lupulina*, *Carex muehlenbergii*, *Carex muskingumensis*, *Carex pensylvanica*, *Carex rosea*, *Carex stipata*, *Carex tribuloides*, *Carpinus caroliniana* ssp. *virginiana*, *Carya ovata*, *Caulophyllum thalictroides*, *Celastrus orbiculatus*, *Cephalanthus occidentalis*, *Ceratophyllum demersum*, *Cercis canadensis*, *Cinna arundinacea*, *Claytonia virginica*, *Cystopteris tenuis*, *Dactylis glomerata*, *Dichanthelium acuminatum* ssp. *fasciculatum*, *Dryopteris carthusiana*, *Duchesnea indica*, *Echinocystis lobata*, *Elodea canadensis*, *Elymus hystrix*, *Elymus virginicus*, *Erigeron philadelphicus*, *Erigeron pulchellus*, *Euonymus alatus*, *Fagus grandifolia*, *Floerkea proserpinacoides*, *Fraxinus pennsylvanica*, *Galium concinnum*, *Geranium maculatum*, *Geum canadense*, *Hibiscus moscheutos*, *Hylodesmum glutinosum*, *Impatiens capensis*, *Iris pseudacorus*, *Iris virginica*, *Juglans nigra*, *Juncus tenuis*, *Krigia biflora*, *Laportea canadensis*, *Leersia oryzoides*, *Lemna minor*, *Lonicera maackii*, *Lysimachia ciliata*, *Lysimachia nummularia*, *Maianthemum racemosum*, *Moehringia lateriflora*, *Morus alba*, *Myriophyllum spicatum*, *Najas flexilis*, *Nuphar advena*, *Nymphaea odorata* ssp. *tuberosa*, *Oenothera biennis*, *Osmorhiza claytonii*, *Ostrya virginiana*, *Oxalis stricta*, *Packera glabella*, *Parthenocissus quinquefolia*, *Persicaria amphibia* var. *stipulacea*, *Persicaria lapathifolia*, *Persicaria virginiana*, *Phalaris arundinacea*, *Phlox divaricata*, *Phragmites australis*, *Phyla lanceolata*, *Physostegia virginiana*, *Pilea pumila*, *Podophyllum peltatum*, *Pontederia cordata*, *Populus deltoides*, *Potamogeton crispus*, *Potamogeton nodosus*, *Primula meadia*, *Prunus serotina*, *Quercus alba*, *Quercus rubra*, *Quercus velutina*, *Ranunculus hispidus nitidus*, *Ribes cynosbati*, *Rosa multiflora*, *Rubus pubescens*, *Rubus idaeus strigosus*, *Rudbeckia laciniata*, *Rumex verticillatus*, *Salix interior*, *Salix nigra*, *Sanguinaria canadensis*, *Silene stellata*, *Sium suave*, *Smilax tamnoides hispida*, *Solidago altissima*, *Solidago caesia*, *Spirodela polyrhiza*, *Symphyotrichum cordifolium*, *Teucrium canadense*,

Table 43 (continued). Sources of new species verified and reported from Hobart Prairie Grove.

Note	Source(s)	Date	Species
18	N. Pilla (*continued*)	2017	*Thalictrum thalictroides*, *Tilia americana*, *Toxicodendron radicans*, *Typha* × *glauca*, *Viburnum prunifolium*, *Viola sororia*
19	N. Pilla	2008	*Amelanchier arborea*
20	L. Rericha and G. Wilhelm	15 June 2003	*Crataegus succulenta*

alatus, *Monotropa uniflora*, *Oenothera gaura*, *Oxalis violacea*, *Phyla lanceolata*, *Sabatia angularis*, *Sedum ternatum*, *Solidago speciosa*, *Spiranthes magnicamporum*, *Vicia caroliniana*, and *Viola sagitata ovata*.

Of these only two are restricted to Peddicord property owned by Save The Dunes: *Carex crus-corvi* and *Carex muskingumensis*.

Floristic summary

Hobart Prairie Grove provides habitat for 416 taxa comprising 376 native taxa, seven adventive taxa, and 33 exotic taxa. Of the 376 native taxa, 369 are native, six are varieties, and one is a hybrid. Of the plant species, 369 are native, seven are adventive, and 31 are exotic species (Table 44). Hobart Prairie Grove A has a mean CoC of 5.20 and an FQI of 96. Of the six reported state-listed species, three are endangered, two are threatened, and one is on the watch list. The southern Peddicord property, subunit B, owned by Save The Dunes, has a mean CoC of 4.39 and an FQI of 47.

Newly reported species for Hobart Prairie Grove include *Acalypha rhomboidea*, *Agastache scrophulariifolia*, *Agrostis perennans*, *Aralia racemosa*, *Asclepias purpurascens*, *Bidens frondosa*, *Blephilia hirsuta*, *Carex swanii*, *Crataegus crus-galli*, *Erigeron annuus*, *Eupatorium serotinum*, *Galium circaezans*, *Gentiana puberulenta*, *Hackelia virginiana*, *Juglans cinerea*, *Oxalis stricta*, *Oxypolis rigidior*, *Physalis heterophylla*, *Podophyllum peltatum*, *Polystichum acrostichoides*, *Rubus allegheniensis*, *R. flagellaris*, *R. pensilvanicus*, *Sanicula marilandica*, *Sassafras albidum*, *Sedum ternatum*, *Smilax tamnoides*, and *Thaspium barbinode*. The adventive species are *Robinia pseudoacacia* and *Sporobolus compositus* var. *compositus*. Of the 24 exotic species, eight are new reports to Hobart Prairie Grove. They include *Arctium minus*, *Cirsium arvense*, *C. vulgare*, *Persicaria longiseta*, *Plantago major*, *Solanum dulcamara*, *Trifolium pratense*, and *Viburnum dentatum lucidum*.

Nathanael Pilla found *Cystopteris tenuis* growing on a steep north-facing slope in subunit B on 23 May 2017. Hamilla confirmed the identification based on spore size and nature of the rhizome growth. It is possible that this species may be found on the steep north-facing slopes along the ravines in Hobart Prairie Grove.

Conservation issues

Hobart Prairie Grove is a mosaic of prairie, bur oak savanna, white oak flatwoods, pin oak flats, floodplain forest, mesophytic forest, and wetlands. Many of the oak savanna herbaceous species were confined to the bluff slopes adjacent to Lake George, although some did persist on the uplands (Pavlovic, personal observation, 2005–2007). Prescribed fire and mechanical removal of smaller diameter stems will benefit the area by increasing light infiltration to the ground, especially adjacent to the slopes where savanna species persist. Besides light, soil texture is a major determinant of savanna groundlayer vegetation (Bowles and McBride 1998, Leach and Givnish 1999, Meisel et al. 2002, Pavlovic et al. 2006, Peterson et al. 2007). Recent attempts at restoration by thinning the subcanopy in the northwest corner south of the bike trail has led to weedy *Rubus* species growth in the open canopy rather than the savanna forbs (Pavlovic, personal observation, 2008). In addition, this lack of a persistent seed bank means that savanna forb species would have to be seeded to restore the groundlayer flora. Such reseeding needs to be performed wherever canopy closure has resulted in a depauperate groundlayer.

Table 44. Summary of floristic statistics by subunit of Hobart Prairie Grove. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit		Entire Unit
	A	*B*	
Area (ha/acres)	134/330	23/57	157/387
Special flora total	30	5	34
Confirmed	22	0	22
New	6	5	10
Reported	1	0	1
Extirpated	1	0	1
Total taxa, FNA/ITIS	367	129	416
Total native taxa, FNA/ITIS	339	112	376
Native species, FNA/ITIS	333	110	369
Native variety, FNA/ITIS	6	1	6
Native hybrid, FNA/ITIS	0	1	1
Total adventive taxa, FNA/ITIS	4	3	7
Total adventive species, FNA/ITIS	4	3	7
Total adventive variety, FNA/ITIS	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0
Total exotic taxa, FNA/ITIS	24	14	33
Total exotic species, FNA/ITIS	22	14	31
Total exotic variety, FNA/ITIS	1	0	1
Total exotic hybrid, FNA/ITIS	1	0	1
Total Indiana-listed	6	0	6
Endangered	3	0	3
Threatened	2	0	2
Rare	0	0	0
Watch List	1	0	1
Extirpated	0	0	0
Sum CC	1,782	496	1,951
Sum CC adventive and Invasive	1,756	480	1,914
Mean CoC	5	4	5
Mean CoC modified	5	4	5
FQI (I) Wilhelm	96	47	100
FQI with adventive and invasive	91	42	93
FQI	96	47	100
FQI modified	91	43	93

Sandy O'Brien did extensive reseeding on the east side of Hobart Prairie Grove from 1985 through 1992 for groundlayer and biodiversity enhancement. For example, she planted *Bouteloua curtipendula* and other species in the hill prairie (tiny orange sliver in Figure 27 on the west side of the peninsula that juts south into Lake George). These seedings in other general areas contributed to an increase in local plant richness.

Many savanna and prairie plants were destroyed by the construction of the Oak Savannah Bike Trail (Sandy O'Brien, pers. comm. with Pavlovic, 2007; Pavlovic, personal observation, 2007). Many of these species continue to decline due to shrub invasion since fire has not controlled shrub growth. Regrowth of invasive shrubs continues to persist along the bike trail. Species that have declined along the bike trail include *Asclepias sullivantii*, *Carex meadii*, *Carex tonsa*, *Dalea candida*, *Gentiana puberulenta*, *Helianthus occidentalis*, *Lathyrus venosus*, *Oenothera pilosella*, *Oxypolis rigidior*, *Sporobolus heterolepis*, and *Vicia caroliniana* (O'Brien, pers. comm. with Pavlovic, 2010).

The tiny southwest-facing dry hill prairie at the southeast end of the main unit has been bisected and the vegetation damaged by off-road vehicle activity, with soil washing into Lake George. Several state-listed plants are threatened by illegal off-road vehicles in the small dry hill prairie. These include *Amorpha canescens*, *Bouteloua curtipendula* var. *curtipendula*, *Dalea candida*, *Lathyrus venosus*, and *Vicia caroliniana*. Since this community is unique in INDU and harbors Indiana-listed species, this area could be a high priority for restoration. In 2011, Sandy O'Brien initiated restoration at this site by constructing berms to hold the soil and then seeding grasses and forbs. Removal of timbers for firewood by vandals contributed to further degradation. Further erosion, perhaps from extreme rainfall events prevented complete restoration. Locally rare plants could be propagated and introduced to ensure genetic diversity and population viability. This site

was purchased by Save The Dunes in 2015 but has since been transferred to INDU for management.

Despite much of Hobart Prairie Grove having experienced fire suppression it harbors 369 native plant species, and has a mean CoC of 5.13, and a FQI of 100. The portion north of the bike trail has had considerable woody encroachment. The fall 2005 prescribed fire in the southwest portion owned by INDU was beneficial to Hobart Prairie Grove. The national park mapped exotic species within this unit in 2005 and 2006 (John Kwilosz, resource management specialist, pers. comm. with Pavlovic, 2010). Multiflora rose, black locust, creeping smartweed, and Asiatic bush honeysuckles are particularly abundant. Oriental bittersweet is beginning to take hold. Prevention of off-road vehicle activity combined with trail restoration will be important for habitat restoration. Re-creating prairie to the west of Hobart Prairie Grove will help in consolidating landscape restoration in the Hobart Marsh region.

Unit 14: Hoosier Prairie

My part of the Hoosier Prairie story began on May 23, 1967, when a neighbor with whom I used to go bird watching knocked on my door. Her husband was being transferred to Texas and she was leaving, so for the first time she offered to take me to her secret place she called the "Griffith Dump." She was very interested in wildflowers: I didn't know anything about them. I was over forty before I became a bird watcher, and this was even later. I tell my husband I was a late bloomer like the prairie flowers. Well, we went there on May 23. You know the prairie in late May. I was stunned. I couldn't believe there was something so beautiful only ten minutes from my home, and I'd lived within ten miles of this area all my life. The ground was covered in flowers—bird's foot violets, bluets, blue-eyed grass, yellow star grass, shooting stars . . .

—Irene Herlocker (1976)

Hoosier Prairie, formerly known as Schererville Prairie, occupies about 279 hectares (689 acres). Nearly 45% of the site has been highly disturbed by cultivation, drainage, grazing, right-of-way construction, fire suppression, or various combinations of those factors (Figure 28) (Wilhelm 1990). Hoosier Prairie is on the low feathered dunes of the Glenwood phase of dune formation that occurred after the retreat of the Wisconsinin glaciation (Schoon 2003).

Irene Herlocker (later Herlocker Meyer) was instrumental in creating awareness of this site and helping John Bacone, the Director of Indiana Division of Nature Preserves, and stakeholders to obtain protection for this large prairie/savanna/wetland complex (Herlocker 1976). The first purchase of land by the Division of Nature Preserves was in 1976.

We divided Hoosier Prairie into two subunits: subunit A is the main portion found on the north and south sides of Main Street in Griffith, Indiana. Subunit B includes the Gaylord Butterfly Tract and a southern portion of Hoosier Prairie Nature Preserve south of Griffith. Various parcels south of the Gaylord Butterfly Tract, Norco, and Martha Collins tracts (insular tract south of Gaylord in Figure 28) have been acquired by the Division of Nature Preserves (Tom Post, pers. comm. with Pavlovic, 22 August 2013).

Wilhelm surveyed subunit A (Hoosier Prairie) multiple times prior to 1990 (Wilhelm 1990). He resurveyed the subunit B (Gaylord Tract) on 10 August 1999. He and Craig Johnson surveyed the Hoosier Prairie east of the tank farm, north of the railroad, and lying along the east side of the NIPSCO right-of-way on 25 August 1999. Johnson and Linda Masters surveyed a second Hoosier Prairie addition and NIPSCO right-of-way, which includes the above additions, and the

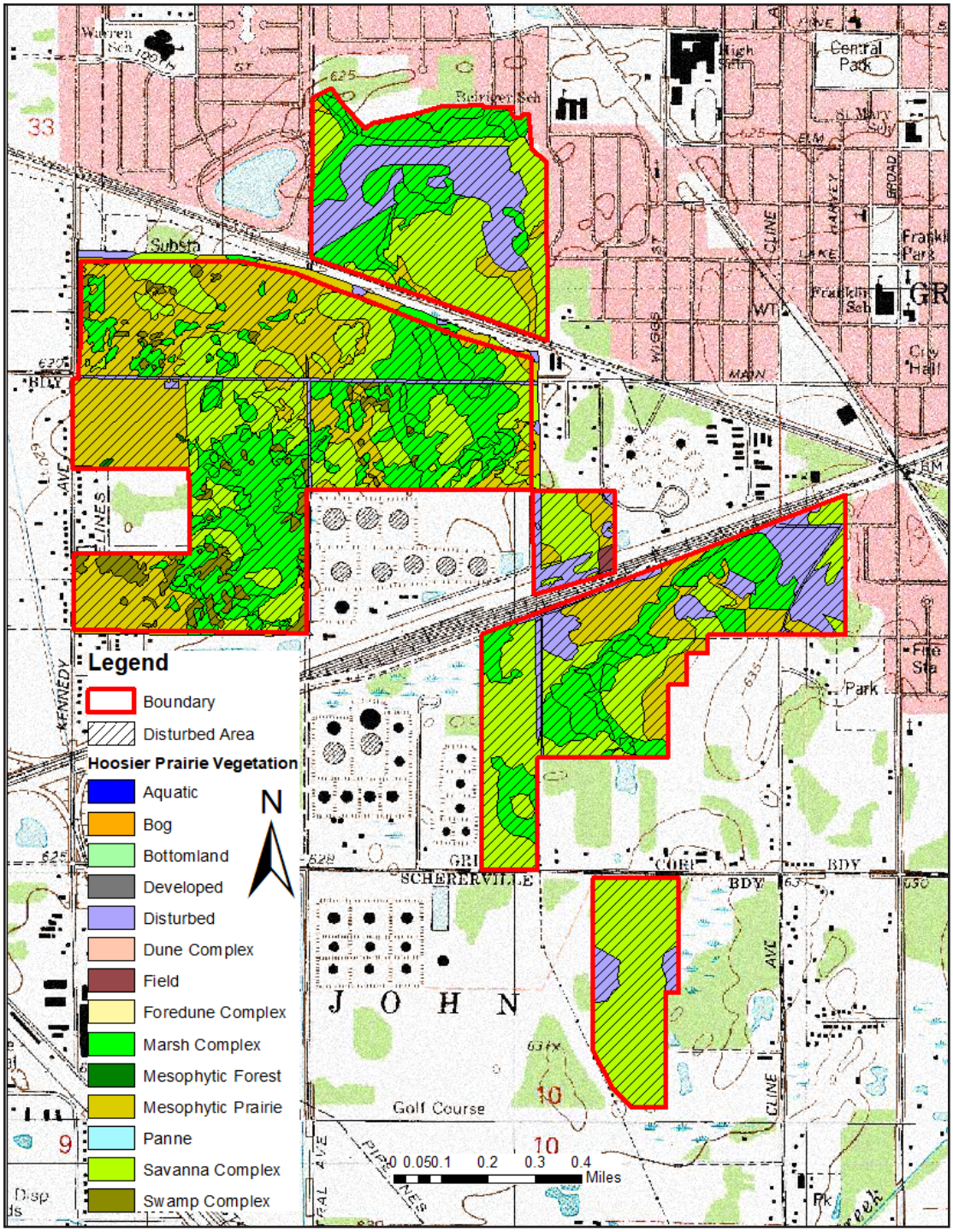


Figure 28. Vegetation of Hoosier Prairie Unit. Letters indicate subunits. Cross-hatching indicates disturbed areas.

NIPSCO right-of-way abutting it along the western edge on 25 July 1994 and 25 August 1999. Because of its proximity and because it is part of this larger complex, the state nature preserves south of the Gaylord Tract are included in the Hoosier Prairie Unit.

Hoosier Prairie A has received plenty of serious attention by local botanists and ecologists including Robert Betz (1978), Irene Herlocker Meyer, Ken Klick, Ed Lace, Herbert Lamp, Ray Schulenberg, Paul Strand, Floyd Swink, Marlin Bowles, Ralph Grundel, Gerould Wilhelm, and Pavlovic. Ken Klick spent hundreds of hours here in the late 1980s and became intimately knowledgeable about the prairie (Wilhelm 1990). John Bacone and Thomas Post continued to quantitatively monitor the

prairie and individual species found there. Largely through the efforts of these botanists and others, a rather comprehensive summary of the vascular plants currently inhabiting the subunits A and B has been compiled (Table 45).

The NIPSCO substation at the northwest portion of the prairie in subunit A received much floristic attention between 1985 and 1990 (Wilhelm 1990). Regular mowing and activity of utility maintenance vehicles along rights-of-way created disturbances that appear to be absent in other wet prairies and sedge meadow throughout Hoosier Prairie. These disturbances in the substation area created suitable habitat for *Callitriche heterophylla*, *Lycopodiella inundata*, *Rhynchospora recognita*, and *Utricularia subulata*.

An unusual feature of the Hoosier Prairie Unit is that the topographic-moisture gradient at many places is drawn out over large distances of five or more meters (Pavlovic, personal observation, 2003). By comparison, elevational drops from mesic or xeric communities to hydric ones in other areas of the Indiana Dunes occur in a matter of a meter or two. Thus, at Hoosier Prairie these gradual changes in elevation produce a wide wet-mesic gradient that is dominated by broad stands of willow shrubs (*Salix*), whereas in most of the Indiana Dunes, these transitions are represented by narrow and often single rows of willow (or buttonbush) shrubs. As a result, these wet-mesic communities are broad enough to be mappable units.

Table 45. Summary of species verified and reported at Hoosier Prairie Unit. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Acalypha rhomboidea Raf.	x	x	X	0
Acer saccharinum L.	x	x	X	0
Achillea millefolium L.	x	x	X	*
SF***Agalinis auriculata*** (Michx.) S.F. Blake (*Tomanthera auriculata* Raf.)	9	–	R	8
Agalinis purpurea (L.) Pennell	x	x	X	6
Agalinis purpurea (L.) Pennell var. *parviflora* (Benth.) B. Boivin	x	–	X	7
SF***Agalinis skinneriana*** (Alph. Wood) Britton	3	–	N	10
Agalinis tenuifolia (Vahl) Raf.	x	–	X	7
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	x	x	X	4
Agrimonia parviflora Aiton	x	x	X	7
Agrimonia pubescens Wallr.	x	–	X	5
Agrostis gigantea Roth (*A. alba* L. misapplied)	x	x	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	x	–	X	1
SF***Aletris farinosa*** L.	x	–	X	10
Alisma subcordatum Raf.	x	x	X	4
Alisma triviale Pursh	x	–	X	4
Allium canadense L. var. *canadense*	x	–	X	2
Allium vineale L.	x	–	X	*

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Alopecurus aequalis Sobol.	9	–	R	6
Alopecurus carolinianus Walter	9	–	R	0
Alopecurus pratensis L.	R	–	R	*
Amaranthus retroflexus L.	9	–	R	*
Ambrosia artemisiifolia L.	x	x	X	0
Ambrosia trifida L.	–	x	X	0
Amelanchier laevis Wiegand	9	–	R	8
Amorpha canescens Pursh	x	x	X	9
Amphicarpaea bracteata (L.) Fernald	x	x	X	4
Andropogon gerardii Vitman	x	x	X	5
Anemone cylindrica A. Gray	9	–	N	6
Anemone quinquefolia L. var. *quinquefolia*	x	1	X	7
Antennaria howellii Greene ssp. *petaloidea* (Fernald) R. J. Bayer (*Antennaria neglecta* Greene)	x	–	X	4
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	x	X	3
SF***Anthoxanthum nitens*** (Weber) Y. Schouten & Veldkamp (*Hierochloë odorata* (L.) P. Beauv.)	x	–	X	9
Apios americana Medik.	x	x	X	7
Apocynum androsaemifolium L.	x	x	X	5
Apocynum cannabinum L. (var. *glaberrimum*)	9	–	R	4
Apocynum cannabinum L. (*A. sibiricum*)	x	x	X	2
Aquilegia canadensis L.	–	x	X	6
Arabidopsis lyrata (L.) O'Kane & Al-Shehbaz (*Arabis lyrata* L.)	x	–	X	5
Aralia nudicaulis L.	x	x	X	8
Arctium lappa L.	–	x	X	*
Arctium minus (Hill) Bernhardi (*Arctium minus* Schkuhr)	x	x	X	*
SF***Arnoglossum plantagineum*** Raf. (*Cacalia plantaginea* (Raf.) Shinners)	x	–	X	10
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*]	x	x	X	6
Artemisia campestris L. ssp. *caudata* (Michx.) H.M. Hall & Clements (*Artemisia caudata* Michx.)	x	–	X	5
Asclepias amplexicaulis Sm.	x	–	X	7
Asclepias hirtella (Pennell) Woodson	x	x	X	10
Asclepias incarnata L.	x	x	X	4
Asclepias syriaca L.	x	x	X	0
Asclepias tuberosa L.	x	x	X	7
Asclepias verticillata L.	x	–	X	1
Asparagus officinalis L.	x	x	X	*

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	3	–	R	8
Aureolaria flava (L.) Farw.	x	x	X	9
Baptisia lactea (Raf.) Thieret (*B. leucantha* Torr. & A. Gray)	x	x	X	8
SF***Baptisia tinctoria*** (L.) R. Br.	x	–	X	10
Barbarea vulgaris W.T. Aiton	x	–	X	*
SF***Bartonia virginica*** (L.) Britton, Sterns & Poggenburg	9	–	N	10
Berberis thunbergii DC.	9	–	R	*
Betula pendula Roth	R	–	R	*
Bidens cernua L.	x	–	X	5
Bidens frondosa L.	x	x	X	1
Bidens polylepis S.F. Blake	R	–	R	3
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	x	x	X	9
Bidens tripartita L. (*B. comosa* (A. Gray) Wiegand	x	x	X	5
Blephilia hirsuta (Pursh) Benth.	9	–	R	8
Boehmeria cylindrica (L.) Sw.	x	x	X	2
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	–	x	X	4
Boltonia asteroides (L.) L'Her. var. *latisquama* (A. Gray) Cronquist (*B. latisquama* A. Gray; *B. asteroides* (L.) L'Her. var. *recognita* (Fernald & Griscom) Cronquist)	x	–	X	9
Botrychium virginianum (L.) Sw. (*Botrypus virginiana* (L.) Michx.)	9	–	R	6
Bromus commutatus Schrad.	–	1	N	*
Bromus inermis Leyss.	x	–	X	*
Bromus latiglumis (Scribn. ex Shear) Hitchc.	x	–	X	*
Bromus pubescens Spreng.	9	–	R	5
Bromus tectorum L.	9	–	R	*
Bulbostylis capillaris (L.) C.B. Clarke	9	–	R	4
Calamagrostis canadensis (Michx.) P. Beauv.	x	x	X	3
Calamagrostis stricta (Timm) Koeler ssp. *inexpansa* (A. Gray) C.W. Greene (*Calamagrostis inexpansa* A. Gray var. *brevior* (Vasey) Stebbins)	x	–	X	5
SF***Callitriche heterophylla*** Pursh	x	–	X	9
SF***Calopogon tuberosus*** (L.) Britton, Sterns & Poggenburg var. ***tuberosus*** (*Calopogon tuberosus* (L.) Britton, Sterns & Poggenburg)	x	–	X	10
Caltha palustris L.	x	–	X	5
Calystegia sepium (L.) R. Br. ssp. *sepium*	x	x	X	1
Campanula aparinoides Pursh	x	x	X	8
Capsella bursa-pastoris (L.) Medik.	9	–	R	*
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	x	–	X	6
SF***Cardamine parviflora*** L. (*C. parviflora* var. *arenicola* (Britton) O.E. Schulz)	x	–	X	2

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Cardamine pensylvanica Muhl. ex Willd.	9	–	R	4
Carex albicans Willd. ex Spreng. var. *emmonsii* (Dewey ex Torr.) Rettig	x	–	X	9
Carex annectens (E.P. Bicknell) E.P. Bicknell (*Carex annectens* E.P. Bicknell var. *xanthocarpa* (E.P. Bicknell) Wiegand)	R	x	X	7
Carex aquatilis Wahlenb. var. *substricta* Kukenth. (*Carex aquatilis* Wahlenb. var. *altior* (Rydb.) Fern)	x	–	X	5
SF***Carex bebbii*** (L.H. Bailey) Olney ex Fernald	x	–	X	6
Carex bicknellii Britton	9	–	R	10
Carex buxbaumii Wahlenb.	x	–	X	9
Carex cephalophora Muhl. ex Willd.	3	–	R	3
SF***Carex conoidea*** Schkuhr. ex Willd.	x	–	X	10
SF***Carex crawei*** Dewey ex Torrey	15	–	X	10
Carex emoryi Dewey	9	–	R	6
Carex haydenii Dewey	x	x	X	6
Carex hystricina Muhl. ex Willd.	9	–	R	5
SF***Carex laevivaginata*** (Kük.) Mack.	R	–	R	8
Carex lasiocarpa Ehrh. ssp. *americana* (Fernald) Hulten	x	x	X	10
Carex meadii Dewey	3	–	N	9
Carex muehlenbergii Schkuhr ex Willdenow (*Carex muehlenbergii* Schkuhr ex Willd.)	–	1	N	5
Carex pellita Willd.	–	x	X	4
Carex pensylvanica Lam.	x	x	X	5
Carex sartwellii Dewey	9	–	R	6
Carex scoparia Schkuhr ex Willd. var. *scoparia*	x	x	X	7
SF***Carex siccata*** Dewey	9	–	R	10
Carex sterilis Willd.	9	–	R	10
Carex stricta Lam.	x	x	X	5
Carex suberecta (Olney) Britton	x	x	X	8
Carex tetanica Schkuhr	9	–	R	9
Carex tribuloides Wahlenb.	x	x	X	3
SF***Carex trichocarpa*** Muhl. ex Willd.	–	x	X	7
Carex vesicaria L. (*C. vesicaria* var. *monile* (Tuck.) Fernald)	9	–	R	10
Carex vulpinoidea Michx.	9	–	R	2
SF***Castilleja coccinea*** (L.) Spreng.	x	–	X	10
Catalpa speciosa Teas	–	x	X	ad
Ceanothus americanus L.	x	–	X	6
Cenchrus longispinus (Hack.) Fernald	–	x	X	0
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek (*Centaurea maculosa* Lam.)	x	x	X	*

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Centaurium pulchellum (Sw.) Druce	x	–	X	*
Cephalanthus occidentalis L.	11	–	R	5
Cerastium brachypodum (Engelm. ex A. Gray) B. L. Rob.	9	–	R	*
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet	x	–	X	*
SF***Chamerion angustifolium*** (L.) Holub (*Epilobium angustifolium* L.)	x	–	X	10
Chenopodium album L.	x	x	X	*
Cichorium intybus L.	x	–	X	*
Cicuta maculata L.	x	x	X	6
Circaea canadensis (L.) Hill ssp. *canadensis*	x	x	X	1
Cirsium arvense (L.) Scop.	x	x	X	*
Cirsium discolor (Muhl. ex Willd.) Spreng.	x	x	X	2
Cirsium muticum Michx.	x	x	X	10
Cirsium vulgare (Savi) Ten.	x	–	X	*
Claytonia virginica L.	x	–	X	2
SF***Clinopodium arkansanum*** (Nutt.) House (*Satureja arkansana* Brig.)	x	–	X	10
SF***Clinopodium vulgare*** L. (*Satureja vulgaris* (L.) Fritsch var. *neogaea* Fernald)	9	–	R	6
Comandra umbellata (L.) Nutt. ssp. *umbellata*	x	x	X	7
SF***Comptonia peregrina*** (L.) J. M. Coult.	x	x	X	9
Convolvulus arvensis L.	–	x	X	*
Conyza canadensis (L.) Cronquist (*Erigeron canadensis* L.)	x	x	X	0
SF***Corallorhiza odontorhiza*** (Willd.) Poir.	2	–	R	9
Coreopsis lanceolata L.	x	–	X	5
Coreopsis palmata Nutt.	x	x	X	6
Coreopsis tripteris L.	x	x	X	5
Cornus obliqua Raf. (*Cornus amomum* Mill. ssp. *obliqua* (Raf.) J.S. Wilson)	x	x	X	6
Cornus racemosa Lam.	x	x	X	1
Cornus sericea L. ssp. *sericea* (*Cornus stolonifera* Michx.)	x	x	X	6
SF***Corydalis sempervirens*** (L.) Pers.	x	–	X	10
Corylus americana Walter	x	x	X	5
SF***Crocanthemum bicknellii*** (Fernald) Janch. (*Helianthemum bicknellii* Fernald)	9	–	R	10
Crocanthemum canadense (L.) Britton (*Helianthemum canadense* (L.) Michx.)	x	–	X	8
SF***Crotalaria sagittalis*** L.	9	–	R	7
Cuscuta gronovii Willd. ex Schult.	–	x	X	4
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	x	–	X	4
Cyperus lupulinus (Spreng.) Marcks ssp. *lupulinus*. (*Cyperus filiculmis* Vahl)	–	x	X	5
Cyperus strigosus L.	x	x	X	1
SF***Cypripedium candidum*** Muhl. ex Willd.	x	–	X	10
SF***Cypripedium parviflorum*** Salisb. var. ***pubescens*** (Willd.) O.W. Knight (*Cypripedium calceolus* L. var. *pubescens* (Willd.) L. Connell)	9	–	R	10

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Dactylis glomerata L.	x	–	X	*
Dalea purpurea Vent. var. *purpurea* (*Petalostemum purpureum* (Vent.) Rydb.)	x	–	X	9
Daucus carota L.	x	x	X	*
Desmanthus illinoensis (Michx.) MacMill. ex B.L. Rob. & Fernald	14	–	N	3
Desmodium canadense (L.) DC.	x	x	X	4
SF***Desmodium ciliare*** (Muhl. ex Willd.) DC.	x	–	X	10
Desmodium glabellum (Michx.) DC.	x	x	X	5
Desmodium illinoense A. Gray	x	–	X	6
Desmodium paniculatum (L.) DC.	x	x	X	6
Dianthus armeria L.	9	–	R	*
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	x	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *implicatum* (Scribn.) Freckmann & Lelong (*Panicum meridionale* Ashe)	9	–	R	8
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *spretum* (Schultes) Freckmann & Lelong (*Panicum spretum* Schult.)	9	–	R	9
SF***Dichanthelium boreale*** (Nash) Freckmann (*Panicum boreale* Nash)	x	–	X	10
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	9	–	N	7
SF***Dichanthelium oligosanthes*** (J.A. Schultes) Gould ssp. ***oligosanthes*** (*Panicum oligosanthes* Schult.)	–	1	N	9
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong (*Panicum oligosanthes* Schult. var. *scribnerianum* (Nash) Fernald)	x	x	X	4
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong (*Panicum villosissimum* Nash)	x	–	X	8
Dichanthelium sphaerocarpon (Elliott) Gould (*Panicum sphaerocarpon* Elliott)	9	–	R	8
SF***Diervilla lonicera*** Mill.	9	–	R	9
Digitaria cognata (J.A. Schultes) Pilger (*Leptoloma cognatum* (Schult.) Chase)	R	–	R	3
Digitaria ischaemum (Schreb.) Muhl.	x	–	X	*
Digitaria sanguinalis (L,) Scop.	x	–	X	*
Dipsacus fullonum L. (DC) (*Dipsacus sylvestris* Huds)	6	–	N	*
Doellingeria umbellata (Mill.) Nees var. *umbellata* (*Aster umbellatus* Mill.)	x	x	X	9
SF***Drosera intermedia*** Hayne	x	–	X	10
SF***Drymocallis arguta*** (Pursh) Rydb. (*Potentilla arguta* Pursh)	x	–	X	9
Dulichium arundinaceum (L.) Britton	9	x	X	9
Echinochloa crusgalli (L.) P. Beauv.	x	–	X	0
Echinocystis lobata (Michx.) Torr. & A. Gray	–	x	X	5
Eleocharis acicularis (L.) Roem. & Schult.	x	–	X	2
Eleocharis compressa Sull.	9	1	R	8
Eleocharis elliptica Kunth	x	–	X	8
Eleocharis erythropoda Steud. (*Eleocharis calva* Torr.)	x	–	X	2

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Eleocharis obtusa (Willd.) Schult.	x	–	X	3
Eleocharis palustris (L.) Roemer & J.A. Schultes	9	–	N	10
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis smallii* Britton)	x	–	X	5
SF***Eleocharis quinqueflora*** (Hartmann) O. Schwartz [*Eleocharis pauciflora* (Lightf.) Link var. *fernaldii* Svenson]	9	–	N	9
SF***Eleocharis tenuis*** (Willd.) Schult. var. ***verrucosa*** (Svenson) Svenson	9	–	X	10
SF***Eleocharis wolfii*** (A. Gray) A. Gray	x	–	X	10
Elymus canadensis L.	–	x	X	4
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	x	x	X	*
Elymus riparius Wiegand	–	x	X	5
Elymus virginicus L.	9	–	X	4
SF***Epilobium ciliatum*** Raf. (*Epilobium glandulosum adenocaulon* (Haussk.) Fernald)	x	x	X	3
Epilobium coloratum Biehler	x	x	X	3
Epilobium leptophyllum Raf.	x	x	X	10
SF***Epilobium strictum*** Muhl. ex Spreng.	9	–	R	10
Equisetum arvense L.	x	x	X	0
Equisetum hyemale L. ssp. *affine* (Engelm.) Calder & Roy L. Taylor	9	–	N	3
Equisetum laevigatum A. Braun	x	–	X	2
Eragrostis spectabilis (Pursh) Steud.	x	x	X	3
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	x	x	X	2
Erigeron annuus (L.) Pers.	x	x	X	0
Erigeron philadelphicus L.	x	x	X	4
SF***Erigeron pulchellus*** Michx.	9	–	N	10
Erigeron strigosus Muhl. ex Willd.	x	x	X	5
SF***Eriophorum angustifolium*** Honck.	9	–	R	10
Eryngium yuccifolium Michx.	x	x	X	9
Erythronium albidum Nutt.	6	–	N	5
Eupatorium altissimum L.	x	x	X	0
Eupatorium perfoliatum L.	–	x	X	4
Eupatorium serotinum Michx.	x	x	X	0
Euphorbia corollata L.	x	x	X	2
Euphorbia maculata L. (*Euphorbia supina* Raf.)	x	–	X	0
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	9	–	R	0
SF***Euthamia caroliniana*** (L.) Greene ex Porter & Britton (*Solidago tenuifolia* Pursh)	9	–	N	10
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	x	X	3
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb)	x	–	X	4

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Euthamia gymnospermoides Greene (*Solidago gymnospermoides* Fernald)	x	x	X	5
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	x	–	X	4
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	R	–	R	*
Fallopia scandens (L.) Holub (*Polygonum scandens* L.)	x	x	X	1
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	–	x	X	5
Fimbristylis autumnalis (L.) Roem. & Schult.	x	x	X	5
Fragaria virginiana Miller	x	x	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	x	x	X	*
SF***Fraxinus pennsylvanica*** Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	x	x	X	1
Galium aparine L.	9	–	X	1
Galium asprellum Michx.	9	–	R	10
Galium boreale L.	x	x	X	7
Galium concinnum Torr. & A. Gray	9	–	R	5
Galium obtusum Bigelow	x	x	X	5
Galium tinctorium L.	9	x	X	8
SF***Galium trifidum*** L.	9	–	N	10
Galium triflorum Michx.	x	x	X	5
Gaylussacia baccata (Wangenh.) K. Koch	x	x	X	9
SF***Gentiana puberulenta*** J.S. Pringle (*Gentiana puberula* Michx.)	x	–	X	10
SF***Gentiana saponaria*** L.	x	–	X	8
Gentianopsis crinita (Froel.) Ma (*Gentiana crinita* Froel.)	x	–	X	10
SF***Geranium bicknellii*** Britton	x	–	X	7
Geranium carolinianum L.	R	1	R	3
Geranium maculatum L.	–	1	N	4
Geum aleppicum Jacq. (*Geum aleppicum* var. *strictum* (Aiton) Fernald)	–	x	X	7
Geum canadense Jacq.	x	x	X	1
Geum laciniatum Murray (*Geum laciniatum* var. *trichocarpum* Fernald)	9	x	X	5
Glechoma hederacea L.	x	x	X	*
Glyceria septentrionalis Hitchc.	9	–	R	8
Glyceria striata (Lam.) Hitchc.	R	x	X	4
Glycyrrhiza lepidota Pursh	R	–	R	*
Gratiola neglecta Torr.	9	–	R	7
Hackelia virginiana (L.) I. M. Johnst.	x	x	X	0
Helenium autumnale L.	9	–	R	5
Helenium flexuosum Raf.	9	–	R	ad
Helianthus divaricatus L.	x	x	X	5
Helianthus giganteus L.	x	x	X	9

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Helianthus grosseserratus M. Martens	x	x	X	2
Helianthus mollis Lam.	x	x	X	9
Helianthus occidentalis Riddell	x	x	X	10
Helianthus pauciflorus Nutt. ssp. *pauciflorus* (*Helianthus rigidus* (Cass.) Desf.)	x	–	X	8
Helianthus petiolaris Nutt. ssp. *petiolaris*	x	–	X	ad
Heliopsis helianthoides (L.) Sweet	–	x	X	5
Hemerocallis fulva (L.) L.	9	–	R	*
Hesperostipa spartea (Trin.) Barkworth (*Stipa spartea* Trin.)	x	x	X	7
Heracleum sphondylium L. ssp. *montanum* (Schleich. ex Gaudin) Briq. (*Heracleum spondylium* Linnaeus)	9	–	R	5
Heuchera richardsonii R. Br.	x	–	X	8
Hieracium longipilum Torr. ex Hook.	–	13	N	9
Hieracium piloselloides Vill. (*Hieracium florentinum* All)	–	1	N	*
Hieracium umbellatum L. (*Hieracium canadense* Michx. var. *fasciculatum* (Pursh) Fern)	x	–	X	6
Hordeum jubatum L.	x	–	X	*
Houstonia caerulea L.	x	1	X	9
Hydrophyllum virginianum L.	9	–	R	5
Hylodesmum glutinosum (Muhl. ex Willd.) H. Ohashi & R. R. Mill (*Desmodium glutinosum* (Willd.) Alph. Wood)	x	x	X	5
Hylodesmum nudiflorum (L.) H. Ohashi & R. R. Mill (*Desmodium mudiflorum* (L.) DC.)	9	–	N	9
SF***Hypericum canadense*** L.	x	–	X	10
Hypericum gentianoides (L.) Britton, Sterns & Poggenburg	x	–	X	7
Hypericum majus (A. Gray) Britton	–	x	X	6
Hypericum mutilum L.	x	x	X	8
Hypericum perforatum L.	x	x 13	X	*
SF***Hypopitys monotropa*** Crantz (*Monotropa hypopitys* L.)	4	–	R	10
Hypoxis hirsuta (L.) Coville	x	1	X	9
Impatiens capensis Meerb.	x	–	X	3
Ionactis linariifolia (L.) Greene (*Aster linariifolius* L.)	x	–	X	10
Ipomoea hederacea Jacq.	9	–	R	*
Iris germanica L.	9	–	R	*
Iris virginica L. (*I. virginica* var. *shrevei* (Small) E. S. Anderson)	x	x	X	5
Juglans nigra L.	9	–	R	5
Juncus acuminatus Michx.	x	–	X	6
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	9	–	R	7
Juncus anthelatus (Wiegand) R. E. Brooks	16	–	N	6

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Juncus brachycarpus Engelm.	x	–	X	9
Juncus brachycephalus (Engelm.) Buchenau	x	–	X	9
Juncus bufonius L.	9	–	R	5
Juncus canadensis J. Gay ex Laharpe	x	–	X	7
Juncus dudleyi Wiegand	x	x	X	4
Juncus effusus L.	9	–	R	7
Juncus greenei Oakes & Tuck.	9	–	R	8
Juncus interior Wiegand	9	–	R	6
Juncus marginatus Rostk.	x	x	X	9
Juncus marginatus Rostk. (*Juncus biflorus* Elliott)	R	–	R	10
Juncus nodosus L.	x 10	–	X	6
Juncus pylaei Laharpe	–	–	N	5
Juncus tenuis Willd.	x 9	x	X	0
Juncus torreyi Coville	x	x	X	4
Koeleria macrantha (Ledeb.) J.A. Schultes (*Koeleria cristata* (L.) Pers.)	x	–	X	7
Krigia biflora (Walter) S.F. Blake	x	1	X	7
Lactuca canadensis L.	x	x	X	2
Lathyrus latifolius L.	R	–	R	*
Lathyrus palustris L.	x	–	X	8
Lathyrus palustris L. (*Lathyrus palustris* var. *myrtifolius* (Willd.) A. Gray)	x	x	X	6
Lechea mucronata Raf. (*Lechea villosa* Elliott)	9	–	R	6
Lechea pulchella Raf. var. *moniliformis* (E.P. Bicknell ex Britton) Mohlenbrock (*Lechea pulchella* Raf.) (*Lechea leggettii moniliformis* (E.P. Bicknell) Hodgdon)	x	–	X	7
SF***Lechea stricta*** Legg. ex Britton	8	–	R	10
Lechea tenuifolia Michx.	R	–	R	8
Leersia oryzoides (L.) Sw.	x	x	X	4
Leersia virginica Willd.	–	x	X	7
Lemna minor L.	9	–	N	5
Lepidium campestre (L.) W.T. Aiton	x	x	X	*
Lepidium virginicum L.	x	1	X	0
Lespedeza capitata Michx.	x	x	X	4
Lespedeza hirta (L.) Hornem.	x	–	X	6
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte)	x	–	X	*
Liatris aspera Michx.	x	x	X	6
Liatris cylindracea Michx.	x	–	X	8
Liatris spicata (L.) Willd.	x	–	X	6

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Lilium michiganense Farw.	x	x	X	6
SF***Lilium philadelphicum*** L. (*Lilium philadelphicum* L. var. *andinum* (Nutt.) Ker Gawl.)	x	–	X	10
Linaria vulgaris Mill.	x	–	X	*
Lindernia dubia (L.) Pennell (includes *Lindernia anagallidea* (Michx.)	x	–	X	5
Linum medium (Planch.) Britton var. *texanum* (Planch.) Fernald	x	–	X	7
Linum usitatissimum L.	x	–	X	*
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	x	x	X	6
SF***Liparis loeselii*** (L.) Rich.	x	x	X	7
Lithospermum canescens (Michx.) Lehm.	x	x	X	8
Lithospermum caroliniense (Walter ex J.F. Gmel.) MacMill. var. *croceum* (Fernald) Cronquist (*Lithospermum croceum* Fernald)	x	1	X	8
Lobelia cardinalis L.	x	–	X	7
Lobelia spicata Lam.	x	–	X	6
Lonicera tatarica L.	9	–	N	*
Ludwigia alternifolia L.	x	x	X	6
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	x	–	X	5
Ludwigia polycarpa Short & R. Peter	x	–	X	6
Lupinus perennis L. var. *occidentalis* S. Watson	x	x	X	7
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	9	–	R	7
SF***Lycopodiella inundata*** (L.) Holub (*Lycopodium inundatum* L.)	x	–	X	10
Lycopus americanus Muhl. ex W.P.C. Barton	x	x	X	5
Lycopus rubellus Moench	x	–	X	10
Lycopus uniflorus Michx.	x	x	X	7
Lycopus virginicus L.	x	–	X	9
Lysimachia ciliata L.	–	x	X	4
Lysimachia lanceolata Walter	x	–	X	7
Lysimachia quadriflora Sims	x	x	X	9
Lysimachia terrestris (L.) Britton	x	–	X	8
Lysimachia thyrsiflora L.	x	–	X	9
Lythrum alatum Pursh	x	x	X	7
Lythrum salicaria L.	x	x	X	*
SF***Maianthemum canadense*** Desf.	9	–	N	10
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	x	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	x	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	–	X	5

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
SF***Malaxis unifolia*** Michx.	x	–	X	10
Malus domestica (Suckow) Borkhh. (*Malus pumila* Mill.)	9	–	R	*
Medicago lupulina L.	x	–	X	*
Melilotus alba Medik.	x	x	X	*
Melilotus officinalis (L.) Lam.	x	–	X	*
Mentha arvensis L. (*Mentha arvensis* L. var. *villosa* (Benth.) S. R. Stewart)	x	x	X	5
Micranthes pensylvanica (L.) Haw. (*Saxifraga pensylvanica* L.)	x	–	X	10
SF***Mimulus alatus*** Aiton	9	–	N	7
Mimulus ringens L.	x	x	X	6
Mirabilis nyctaginea (Michx.) MacMill.	9	–	R	ad
Moehringia lateriflora (L.) Fenzl	x	x	X	8
Mollugo verticillata L.	x	x	X	ad
Monarda fistulosa L.	x	x	X	4
Monarda punctata L.	x	x	X	5
Morus alba L.	–	x	X	*
Muhlenbergia frondosa (Poir.) Fernald	x	–	X	3
Muhlenbergia glomerata (Willd.) Trin.	x	–	X	10
Muhlenbergia mexicana (L.) Trin.	x	x	X	5
Muhlenbergia racemosa (Michx.) Britton, Sterns & Poggenburg	–	x	X	*
Muhlenbergia schreberi J. F. Gmel.	x	x	X	0
SF***Myosotis verna*** Nutt.	x	–	X	6
Najas flexilis (Willd.) Rostk. & W.L.E. Schmidt	9	–	R	6
Nepeta cataria L.	x	–	X	*
Nyssa sylvatica Marshall	x	–	X	8
Oenothera biennis L.	x	x	X	0
Oenothera clelandii W. Dietr., P. H. Raven, & W. L. Wagner (*Oenothera rhombipetala* Nutt.)	–	x	X	7
Oenothera pilosella Raf.	x	–	X	10
Onoclea sensibilis L.	x	x	X	8
SF***Ophioglossum pusillum*** Raf. (*Ophioglossum vulgatum* L. var. *pseudopodum* (S.F. Blake) Farw.)	x	x	X	9
Ornithogalum umbellatum L.	x	–	X	*
SF***Orobanche uniflora*** L.	7	–	N	10
Osmorhiza claytonii (Michx.) C.B. Clarke	9	–	N	3
Osmunda claytoniana L.	x	x	X	9
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	x	x	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	x	x	X	7
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	x	–	X	0

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Oxalis stricta L. (*Oxalis europaea* Jord.)	x	x	X	0
SF***Oxalis violacea*** L.	x	–	X	9
Oxypolis rigidior (L.) Raf.	x	x	X	7
Packera paupercula (Michx.) A. Löve & D. Löve (*Senecio pauperculus* Michx.)	x	1	X	6
Packera plattensis (Nutt.) W.A. Weber & A. Löve (*Senecio plattensis* Nutt.)	9	–	R	6
Panicum capillare L.	x	x	X	1
Panicum dichotomiflorum Michx.	–	x	X	0
Panicum rigidulum Bosc. ex Nees.	x	–	X	5
Panicum virgatum L.	x	x	X	5
Parthenium integrifolium L.	x	x	X	8
Parthenocissus quinquefolia (L.) Planch.	x	x	X	2
Parthenocissus vitacea (Knerr) Hitchc. (*Parthenocissus inserta* (A. Kern.) C. Fritsch)	x	x	X	1
Pastinaca sativa L.	x	–	X	*
Pedicularis canadensis L.	x	x	X	9
Pedicularis lanceolata Michx.	x	–	X	9
Penstemon calycosus Small	9	–	R	7
Penstemon digitalis Nutt. ex Sims	x	–	X	4
Penthorum sedoides L.	x	x	X	5
Persicaria amphibia (L.) Delarbre (*Polygonum amphibium* L. var. *stipulaceum* N. Coleman and *P. coccineum* Willd.)	x	x	X	4
SF***Persicaria careyi*** (Olney) Greene (*Polygonum careyi* Olney)	x	–	X	9
Persicaria hydropiper (L.) Spach (*Polygonum hydropiper* L.)	x	–	X	2
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	x	x	X	7
Persicaria lapathifolia (L.) Delarbe (*Polygonum lapathifolium* L.)	–	x	X	0
Persicaria maculosa A. Gray (*Polygonum persicaria* L.)	9	x	X	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	x	–	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	x	x	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	–	x	X	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	–	x	X	2
Phalaris arundinacea L.	x	x	X	*
Phleum pratense L. ssp. *pratense*	x	–	X	*
Phlox glaberrima L. ssp. *interior* (Wherry) Wherry (*Phlox glaberrima* L. var. *interior* (Wherry) Wherry)	x	x	X	8
Phlox paniculata L.	9	–	R	ad
Phlox pilosa L. ssp. *fulgida* (Wherry) Wherry	x	1	X	7
Physalis heterophylla Nees	x	x	X	3
Physalis longifolia Nutt. var. *subglabrata* (Mackenzie & Bush) Cronquist (*Physalis subglabrata* Mack. & Bush)	9	–	N	0
Physalis virginiana Mill.	x	–	X	4

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Physostegia virginiana (L.) Benth.	x	–	X	6
SF***Physostegia virginiana*** (L.) Benth. ssp. ***praemorsa*** (Shinners) P.D. Cantino (*P. virginiana* var. *arenaria* Shimek)	x	x	X	6
Phytolacca americana L.	–	x	X	1
Pilea pumila (L.) A. Gray	–	x	X	5
Plantago lanceolata L.	x	x	X	*
Plantago major L.	x	–	X	*
Plantago rugelii Decne.	x	–	X	0
SF***Plantago virginica*** L.	x	–	X	1
SF***Platanthera clavellata*** (Michx.) Luer (*Habenaria clavellata* (Michx.) Spreng.)	9	–	R	10
SF***Platanthera flava*** (L.) Lindl. var. ***herbiola*** (R. Br.) Luer (*Habenaria flava* (L.) R. Br. var. *herbiola* Ames & Correll)	x	–	X	10
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* Lodd.)	x	–	X	10
Poa annua L.	x	–	X	*
Poa compressa L.	x	x	X	*
Poa palustris L.	x	x	X	9
Poa pratensis L.	x	x	X	*
Podophyllum peltatum L.	x	–	X	4
SF***Pogonia ophioglossoides*** (L.) Ker Gawl.	4 9	–	X	10
Polygala cruciata L. var. *aquilonia* Fernald & B. G. Schub.	x	–	X	10
Polygala polygama Walter (*Polygala polygama* Walter var. *obtusata* Chodat)	9	–	R	9
Polygala sanguinea L.	9	–	R	6
Polygala senega L.	x	–	X	8
Polygala verticillata L. var. *isocycla* Fernald	x	–	X	7
Polygonatum biflorum (Walter) Elliott (*Polygonatum canaliculatum* (Muhl.) Pursh.)	x	–	X	3
Polygonum tenue Michx.	9	–	R	7
SF***Polytaenia nuttallii*** DC.	x	–	X	10
Populus deltoides W. Bartram ex Marshall	x	x	X	2
Populus grandidentata Michx.	x	–	X	6
Populus tremuloides Michx.	x	x	X	4
Portulaca oleracea L.	x	–	X	*
Potentilla norvegica L.	x	x	X	0
Potentilla recta L.	x	x	X	*
Potentilla simplex Michx.	x	x	X	4
Prenanthes alba L.	x	1	X	5
SF***Prenanthes aspera*** Michx.	x	–	X	8
Prenanthes racemosa Michx.	x	–	X	8

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Primula meadia (L.) A. R. Mast & Reveal (*Dodecatheon meadia* L.)	x	–	X	6
Proserpinaca palustris L. (*Proserpinaca palustris* var. *crebra* Fernald & Griscom)	x	–	X	6
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (W.P.C. Barton) Fernald)	x	x	X	0
Prunus americana Marshall	–	x	X	5
Prunus pumila L.	x	–	X	8
Prunus serotina Ehrh.	x	x	X	1
Prunus virginiana L.	x	x	X	3
Pseudognaphalium obtusifolium (L.) Hilliard & B.L. Burtt (*Gnaphalium obtusifolium* L.)	9	x	X	2
Ptelea trifoliata L. ssp. *trifoliata* (*Ptelea trifoliata* L. ssp. *trifoliata* var. *trifoliata*)	9	–	R	7
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	x	X	5
Pycnanthemum tenuifolium Schrad.	x	x	X	7
Pycnanthemum virginianum (L.) B.L. Rob. & Fernald	x	x	X	5
Quercus alba L.	x	x	X	5
Quercus coccinea Munchh.	4	–	N	4
Quercus ellipsoidalis E. J. Hill	17	–	N	4
Quercus palustris Munchh.	x	x	X	8
Quercus velutina Lam.	x	x	X	6
Ranunculus abortivus L.	x	–	X	0
Ranunculus fascicularis Muhl. ex Bigelow	x	–	X	6
Ranunculus flabellaris Raf.	x	–	X	7
Ranunculus pensylvanicus L. f.	x	–	X	6
Ranunculus recurvatus Poir.	9	–	R	5
Ranunculus sceleratus L.	x	–	X	6
Ratibida pinnata (Vent.) Barnhart	x	–	X	4
Rhamnus cathartica L.	4	–	R	*
SF***Rhexia virginica*** L.	x	x	X	10
Rhus copallinum L. var. *copallinum* Engl. (*R. copallinum* var. *latifolia* Engl.)	x	x	X	6
Rhus glabra L.	x	x	X	1
Rhus typhina L.	x	–	X	1
Rhynchospora capitellata (Michx.) Vahl	x	x	X	8
SF***Rhynchospora recognita*** (Gale) Kral (*Rhynchospora globularis* (Chapm.) Small var. *recognita*)	x	–	X	10
Ribes americanum Mill.	x	x	X	7
Ribes missouriense Nutt.	9	–	R	5
Robinia pseudoacacia L.	9	–	R	ad
Rorippa palustris (L.) Besser ssp. *palustris* (*R. palustris* var. *fernaldiana* (Butters & Abbe) Stuckey)	x	–	X	4

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Rosa carolina L.	x	x	X	5
Rosa multiflora Thunb.	x	x	X	*
Rosa palustris Marshall	9	x	X	7
Rotala ramosior (L.) Koehne	R	–	R	10
Rubus allegheniensis Porter	x	x	X	3
Rubus flagellaris Willd.	x	x	X	3
Rubus hispidus L.	x	x	X	9
Rubus occidentalis L.	x	x	X	2
Rubus pensilvanicus Poir.	x	x	X	3
SF***Rubus setosus*** Bigelow (*Rubus wheeleri* L.H. Bailey in W&R)	16	–	N	10
Rudbeckia hirta L.	x	–	X	1
Rumex acetosella L.	x	1	X	*
Rumex crispus L.	x	x	X	*
Rumex verticillatus L.	x	–	X	6
SF***Sagittaria brevirostra*** Mack. & Bush	x	–	X	7
Sagittaria latifolia Willd.	x	–	X	4
Salix alba L.	–	x	X	*
Salix amygdaloides Andersson	x	x	X	5
Salix babylonica L.	3	–	N	*
Salix discolor Muhl.	x	x	X	2
Salix eriocephala Michx.	x	x	X	5
Salix humilis Marshall	x	x	X	6
Salix interior Rowlee	x	x	X	1
Salix myricoides Muhl. (*Salix glaucophylloides* Fernald)	x	x	X	7
Salix nigra Marshall	x	x	X	4
Salix petiolaris Sm.	x	x	X	7
Salix × *glatfelteri* C. K. Schneid. [*S. amygdaloides* × *S. nigra*]	–	x	X	5
Salix × *fragilis* L. [*S. alba* × *S. euxina*] (*Salix* × *rubens* Schrank)	–	x	X	*
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli	x	x	X	1
Sanicula canadensis L.	x	x	X	7
Sanicula marilandica L.	9	–	R	6
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe (*Sanicula gregaria* E.P. Bicknell)	9	–	N	2
Saponaria officinalis L.	x	x	X	*
Sassafras albidum (Nutt.) Nees	x	–	X	3
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	–	x	X	*
Schizachyrium scoparium (Michx.) Nash	x	x	X	5
Schoenoplectus acutus (Muhl. ex Bigelow) A. Löve & D. Löve var. *acutus* (*Scirpus acutus* Bigelow)	x	–	X	6

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla (*Scirpus validus* Vahl. var. *creber* Fernald)	x	–	X	5
Scirpus atrovirens Willd.	x	–	X	4
Scirpus cyperinus (L.) Kunth	x	x	X	6
Scirpus pendulus Muhl.	R 9	–	R	4
Scleria triglomerata Michx.	9	–	R	10
Scrophularia lanceolata Pursh	x	x	X	5
Scutellaria galericulata L. (*Scutellaria epilobiifolia* A. Ham)	x	x	X	5
Scutellaria lateriflora L.	x	x	X	5
SF***Scutellaria parvula*** Michx. var. ***missouriensis*** (Torr.) Goodman & C.A. Lawson (*Scutellaria parvula* Muhl. var. *leonardii* (Epling) Fernald)	R	–	R	7
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	x	–	X	*
Setaria viridis (L.) P. Beauv.	–	x	X	*
Silene antirrhina L.	9	–	R	1
Silene dioica (L.) Clairville (*Lychnis dioica* L.)	9	–	R	*
Silene stellata (L.) W. T. Aiton	x	x	X	6
Silphium integrifolium Michx.	x	–	X	5
Silphium laciniatum L.	x	–	X	5
Silphium terebinthinaceum Jacq. var. *terebinthinaceum*	3	–	N	5
Sisyrinchium albidum Raf.	x	1	X	7
SF***Sisyrinchium angustifolium*** Mill.	9	–	R	10
Sium suave Walter	x	x	X	7
Solanum carolinense L.	9	x	X	ad
Solanum dulcamara L.	x	x	X	*
Solanum ptychanthum Dunal (*S. americanum* Mill.)	–	x	X	0
Solidago altissima L.	x	x	X	1
Solidago canadensis L.	–	x	X	1
Solidago gigantea Aiton	x	x	X	4
Solidago juncea Aiton	x	x	X	5
Solidago missouriensis Nutt. (*Solidago missouriensis* Nutt. var. *fasciculata* Holz.)	x	–	X	7
Solidago nemoralis Aiton	x	–	X	4
Solidago ohioensis Riddell	9	–	R	9
SF***Solidago ptarmicoides*** (Torr. & A. Gray) B. Boivin (*Aster ptarmicoides* (Nees) Torr. & A. Gray)	x	–	X	10
Solidago riddellii Frank	x	–	X	7
Solidago rigida L.	x	–	X	4
Solidago rugosa Mill.	x	–	X	6
SF***Solidago speciosa*** Nutt.	x	–	X	7

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Solidago uliginosa Nutt.	x	–	X	10
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman	x	–	X	*
Sonchus asper (L.) Hill	–	x	X	*
Sorghastrum nutans (L.) Nash	x	x	X	5
SF***Sparganium americanum*** Nutt.	9	–	R	10
Sparganium eurycarpum Engelm.	–	x	X	6
Spartina pectinata Link	x	x	X	4
Sphenopholis intermedia (Rydb.) Rydb.	x	–	X	4
Spiraea alba Du Roi	x	x	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	x	x	X	9
Spiranthes cernua (L.) Rich.	x	x	X	7
Sporobolus compositus (Poir.) Merr. var. *compositus (Sporobolus asper* (Michx.) Kunth)	–	x	X	ad
Sporobolus cryptandrus (Torr.) A. Gray	–	x	X	7
Sporobolus heterolepis (A. Gray) A. Gray	x	–	X	10
Stachys pilosa Nutt. (*Stachys palustris* L. var. *homotricha* Fernald)	x	–	X	5
Stachys hispida Pursh (*Stachys tenuifolia* Willd. var. *hispida* (Pursh) Fernald)	x	x	X	5
Stellaria graminea L.	x	–	X	*
SF***Strophostyles leiosperma*** (Torr. & A. Gray) Piper	x	–	X	9
Symphyotrichum dumosum (L.) G.L. Nesom (*Aster dumosus* L.)	x	–	X	5
Symphyotrichum ericoides (L.) G.L. Nesom (*Aster ericoides* L.)	x	x	X	5
Symphyotrichum laeve (L.) A. Löve & D. Löve var. *laeve* (*Aster laevis* L.)	9	–	N	9
SF***Symphyotrichum lanceolatum*** (Willd.) G.L. Nesom var. ***interior*** (Wiegand) G.L. Nesom (*Aster simplex* Willd.)	x	–	X	3
Symphyotrichum lanceolatum (Willd.) G.L. Nesom var. *lanceolatum* (*Aster simplex* Willd.)	x	x	X	3
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	9	–	R	4
Symphyotrichum novae-angliae (L.) G.L. Nesom (*Aster novae-angliae* L.)	x	–	X	4
Symphyotrichum oolentangiense (Riddell) G.L. Nesom (*Aster azureus* Lindl.)	x	x	X	8
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	x	x	X	0
Symphyotrichum praealtum (Poir.) G.L. Nesom (*Aster praealtus* Poir.)	x	x	X	9
Syringa vulgaris L.	9	–	R	*
Taenidia integerrima (L.) Drude	x	–	X	9
Taraxacum officinale F. H. Wiggers	x	x	X	*
Tephrosia virginiana (L.) Pers.	x	x	X	8
Teucrium canadense L.	x	–	X	3
Thalictrum amphibolum Greene (*Thalictrum revolutum* DC)	x	x	X	6
Thalictrum dasycarpum Fisch. & Avé-Lall.	x	x	X	5
Thalictrum dioicum L.	9	–	R	7

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Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin	x	–	X	7
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	x	x	X	6
Thlaspi arvense L.	–	1	N	*
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	x	X	2
SF***Toxicodendron vernix*** (L.) Kuntze (*Rhus vernix* L.)	4	–	R	10
Tradescantia ohiensis Raf.	x	x	X	2
Tragopogon pratensis L.	9	1	R	*
Triadenum fraseri (Spach) Gleason (*Hypericum virginicum* L. var. *fraseri* (Spach) Fernald)	x	–	X	8
Trifolium aureum Pollich	9	–	R	*
Trifolium hybridum L.	9	–	R	*
Trifolium pratense L.	x	–	X	*
Trifolium repens L.	x	–	X	*
Trillium recurvatum L. C. Beck	x	–	X	5
Triosteum aurantiacum E.P. Bicknell	–	x	X	5
Typha angustifolia L.	x	–	X	1
Typha latifolia L.	x	–	X	1
Typha × *glauca* Godr. (*T. angustifolia* × *T. latifolia*)	–	x	X	1
Ulmus americana L.	4	–	N	3
Ulmus rubra Muhl.	9	–	R	4
Urtica dioica L. ssp. *gracilis* (Aiton) Selander (*Urtica procera* Willd.)	–	x	X	2
SF***Utricularia gibba*** L.	9	–	R	10
SF***Utricularia subulata*** L.	x	–	X	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen	9	–	R	9
Vaccinium angustifolium Aiton	x	x	X	5
SF***Vaccinium myrtilloides*** Michx.	–	10 12	N	10
Vaccinium pallidum Aiton	x	x	X	5
Verbascum blattaria L.	R	–	R	*
Verbascum thapsus L. ssp. *thapsus*	x	x	X	*
Verbena hastata L.	x	x	X	4
SF***Verbena simplex*** Lehm.	–	x	X	6
Verbena stricta Vent.	x	x	X	4
Verbena urticifolia L.	9	x	X	5
Vernonia fasciculata Michx.	x	–	X	5
Vernonia gigantea (Walter) Trel. ex Branner & Coville (*Vernonia altissima* Nutt. var. *taeniotricha* S.F. Blake)	–	x	X	5
Vernonia missurica Raf.	x	x	X	4

Table 45 (continued). Summary of species verified and reported at Hoosier Prairie Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 46. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Veronica arvensis L.	9	1	R	*
Veronica peregrina L.	x	–	X	0
Veronica scutellata L.	x	x	X	10
Veronica serpyllifolia L.	x	–	X	*
Veronicastrum virginicum (L.) Farw.	x	x	X	7
Viburnum lentago L.	5	–	N	5
Viburnum opulus L. var. *opulus*	–	x	X	*
Vicia americana Muhl. ex Willd.	x	–	X	7
Viola lanceolata L.	x	–	X	7
Viola pedata L. (*Viola pedata* var. *linearíloba* Ging.)	x	–	X	9
SF***Viola sagittata*** Aiton var. ***ovata*** (Nutt.) Torr. & A. Gray (*Viola fimbriatula* Sm.)	x	–	X	6
Viola sagittata Aiton var. *sagittata*	x	–	X	7
Viola sororia Willd.	x	–	X	3
Vitis aestivalis Michx.	–	x	X	7
Vitis riparia Michx.	x	x	X	2
Wisteria frutescens (L.) Poir. (*Wisteria macrostachya* Nutt.)	R	–	R	*
Xanthium strumarium L.	x	–	X	*
SF***Xyris torta*** Sm.	x	–	X	10
Zea mays L.	R	–	R	*
Zizia aurea (L.) W. D. J. Koch	x	1	X	7

Table 46. Sources of new species verified and reported from Hoosier Prairie at INDU.

Notes	Source(s)	Date	Species
1	I. Herlocker and G. Livovich	30 May 2000	*Anemone quinquefolia*, *Bromus commutatus*, *Carex muehlenbergii*, *Dichanthelium oligosanthes* ssp. *oligosanthes*, *Geranium carolinianum*, *Geranium maculatum*, *Hieracium piloselloides*, *Houstonia caerulea*, *Hypoxis hirsuta*, *Krigia biflora*, *Lepidium virginicum*, *Lithospermum caroliniense*, *Packera paupercula*, *Phlox pilosa* ssp. *fulgida*, *Prenanthes alba*, *Rumex acetosella*, *Sisyrinchium albidum*, *Thlaspi arvense*, *Tragopogon pratensis*, *Veronica arvensis*, *Zizia aurea*
2	IN DNP	1982	*Corallorhiza odontorhiza*
3	IN DNP	1987	*Agalinis skinneriana*, *Athyrium filix-femina* var. *angustum*, *Carex cephalophora*, *Carex meadii*, *Salix babylonica*, *Silphium terebinthinaceum* var. *terebinthinaceum*
4	IN DNP	1988	*Hypopitys monotropa*, *Pogonia ophioglossoides*, *Quercus coccinea*, *Rhamnus cathartica*, *Toxicodendron vernix*, *Ulmus americana*
5	IN DNP	1989	*Viburnum lentago*
6	IN DNP	1990	*Dipsacus fullonum*, *Erythronium albidum*
7	IN DNP	1991	*Orobanche uniflora*
8	IN DNP	25 Sept 1995	*Lechea stricta*
9	IN DNP	24 Oct 1995	*Agalinis auriculata*, *Alopecurus aequalis*, *Alopecurus carolinianus*, *Amaranthus retroflexus*, *Amelanchier laevis*, *Anemone cylindrica*, *Apocynum cannabinum*, *Bartonia virginica*, *Berberis thunbergii*, *Blephilia hirsuta*, *Botrychium virginianum*, *Bromus pubescens*, *Bromus tectorum*, *Bulbostylis capillaris*, *Capsella bursa-pastoris*, *Cardamine pensylvanica*, *Carex bicknellii*, *Carex emoryi*, *Carex hystricina*, *Carex sartwellii*, *Carex siccata*, *Carex sterilis*, *Carex tetanica*, *Carex vesicaria* var. *monile*, *Carex vulpinoidea*, *Cerastium brachypodum*, *Clinopodium vulgare*, *Crocanthemum bicknellii*, *Crotalaria sagittalis*, *Cypripedium parviflorum* var. *pubescens*, *Dianthus armeria*, *Dichanthelium acuminatum* ssp. *implicatum*, *Dichanthelium acuminatum* ssp. *spretum*, *Dichanthelium depauperatum*, *Dichanthelium sphaerocarpon*, *Diervilla lonicera*, *Dulichium arundinaceum*, *Eleocharis compressa*, *Eleocharis palustris*, *Eleocharis quinqueflora*, *Eleocharis tenuis*, *Elymus virginicus*, *Epilobium strictum*, *Equisetum hyemale* ssp. *affine*, *Erigeron pulchellus*, *Eriophorum angustifolium*, *Euphorbia nutans*, *Euthamia caroliniana*, *Galium aparine*, *Galium asprellum*, *Galium tinctorium*, *Galium trifidum*, *Geum laciniatum*, *Glyceria septentrionalis*, *Gratiola neglecta*, *Helenium autumnale*, *Helenium flexuosum*, *Hemerocallis fulva*, *Heracleum sphondylium* ssp. *montanum*, *Hieracium longipilum*, *Hydrophyllum virginianum*, *Hylodesmum nudiflorum*, *Ipomoea hederacea*, *Iris germanica*, *Juglans nigra*, *Juncus alpinoarticulatus*, *Juncus bufonius*, *Juncus effusus*, *Juncus greenei*, *Juncus interior*, *Juncus tenuis*, *Lechea mucronata*, *Lemna minor*, *Lonicera tatarica*, *Luzula multiflora*, *Maianthemum canadense*, *Malus domestica*, *Mimulus alatus*, *Mirabilis nyctaginea*, *Najas flexilis*, *Osmorhiza claytonia*, *Packera plattensis*, *Penstemon calycosus*, *Persicaria maculosa*, *Phlox paniculata*, *Physalis longifolia* var. *subglabrata*, *Platanthera clavellata*, *Pogonia ophioglossoides*, *Polygala polygama*, *Polygala sanguinea*, *Polygonum tenue*, *Pseudognaphalium obtusifolium*, *Ptelea trifoliata* ssp. *trifoliata*, *Ranunculus recurvatus*, *Ribes missouriense*, *Robinia pseudoacacia*, *Rosa palustris*, *Sanicula marilandica*, *Sanicula odurata*, *Scirpus pendulus*, *Scleria triglomerata*, *Silene antirrhina*, *Silene dioica*, *Sisyrinchium angustifolium*, *Solanum carolinense*, *Solidago ohioensis*, *Sparganium americanum*, *Symphyotrichum laeve*, *Symphyotrichum lateriflorum*, *Syringa vulgaris*, *Thalictrum dioicum*, *Tragopogon pratensis*, *Trifolium aureum*, *Trifolium hybridum*, *Ulmus rubra*, *Utricularia gibba*, *Utricularia vulgaris* ssp. *macrorhiza*, *Verbena urticifolia*, *Veronica arvensis*
10	Pavlovic et al. (Exotic Project)	7 Aug 2000	*Juncus nodosus*, *Vaccinium myrtilloides*
11	B. Plampin and M. Newgent	Aug 1995	*Cephalanthus occidentalis*
12	T. Post	31 May 2002	*Vaccinium myrtilloides*
13	D. Petro (in Gaylord tract?)	Sept 1990	*Hieracium longipilum*, *Hypericum perforatum*
14	M. Medley (MOR)	4 Oct 1975	*Desmanthus illinoensis*

Table 46 (continued). Sources of new species verified and reported from Hoosier Prairie at INDU.

Notes	Source(s)	Date	Species
17	A.L. Hipp (MOR)	24 Sept 2007	*Quercus ellipsoidalis*
16	P. Rothrock	10 July 2008	*Juncus anthelatus*
15	P. Rothrock	16 June 2008	*Carex crawei*
16	Rericha and Wilhelm	15 June 2003	*Rubus setosus* (*Rubus wheeleri* W&R)

Special flora summary

The entire Hoosier Prairie Unit (including both subunits) provides habitat for 84 special flora species (formerly 53; Wilhelm (1990)), a 58% increase from 1990. Fifty-one special flora are confirmed, and 12 are new, 19 reported, and two are extirpated. Six (12%) of the special floristic elements known from the Hoosier Prairie Unit were considered by Peattie (1922), Hoober (1934), McLaughlin (1932), Parker (1936), and Trefz (1935) to have ancestral affinities to the Atlantic coastal plain, while four others (8%) were considered by Welch (1935) to be boreal relicts (Wilhelm 1990). One report of *Betula papyrifera* from Indiana Department of Natural Resources (1995) is probably a misidentification since it is unlikely to occur so far south of the moderating effect of Lake Michigan.

Sixteen new special flora species to Hoosier Prairie include *Agalinis skinneriana*, *Bartonia virginica*, *Carex crawei*, *Carex trichocarpa*, *Dichanthelium oligosanthes*, *Epilobium ciliatum*, *Eriocaulon aquaticum*, *Euthamia caroliniana*, *Galium trifidum*, *Maianthemum canadense*, *Mimulus alatus*, *Orobanche uniflora*, *Physostegia virginiana praemorsa*, *Vaccinium myrtilloides*, and *Verbena simplex*. Special flora believed to be extirpated include *Lechea stricta* and *Polytaenia nuttallii*.

Another species on the Indiana Department of Natural Resources (1995) plant list is *Cyperus dentatus*, also a likely misidentification since this species has not been reported from Lake County. It is only from east of Porter County (Wilhelm and Rericha 2017) and from Tefft Savanna at the Jasper Pulaski Fish and Game Area (Wilhelm 1990). Until a specimen is procured, we remain skeptical that this species grows at Hoosier Prairie.

Twenty-seven (about 30%) of the special floristic elements known from Hoosier Prairie are unknown from any other Indiana Dunes Unit. These include *Agalinis auriculata*, *A. skinneriana*, *Anthoxanthum nitens*, *Arnoglossum plantagineum*, *Baptisia tinctoria*, *Cardamine parviflora*, *Carex crawei*, *C. trichocarpa*, *Corydalis sempervirens*, *Crocanthemum bicknellii*, *Crotalaria sagittalis*, *Desmanthus illinoensis*, *Drymocallis arguta*, *Eleocharis wolfii*, *Epilobium strictum*, *Euthamia caroliniana*, *Lechea stricta*, *Myosotis verna*, *Plantago virginica*, *Polytaenia nuttallii*, *Prenanthes aspera*, *Sagittaria brevirostra*, *Scutellaria parvula* var. *missouriensis*, *Strophostyles leiosperma*, *Vaccinium myrtilloides*, and *Verbena simplex*.

Floristic summary

Hoosier Prairie provides habitat for 667 taxa, including 559 native taxa, 13 adventive taxa, and 95 exotic taxa. Of the 559 native taxa, 542 are native species, 14 are varieties, and three are hybrids. There are 13 adventive species and 95 exotic species known to occur at Hoosier Prairie (Table 47). New exotic species include *Bromus commutatus*, *Dipsacus fullonum*, *Hieracium piloselloides*, *Lonicera tatarica*, *Salix babylonica*, and *Thlaspi arvense*. Of the 47 state-listed species found at Hoosier Prairie, nine are endangered, 19 are threatened, 17 are on the watch list, and two are extirpated (*Lechea stricta* and *Polytaenia nuttallii*).

Wilhelm (1980) found 323 native species in the Hoosier Prairie Unit. By 1990, the number of known species increased to 475 after much brush cutting, clearing, and prescribed burning by the Indiana Division of Nature Preserves. The number of known native species (542) results in a mean C of 5.72 and an FQI of 136.

Table 47. Summary of floristic statistics by subunit of Hoosier Prairie. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit		Entire Unit
	A	*B*	
Area (ha/acres):	193/478	86/212	279/689
Special flora total	79	9	84
Confirmed	48	8	51
New	27	1	12
Reported	3	0	19
Extirpated	1	0	2
Total taxa, FNA/ITIS	608	312	667
Total native taxa, FNA/ITIS	516	266	559
Native species, FNA/ITIS	505	257	542
Native variety, FNA/ITIS	6	6	14
Native hybrid, FNA/ITIS	1	3	3
Total adventive taxa, FNA/ITIS	10	5	13
Total adventive species,FNA/ITIS	10	5	13
Total adventive variety, FNA/ITIS	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0
Total exotic taxa, FNA/ITIS	82	41	95
Total exotic species, FNA/ITIS	82	39	93
Total exotic variety, FNA/ITIS	0	1	1
Total exotic hybrid, FNA/ITIS	0	1	1
Total Indiana Listed	44	6	47
Endangered	8	1	9
Threatened	8	2	19
Rare	0	0	0
Watch List	16	3	17
Extirpated	2	0	2
Sum CC	3,054	1,319	3,247
Sum CC adventive & invasive	2,967	1,276	3,146
Mean CoC	6	5	6
Mean CoC with adventive and invasive	5	4	5
FQI	133	80	136
FQI with adventive and invasive	119	72	121

Several other taxa have been erroneously reported from Hoosier Prairie: *Betula papyrifera*, *Carex artitecta*, *C. eburnea*, *C. gracillima*, *Cyperus dentatus*, *Diphasiastrum digitatum*, *Eleocharis quinqueflora*, *Luzula acuminata*, *Rhynchospora scirpoides*, *Schoenoplectiella purshiana*, and *Viola canadensis*. Their attribution to Hoosier Prairie, we feel, may be the result of some clerical error, or of specimen misidentification.

Hoosier Prairie A

Hoosier Prairie A was the core unit first acquired by the park and has been managed the longest of this entire unit. It has 505 native species, 82 exotic species, and 10 adventive species. It has a mean C of 5.82 and an FQI of 133.

Hoosier Prairie B

Hoosier Prairie B has been less managed than subunit A and has 257 native species, 39 exotics, and five adventive species. Thus, the mean CoC is less than for subunit A at 4.85 and the FQI is 80.

Conservation issues

The uplands of Hoosier Prairie consist of both mesophytic prairie and savanna complex, which are often intermixed. Most of Hoosier Prairie is too wet, or too sandy, or too populated by black oak to classify as mesophytic prairie, but high floristic similarity makes the entire complex important for diversity. The mesophytic prairie patches are quite small but abundant and might be better called prairie openings (Curtis 1959, Easterly 1979, Grigore and Windus 1994, Pavlovic et al. 2006).

Prior to protection, Irene Herlocker and Terry McCloskey constantly kept watchful eyes on the prairie with respect to public use and access. In the 1980s, Ken Klick labored hundreds of hours cutting aspens and removing exotics. John Bacone took the initiative to set up sampling transects throughout the prairie to monitor and evaluate the effects of the various management techniques. Such management was conducted by Thomas Post (retired from Division of Nature Preserves). Alan Haney and Steve Apfelbaum recorded the demographics of canopy and shrub species to describe cohort structure and recruitment (Haney et al. 1986). The Indiana Division of Nature Preserves (principally Emily Stork and Tom Post) continues to monitor its management and enlarge our understanding of this prairie. Much of Hoosier Prairie A had the formerly abundant oak sprouts

thinned and removed, improving the habitat for herbaceous species (Pavlovic, personal observation, 16 May 2020).

The Gaylord Butterfly Tract of subunit B has not been regularly managed by the NPS, in part because the site is so far away from the rest of INDU. It is difficult to manage all areas in an urban national park that is fragmented and has multiple subunits requiring different management practices. Illegal off-road vehicle activity has trampled portions of the vegetation to the north by the train tracks (Pavlovic, personal observation). The Gaylord Butterfly Tract has burned in the past due to its proximity to a major train line as a source of ignition and as evidenced by copious oak sprouting, but the date of prior burns is not known (Pavlovic, personal observation). It was quite a surprise to discover plants such as *Vaccinium myrtilloides* growing there. We suspect that deer abundance might be high given the residential and industrial development surrounding the site. An observation that might contribute to species loss or decline from overbrowsing. Laura Brenen reported in the first decade of the 2000s that removal of buckthorn on a portion of this tract resulted in the resurgence of a sedge meadow.

Despite the loss of prairie parsley, Hoosier Prairie has benefited from the almost four decades of management. Acquisition of adjacent parcels of land, particularly south of the Gaylord Butterfly Tract, has provided a buffer around this protected area.

Unit 15: Pinhook Bog

Pinhook Bog rates very high in quality, and its physical characteristics are such that it is likely to remain in high quality unless there are drastic local changes. However, the average farmer or practical-minded individual can see little value in an old wet bog infested with insects and poison sumac. Consequently, many which once existed have been destroyed, and many others will. This area is not unique. There are other bogs in northern Indiana, but I doubt if many are of similar quality of Pinhook. This one bog has many of the features one would expect to see in a bog, and the small marsh and swamp near the Jackman residence gives a sharp contrast between the species found in a marsh and a bog. Any student of biology would be well repaid by a visit to Pinhook. . . .

I hereby recommend Pinhook Bog be designated a Natural Landmark.

—Maurice Sullivan (1967)

Pinhook Bog was once known as Jackman's Bog, the name of the landowner prior to the purchase by the National Park Service. Despite the Jackman name, the bog was actually owned by his wife (Sullivan 1967). The bog occupies a little over 203 hectares (501 acres), about half of which have been highly disturbed (Figure 29). Situated on the Valparaiso moraine, Pinhook Bog is habitat for mesophytic forest (beech-maple), the bog, marsh complex, swamp forest, and oak-hickory forest on the uplands. Old fields and home sites are slowly changing to low-diversity forest with dominance of invasive plants. Wilhelm (1990) divided Pinhook Bog into two discrete survey areas: the uplands (subunit A) that surround the bog, and the bog and swamp complex (subunit B). In addition to numerous visits over the years, Wilhelm made formal surveys of these areas prior to 1990 (Wilhelm 1990).

When Wilhelm first surveyed Pinhook Bog in 1980, "little had been written about it outside of the brief discussion by Lindsey (1966), stating it was one of the finest bogs in the state" (Wilhelm 1990). Also at that time, visitors had to stop by Mr. Jackman's house and sign his register before beginning the descent to the bog (Daryl Blink, former NPS ranger, pers. comm. with Pavlovic,

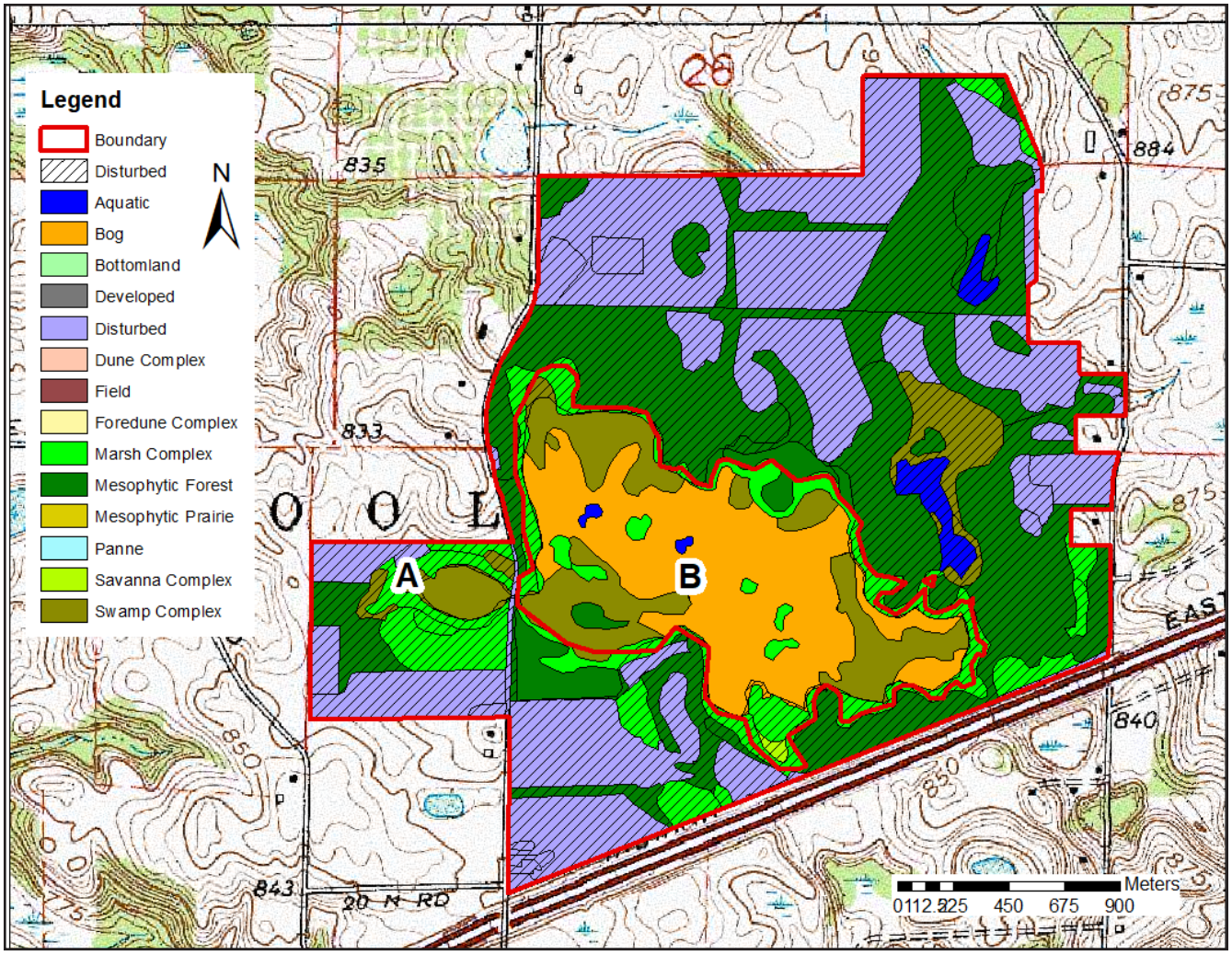


Figure 29. Vegetation of Pinhook Bog Unit. Letters indicate subunits. Cross-hatching indicates disturbed areas.

15 June 2019). Since then, access has been restricted due to the rarity and sensitivity of the bog and its watershed. Now the north trail outside the bog proper is open to the public. What attracts the visitors was and is the unusual and best quality bog in Indiana in terms of its flora. The insectivorous plants attract considerable interest.

Former NPS aquatic ecologist Doug Wilcox's interest in this bog first arose from the fact that highway salt from a nearby storage area along the Indiana Toll Road drained into the southern basin and impacted about five acres of the 36-hectare (90-acre) peatland (Wilcox 1979). Wilcox's studies resulted in definitive works on the effects of salt intrusion on both the vegetation and water chemistry of the impacted area (Wilcox 1986a, 1986b) and culminated in a complete discussion on the stratigraphy of the bog and the ontogeny of the floating mat (Wilcox and Simonin 1987).

In addition, Andrus and Wilcox (1985) pointed out that Pinhook Bog is an extremely significant natural area in Indiana for the genus *Sphagnum*. Of the 28 species of *Sphagnum* known from the state, more than half of them grow in Pinhook Bog. Andrus and Wilcox reported that *Sphagnum papillosum* Lindb., *S. pulchrum* (Braithw.) Warnst., and *S. riparium* Angstr. are known in Indiana only from here. They also noted that *S. bartlettianum* Warnst., a species restricted to the southeastern coastal plain, is known in the interior United States only from Pinhook Bog, and that *S. recurvum* P. Beauv. has coastal plain affinities. Since 2012, and until his death on 29 August 2018, David Hamilla studied the modern identification and distribution of *Sphagnum* species in the park to assist Daniel Mason, INDU botanist. Hamilla found the taxonomy of this species

challenging even after consulting with national experts. He recorded the following 15 species from Pinhook Bog: *Sphagnum affine* Ren. & Card.; *S. angustifolium* C. Jens. ex Russ.) C. Jens.; *S. bartlettianum* Warnst.; *S. capilifolium* (Ehrh.) Hedw.; *S. cuspidatum* Ehrh. ex Hoffm., *S. fallax* (Klinggr.) Klinggr.; *S. fimbriatum* Wils.; *S. flexuosum* Dozy & Molk.; *S. henryense* Warnst.; *S. magellenicum* Brid.; *S. papillosum* Lindb.; *S. pulchrum* (Lindb. ex Brainthw.) Warnst.; *S. recurvum* P. Beauv.; *S. riparium* Angstr.; *S. squarrosum*; and *S. teres* (Schimp.) Angstr. (Hamilla 2014). The complete vascular flora of Pinhook Bog is listed below (Table 48).

Special flora summary

Pinhook Bog is habitat for at least 81 special flora (formerly 69; Wilhelm (1990)). Sixty-nine are confirmed, six are new, two are reported, and four are extirpated. Sixteen percent of the special flora were considered by Peattie (1922), McLaughlin (1932), and Hoober (1934) to have ancestral affinities to the Atlantic coastal plain, while Welch (1935), Parker (1936), and Friesner (1937) considered nine species (13%) to be boreal relicts. New special flora found in Pinhook Bog since 1990 include *Carex bebbii*, *Eriophorum tenellum*, *Goodyera pubescens*, *Spiranthes ovalis erostellata*, and *Utricularia cornuta*. Species that were added as new

Table 48. Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Acalypha rhomboidea Raf.	x	–	X	0
Acer nigrum F. Michx.	7	–	N	5
Acer rubrum L.	x	x	X	7
Acer saccharum Marshall	x	–	X	3
Achillea millefolium L.	–	–	X	*
Actaea pachypoda Elliott	x	–	X	7
SF*Actaea rubra* (Aiton) Willd.	x	–	X	10
Ageratina altissima (L.) R.M. King & H. Rob. var. *altissima* (*Eupatorium rugosum* Houtt.)	x	–	X	4
Agrimonia gryposepala Wallr.	x	–	X	2
Agrimonia parviflora Aiton	x	–	X	7
Agrostis gigantea Roth (*Agrostis alba* L.)	x 3	–	X	*
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	x	–	X	1
Agrostis perennans (Walter) Tuck.	x	–	X	3
Ajuga reptans L.	x	–	N	*
Alisma subcordatum Raf.	–	x	X	4
Alisma triviale Pursh	–	x	X	4
Allium tricoccum Aiton	x	–	X	7
Allium tricoccum Aiton var. *burdickii* Hanes	x	–	X	6
Alopecurus aequalis Sobol.	–	R 16	R	6
Ambrosia artemisiifolia L. (*Ambrosia artemisiifolia* L. var. *elatior* (L.) Descourt.)	x	–	X	0

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Amelanchier arborea (F. Michx.) Fernald	x	–	X	8
Amelanchier laevis Wiegand	x	x	X	8
SF***Andromeda polifolia*** L. var. ***latifolia*** Aiton (*Andromeda glaucophylla* Link)	–	x	X	10
Anemone acutiloba (DC.) G. Lawson (*Hepatica acutiloba* DC.)	x	–	X	6
Anemone quinquefolia L. var. *quinquefolia* (*Anemone quinquefolia* L.)	x	–	X	7
Antennaria howellii Greene ssp. *petaloidea* (Fernald) R. J. Bayer (*Antennaria neglecta* Greene)	x	–	X	4
Antennaria parlinii Fernald (*Antennaria plantaginifolia* (L.) Richardson)	x	–	X	3
Apios americana Medik.	x	–	X	7
Arabidopsis thaliana (L.) Heynh.	–	–	X	*
Aralia nudicaulis L.	x	–	X	8
Arisaema triphyllum (L.) Schott	x	–	X	4
SF***Aristolochia serpentaria*** L.	x	–	X	10
Aronia × *prunifolia* (Marshall) Rehder [*A. melanocarpa* × *A. arbutifolia*] (*Aronia prunifolia* (Michx.) Rehder)	–	x	X	6
Asarum canadense L.	x	–	X	7
Asclepias amplexicaulis Sm.	x	–	X	7
Asclepias incarnata L.	–	x	X	4
Asclepias syriaca L.	x	–	X	0
Asclepias tuberosa L.	x	–	X	7
Asimina triloba (L.) Dunal	15	–	N	10
Asplenium platyneuron (L.) Britton, Sterns & Poggenburg (*Asplenium platyneuron* (L.) Oakes)	x	–	X	4
Athyrium filix-femina (L.) Roth ex Mertens var. *angustum* (Willd.) G. Lawson (*Athyrium filix-femina* (L.) Roth var. *michauxii* (Spreng.) Farw.)	x	–	X	8
Aureolaria flava (L.) Farw.	x	–	X	9
Barbarea vulgaris W.T. Aiton	–	–	X	*
SF***Bartonia virginica*** (L.) Britton, Sterns & Poggenburg	–	x	X	10
SF***Betula populifolia*** Marshall	–	x	X	10
SF***Bidens discoidea*** (Torr. & A. Gray) Britton	–	x	X	9
Bidens frondosa L.	–	x	X	1
Bidens trichosperma (Michx.) Britton (*Bidens coronata* (L.) Britton)	–	x	X	9
Bidens tripartita L. (*Bidens comosa* (A. Gray) Wiegand)	–	x	X	5
Blephilia hirsuta (Pursh) Benth.	x	–	X	8
Boehmeria cylindrica (L.) Sw.	x	–	X	2
Bolboschoenus fluviatilis (Torr.) Sojak (*Scirpus fluviatilis* (Torr.) A. Gray)	–	x	X	4
Botrychium virginianum (L.) Sw.	x	–	X	6
SF***Brasenia schreberi*** J.F. Gmel.	–	x	X	10
Bromus inermis Leyss.	–	–	X	*
Bromus pubescens Spreng.	x	–	X	5

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Bromus tectorum L.	–	–	X	*
Calamagrostis canadensis (Michx.) P. Beauv.	–	x	X	3
SF Calla palustris L.	x	x	X	10
SF Calopogon tuberosus (L.) Britton, Sterns & Poggenburg var. ***tuberosus*** (*Calopogon tuberosus* (L.) BSP.)	–	x	X	10
Caltha palustris L.	–	x	X	5
Capsella bursa-pastoris (L.) Medik.	–	–	X	*
Cardamine bulbosa (Schreb. ex Muhl.) Britton, Sterns & Poggenburg (*Cardamine bulbosa* (Muhl.) Britton, Sterns & Poggenburg)	x	–	X	6
Cardamine concatenata (Michx.) O. Schwarz (*Dentaria laciniata* Willd.)	x	–	X	5
Carex albolutescens Schwein.	x	–	X	8
Carex albursina E. Sheld.	x	–	X	7
SF Carex atherodes Spreng.	–	x	X	5
SF Carex bebbii (L.H. Bailey) Olney ex Fernald	–	12	N	6
SF Carex canescens L. ssp. ***disjuncta*** (Fernald) Toivonen	–	x	X	10
SF Carex careyana Torr. ex Dewey	x	–	X	10
SF Carex chordorrhiza L.f.	–	x	X	10
Carex comosa Boott	–	x	X	5
Carex crinita Lam. var. *crinita*	–	x	X	10
SF Carex digitalis Willd.	x	–	X	10
Carex gracillima Schwein.	x	–	X	10
Carex grayi J. Carey	–	x	X	7
SF Carex intumescens Rudge	x	x	X	10
Carex jamesii Schwein.	x	–	X	5
Carex lacustris Willd.	–	x	X	6
Carex lasiocarpa Ehrh. ssp. *americana* (Fernald) Hulten (*Carex lasiocarpa* Ehrh. var. *americana* Fernald)	–	x	X	10
Carex laxiflora Lam.	x	–	X	10
SF Carex leptonervia (Fernald) Fernald	x	–	X	10
SF Carex limosa L.	–	x	X	10
Carex lurida Wahlenb.	–	x	X	8
SF Carex oligosperma Michx.	–	x	X	10
Carex pellita Willd.	–	x	X	4
Carex pensylvanica Lam.	x	–	X	5
Carex rosea Schkuhr ex Willd.	x	–	X	4
SF Carex seorsa Howe	x	–	X	10
Carex sparganioides Muhl. ex Willd.	x	–	X	3
Carex sterilis Willd.	–	x	X	10
Carex stipata Muhl. ex Willd.	–	x	X	3
Carex suberecta (Olney) Britton	–	x	X	8

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Carex swanii (Fernald) Mack.	x	–	X	8
Carex tribuloides Wahlenb.	–	x	X	3
SF***Carex trisperma*** Dewey	x	–	X	10
Carex utriculata Boott	–	x	X	10
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow (*Carpinus caroliniana* Walter var. *virginiana* (Marshall) Fernald)	x	–	X	8
Carya cordiformis (Wangenh.) K. Koch	x	–	X	7
SF***Carya glabra*** (Mill.) Sweet (includes former *C. ovalis* (Wangenh.) Sarg.)	x	–	X	5
SF***Carya ovata*** (Mill.) K. Koch	x	–	X	5
Caulophyllum thalictroides (L.) Michx.	x	–	X	8
SF***Celastrus scandens*** L.	x	–	X	4
Celtis occidentalis L.	x	–	X	3
Cephalanthus occidentalis L.	–	x	X	5
Cerastium fontanum Baumg. ssp. *vulgare* (Hartman) Greuter & Burdet (*Cerastium vulgatum* L.)	–	–	X	*
SF***Chamaedaphne calyculata*** (L.) Moench (*Chamaedaphne calyculata* (L.) Moench var. *angustifolia* (Aiton) Rehder)	–	x	X	10
Chelone glabra L.	x	–	X	8
Chenopodium album L.	–	–	X	*
Cichorium intybus L.	–	–	X	*
Cicuta bulbifera L.	–	x	X	8
Cicuta maculata L.	–	x	X	6
Circaea canadensis (L.) Hill ssp. *canadensis* (*Circaea lutetiana* L. var. *canadensis* L.)	x	–	X	1
Cirsium arvense (L.) Scop.	x	–	X	*
Cirsium vulgare (Savi) Ten.	x	–	X	*
Claytonia virginica L.	x	–	X	2
SF***Comarum palustre*** L. (*Potentilla palustris* (L.) Scop.)	–	x	X	10
SF***Conopholis americana*** (L.) Wallr.	x	–	X	10
Convolvulus arvensis L.	–	–	X	*
Cornus alternifolia L. f.	x	–	X	9
Cornus florida L.	–	x	X	8
Cornus obliqua Raf.	x	–	X	6
Cornus racemosa Lam.	x	–	X	1
Corylus americana Walter	x	–	X	5
Crataegus macrosperma Ashe (*Crataegus flabellata* Ashe)	x	–	X	5
Crataegus pruinosa (H.L. Wendl.) K. Koch	x	–	X	5
Cryptotaenia canadensis (L.) DC.	x	–	X	2
Cuscuta gronovii Willd. ex Schult.	x	x	X	4
Cyperus bipartitus Torr. (*Cyperus rivularis* Kunth)	–	x	X	4

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Cyperus erythrorhizos Muhl.	–	x	X	2
SF Cyperus odoratus L. (*Cyperus engelmanii* Steud.)	–	x	X	6
SF Cypripedium acaule Aiton	–	x	X	10
Cystopteris protrusa (Weatherby) Blasdell (*Cystopteris fragilis* (L.) Bernh. var. *protrusa* Weath.)	x	–	X	6
Dactylis glomerata L.	x	–	X	*
Danthonia spicata (L.) P. Beauv. ex Roem. & Schult.	x	–	X	3
Dasistoma macrophylla (Nutt.) Raf. (*Seymeria macrophylla* Nutt.)	x	–	X	8
Daucus carota L.	–	–	X	*
Decodon verticillatus (L.) Elliott	–	x	X	8
Desmodium marilandicum (L.) DC.	x	–	X	7
Desmodium paniculatum (L.) DC.	x	–	X	6
SF Desmodium rotundifolium DC.	x	–	X	9
Dianthus armeria L.	–	–	X	*
Dicentra canadensis (Goldie) Walp.	x	–	X	8
Dicentra cucullaria (L.) Bernh.	x	–	X	6
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *fasciculatum* (Torr.) Freckmann & Lelong (*Panicum implicatum* Britton)	x	–	X	2
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark ssp. *implicatum* (Scribn.) Freckmann & Lelong (*Panicum meridionale* Ashe)	–	x	X	8
Dichanthelium depauperatum (Muhl.) Gould (*Panicum depauperatum* Muhl.)	x	–	X	7
SF Dichanthelium dichotomum (L.) Gould ssp. ***dichotomum*** (*Panicum dichotomum* L.)	x	–	X	10
Dichanthelium latifolium (L.) Harvill (*Panicum latifolium* L.)	x	–	X	5
Dioscorea villosa L.	x	–	X	7
Diphasiastrum digitatum (Dill. ex A. Braun) Holub (*Lycopodium complanatum* L. var. *flabelliforme* Fernald)	x	–	X	8
Dipsacus fullonum L. (*Dipsacus sylvestris* Huds.)	–	–	X	*
SF Drosera intermedia Hayne	–	x	X	10
SF Drosera rotundifolia L.	–	x	X	10
Dryopteris carthusiana (Vill.) H.P. Fuchs (*Dryopteris spinulosa* (O. F. Müll.) Watt)	x	–	X	8
Dryopteris cristata (L.) A. Gray	–	x	X	10
Dryopteris intermedia (Muhl. ex Willd.) A. Gray	x	–	X	8
Dulichium arundinaceum (L.) Britton	–	x	X	9
Echinochloa crusgalli (L.) P. Beauv.	–	x	X	0
Elaeagnus umbellata Thunb.	–	–	X	*
Eleocharis flavescens (Poir.) Urb. var. *olivacea* (Torr.) Gleason (*Eleocharis olivacea* Torr.)	–	x	X	9
Eleocharis obtusa (Willd.) Schult.	–	x	X	3
Eleocharis palustris (L.) Roemer & J.A. Schultes (*Eleocharis smallii* Britton)	–	x	X	5

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Elymus hystrix L. (*Hystrix patula* Moench)	x	–	X	5
Elymus repens (L.) Gould (*Agropyron repens* (L.) P. Beauv.)	–	–	X	*
Elymus virginicus L.	x	–	X	4
Enemion biternatum Raf. (*Isopyrum biternatum* (Raf.) T. & G.)	x	–	X	8
Epifagus virginiana (L.) W.P.C. Barton	x	–	X	10
Epilobium coloratum Biehler	–	x	X	3
Equisetum arvense L.	x	–	X	0
Equisetum fluviatile L.	–	x	X	7
Eragrostis cilianensis (All.) Vignolo ex Janchen	x	–	X	*
Eragrostis minor Host (*Eragrostis poaeoides* Roem. & Schult.)	x	–	X	*
Erechtites hieraciifolius (L.) Raf. ex DC. var. *hieraciifolius*	–	x	X	2
Erigenia bulbosa (Michx.) Nutt.	x	–	X	10
Erigeron annuus (L.) Pers.	x	–	X	0
Erigeron strigosus Muhl. ex Willd.	x	–	X	5
Eriophorum tenellum Nutt.	N	–	N	10
SF *Eriophorum vaginatum* L. (*Eriophorum spissum* Fernald)	–	R	R	10
SF *Eriophorum virginicum* L.	–	x	X	10
Erythronium americanum Ker Gawl.	x	–	X	8
Euonymus obovatus Nutt.	x	–	X	7
Eupatorium perfoliatum L.	–	x	X	4
Euphorbia corollata L.	x	–	X	2
Euphorbia nutans Lag. (*Euphorbia maculata* L.)	–	–	X	0
Eurybia macrophylla (L.) Cass. (*Aster macrophyllus* L.)	x	–	X	8
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb.)	x	–	X	4
Euthamia graminifolia (L.) Nutt. (*Solidago graminifolia* (L.) Salisb. var. *nuttallii* (Greene) Fernald)	x	–	X	3
Eutrochium maculatum (L.) E.E. Lamont (*Eupatorium maculatum* L.)	–	x	X	4
Eutrochium purpureum (L.) E.E. Lamont (*Eupatorium purpureum* L.)	x	–	X	7
Fagus grandifolia Ehrh.	x	–	X	5
Festuca rubra L.	–	–	X	*
Festuca subverticillata (Pers.) E.B. Alexeev (*Festuca obtusa* Biehler)	x	–	X	5
Floerkea proserpinacoides Willd.	x	–	X	8
Fragaria virginiana Miller	x	–	X	1
Frangula alnus Mill. (*Rhamnus frangula* L.)	–	x	X	*
SF *Fraxinus americana* L.	x	x	X	5
SF *Fraxinus nigra* Marshall	–	x	X	10
SF *Fraxinus pennsylvanica* Marshall (*Fraxinus pennsylvanica* Marshall var. *subintegerrima* (Vahl.) Fernald)	x	–	X	1
Galium aparine L.	x	–	X	1

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Galium circaezans Michx. var. *hypomalacum* Fernald	x	–	X	7
Galium concinnum Torr. & A. Gray	x	–	X	5
SF Galium lanceolatum (Torr.) Torr.	x	–	X	10
Galium obtusum Bigelow	–	x	X	5
Galium tinctorium L.	–	x	X	8
Galium triflorum Michx.	x	–	X	5
Gaultheria procumbens L.	x	–	X	9
Gaylussacia baccata (Wangenh.) K. Koch	x	x	X	9
Geranium maculatum L.	x	–	X	4
Geum canadense Jacq.	x	–	X	1
Glechoma hederacea L.	x	–	X	*
Glyceria canadensis (Michx.) Trin.	–	x	X	10
Glyceria septentrionalis Hitchc.	–	x	X	8
Glyceria striata (Lam.) Hitchc.	–	x	X	4
SF Goodyera pubescens (Willd.) R. Br.	–	10	N	9
Hackelia virginiana (L.) I.M. Johnst.	x 2	–	X	0
Hamamelis virginiana L.	x	–	X	8
Helianthus decapetalus L.	x	–	X	5
Hemerocallis fulva L.	x	–	X	*
Hieracium aurantiacum L.	–	–	X	*
Hieracium gronovii L.	x	–	X	6
Hordeum jubatum L.	–	–	X	*
SF Huperzia lucidula (Michx.) Trevisan (*Lycopodium lucidulum* Michx.)	x	x	X	10
Hydrophyllum appendiculatum Michx.	x	–	X	8
Hydrophyllum virginianum L.	x	–	X	5
Hylodesmum nudiflorum (L.) H. Ohashi & R.R. Mill (*Desmodium mudiflorum* (L.) DC.)	x	–	X	9
SF Hypericum canadense L.	–	x	X	10
Hypericum perforatum L.	–	–	X	*
Hypericum punctatum Lam.	x	–	X	4
SF Ilex mucronata (L.) M. Powell, Savol. & S. Andrews (*Nemopanthus mucronata* (L.) Trel.)	–	x	X	10
Ilex verticillata (L.) A. Gray	–	x	X	9
Impatiens capensis Meerb.	x	x	X	3
Impatiens pallida Nutt.	x	–	X	6
Iris germanica L.	–	–	X	*
Iris virginica L. (*Iris virginica* L. var. *shrevei* (Small) E. S. Anderson)	–	x	X	5
SF Isotria verticillata (Muhl. ex Willd.) Raf.	–	x	X	10
Juglans nigra L.	x	–	X	5

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Juncus alpinoarticulatus Chaix (*Juncus alpinus* Vill.)	–	x	X	7
SF***Juncus arcticus*** Willd. var. ***balticus*** (Willd.) Trautvetter (*Juncus balticus* Willd. var. *littoralis* Engelm.)	–	x	X	6
Juncus canadensis J. Gay ex Laharpe	–	x	X	7
Juncus effusus L.	–	x	X	7
Juncus tenuis Willd.	x 4	–	X	0
Krigia biflora (Walter) S.F. Blake	x	–	X	7
SF***Larix laricina*** (Du Roi) K. Koch	–	x	X	10
SF***Lathyrus venosus*** Muhl. ex Willd. (*Lathyrus venosus* Willd.)	x	–	X	9
Leersia oryzoides (L.) Sw.	–	x	X	4
Leersia virginica Willd.	x	–	X	7
Lemna minor L.	–	x	X	5
Lepidium campestre (L.) W.T. Aiton	–	–	X	*
Lespedeza hirta (L.) Hornem.	x	–	X	6
Leucanthemum vulgare Lam. (*Chrysanthemum leucanthemum* L. var. *pinnatifidum* Lecoq & Lamotte)	x	–	X	*
Lindera benzoin (L.) Blume	x	x	X	7
Liparis liliifolia (L.) Rich. ex Lindl. (*Liparis lilifolia* (L.) Lindl.)	x	–	X	6
SF***Liparis loeselii*** (L.) Rich.	–	x	X	7
Liriodendron tulipifera L.	x	x	X	5
Lobelia inflata L.	x	–	X	4
SF***Lonicera dioica*** L.	x	–	X	10
Lonicera japonica Thunb.	x	–	X	*
Lotus corniculatus L.	x	–	X	*
Ludwigia palustris (L.) Elliott (*Ludwigia palustris* (L.) Elliott var. *americana* (DC.) Fernald & Griscom)	–	x	X	5
Luzula multiflora (Ehrh.) Lej. ssp. *multiflora*	x	–	X	7
SF***Lycopodiella subapressa*** J.G. Bruce, W.H. Wagner & Beitel	–	x	X	10
SF***Lycopodium clavatum*** L.	x	–	X	10
Lycopus rubellus Moench	–	x	X	10
Lycopus uniflorus Michx.	–	x	X	7
Lysimachia thyrsiflora L.	–	x	X	9
Maclura pomifera (Raf.) C.K. Schneid.	x	–	X	ad
SF***Maianthemum canadense*** Desf.	x	x	X	10
Maianthemum canadense Desf. (*Maianthemum canadense* Desf. var. *interius* Fernald)	x	–	X	8
Maianthemum racemosum (L.) Link ssp. *racemosum* (*Smilacina racemosa* (L.) Desf.)	x	–	X	3
Maianthemum stellatum (L.) Link (*Smilacina stellata* (L.) Desf.)	x	–	X	5

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
SF***Malaxis unifolia*** Michx.	–	x	X	10
Malus ioensis (Alph. Wood) Britton	x	–	X	3
Malus domestica (Suckow) Borkh. (*Malus pumila* Mill.)	–	–	X	*
Medeola virginiana L.	x	–	X	10
Melilotus alba Medik.	x	–	X	*
Melilotus officinalis (L.) Lam.	x	–	X	*
SF***Menyanthes trifoliata*** L. (*Menyanthes trifoliata* L. var. *minor* Fernald)	–	x	X	10
SF***Mitchella repens*** L.	x	x	X	10
Morus alba L.	–	–	X	*
Narcissus pseudonarcissus L.	–	–	X	*
Nuphar advena (Aiton) W. T. Aiton	–	x	X	7
Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersma & Hellquist (*Nymphaea tuberosa* Paine)	–	x	X	7
Nyssa sylvatica Marshall	–	x	X	8
Onoclea sensibilis L.	–	x	X	8
Osmorhiza claytonii (Michx.) C.B. Clarke	x	–	X	3
Osmunda regalis L. var. *spectabilis* (Willd.) A. Gray	–	x	X	8
Osmundastrum cinnamomeum (L.) C. Presl (*Osmunda cinnanomea* L.)	–	x	X	7
Ostrya virginiana (Mill.) K. Koch	x	–	X	5
Oxalis dillenii Jacq. (*Oxalis stricta* L.)	–	x	X	0
Oxalis stricta L. (*Oxalis europaea* Jord.)	x	–	X	0
Packera aurea (L.) A. Löve & D. Löve (*Senecio aureus* L.)	x	–	X	7
SF***Panax quinquefolius*** L.	x	–	X	9
Panicum capillare L.	x	–	X	1
Panicum dichotomiflorum Michx.	x	–	X	0
Parietaria pensylvanica Muhl. ex Willd.	x	–	X	3
Parthenocissus quinquefolia (L.) Planch.	x	–	X	2
Penthorum sedoides L.	–	x	X	5
Persicaria amphibia (L.) Delarbre (*Polygonum coccineum* Willd.)	–	x	X	4
SF***Persicaria arifolia*** (L.) Haroldson (*Polygonum arifolium* L. var. *pubescens* (Keller) Fernald)	–	x	X	9
Persicaria hydropiperoides (Michx.) Small (*Polygonum hydropiperoides* Michx.)	–	x	X	7
Persicaria maculosa Gray (*Polygonum persicaria* L.)	x	–	X	*
Persicaria pensylvanica (L.) M. Gomez (*Polygonum pensylvanicum* L.)	–	x	X	0
Persicaria punctata (Elliott) Small (*Polygonum punctatum* Elliott)	–	x	X	6
Persicaria sagittata (L.) H. Gross (*Polygonum sagittatum* L.)	–	x	X	8
Persicaria virginiana (L.) Gaertn. (*Polygonum virginianum* L.)	x	–	X	2
Phalaris arundinacea L.	–	x	X	*

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
SF***Phegopteris hexagonoptera*** (Michx.) Fee (*Dryopteris hexagonoptera* (Michx.) C. Chr.	x	–	X	10
Phleum pratense L. ssp. *pratense*	–	–	X	*
Phlox divaricata L.	x	–	X	5
Phytolacca americana L.	x	–	X	1
Pilea pumila (L.) A. Gray	–	x	X	5
SF***Pinus strobus*** L.	–	x	X	9
Plantago lanceolata L.	–	–	X	*
Plantago major L.	–	–	X	*
Plantago rugelii Decne.	x	–	X	0
SF***Platanthera ciliaris*** (L.) Lindl. (*Habenaria ciliaris* (L.) R. Br.)	–	x	X	10
SF***Platanthera lacera*** (Michx.) G. Don (*Habenaria lacera* (Michx.) Lodd.)	–	R	R	10
Poa compressa L.	x	–	X	*
Poa pratensis L.	–	–	X	*
Podophyllum peltatum L.	x	–	X	4
SF***Pogonia ophioglossoides*** (L.) Ker Gawl.	–	x	X	10
Polygala sanguinea L.	x 5	–	X	6
Polygonatum pubescens (Willd.) Pursh	x	–	X	7
Polystichum acrostichoides (Michx.) Schott	x	–	X	9
Populus alba L.	x	–	X	*
Populus deltoides W. Bartram ex Marshall	x	–	X	2
Populus grandidentata Michx.	x	–	X	6
Populus tremuloides Michx.	x	–	X	4
Potamogeton natans L.	–	x	X	7
Potentilla norvegica L.	x	–	X	0
Potentilla recta L.	–	–	X	*
Potentilla simplex Michx.	x	–	X	4
Prenanthes alba L.	x	–	X	5
Prenanthes altissima L.	x	–	X	8
Prunella vulgaris L. ssp. *lanceolata* (W.P.C. Barton) Hulten (*Prunella vulgaris* L. var. *lanceolata* (Barton) Fernald)	x	–	X	0
SF***Prunus pensylvanica*** L. f.	–	R	R	5
Prunus serotina Ehrh.	x	–	X	1
Prunus virginiana L.	x	–	X	3
Pteridium aquilinum (L.) Kuhn. var. *latiusculum* (Desv.) Underw. ex A. Heller	x	–	X	5
Puccinellia distans (Jacq.) Parl.	–	–	X	*
Quercus alba L.	x	–	X	5
Quercus rubra L.	x	x	X	7
Quercus velutina Lam.	x	–	X	6

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Ranunculus abortivus L.	x	–	X	0
Ranunculus flabellaris Raf.	–	x	X	7
Ranunculus sceleratus L.	–	x	X	6
Rhus copallinum L. var. *copallinum* (*Rhus copallina* L. var. *latifolia* Engl.)	x	–	X	6
Rhus typhina L.	x	–	X	1
SF***Rhynchospora alba*** (L.) Vahl	–	x	X	10
Ribes cynosbati L.	x	–	X	5
Ribes missouriense Nutt.	x	–	X	5
Robinia pseudoacacia L.	x	–	X	ad
Rorippa palustris (L.) Besser ssp. *palustris* (*Rorippa palustris* (L.) Besser var. *fernaldiana* (Butters & Abbe) Stuckey)	–	x	X	4
Rosa blanda Aiton	x	–	X	5
Rosa multiflora Thunb.	x	–	X	*
Rosa palustris Marshall	–	x	X	7
Rubus bifrons Vent	17	–	N	*
Rubus hispidus L.	–	x	X	9
Rubus idaeus L. ssp. *strigosus* (Michx.) Focke (*Rubus idaeus* L. var. *strigosus* (Michx.) Maxim.)	–	x	X	3
Rubus occidentalis L.	x	–	X	2
SF***Rubus pubescens*** Raf.	–	x	X	10
Rumex acetosella L.	–	–	X	*
Rumex altissimus Alph. Wood	–	x	X	2
Rumex crispus L.	–	–	X	*
Rumex obtusifolius L.	x	–	X	*
Rumex verticillatus L.	–	x	X	6
Sagittaria latifolia Willd.	–	x	X	4
Salix discolor Muhl.	–	x	X	2
Salix eriocephala Michx.	–	x	X	5
Salix euxina J. Belyaeva (*Salix fragilis* L.)	x	–	X	*
SF***Salix lucida*** Muhl.	–	x 6	X	10
Salix nigra Marshall	–	x	X	4
SF***Salix pedicellaris*** Pursh (*Salix pedicellaris* Pursh var. *hypoglauca* Fernald)	–	x	X	10
SF***Salix sericea*** Marshall	–	x	X	10
Sambucus nigra L. ssp. *canadensis* (L.) R. Bolli (*Sambucus canadensis* L.)	x	–	X	1
Sambucus racemosa L. ssp. *pubens* (Michx.) Hulten (*Sambucus pubens* Michx.)	x	–	X	10
Sanguinaria canadensis L.	x	–	X	6
Sanicula canadensis L.	x	–	X	7
SF***Sanicula trifoliata*** E.P. Bicknell	x	–	X	10
Saponaria officinalis L.	x	–	X	*

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
SF***Sarracenia purpurea*** L.	–	x	X	10
Sassafras albidum (Nutt.) Nees	x	–	X	3
Saururus cernuus L.	–	x	X	9
SF***Sceptridium dissectum*** (Spreng.) Lyon (*Botrychium dissectum* Spreng.)	x	–	X	6
Schedonorus arundinaceus (Schreb.) Dumort. (*Festuca elatior* L.)	x	–	X	*
SF***Scheuchzeria palustris*** L. (*Scheuchzeria palustris* L. var. *americana* Fernald)	–	R	R	10
Schizachyrium scoparium (Michx.) Nash (*Andropogon scoparius* Michx.)	x	–	X	5
Scirpus cyperinus (L.) Kunth	–	x	X	6
Scrophularia marilandica L.	x	–	X	4
Scutellaria lateriflora L.	–	x	X	5
Securigera varia (L.) Lassen (*Coronilla varia* L.)	1	–	X	*
Setaria pumila (Poir.) Roem. & Schult. ssp. *pumila* (*Setaria glauca* (L.) P. Beauv.)	x	–	X	*
Silene latifolia Poir. (*Lychnis alba* Mill.)	x	–	X	*
Sisymbrium officinale (L.) Scop.	9	–	N	*
Sium suave Walter	–	x	X	7
Smilax ecirrata (Engelm. ex Kunth) S. Watson (*Smilax ecirrhata* (Engelm.) S. Watson)	x	–	X	5
Smilax rotundifolia L.	x	–	X	7
Solanum carolinense L.	x	–	X	ad
Solanum dulcamara L.	–	x	X	*
Solidago altissima L.	x	–	X	1
Solidago caesia L.	x	–	X	7
Solidago flexicaulis L.	x	–	X	7
Solidago juncea Aiton	x	–	X	5
Solidago nemoralis Aiton	x	–	X	4
Solidago rugosa Mill. (*Solidago rugosa* Aiton)	–	x	X	6
Solidago uliginosa Nutt.	–	x	X	10
Solidago ulmifolia Muhl. ex Willd.	x	–	X	5
Sonchus arvensis L. ssp. *uliginosus* (M. Bieb.) Nyman (*Sonchus uliginosus* M. Bieb.)	x	–	X	*
Sonchus asper (L.) Hill	–	–	X	*
Sonchus oleraceus L.	–	–	X	*
Spergularia media (L.) C. Presl	–	–	X	*
Spiraea alba Du Roi	–	x	X	7
Spiraea tomentosa L. var. *rosea* (Raf.) Fernald	–	x	X	9
Spiranthes cernua (L.) Rich.	–	x	X	7
SF***Spiranthes ovalis*** Lindl. var. ***erostellata*** Catling	8	–	N	10
Staphylea trifolia L.	x	–	X	7
Stellaria media (L.) Vill.	x	–	X	*

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
Symphyotrichum cordifolium (L.) G.L. Nesom (*Aster cordifolius* L.)	x	–	X	7
Symphyotrichum drummondii (Lindl.) G.L. Nesom var. *drummondii* (*Aster sagittifolius* Willd. var. *drummondii* (Lindl.) Shinners)	x	–	X	2
Symphyotrichum lateriflorum (L.) A. Löve & D. Löve (*Aster lateriflorus* (L.) Britton)	x	–	X	4
Symphyotrichum pilosum (Willd.) G.L. Nesom (*Aster pilosus* Willd.)	–	–	X	0
Symphyotrichum puniceum (L.) A. Löve & D. Löve (*Aster puniceus* L.)	–	x	X	7
Symphyotrichum urophyllum (Lindl.) G.L. Nesom (*Aster sagittifolius* Willd.)	x	–	X	5
Taraxacum officinale F.H. Wiggers	x	–	X	*
Teucrium canadense L.	x	–	X	3
Thalictrum dioicum L.	x	–	X	7
Thalictrum thalictroides (L.) A.J. Eames & B. Boivin (*Anemonella thalictroides* (L.) Spach)	x	–	X	7
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald (*Dryopteris thelypteris* (L.) A. Gray var. *pubescens* (G. Lawson) Nakai)	–	x	X	6
Tilia americana L.	x	–	X	5
Toxicodendron radicans (L.) Kuntze (*Rhus radicans* L.)	x	–	X	2
SF Toxicodendron vernix (L.) Kuntze (*Rhus vernix* L.)	–	x	X	10
Tragopogon pratensis L.	–	–	X	*
Triadenum virginicum (L.) Raf. (*Hypericum virginicum* L.)	–	x	X	10
Trifolium dubium Sibth.	–	–	X	*
Trifolium hybridum L.	x	–	X	*
Trifolium pratense L.	–	–	X	*
Trifolium repens L.	–	–	X	*
Trillium flexipes Raf.	x	–	X	6
Trillium grandiflorum (Michx.) Salisb.	x	–	X	8
Trillium recurvatum L.C. Beck	x	–	X	5
Typha angustifolia L.	–	x	X	1
Typha latifolia L.	–	x	X	1
Typha × *glauca* Godr. (*T. angustifolia* × *T. latifolia*)	–	11	N	1
Ulmus americana L.	x	–	X	3
Ulmus pumila L.	x	–	X	*
Ulmus rubra Muhl.	x	–	X	4
Urtica dioica L. ssp. *gracilis* (Aiton) Selander (*Urtica procera* Willd.)	–	x	X	2
SF Utricularia cornuta Michx.	–	14	N	10
SF Utricularia geminiscapa Benj.	–	x	X	10
Utricularia vulgaris L. ssp. *macrorhiza* (Le Conte) Clausen (*Utricularia vulgaris* L.)	–	x	X	9
Uvularia grandiflora Sm.	x	–	X	7
Vaccinium angustifolium Aiton	x	–	X	5
Vaccinium corymbosum L.	–	x	X	8
SF Vaccinium macrocarpon Aiton	–	x	X	10

Table 48 (continued). Summary of species verified and reported at Pinhook Bog Unit of INDU. Subunit species status codes: x = verified, R = reported, and numbers cross-reference to discoverer and date information in Table 49. Verified means species presence has been verified by Wilhelm (1980 and 1990) and from his unpublished 1990s reports to the SHLT. Reported (R) are species that have not been seen by Wilhelm but reported by others. Numbered species presences are new reports since 1990 or earlier reports that were previously missed. Unit species codes: X = verified, R = reported, and N = new for this edition. CoC = coefficient of conservativism (for native species). CoC is not calculated for adventive (ad) and non-native species (*). Names of special flora are indicated in bold and preceded by a superscript "SF."

Species	Species Status by Subunit		Entire Unit Species Status	CoC
	A	*B*		
SF***Vaccinium oxycoccos*** L.	–	x	X	10
Vaccinium pallidum Aiton	x	–	X	5
Verbascum thapsus L. ssp. *thapsus*	–	–	X	*
Verbena urticifolia L.	x	–	X	5
Veronica officinalis L.	x	–	X	*
Viburnum acerifolium L.	x	–	X	9
Viburnum lentago L.	x	–	X	5
Viburnum prunifolium L.	x	–	X	5
SF***Viburnum trilobum*** Marshall (*Viburnum opulus* L. var. *americanum* Aiton)	0	0	E	10
Vinca minor L.	–	–	X	*
Viola affinis Leconte	x	–	X	4
SF***Viola macloskeyi*** F.E. Lloyd (*V. pallens* (Banks ex Ging.) Brainderd; *V. macloskeyi* ssp. *pallens* (Banks ex Ging.) M.S. Baker)	x	x	X	10
Viola pubescens Aiton	x	–	X	5
Viola sororia Willd.	x	–	X	3
Vitis aestivalis Michx.	x	–	X	7
Vitis riparia Michx.	x	–	X	2
SF***Woodwardia virginica*** (L.) Sm.	–	x	X	10
SF***Xyris difformis*** Chapman var. ***difformis*** (*Xyris difformis* Chapm.)	–	x	X	10

Table 49. Sources of new species verified and reported from Pinhook Bog.

Note	Source(s)	Date	Species
1	E. Kjellmark	19 July 1989	*Securigera varia*
2	Pavlovic et al. (Exotic Project)	30 June 1998	*Hackelia virginiana*
3	Pavlovic et al. (Exotic Project)	2 July 1998	*Agrostis gigantea*
4	Pavlovic et al. (Exotic Project)	8 July 1998	*Juncus tenuis*
5	Pavlovic et al. (Exotic Project)	9 July 1998	*Polygala sanguinea*
6	Pavlovic et al. (Exotic Project)	10 July 1998	*Salix lucida*
7	S. Leicht-Young, L. Cremin, K. Kangas, and K. McAvoy	4 June 2009	*Acer nigrum*
8	B. Plampin, D. Hamilla, and D. Mason	25 Sept 2008	*Spiranthes ovalis*
9	F. Swink	21 Aug 1985	*Sisymbrium officinale*
10	C. Satkoski, N. PIlla, G. Tonkovich	Dec 2015	*Goodyera pubescens*
11	N.B. Pavlovic and D.A. Wilcox	2010	*Typha* × *glauca*
12	E. Kjellmark and P. Benjamin	13 June 1989	*Carex bebbii*
13	J. Chappelle	13 May 2017	*Ajuga reptans*
14	N. Pilla	11 Sept 2015	*Utricularia cornuta*
16	F. Swink (MOR)	18 June 1948	*Alopecurus aequalis*
15	B. Plampin and D. Hamilla	27 Aug 2008	*Asimina triloba*
17	NPS alerted EDDMaps, D. Mason	31 July 2020	*Rubus bifrons*
18	S. Namestnik and R. Hedge	12 June 2020	*Eriophroum tenellum*

special flora include *Celastrus scandens*, *Eriophorum tenellum*, *Fraxinus americana*, *F. nigra*, *F. pennsylvanica*, *Juglans cinerea*, *Platanthera lacera*, and *Salix lucida*. Special flora believed to be extirpated include *Eriophorum vaginatum*, *Isotria verticillata*, *Scheuchzeria palustris*, and *Viburnum trilobum*.

Eleven (14%) of the special floristic elements known from Pinhook Bog are found nowhere else in the Indiana Dunes. These include *Andromeda polifolia* var. *latifolia* (*Andromeda glaucophylla*), *Carex careyana*, *C. chordorrhiza*, *Carya glabra*, *Desmodium rotundifolium*, *Eriophorum tenellum*, *Eriophorum vaginatum*, *E. virginicum*, *Isotria verticillata*, *Utricularia geminiscapa*, *Vaccinium oxycoccos*, and *Xyris difformis*.

Floristic summary

Pinhook Bog has a total of 469 taxa composed of 391 native taxa, three adventive taxa, and 75 invasive taxa (Table 50). Pinhook Bog has a total of 380 native species, nine varieties, and two hybrids (Table 50). The six new native species found at Pinhook Bog (*Acer nigrum*, *Carex bebbii*, *Eriophorum tenellum*, *Goodyera pubescens*, *Sisymbrium officinale*, *Spiranthes ovalis*, *Typha* × *glauca*) represent a minor increase in species richness. There were no new adventive species reported from Pinhook Bog. Pinhook Bog A has a total of 270 species with 228 native, three adventive, and 33 exotic species. Pinhook Bog B has a total of 163 native species, no adventive, and three exotic species (Table 50). Of the 39 Indiana-listed species, 14 are endangered, one is threatened, 13 are watch list, and one is extirpated. One species (*Eriophorum tenellum*) is not rated but is likely to be listed as endangered.

Conservation issues

The Pinhook Bog natural area totals 203 ha (501 acres) including the 38-hectare (98-acre) bog, the 20- to 25-acre moat buffer between the peatland, and the 380 acres of highly disturbed upland in the bog watershed. About half of the bog is floating peat mat, or *Schwingmoor* (Wilcox and Simonin 1988). Along the margins of the bog basin, there are small ravines and narrow slopes of mesophytic forest and savanna complex. Along portions of the bog margin, there are hydromesophytic swamp forests with young beech trees and red maples.

The most significant human impact on the

Table 50. Summary of floristic statistics by subunit of Pinhook Bog. FNA/ITIS indicates the statistics are derived from the nomenclature of the *Flora of North America* (FNA 2022) and the Integrated Taxonomic Information System (ITIS 2022). CoC is the Coefficient of Conservatism. CoC with adventive and invasive is calculated with –0.5 and –1 discount for each of these respective species types.

Category	Subunit		Entire Unit
	A	*B*	
Area (ha/acres)	165/407	38/94	203/501
Special flora total	28	58	81
Confirmed	26	48	69
New	1	4	86
Reported	0	2	2
Extirpated	1	4	4
Total taxa, FNA/ITIS	270	171	469
Total native taxa, FNA/ITIS	234	168	391
Native species, FNA/ITIS	228	163	380
Native variety, FNA/ITIS	6	3	9
Native hybrid, FNA/ITIS	0	2	2
Total adventive taxa, FNA/ITIS	3	0	3
Total adventive species, FNA/ITIS	3	0	3
Total adventive variety, FNA/ITIS	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0
Total exotic taxa, FNA/ITIS	33	3	75
Total exotic species, FNA/ITIS	33	3	75
Total exotic variety, FNA/ITIS	0	0	0
Total exotic hybrid, FNA/ITIS	0	0	0
Total Indiana Listed	10	31	39
Endangered	4	12	14
Threatened	2	10	13
Rare	0	0	0
Watch List	4	8	11
Extirpated	0	1	1
Sum CC	1,312	1,213	2,426
Sum CC adventive & invasive	1,277	1,210	2,349
Mean CoC	6	7	6
Mean CoC with adventive and invasive	5	7	5
FQI	85	93	122
FQI with adventive and invasive	77	92	108

bog was the salt intrusion from the salt pile just south of the bog along the Indiana Toll Road (Wilcox 1979). From 1963 to 1972, this intrusion allowed homogeneous stands of hybrid cattail (*Typha* × *glauca*) to became established in response to the disturbance in five acres of the bog. According to Wilcox (1986a), *Typha angustifolia* was found as far as 130 m into the bog along the transect and was by far the most prevalent cattail species. Other prominent plant species of the impacted area were *Cephalanthus occidentalis*, *Onoclea sensibilis*, *Dryopteris thelypteris* var. *pubescens* [*Thelypteris palustris* var. *pubescens*], *Hypericum virginicum* [*Triadenum virginicum*], *Scirpus cyperinus*, *Pilea pumila*, *Panicum implicatum* [*Dichanthelium acuminatum* ssp. *fasciculatum*], and *Solidago graminifolia* var. *nuttallii* [*Euthamia graminifolia*]. These and other impacted area plants were not common elsewhere in the bog, and if present at all on the unimpacted transect, they were within or adjacent to the moat.

Wilcox (1982) measured high chloride levels and elevated specific conductance nearly 200 meters from the point of the salt intrusion from the Toll Road. He noted it is "apparent that the salt load from the road-salt storage operation had not dissipated by 1981, but remained held within the peat mat, showing a clearly defined gradient from south to north" (Wilcox 1986b). Portions less impacted by cattails but subject to salt damage were locations where *Lycopodiella inundata* and *Lycopodium clavatum* have flourished (Pavlovic, personal observation). Other special flora in less-impacted areas may have benefited from this disturbance because of the lack of vegetative cover and their disturbance-dependent and early successional life histories.

Though Wilcox (1986a) described a secondary succession, particularly in more remote portions of the area affected by the saltwater runoff, his assessment on the fate of this area remained pessimistic:

> *Although the native plant community has shown favorable responses to the declining salt concentrations, there appear to be some limitations to the extent of recovery. The failure of alkalinity and pH to show significant yearly reductions in much of the impacted area does not bode well for flourishing* Sphagnum *recolonization. Even though* Sphagnum *can lower pH through cation exchange, buffered waters in the impacted zone will not allow that to occur very rapidly.*

Continued intermittent resampling of vegetation plots at the salt impacted area could help in validating this prediction.

Succession is also an issue regarding bog management, as this process tends to negatively impact rare plant species as the bog fills in and becomes a red maple swamp (Swinehart and Parker 2000, Swinehart et al 2001). The increasing dominance of highbush blueberry and red maple in Pinhook Bog has been a concern for rare bog plant management. For example, Hamilla and Tonkovich noted "It has choked out so much of the 'good stuff' at the south end that David and I only found *Sphagnum* and orchids and cranberry and *Rhynchospora* and such in small gaps where the blueberry bushes had been killed or prohibited for some unknown reason (patchy openings were rarely more than 2 sq. m in area)!" Future management work may address this issue.

The 380 acres of upland in this unit are comprised of timbered slopes of mesophytic forest (beech-maple and oak-hickory) and disturbed secondary forest. Much of the uplands contain little groundcover, and what groundcover exists is of low diversity and often intermixed or dominated by invasive exotic plants. This is especially true in the young second-growth stands and the ridges on the north side of the bog. In contrast to the young trees, on 29 April 1987, Wilhelm noted a 40-inch diameter red oak there, and Emma "Bickie" Pitcher commented that there is the "biggest oak [she's] ever seen north of Pinhook in park woods" (Wilhelm 1990). Wilhelm also noted a 36-inch diameter white oak, a 43-inch tulip tree, and a 48-inch beech in that area. The good quality beech-maple forest in the south-central edge of the bog on the east side of Wozniak Road, and the small remnant areas along the north side include large trees, occasional special flora, and a diverse groundlayer flora (Pavlovic, personal observation).

Whether or not the slopes of this unit are remnant or secondary, they perform a valuable function as buffer for the bog. Without such buffers, the silts from eroding uplands could flow freely into the bog, carrying excessive quantities of calcium and magnesium bicarbonates. The natural moat itself is a small example of the impacts of minerotrophic water. The moat appears to have been enlarged in recent years adjacent to Wozniak Road at its lowest point (Pavlovic, personal observation). Nevertheless, the deeper portions of the moat are habitat for *Calla palustris*, especially in the southern portions. The little "lake" in the northeast corner of the bog is surrounded by disturbed slopes and receives mineral-laden waters from the eroding uplands; consequently, it is devoid of bog vegetation. It may be that this little appendix of the wetland was never a bog because of the smallness of the ice block that created the spur valley and the dominance of minerotrophic waters it received from the uplands (Pavlovic, personal observation). Like the salt impact on the southeast corner of the bog, actions on the uplands that increased soil erosion and input of magnesium and calcium carbonates could negatively affect the bog. Reintroduction of spring ephemeral ground layer species on the uplands could better protect the bog from soil erosion and minerotrophic waters.

The swamp complex west of Wozniak Road, not frequently surveyed by botanists in the past, is a unique form of hydromesophytic swamp forest. This small area has yielded several county flora records. The uplands surrounding this swamp complex include only scattered patches of ground flora and an abundance of invasive species (Pavlovic, personal observation, 1999). A young swamp forest is developing inside the moat in the northwest portion of the bog.

Pinhook Bog A

Pinhook Bog A includes the areas on the vegetation map classified as mesophytic forest and oak-hickory forest, with successional forests that have a low diversity of native flora (see Figure 29). This area is essentially equivalent to the exposed slopes of the old morainal kettle-hole depression and pond. The adjacent flat or gently sloping uplands have been timbered, cultivated, and abandoned right up to the edge of the depression. The flats and uplands are

mixtures of pastures, old fields, orchards, and former homesites that are undergoing succession and are being invaded by *Rosa multiflora*, *Alliaria petiolata*, and *Lonicera* spp. Remnant vegetation on a few steeper slopes retains some native flora and serves as a buffer for the bog. A new loop trail along the north uplands passes by the northeast corner of the bog but is largely outside the watershed and passes mostly through late successional old fields.

Wilhelm (1990) catalogued 230 native flora, with a mean C-value of 5.5, representing an FQI of 85. Now there are 234 native flora with mean C-value and FQI unchanged. Overabundant deer activity is negatively affecting the ground flora and exacerbating erosion where the ground flora is sparse. Both deer teeth and hooves adversely affect the uplands, creating sparse vegetation and erodible bare soil (Pavlovic, personal observation). With increasing probability of extreme rainfall events, such erosion may accelerate.

Pinhook Bog B

The bog and swamp at Pinhook B are one of the truly remarkable natural areas, not only for the Indiana Dunes but for the entire Chicago Region. A combined total of 168 native floristic elements in the bog and swamp yield a mean C of 7.18 and an FQI of 93.

Overall, Pinhook Bog has an FQI of 122. The addition of the buffer, both mathematically and ecologically, improves the overall floral significance of the unit. Control of invasive plants in concert with native species reintroductions in the low-quality forests on the uplands could improve the diversity of native plant species on the slopes above the bog and further limit nutrient flow into the bog. Recent shrub thinning by Daniel Mason has increased the early successional special flora of the bog. Whether the bog flora will persist as the impacts of climate change increase remains an open question.

Discussion and Conclusions Concerning Preserving Plant Diversity at the Indiana Dunes in the 21st Century

It is not so well known as it should be that the dunes of Lake Michigan are much the grandest in the entire world. Not necessarily the highest, though some of them reach up 400 feet and more above the lake, but more than any other anywhere, our dunes show magnificent and contrasting types of plant life, everything from the bare dunes to magnificent primeval forests. No other dunes than ours show such bewildering displays of dune movement and struggle for existence, such labyrinths of motion, form, and life; just because its uniqueness preserved the Yellowstone—there are no such geysers elsewhere, so should their uniqueness preserve our dunes, for they are without a parallel.

—Henry Chandler Cowles' testimony at the National Park Service hearing to establish a Dunes National Park in Indiana (Mather 1917)

We have characterized the vegetation, documented the distribution of the flora, and updated the status of special flora of Indiana Dunes (15 units of INDU and state of Indiana and SHLT properties). We have provided updated and GIS-derived color maps of the potential vegetation of the Dunes that still employ the classification developed by Bacone et al. (1980). We have updated the taxonomy of the flora to represent current nomenclature and phylogenetic classifications. Abstracts of species flora have been updated and include references to updated research on species biology where relevant.

Current State of the Flora of the Indiana Dunes

In 1980, 994 native species were reliably recorded from within the Indiana Dunes boundaries. In 1990, we knew of an additional 137, for a total of 1,131 (Wilhelm 1990); that became 1,132 in 2004, and in 2020 the total was 1,212.

However, the total flora of any area depends on the size of the area, its heterogeneity, and other factors discussed previously. Some taxonomists and botanical authorities have reason to split species into more species and others might want to combine species or not split them. Thus, the number of species found also depends on the nomenclature or taxonomic treatment used. Thus, the total flora of the Indiana Dunes, including native, adventive, and exotic species; varieties; and hybrids varies among floral treatments (Table 51). The NPS reported 1,132 native species at INDU, with an additional 400 exotic/adventive species, for a total of 1,532 (National Park Service 2014). The native species at Indiana Dunes total 1,212 (FNA 2022), 1,223 (ITIS 2022), 1,227 (USDA Plants 2022), 1,204 (Swink and Wilhelm 1994), or 1,232 (Wilhelm and Rericha 2017). If we include varieties and hybrids the numbers are, respectively, 1,229, 1,271, 1,244, 1,275, or 1,279 taxa. The FNA (2022) totals represent an increase of 87 native species since the

Table 51. Total flora of INDU by taxonomic level (species, varieties, and hybrids) and origin (native, adventive, and invasive). Floristic classifications are: FNA (Flora of North America; FNA 2022), SW4 (Swink and Wilhelm 1994), ITIS (Integrated Taxonomic Information System; ITIS 2022), USDA (USDA Plants 2022), and W&R (Wilhelm and Rericha 2017).

Taxonomic Level	Native					Adventive					Invasive				
	FNA	*ITIS*	*SW4*	*USDA*	*W&R*	*FNA*	*ITIS*	*SW4*	*USDA*	*W&R*	*FNA*	*ITIS*	*SW4*	*USDA*	*W&R*
Species	1,212	1,223	1,204	1,227	1,232	85	77	75	76	76	332	335	320	337	332
Variety	0	39	32	40	36	1	2	1	2	1	1	0	0	0	0
Hybrid	17	9	8	8	11	1	1	1	1	1	0	0	0	0	0
Sub-Total	1,229	1,271	1,244	1,275	1,279	87	80	77	79	78	333	335	320	337	332

previous special vegetation report (Wilhelm 1990).

Most species in the Indiana Dunes are forbs, graminoids, shrubs, and trees, with the remainder being clubmosses (lycopods), ferns, lianas, subshrubs, and vines (Table 52). Ferns and clubmosses are the only groups without exotic or adventive species present. Excluding varieties, there are nine native clubmosses, 37 native ferns, 682 native forbs, 297 native graminoids, 11 native lianas, 60 native shrubs, seven native subshrubs, 93 native trees, and 16 native vines. The most species-rich plant family is the sedge family (Cyperaceae), which is represented by 153 native species (158 taxa), followed by the grass family (Poaceae), which is represented by 128 species (138 taxa). The third largest family is the aster family (Asteraceae), which is represented by 124 species (128 taxa). Boreal species account for 3.5% of our native flora, and 4.2% are coastal plain disjuncts. According to BONAP (2021), there are 1,166, 1,208, and 1,125 native plant species for Lake, Porter, and LaPorte counties, respectively. They recorded 1,347 native plants species in Cook County, Illinois, thus making Cook and Porter counties the heavyweight counties for native plant species density in the Chicago crescent at the southern tip of Lake Michigan.

The Indiana Dunes flora represents 63% of the flora of the Chicago Region (Gerould Wilhelm, pers. comm. with Pavlovic, 19 Sept 2016). The Indiana Dunes is home to 40% of the Indiana state-listed flora: 47 State extirpated (SX; 51 in previous list), 233 State endangered (SE; 216 in Wilhelm (1990)), 87 State threatened (ST; 77 in previous list), 0 State rare (SR; 96 in previous list), 133 State watch list (SWL; 129 in previous list), and two State reintroduced (SR; two in previous list), for a total of 609 species (592 in previous list) (Indiana Department of Natural Resources 2016). Broken down by category, Indiana Dunes has 28% of the State's extirpated species, 25% of the State's endangered species, 46% of the State's threatened species, and 41% of the State's watch list species. The two species reintroduced to Indiana—*Asclepias meadii* Torr. ex A. Gray (Bowles et al 2001, 2015a) and *Astragalus tennesseensis* A. Gray ex Chapm.—are not present in the park and have never been reported from it, though the former does grow near the park in Lake County. A total of 436 species are listed as special flora. Twenty-nine native species are possibly extirpated from the dunes (Table 53). If these extirpated statistics are true, then the total native flora would be 1,183 species. Nevertheless, any of these might still be relocated or appear again, although for

Table 52. Total flora of INDU by growth form, taxonomic level (species and varieties), and origin (native, adventive, and invasive) based on the Flora of North America (FNA 2022) and Integrated Taxonomic Information System (ITIS 2022). These totals differ from the text, as they exclude hybrids. There is a total of 1,210 native species, extirpated plus currently present in Indiana Dunes National Park.

Growth Form	Species			Varieties	Total	Percent of Group		
	Native	*Adventive*	*Invasive*	*Native*		*Invasive*	*Adventive*	*Native*
Fern	37	0	0	0	37	0.00	0.00	3.05
Forb	682	48	219	19	968	65.96	56.47	56.27
Graminoid	297	11	50	15	373	15.06	12.94	24.50
Liana	11	1	3	0	15	0.90	1.18	0.91
Lycopod	9	0	0	0	9	0	0	0.74
Shrub	60	6	28	5	99	8.43	7.06	4.95
Subshrub	7	2	2	0	11	0.60	2.35	0.58
Tree	93	15	23	3	134	6.93	17.65	7.67
Vine	16	2	7	1	26	2.11	2.35	1.32
Total	1,212	85	332	43	1,672	100	100	100

Table 53. Species possibly extirpated from the Indiana Dunes.

Species	Location	Date Last Seen
Botrychium simplex E. Hitch.	Tolleston Dunes	1991
Carex pauciflora Lightf.	Cowles Dunes	1918
Chamerion angustifolium (L.) Holub	Tolleston Dunes & Hoosier Prairie	1985
Circaea alpina L.	Tamarack	17 June 2011
Collinsia verna Nutt.	Heron Rookery	1990
Cornus canadensis L.	West Beach & Cowles Dunes	1929, 1989
Cypripedium reginae Walter	Cowles Bog	1988
Dactylorhiza viridis (L.) R.M. Bateman, A.M. Pridgeon & M.W. Chase	Dune State Park	1927
Dendrolycopodium dendroideum (Michx.) A. Haines	Dunes State Park, Furnessville, Keiser, Tamarack	?, 1999, 12 Oct 1991, 24 Aug 1992, 24 Aug 1992
Eriocaulon aquaticum (Hill) Druce	Cowles Dunes	1927
Eriophorum vaginatum L.	Pinhook Bog	30 May 1929
Juncus diffusissimus Buckley	Miller Woods	Aug 1984
Lathyrus ochroleucus Hook.	Miller Woods and Dunes State Park	1986, 1927
Lechea stricta Leggett ex Britton	Hoosier Prairie	1990
Linnaea borealis L. var. *longiflora* Torr.	West Beach	Shortly after 1926
Orobanche fasciculata Nutt.	Miller, Cowles Dunes	1970s, 1980s
Orthilia secunda (L.) House (*Pyrola secunda* L.)	West Beach, Cowles Dunes	1923, 1927
Platanthera hookeri (Torr. ex A. Gray) Lindl.	Dunes State Park	1969
Polytaenia nuttallii DC.	Hoosier Prairie	1987
Ruellia humilis Nutt.	Furnessville	Early 1980s, probably adventive
Sceptridium rugulosum (W.H. Wagner) Skoda & Holub	Miller Woods	5 July 1878
Scheuchzeria palustris L.	Tamarack, Pinhook Bog	1930, 15 Sept 1929
Schoenoplectus subterminalis (Torr.) SojA.k	West Beach	1930
Selaginella eclipes W. R. Buck	Keiser	2000, 2001?
Scleria muehlenbergii Steud.	Dune Park (Cowles Dunes?)	1902
Trillium erectum L.	Furnessville	11 May 1987, probably originally adventive
Triphora trianthophoros (Sw.) Rydb.	Dunes State Park	1927
Vaccinium macrocarpon Aiton	West Beach, Cowles Dunes, Dunes State Park, Keiser, Tamarack, and Pinhook Bog.	1923, 1927, 1930
Woodwardia areolata (L.) T. Moore	Cowles Dunes	1988

many it is unlikely. Floristic statistics from the Indiana Dunes are presented in Table 54. A summary of the Indiana Dunes flora by the numbers is presented in Appendix E.

Richness by Park Units

The titans of floristic richness in the Indiana Dunes are Cowles Dunes (788 native species) and Dunes State Park (685 native species) (Table 54). Seven of the 15 units have more than 500 native species, while the remaining eight are under 500 (Figure 30). Again, Cowles Dunes and Dunes State Park have the highest number of special flora, with 225 and 182 species, respectively (Table 54). Six units have more than 100 special flora (Table 54). Cowles Dunes is the only unit having more than 100 state-listed species (134), with a total of seven units having more than 50 (endangered+threatened+Watch

Table 54. Summary of floristic statistics, by unit, at Indiana Dunes. Units are BA = Bailly, CD = Cowles Dunes, CP = Calumet Prairie, DSP = Dunes State Park, FV = Furnessville, HP = Hoosier Prairie, HPG = Hobart Prairie Grove, HR = Heron Rookery, IM = Inland Marsh, KE = Keiser, MW = Miller Woods, PB = Pinhook Bog, TA = Tamarack,TD = Tolleston Dunes, WB = West Beach. FNA = *Flora of North America* (FNA 2022). ITIS = Integrated Taxonomic Information System (ITIS 2022). CC/CoC = Conservatism Coefficient/Coefficient of Conservatism. FQI = Floristic Quality Index.

	Unit														
Variable	***MW***	***TD***	***CP***	***WB***	***IM***	***BA***	***CD***	***SP***	***FV***	***KE***	***TA***	***HR***	***HPG***	***HP***	***PB***
Area (hectares)	422	399	125	576	526	484	801	945	606	573	690	256	134	279	203
Area (acres)	1,042	864	308	1,423	1,300	1,195	1,731	2,336	1,499	1,415	1,684	636	331	689	501
Total taxa, FNA/ITIS	699	602	383	572	603	601	985	828	750	813	737	236	416	667	469
Total native taxa, FNA/ITIS	573	485	331	458	486	457	818	709	595	656	593	224	376	559	391
Native Species, FNA/ITIS	551	466	321	444	466	447	788	685	576	630	570	220	369	542	380
Native Variety, FNA/ITIS	16	14	6	11	16	9	24	18	18	21	17	4	6	14	9
Native Hybrid, FNA/ITIS	6	5	4	3	4	1	6	6	1	5	6	0	1	3	2
Total adventive taxa, FNA/ITIS	23	21	5	13	21	23	24	18	30	22	19	1	7	13	3
Total adventive species, FNA/ITIS	23	21	5	13	20	22	24	18	30	22	19	1	7	13	3
Total adventive variety, FNA/ITIS	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Total adventive hybrid, FNA/ITIS	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Total exotic taxa, FNA/ITIS	103	96	47	101	96	121	143	101	125	135	125	11	33	95	75
Total exotic species, FNA/ITIS	101	93	46	99	93	118	139	97	122	131	120	11	31	93	75
Total exotic variety, FNA/ITIS	0	1	0	1	1	1	1	1	1	1	1	0	1	1	0
Total exotic hybrid, FNA/ITIS	2	2	1	1	2	2	3	3	2	3	4	0	1	1	0
Total native species	551	466	321	444	466	447	788	685	576	630	570	220	369	542	380
Native species confirmed	480	397	321	393	386	352	637	536	490	492	408	188	300	425	365
Native species new	45	63	0	34	77	90	62	53	69	113	94	23	66	34	8
Native species reported	19	4	0	13	3	3	79	88	16	22	64	7	1	81	3
Native species extirpated	7	2	0	4	0	2	10	8	1	3	4	2	2	2	4
Special flora total	112	55	21	98	73	37	225	182	106	133	133	44	34	84	81
Confirmed	78	36	21	68	53	20	150	111	80	83	61	29	22	51	69
New	19	16	0	15	19	16	28	23	20	41	35	13	10	12	6
Reported	8	1	0	11	1	0	36	40	5	6	33	0	1	19	2
Extirpated	7	2	0	4	0	1	11	8	1	3	4	2	1	2	4
Total Indiana Listed	72	35	14	63	41	15	134	99	50	71	78	15	6	47	39
Endangered	18	8	1	9	11	1	33	25	5	9	16	3	3	9	14
Threatened	29	16	5	34	17	11	62	46	23	37	36	5	2	19	13
Rare	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Watch List	22	11	8	18	13	3	34	27	22	25	25	7	1	17	11
Extirpated	3	0	0	2	0	0	5	1	0	0	1	0	0	2	1

Table 54 (continued). Summary of floristics statistics, by unit, at Indiana Dunes. Units are BA = Bailly, CD = Cowles Dunes, CP = Calumet Prairie, DSP = Dunes State Park, FV = Furnessville, HP = Hoosier Prairie, HPG = Hobart Prairie Grove, HR = Heron Rookery, IM = Inland Marsh, KE = Keiser, MW = Miller Woods, PB = Pinhook Bog, TA = Tamarack,TD = Tolleston Dunes, WB = West Beach. FNA = *Flora of North America* (FNA 2022). ITIS = Integrated Taxonomic Information System (ITIS 2022). CC/CoC = Conservatism Coefficient/Coefficient of Conservatism. FQI = Floristic Quality Index.

	Unit														
Variable	***MW***	***TD***	***CP***	***WB***	***IM***	***BA***	***CD***	***SP***	***FV***	***KE***	***TA***	***HR***	***HPG***	***HP***	***PB***
Sum CC	3,452	2,673	1,714	2,776	2,800	2,336	5,401	4,564	3,547	4,095	3,595	1,327	1,951	3,246	2,426
Sum CC adventive & invasive	3,337	2,567	1,664	2,666	2,693	2,204	5,244	4,454	3,403	3,949	3,460	1,316	1,914	3,145	2,349
Mean CoC	6	5	5	6	6	5	7	6	6	6	6	6	5	6	6
Mean CoC modified	5	4	4	5	4	4	5	5	5	5	5	6	5	5	5
FQI (I) Wilhelm	143	121	94	129	126	109	188	170	145	159	147	88	100	136	122
I with adventive and invasive	126	104	84	111	109	90	166	154	124	138	127	85	93	121	108

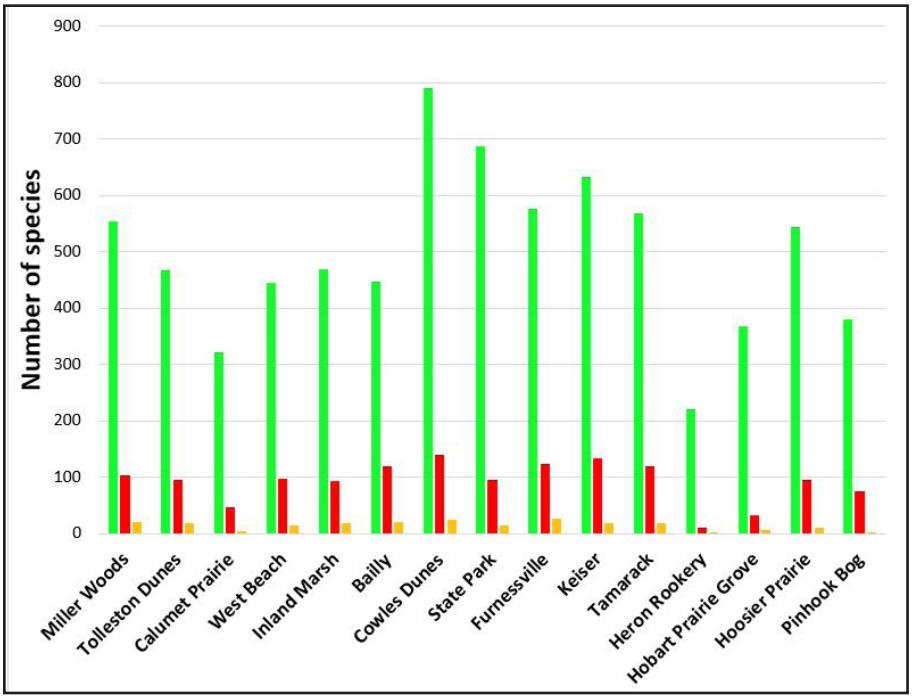


Figure 30. Total number of native (*green bars*), adventive (*red*), and exotic (*orange*) species by unit at Indiana Dunes National Park.

List+extirpated). Cowles Dunes and Hoosier Prairie have the highest number of unique species (26 and 24, respectively). Calumet Prairie has no unique species and the lowest number of special flora and native flora. Cowles Dunes have ten possibly extirpated species; Miller Woods and Dunes State Park have eight; West Beach, Tamarack and Pinhook each have four; Keiser has three; Tolelston, Bailly, Heron Rookery, Hobart Prairie Grove, and Hoosier Prairie have two; Tolleston Dunes has one; and Calumet Prairie and Inland Marsh have none (Table 54).

Special Flora

Of the 436 special flora of the Indiana Dunes, 300 have a CoC of 10, 47 have a CoC of 9, 20 have a CoC of 8, 21 have 7, 14 have 6, 18 have 5, two have 4, four have 3, four have 2, and three have a CoC of 1. Four possibly adventive species are included due to their rarity. Seventy-one are listed as State endangered, 10 as State extirpated, 97 as State threatened, and 54 are on the State watch list. For geographic affinity, 47 are boreal, 65 are coastal plain disjuncts, one is in decline, 161 are locally rare, and the remainder (196) have no affinity designation (summarized from Table 4).

The three top ranked units for Mean CoC and FQI are Cowles Dunes, Dunes State Park, Keiser, and Pinhook. Below those, the rank orders between CoC and FQI vary among units.

Thus, Cowles Dunes and Dunes State Park are consistently first and second in rank of the 15 units. Calumet Prairie is either last or next to last. Keiser is often third place from the top.

Adventive Species

Adventive species are species native to North America that arrived in the Indiana Dunes due to direct and indirect human activity. A total of 85 species are adventive to the park (Table 55), plus one hybrid and one variety. Many of these species are present but will not become invasive, if their invasiveness is comparable to the non-native species that have been introduced. Many of the adventive species arrived via the railroad lines, as described in the notes left by early botanists about specific species (Mohar 2000; Pavlovic, personal observations, 1998–2000).

Other adventive species may cause management problems, such as black locust (*Robinia pseudoacacia*), which invades oak savannas and enriches the soil through nitrogen fixation (*Rhizobium* bacteria) (Peloquin and Hiebert 1999). Black locust alters the nutrient status of the nitrogen-limited sand savannas and changes the litter and ground layer species composition. Native to canopy gaps in the forests of the Appalachian plateau and mountains, black locust finds the openings in oak savannas a suitable habitat to invade. Removal and control in the west unit of INDU has greatly reduced the abundance of this adventive woody invader but it is still common in the east unit of INDU.

Some adventive species, such as *Croton* ssp. and *Helianthus petiolaris*, can be visually dominant at times but have a minor impact on the open sandy habitats where they occur. Controlling these benign species

Table 55. Potential for adventive species found at the Indiana Dunes National Park to behave like invasive species or become overabundant in the dunes. Relevant life history traits regarding ecological behavior are also given. Question mark (?) indicates uncertainty or lack of knowledge. Units are BA = Bailly, CD = Cowles Dunes, CP = Calumet Prairie, DSP = Dunes State Park, FV = Furnessville, HP = Hoosier Prairie, HPG = Hobart Prairie Grove, HR = Heron Rookery, IM = Inland Marsh, KE = Keiser, MW = Miller Woods, PB = Pinhook Bog, TA = Tamarack, TD = Tolleston Dunes, WB = West Beach.

Species	Park Unit	Threat	Life History Characteristics and Other Observations
Abies concolor (Gordon & Glendinning) Lindl. ex Hildebr., concolor fir	FV	Low	Reproduction appears to be absent
Acmispon americanus (Nutt.) Rydb., American deer vetch	IM	Low	Extirpated, Disturbance dependent
Amaranthus blitoides S. Watson, creeping amaranth	CD	Low	Disturbance dependent
Amaranthus hybridus L., green amaranth	??	Low	Disturbance dependent
Amaranthus powellii S. Watson, fall amaranth	BA	Low	Disturbance dependent
Amaranthus retroflexus L., rough amaranth	BA, FV, HP	Low	Disturbance dependent
Ambrosia psilostachya DC., western ragweed	MW, TD, IM	Low	Disturbance dependent
Amelanchier × *grandiflora* Rehder	BA	Low	Cultivar planted in homesites
Andropogon virginicus L., broomsedge	BA, CD, DSP, KE, TA	Moderate	Replaces little bluestem?
Artemisia biennis Willd., biennial wormwood	FV	Moderate	Disturbance dependent, but aggressive
Artemisia ludoviciana Nutt. ssp. *ludoviciana*	TA	Moderate	
Berberis repens Lindl., Oregon grape	WB, IM	High	Spreading in West Beach and Ogden Dunes
Betula nigra L., river birch	DSP, FV, KE	Moderate?	Commonly planted in homesites but is native the Kankakee River valley
Bidens bipinnata L., Spanish needles	TD, IM	Moderate	Disturbance dependent
Bouteloua curtipendula (Michx.) Torr., side oats grama	HPG	Low	Dry habitat dependent
Calycanthus floridus L., Carolina allspice	FV	Low	Vegetative spread only
Campsis radicans (L.) Bureau, trumpet creeper	FV, TA	Low	Early successional habitats only
Carex bushii Mack., Bush's sedge	BA	Low	Often found in old fields
Carex frankii Kunth	DSP	Low	Correct habitat but likely restoration planted
Carex glaucodea Tuckerman ex Olney, blue sedge	BA	Low	Old field
Castanea dentata (Marshall) Borkh. American chestnut	DSP, FV	Low	Associated with old homesites
Catalpa bignonoides Walter, southern cigar tree	FV	Low	Homesites only
Catalpa speciosa Teas, catalpa	All except WB and CD	Moderate	Does not appear to be aggressive
Cercis canadensis L.	BA, FV	Moderate	Planted. May spread.
Chenopodium subglabrum (S. Watson) A. Nelson, dune goosefoot	IM	Low	Often found in open sand
Collinsia parviflora Lindl., blue-lips	TA	Moderate	Disturbance areas only?

Table 55 (continued). Potential for adventive species found at the Indiana Dunes National Park to behave like invasive species or become overabundant in the dunes. Relevant life history traits regarding ecological behavior are also given. Question mark (?) indicates uncertainty or lack of knowledge. Units are BA = Bailly, CD = Cowles Dunes, CP = Calumet Prairie, DSP = Dunes State Park, FV = Furnessville, HP = Hoosier Prairie, HPG = Hobart Prairie Grove, HR = Heron Rookery, IM = Inland Marsh, KE = Keiser, MW = Miller Woods, PB = Pinhook Bog, TA = Tamarack, TD = Tolleston Dunes, WB = West Beach.

Species	Park Unit	Threat	Life History Characteristics and Other Observations
Conoclinium coelestinum (L.) DC., mist-flower	IM, CD, LE	low	Often escaped from cultivation
Croton capitatus Michx., hogwort, wooly croton	CD, TA	Low	Disturbance dependent
Croton glandulosus L. var. *septentrionalis* Müll. Arg.	TD, WB, TA	Low	Disturbance dependent
Datura stramonium L., jimson weed	MW, TD, BA, FV, KE	Low	Disturbance dependent
Diodia teres Walter, buttonweed	IM	low	First noted along a railroad
Dracocephalum parviflorum Nutt., dragonhead	IM	Low	It is associated with old fields and railroads
Echinacea purpurea (L.) Moench, purple coneflower	FV	moderate	NIPSCO restoration planting after pipeline replacement
Eragrostis trichodes (Nutt.) Alph. Wood, tall lovegrass	MW, WB, IM	Low?	?
Eriogonum annuum Nutt., annual wild bush-wheat	MW	Low?	This has not been seen to spread since its introduction to the Douglas Center
Euphorbia dentata Michx., toothed spurge	MW, TD, WB, CD, FV	Moderate	Originally occurred along railroads
Froelichia gracilis (Hook.) Moq., small cottonweed	MW, TD	Moderate	May be increasing in abundance. It grows along railroads
Helenium flexuosum Raf., purple head sneezeweed	FV, KE, HP	Low	?
Helianthus annuus L., sunflower	TD, BA, CD, TA	Low	?
Helianthus maximiliani Schrad., Maximillian sunflower	KE	Low	Often found around railroads
Helianthus petiolaris Nutt. ssp. *petiolaris*, prairie sunflower	MW, TD, WB, CD, KE, HP	Low	Disturbance dependent
Heterotheca camporum (Greene) Shinners, yellow aster	IM	Low	Disturbance dependent
Heterotheca subaxillaris (Lam.) Britton & Rusby ssp. *latifolia* (Buckley) Semple, camphor weed	WB, IM, BA, TA	Low?	Disturbance dependent
Hibiscus laevis Alliioni	CD	Low	Inadvertently restoration planted
Hibiscus moscheutos L. ssp. *moscheutos*	CP, CD, DSP, KE	Low	Introduced to homesites and in restoration plantings.
Hydrangea arborescens L. var. *sterilis* Torr. & A. Gray	TA	Low	Cultivar planted in home sites.
Ilex opaca Aiton, American holly	DSP, FV	high	Seems to be spreading from Teal Rd. to State Park and adjacent areas.
Ipomoea purpurea (L.) Roth, tall morning glory	BA, CD	Low	Disturbance dependent, agricultural fields
Maclura pomifera (Raf.) C. K. Schneid., Osage orange	BA, PB	Low	Planted but innocuous
Madia sativa Molina, tarweed	DSP	Low	Probably extirpated after introduction, last seen in 1929
Mentzelia decapetala (Pursh ex Sims) Urb. & Gilg, ten petal blazingstar	MW	Low	Never spread far from introduction site at the Douglas Center.

Table 55 (continued). Potential for adventive species found at the Indiana Dunes National Park to behave like invasive species or become overabundant in the dunes. Relevant life history traits regarding ecological behavior are also given. Question mark (?) indicates uncertainty or lack of knowledge. Units are BA = Bailly, CD = Cowles Dunes, CP = Calumet Prairie, DSP = Dunes State Park, FV = Furnessville, HP = Hoosier Prairie, HPG = Hobart Prairie Grove, HR = Heron Rookery, IM = Inland Marsh, KE = Keiser, MW = Miller Woods, PB = Pinhook Bog, TA = Tamarack, TD = Tolleston Dunes, WB = West Beach.

Species	Park Unit	Threat	Life History Characteristics and Other Observations
Mertensia virginica (L.) Pers. ex Link, Virginia bluebells	BA, CD, FV	High	Bluebells is native south of the dunes. It is neither locally rare nor state-listed, so it is not a special flora species. Abundant vegetative spread.
Mirabilis jalapa L.	MW, TH	Low	Disturbance dependent
Mirabilis nyctaginea (Michx.) MacMill., prairie four-o'clock	MW, TD, WB, IM, FV, HP	Low	Disturbance dependent
Mollugo verticillata L., carpetweed	MW. TD. IM, CD, SP, TA, HP	Low	Disturbance dependent
Monarda didyma L., bee balm	DSP	Low	Local vegetative spread, introduced by Norman Bergendahl
Muhlenbergia racemosa (Michx.) Britton, Sterns & Poggenburg, upland wild timothy	MW,TD, HP	Low	Disturbance dependent
Oenothera glaucifolia W.L. Wagner & Hoch, smooth or false gaura	MW	Low	Was introduced at the Douglas Center
Packera glabella (Poir) C. Jeffrey, butterweed	WB, CD	Moderate to high	Disturbance dependent, newly arrived in 2012.
Pascopyrum smithii (Rydb.) A. Löve	MW, IM	Moderate	Disturbance dependent
Penstemon grandiflorus Nuttall, large beard tongue	TD	Low	Adjacent to old sand mining railroad track
Phlox drummondii Hook.	DSP	Low	Planted in garden
Phlox paniculata L. fall phlox	MW, TD, IM, BA, CD, TA, HP	Moderate	Local vegetative spread
Physalis pubescens L., hairy ground cherry	MW	Low	Swink and Wilhelm (1994) suggest disturbance dependence.
Pinus rigida Mill., pitch pine	FV	Low	Planted but innocuous
Pseudotsuga menziesii (Mirb.) Franco, Douglas fir	BA	Low	Planted but innocuous
Ribes aureum Pursh var. *villosum* DC., golden currant	BA	low	Planted in homesites
Robinia hispida L., bristly locust	BA, KE	High	Planted in homesites
Robinia hispida L. var. fertilis (Ashe) R.T. Clausen	IM, BA, TA	High	Nitrogen fixation and invasion
Robinia neomexicana A. Gray var. *neomexicana*	CD, DSP, KE	Moderate	Planted at homesites
Robinia pseudoacacia L., black locust,	MW, TD, WB, IM, BA, CD, SP, FV, TA, HPG, HP, HR, PB	High	Nitrogen fixation and invasion
Rubus odoratus L., purple-flowering raspberry	SP	Low	Purple flowering raspberry was introduced to the Dunes State Park by Norman Bergendahl.
Senna hebecarpa (Fernald) H.S. Irwin & Barneby, wild senna	FV	Moderate	Disturbance dependent, NIPSCO restoration planting after pipeline replacement
Solanum carolinense L., horse nettle	TD, CP, WB, BA, CD, FV, TA, HP, PB	Low	Disturbance dependent, naturalized, but never abundant in the dunes
Solidago sempervirens L., seaside goldenrod	FV?	Low	Disturbance dependent and salt tolerant

Table 55 (continued). Potential for adventive species found at the Indiana Dunes National Park to behave like invasive species or become overabundant in the dunes. Relevant life history traits regarding ecological behavior are also given. Question mark (?) indicates uncertainty or lack of knowledge. Units are BA = Bailly, CD = Cowles Dunes, CP = Calumet Prairie, DSP = Dunes State Park, FV = Furnessville, HP = Hoosier Prairie, HPG = Hobart Prairie Grove, HR = Heron Rookery, IM = Inland Marsh, KE = Keiser, MW = Miller Woods, PB = Pinhook Bog, TA = Tamarack, TD = Tolleston Dunes, WB = West Beach.

Species	Park Unit	Threat	Life History Characteristics and Other Observations
Sporobolus compositus (Poir.) Merr. var. *compositus*, rough dropseed	MW, TD, HPG, HP	Low	Disturbance dependent
Stylophorum diphyllum (Michx.) Nutt., celandine poppy	CD, FV	Low	According to Eva Hopkins, Hazell Hanel collected this species from the Valparaiso Moraine and planted it on their Furnessville Rd. property. Local vegetative spread
Symphoricarpos albus (L.) S.F. Blake var. *laevigatus* (Fernald) S.F. Blake, garden snowberry	FV	Low	Local vegetative spread? Could be removed.
Symphoricarpos orbiculatus Moench, coralberry	MW, TD, FV	Moderate	More widespread than the previous with similar lateral spread.
Taxodium distichum (L.) Rich., bald cypress	CD, KE	Low	Benign since it is not known to spread? The seeds may not be viable in our climate?
Thelesperma megapotamicum (Spreng.) Kuntze, green thread	MW	Low	It has not spread from the original introduction site at the Douglas Center, may still be present
Tridens flavus (L.) Hitchc., redtop	TD, CD, DSP, FV, TA	Moderate	Disturbance dependent and may be salt tolerant.
Tsuga canadensis (L.) Carrière, eastern hemlock	FV, TA	Low	Planted but innocuous. Known from the dunes after the Wisconsinin glaciation (Futyma 1985)
Viburnum dentatum L., southern arrowwood	TD, CP, IM, BA, CD, FV, KE, TA, HPG	Moderate	Lateral spread, but not shown to be invasive. Introduced from south of the region (Wilhelm and Rericha 2017)
Wisteria frutescens (L.) Poir.	KE	Low	Planted at former homesite
Yucca flaccida Haworth, yucca	WB, FV, KE, TA	Low	Planted but innocuous
Zea mays L., corn	TD, CD, HP	Low	Disturbance/human dependent

could be less beneficial relative to controlling other more highly invasive nonnative plants such as oriental bittersweet, hybrid cattail, common reed, and reed canary grass (see Exotic Species section below). The threat levels (low, moderate, and high)of adventive species (Table 56), are based on Pavlovic's observations and experience and whether the species are invasive elsewhere. It is possible that some of these species are still in the lag phase of invasion (the period when they are becoming established) and may yet become invasive. We can expect the list of adventive species to grow as more southern species become introduced to the dunes and as the climate becomes more favorable with warming temperatures. For example, native trees in eastern North America have

Table 56. Most invasive exotic plant species found at Indiana Dunes National Park. Units are BA = Bailly, CD = Cowles Dunes, CP = Calumet Prairie, DSP = Dunes State Park, FV = Furnessville, HP = Hoosier Prairie, HPG = Hobart Prairie Grove, HR = Heron Rookery, IM = Inland Marsh, KE = Keiser, MW = Miller Woods, PB = Pinhook Bog, TA = Tamarack, TD = Tolleston Dunes, WB = West Beach.

Species	Common Name	Park Unit	Threat	Distribution Notes
Acer platanoides L.	Norway maple	SP and FV	High	Invading the secondary and remnant oak forests on and north of the Glenwood Dunes along US 12.
Ailanthus altissimus (Mill.) Swingle	Tree of heaven	All except HR, HPG, HP, and PB	Moderate	Invading throughout the park but especially dense at the West foredunes of West Beach.
Berberis thunbergii DC	Japanese barberry	All except CP, HR, HPG, and PB	High	Spreading throughout, but particularly bad in portions of Furnessville E.
Celastrus orbiculatus Thunb.	Oriental bittersweet	All except HR, HP, and PB	High	Spreading throughout all terrestrial portions of the park. A major threat to fire dependent communities.
Centaurea stoebe L. ssp. *micranthos* (S.G. Gmel. ex Gugler) Hayek	Spotted knapweed	All except HR, HPG and PB	High	Spreading aggressively along all transportation corridors.
Dipsacus fullonum L.	Teasel	BA and FV	High	Spreading from transportation corridors. Quite restricted now but likely to become pervasive.
Euonymus alatus (Thunb.) Siebold	Burning bush	CD, IM, FV and TA	High	Occasional in the east unit of the park and especially bad along Tremont Rd. and Kintzele Ditch.
Fallopia japonica (Houtt.) Ronse Decr. (*Polygonum cuspidatum* Siebold & Zucc.)	Japanese knotweed	TD, IM, BA, CD, SP, FV, KE,	High	Earliest at TD. Introduced elsewhere from sand fill with fragments of stems and rhizomes present. Is INDU treating this?
Lonicera spp.	Asiatic bush honeysuckle	All except HR	High	Common throughout the park.
Lythrum salicaria L.	Purple loosestrife	All except BA, HA and PB	Low	Densities were high in the 1990s but have greatly reduced since the introduction of the Galerucella beetles for bio control. Can we consider naturalized now?
Myriophyllum spicatum L.	European water milfoil	WB	High	Wilhelm first reported this in 1990. Spreading region wide (Wilhelm and Rericha 2017)
Phalaris arundinacea L.	Reed canary grass	All except HR	High	Many wetlands and especially along the NIPSCO ROW
Phragmites australis (Cav.) Trin. ex Steud. ssp. *australis*	Common reed	All except BA, KE, HR, HPG, HP and PB	High	Clonally abundant in most portions of all wetlands.
Populus alba L.	White poplar	TD, IM, CD, KE and PB	Moderate	Occasional throughout the park, but dense stands are invading wet/mesic transitions in Inland Marsh
Rosa multiflora Thunb.	Multiflora rose	All	High	Formerly the most common invasive plant at INDU prior to 2010, but still is a significant threat.
Typha × *glauca* Godr. [*T. angustifol*ia × *T. lat*ifolia]	Hybrid cattail	All except IM and BA	High	Occasional to common in most wetlands of INDU.

been shown to be shifting their distribution westward due to changes in moisture availability (Fei et al. 2017). These climate change induced population shifts may bring new adventive species from the east (Fei et al. 2017).

Exotic and Invasive Species

Exotic or non-indigenous species are not native to North America but have arrived directly or indirectly because of human activity. Such introductions can be intentional, but many are not. Most non-indigenous species have become naturalized, but only less than 10% of them become invasive—garlic mustard, dame's rocket, multiflora rose, hybrid cattail, oriental bittersweet, reed canary grass, and common reed, to mention a few (Table 57).

increases in some woody invasives occurred in the park from 1998 and 2000 to 2010 and 2012 (Table 56). Japanese stiltgrass (*Microstegium vimineum*) and porcelain berry (*Ampelopsis brevipedunculata*) are invasive species to watch for as they become more abundant in surrounding areas (Kendig et al. 2021, Koenig and Emery 2021, Stalter et al. 2009). Black swallowwort (*Vincetoxicum nigrum*), a recent discovery in the West Beach Unit (See Unit 4 West Beach for documentation), poses a threat to mesic habitats in the park. Common reed, hybrid cattail, and reed canary grass are the greatest threats to wetlands (Dan Mason, pers. obs., 2000–present; Pavlovic, pers. obs., 1983–present). Purple loosestrife has been a threat to wetlands, but populations have decreased in the Indiana Dunes since

Table 57. Comparison of frequency of invasive woody plant species between two time periods at Indiana Dunes National Park. The percent frequency is the number of plots over the total number of plots sampled that contained these species. Significance is based on chi-squared analysis. The data were from unpublished results by Pavlovic from an exotic plant survey conducted in 1998–2000 and a woody plant survey in 2010–2012.

Species	Common Name	Origin	% Frequency 2010–2012	% Frequency 1998–2000
Ailanthus altissimus (Mill.) Swingle	Tree of Heaven	East Asia	10/368 = 2.7**	4/900 = 0.4
Berberis thunbergii DC	Japanese barberry	Japan	22/368 = 6.0***	12/900 = 1.3
Celastrus orbiculatus Thunb.	Oriental bittersweet	East Asia	99/368 = 26.9***	22/900 = 2.4
Elaeagnus angustifolia L.	Autumn olive	East Asia	18/368 = 4.9***	1/900 = 0.1
Euonymus alatus (Thunb.) Siebold	Burning bush	East Asia	6/368 = 1.6^{ns}	7/900 = 0.8
Frangula alnus Mill. (*Rhamnus frangula* L.)	Buckthorn	Eurasia, North Africa	5/368 = 1.3^{ns}	19/900 = 2.1
Lonicera spp.	Asiatic bush honeysuckle	East Asia	103/368 = 27.9***	18/900 = 2.0
Rosa multiflora Thunb.	Multiflora rose	Japan	79/368 = 21.5*	147/900 = 16.3

* P <0.05

** P <0.01

*** P <0.001

^{ns} = not significant

A total of 332 species are not indigenous to the dunes, and they are listed in the individual unit chapters. Those that pose the most significant threats in the terrestrial zone are oriental bittersweet, multiflora rose, Asiatic bush honeysuckles, Japanese barberry, Japanese knotweed, wintercreeper (*Euonymus fortunei* (Turcz.) Hand.-Mazz), Norway maple, and burning bush. Significant

the 1990s due to the introduction of the *Galerucella* beetles for biocontrol (Albright et al. 2004). Nevertheless, purple loosestrife is still present and there are occasionally local outbreaks, but it does not appear to be approaching the dominance and stature seen in the 1990s (Edwards 1995; Pavlovic, personal observation, 1990 to present).

Research has shown that invasive species impact native species area relationships and thus reduce species richness at mostly small spatial scales (Powell et al. 2013). Hence, invasive species drive the loss of rare species at the landscape scale but have greater impact locally on more common species. This may underestimate extinctions since species area relationships do not take into account population size, which has a large effect on population viability.

Invasive plant control in the Indiana Dunes could benefit from a scientifically and GIS-based adaptive management program driven by knowledge of species population levels and integration of exotic species control, native species introduction, and fire management. In addition, management of INDU could include more integration of wetland and terrestrial invasive species control and native species reintroduction. While traditional adaptive management might help in further reducing invasive plants, non-traditional control methods such as gene silencing (de Felippes et al. 2012), application of fungal endophyte and bacterial probiotics (Zhang et al. 2021), use of dogs that can smell and locate invasive plants (Goodwin et al. 2010), unmanned aerial vehicle scanning (Müllerova et al. 2017), and GIS mapping tools could offer further help for landscape scale reduction of invasive plants and restoration of native plant assemblages. Totally eliminating all invasives would not be a realistic objective, but it might be possible to keep these species under control and in check. The reduction in oriental bittersweet in an oak savanna at West Beach, south of the fee collection station (Pavlovic, pers. obs., 2013) is one example of an apparently successful control of an invasive plant through herbicide application. High atmospheric nutrient loads may still make restoration difficult by depositing high nitrogen levels that contribute to rapid invasive plant growth (Liu et al. 2017, Ren et al. 2019).

Other non-plant invasive species of concern in the Indiana Dunes include emerald ash borer, spongy moth, dogwood anthracnose, and beech bark disease (Fisichelli 2015). Introduced earthworms may pose a threat to the INDU ecosystems as a result of their ability to alter the forest floor by impacting nutrient and litter dynamics. Preliminary studies of earthworm abundance at the Indiana Dunes suggested that either the oak-dominated or sandy soil habitats would be less prone to earthworm invasion compared to sites with more mesic soils, such as abandoned homesites (Joy Marburger, former NPS Great Lakes Research and Education Center scientist, pers. comm. with Pavlovic, 2015). Very durable oak litter with high tannin content may deter earthworm invasion.

Future of the Flora of the Indiana Dunes

The future of the flora of the Indiana Dunes will depend mostly on human actions. To the extent that restoration occurs and stressors are mitigated, we might think perhaps that the diversity and abundance of the flora could be maintained and preserved. Restoration of degraded areas by introduction of native plants could increase the likelihood that the population viability of the plants in these areas would increase. Mitigating the effects of overexploitation, fragmentation, pollution, recreation, and invasive species may benefit the native vegetation as well. However, there is one overarching threat that is impacting the dunes in a more comprehensive way: human-induced climate warming. We can think of the Dunes as a microcosm of direct and indirect human impacts on the life of our only home, the third planet from the sun, the Earth. Below, we discuss human-induced global warming, fire regimes, pollution, fragmentation, succession and disturbance regimes, poaching and overexploitation, recreation, and restoration and reconciliation in regard to plant conservation.

Human-Induced Global Warming

Climate change is real and based on quantified physical facts (Bennett 2016):

1. From 1958 to October 2016, global atmospheric concentrations of CO_2 increased from 315.7 parts per million to 401.57 ppm, a 27% increase. In December 2019, daily CO_2 concentration reached 412 ppm for the

first time (NOAA 2020) and it continues to increase.

2. Preindustrial concentrations of CO_2 were estimated to be 278 ppm: thus, there has been a 48% increase in CO_2 concentration since the 1700s.
3. CO_2 absorbs light from the sun and converts the energy to heat (infrared portion of the electromagnetic spectrum), which increases the Earth's temperature. CO_2 is more potent in heating the atmosphere than other common gases except ammonia (NH_3). This impact is commonly called the greenhouse effect. The CO_2 concentration is greater in the northern hemisphere, where monthly CO_2 concentration peaks in late spring; thereafter photosynthesis removes CO_2 from the atmosphere until the next fall and winter when the concentration increases again.
4. From 1880 to 2012, global air temperature increased by 0.85°C ± 0.18°C (1.53°F) (Climate Central 2012). Global surface temperature increase is best estimated to be 1.07°C in 2000–2020 compared to 1850–1900 (IPCC 2021)
5. Warmer air holds more moisture. This increases the water available for rainfall, thus increasing local rainfall totals in some areas (Rohli and Vega 2013).
6. While in the age of dinosaurs global CO_2 concentrations were in the order of 1,000 ppm, higher than in 2021 (416.87 ppm in December 2021; NOAA 2022), it is the rapid increase in CO_2 concentrations in the last 200 years (Bennett 2016) coupled with habitat fragmentation and loss of habitat connectivity that has reduced species populations and contributed to species decline. Only the easily dispersed species can migrate with rapid change. Because animal populations are no longer what they were prior to 40,000 years ago, haphazard plant and animal dispersal is less likely to occur (Fricke et al. 2022).

In this climate change context, what are the local effects of climate change in the Great Lakes region? Effects on the Great Lakes regional climate include the following:

1. The growing season is lengthening. It has increased by seven days from pre-1980 seasonality in the spring and in the fall (Huntington et al. 2009). The growing season was reported to be 10 days longer in the spring and fall in 2015 compared to the first three-quarters of the 20th century.
2. Since 1900, annual average temperatures have increased by 2.0°F (1.1°C) in the U.S. Great Lakes region (GLISA 2017).
3. Average air temperatures have increased, especially in the winter and during the nighttime (Hayhoe et al. 2010).
4. There is increased variability in rainfall events (McBean and Motiee 2006, Vavrus and Van Dorn 2010). Since 1900, total annual precipitation has increased by 10.8% (GLISA 2017).
5. There is increased variability in droughts (Stambaugh et al. 2011).
6. Small mammals are migrating northward of their historic range in the Great Lakes region (Francl et al. 2010).
7. Experimental work suggests that forest understory herbs (*Maianthemum canadense* and *Eurybia macrophylla*) will increase spring production the earlier spring starts, and that this may lead to higher reproduction. However, other factors such as summer drought may reduce this effect (Jacques et al. 2015).
8. Thirty-two invasive forest tree pests may be expected to infest stressed trees at the Indiana Dunes by 2100 (Fisichelli 2015).
9. Absence of shelf ice along the coastline when lake levels are at an all-time high, such as in 2019–2020, means shoreline erosion is more severe than in the past (U.S. Army Corps of Engineers 2021, Theuerkauf and Braun 2021).

Local weather will always vary. Though neither hot nor cold nor dry nor wet spells alone indicate the reality of human-induced climate change, there will nevertheless be weather interactions between the poles and equator due to differences in temperature. For example, there were heat waves in the past, as in 1916 (Edwards 2010) and 1995, that claimed many lives (Karl and Knight 1997, Hayhoe et al. 2010), but these will

increase in frequency, which is a climate change signal (Thornton et al. 2014). The climate change signal is the increasing magnitude and duration of extreme temperatures, rainfall, and other events. Recently the jet stream has slowed down and thus is locked into place longer, resulting in longer periods of typical weather variants, such as rainy periods, hot periods, or dry periods (Melamed-Turkish et al. 2018). All these changes will affect plant distributions, vegetation abundance, and the pattern of the vegetation mosaic on the landscape. Recent research has shown that trees in eastern North America are shifting more westward than northward, driven largely by changes in rainfall (Fei et al. 2017).

The recent arrival of butterweed in Indiana Dunes (*Packera glabella* (Poir) C. Jeffrey), discovered in 2011 by Daniel Mason's crew, is indicative of the changes seen by Pavlovic. This disturbance-dependent annual forb grows up to three-feet-tall and is quite common in floodplains in south and central Indiana and Illinois. Pavlovic has seen acres of it growing in wet to mesic old fields, fallow farm fields, fence rows, and active fields in south and central Illinois and Indiana, where its yellow blooms "butter" the landscape. Deam (1940) showed that this forb's northern limit was in central Indiana, but by 1994 it had reached Du Page and Kankakee Counties in Illinois (Swink and Wilhelm 1994). The northward movement of butterweed is most likely due to it easily dispersed seeds and dominance of agriculture in the landscape. It is likely that butterweed is well suited to dispersing northward due to its tall stature and because the pappus (hairs) attached to the seeds allow long-distance dispersal.

This circumstance illustrates that as the climate warms, new generalist species will arrive in the Indiana Dunes, and initially managers will have to decide what to do about them; however, as the species become more prevalent in the landscape, control will become more difficult. The butterweed plants in the Cowles Bog Wetland Complex were removed to prevent this species' establishment (Dan Mason, personal communication, 2012). Plampin found it growing near her house in 2011, adjacent to Cowles Dunes B and removed them. Michael Huft found this species growing in Long Lake at West Beach in May 2013. Should we eliminate newly arrived plant species that are migrating northward due to climate change? We would call them adventive in this report. It is unlikely that butterweed would become invasive in the sense of persistent dominance because it depends on ground disturbance for its establishment, as exemplified by its abundance in agricultural farmland. Local abundance might be high in high quality wetlands subject to flooding followed by drawdowns. Areas of dynamic transition from wetland to upland seems like a possible habitat for this plant. This case history supports the contention that disturbance-dependent and easily dispersed species could dominate future novel anthropogenic landscapes as climate continues to change. Plants that are likely to do well with human-induced climate change are likely to have the following traits (LaRue 2013):

1. A species that has wide climatic tolerances and larger ranges;
2. A species that is not trapped in a habitat or ecosystem (e.g., edge of continent or peninsula);
3. A species that is common, with populations not already declining or small, or having low genetic diversity;
4. A species with short generation times (e.g., annuals, shorter perennials, reproduce quickly);
5. A species with good water use efficiency (WUE) which does well in warm temperatures and that is drought tolerant;
6. A species with high dispersal capability and long seed bank duration;
7. A species that is resistant to extreme events such as floods and drought, and extreme storm events;
8. A species occupying a generalist niche and habitat requirements;
9. A species that does not require coevolved species such as a specialist pollinator for survival; and
10. A species that has medium phenotypic plasticity: the ability to modify plant

form in response to environmental change without genetic change.

Climate warming could cause the final demise of the boreal flora, representing 3.5% of the Indiana Dunes flora. The boreal species have probably persisted due to the proximity to Lake Michigan and the climatic moderation that it has provided (Scott and Huff 1996). This loss of flora is no different from the loss of tundra species as the glaciers started to recede 14,000 years ago, except in its rapidity due to recent declines from human induced climate change in a landscape that is hostile to species migration. Just as climate shifts in the historical past caused species to disappear locally and new species to arrive, so will climate change cause these shifts. However, this time, human impacts from habitat loss and fragmentation could diminish the rate of spread of new arrivals and possibly cause the extirpation of many other species. Tree species likely to be extirpated from the Dunes by 2100 due to projected climate changes coupled with habitat suitability models, include beech, paper birch, white pine, big-toothed aspen, and quaking aspen, while basswood and black cherry are expected to decrease in abundance (Fisichelli et al. 2014, Fisichelli 2015).

Whether any of the boreal and deciduous flora remains in one hundred years will depend on the severity of climate change and whether suitable microclimates persist in the dunes. Recent downscaling models of the Indiana climate suggest mean temperature will increase by 6°C by 2100, largely because CO_2 emissions have continued to rise rather than slow down or decrease (Byun and Hamlet 2018, Widhalm et al. 2018, Hamlet et al. 2019). Whatever changes occur in the future, the basic template of sand dune and moraine physiognomy will continue to create microhabitats that will moderate climate extremes and create conditions for a variety of plant species. With conditions that are 6°C warmer, Lake Michigan could diminish in size due to increased evaporation, a change that would remove the moderating lake effect. Nevertheless, models suggest that Great Lake water elevations are difficult to predict (Angel and Kunkel 2010). The late Holocene pattern (last 4,000 years) is to have high lake levels at approximately 35- and 150-year cycles. For example, the historic high lake levels in both 1986/1987 and again in 2019/2020. The terrestrial species in the Indiana Dunes may be buffered from climate change due to the predominant west to east orientation of the dunes providing abundant north slopes that face Lake Michigan, where moderated microclimates may be found. Savanna and prairie plants that are most tolerant of dry conditions could become dominant on the sand dunes as the severity of summer droughts increases. If tree mortality increases due to extreme droughts, vegetation along the coast might become less stable and reinvigorate coastal dune processes. If this came to pass, then Pitcher's thistle might have a resurgence in the landscape.

Dynamic Fire Regimes in a Fragmented Landscape

The probability of fire, from lightning strike or human causes, varies with climate, habitat type, landform, topographic heterogeneity, and human activity. For example, mesophytic forests such as beech-maple or sugar maple forests, or mesophytic pockets are less likely to burn due to the soil moisture status and the rapid rate at which the tree leaves decay (Nowacki and Abrams 2008, Kreye et al. 2013). Mesophytic pockets are less likely to burn due to proximity to Lake Michigan with offshore winds during the day and steep north and lee slopes (Olson 1958d, Henderson 1987). Northeast slopes are also cooler. In contrast, oak savannas have coevolved with fire due to dryer climates or their proximity to large expanses of prairies (Anderson 1982, 1983). Ponds, marshes, and other wetlands are unlikely to burn unless they have dried out or emergent plants are dense enough to carry a fire (Apfelbaum et al. 1983). A challenge in managing the dunes is the proximity of fire-dependent and fire-intolerant habitats in the coastal dune complex. Are mesophytic pockets worth retaining in the Indiana Dunes?

Except in drought years, in presettlement times when the prairie peninsula formed (Transeau 1935), fires may have been used as a wildlife management tool by Native

Americans (Barrett 1980, Dorney 1981, Raffensperger 1987, Dorney and Dorney 1989, Anderton 1999). Prior to the 1700s, INDU was inhabited by the Miami tribe, who were later displaced by Potawatomi (Toupal 2006). In some western states, efforts are underway to reincorporate indigenous burning practices into national forest management (Diver 2016, Marks-Block et al. 2019) which might be a management practice to review for incorporation into management at INDU. The last two decades of fire management have taught us much about the challenges of burning a highly heterogeneous dunal landscape. Restrictions in burning the landscape recommended by the USFWS in their biological opinion (issued on May 28, 1993) regarding Karner Blue butterfly (KBB) management resulted in the dividing of each unit of the park into at least three subunits. This increase in subunits greatly increased the units to be burned and, because only certain units are burned in any one year subsequently led to less frequent fires. The oak savanna complex of Inland Marsh (Unit 5), for example, received an average fire return interval of 8.5 years for its subunits 1 through 3. These burns are too infrequent to stop the proliferation of oak sprouts that shade the ground and the buildup of leaf litter that chokes out the ground layer flora. These changes caused the decline in wild lupine, the KBB larval food plant. The abundant fuel has led to high intensity prescribed burns that greatly alter the structure of the oak savanna.

Additional ecological research related to fire management indicates that many species have evolved to exploit heterogeneity, and if that heterogeneity is reduced, those species can no longer persist in the landscape (Schindler et al. 2015). Fire season research by Pavlovic indicated, for example, that resprouting shrubs cannot reproduce in a landscape that is burned more often than every three years because it takes two years after a burn to initiate flower buds and produce fruit (the spring shoots produce flower bud primordia that bloom the following year) (Pavlovic et al. 2011). Thus, there would be only two ways to have flowering shrubs in the landscape: burn less often than every two years, or burn at two-year intervals, ensuring that there are unburned patches or heterogeneity, in the burn unit. Burning less than every three years would not be advisable because tree sprouts and tree invasion would degrade the oak savanna. Annual burning is not advisable since many insects are negatively impacted (Panzer 2003). Prescribed burns in the Cowles Dunes Unit of the park (Unit 7) have shown that areas resistant to burning are steep southwest slopes on the tallest dunes that have sand blows, steep north and northeast slopes near Lake Michigan in the high dunes, and wetlands that retain water, a condition that varies seasonally and annually. Prescribed burning could be conducted to minimize burning on steep north and northeast slopes, since fire sensitive species are often found there.

Of great management concern are nuisance native species that appear to be encouraged by burning including sassafras, bracken fern, aspen, and raspberry/blackberries. Sassafras is known to be allelopathic and to spread vegetatively (Gant and Clebsch 1975, Bosela and Ewers 1997, Del Tredici 2001), two traits that contribute to its clonal nature and impacts on understory vegetation. Sassafras is known to persist in dry habitats despite high stem mortality through sprouting after repeated fires (Iverson et al. 2017, Keyser et al. 2018). It is likely that this woody tree achieved relative abundance during the time of fire suppression when reproduction was not hindered by fire. Quaking aspen also proliferates in wet to wet mesic habitats and readily resprouts after burning when surface waters are low (McIlroy and Shinneman 2020). Pavlovic observed clonal collapse at Howes Prairie (within Unit 7) in 1993, when a fire was followed by a month of rain that flooded the wet prairie. The flooding prevented the roots from obtaining oxygen since they could not resprout under water (Pavlovic, pers. obs.). Precipitation for management of aspen is usually not in managers control unless the system can be managed through dams and weirs.

Bracken fern is known to be allelopathic (Butnariu et al. 2015) and a prolific vegetative spreader and resprouter (Stewart et al. 2008, Roos et al. 2010). The authors and

other botanists have noticed the apparent increase in bracken fern abundance in Miller Woods (Unit 1) to the detriment of herb-rich ground layer. We have wondered if prescribed and wildfires have been too intense, thus initiating resprouting and vegetative propagation due to mortality of subterranean buds. Recent studies have addressed effective methods of bracken fern control (Aguilar-Dorantes et al. 2014, Foster et al. 2015, Milligan et al. 2016).

Species of the genus *Rubus* (raspberries and blackberries) are prolific responders after fire due to their abundant seed banks from avian and mammalian consumption of fruits (Cain and Shelton 2003). There is some evidence that grazers (in this case cattle, but in the past possibly bison and elk. See Hess et al. (2014)) may control the dominance of these post-fire woody shrubs (Harrington and Kathol 2009). Perhaps restoration efforts started by slowly thinning the understory sprouts and working up the canopy in subsequent years, followed by low intensity fires, might lessen the release of the *Rubus* seed bank.

As climate change proceeds, we would expect perhaps a greater frequency of summer widlfires due to more frequent drought (Bennett 2016, Thornton et al. 2014). Oak savannas and woodlands may shift towards prairies with dominance of fire promoting C4 perennial grasses (little bluestem, big bluestem, Indian grass, sand reed grass) and retention of sun loving forbs. In such a developed landscape, management of wildland-urban interfaces may become more critical in protecting private property.

Disturbance and Succession

Appropriate to the Indiana Dunes, as one of the birth places of the concept of vegetation succession (Cowles 1899), is the important discussion of succession and disturbance. A central question for any ecosystem is whether to let succession continue to forest or whether to manage succession to preserve the diversity of habitats and their species. For the Indiana Dunes region, the stark reality is the isolation by fragmentation of the dunes ecosystems from the rest of the ecosystem in the region. This fact, which is true for any ecosystem that is isolated and fragmented by human habitation, agriculture, transportation corridors, and industry, means that without successional management for a heterogeneous dune system, many of the native communities will be eliminated by succession. The inherent difficulty with this concept is that conditions can change so much that those remnant ecosystems are no longer sustainable, especially if they are subject to tipping points.

While not clear as to why, many disturbance-dependent species are declining in the Indiana Dunes region. Several examples of these declining species include fame flower (*Phemeranthus rugospermus*), false heather (*Hudsonia tomentosa*), and Deam's dayflower (*Commelina erecta* var. *deamiana*) (Pavlovic, personal observation, 1987 to 2021). These species benefited from sand mining in the dunes in the late 19th and early 20th centuries. It was thought that reintroduction of fire also would benefit these species, but this appears to not be the case. It might be possible that the loss of herbivores and top predators to the system have altered the disturbance regime so much that these plant species cannot persist. This recalls the considerable vegetation changes that have occurred in the Yellowstone National Park ecosystem with the reintroduction of wolves. The arrival of wolves influenced the behavior of grazing bison, thus changing the pattern of vegetation in the ecosystem (Morell 2015), illustrating cascading effects of top-down control of the pattern and process of plant communities. Another example of the impact of animal introductions on vegetation is the positive impact of the reintroduction of bison on fame flower populations at Nachusa Grasslands and Kankakee Sands in Illinois. In this location, nutrient enrichment also may be increasing rates of succession and thus increasing perennial dominance, reducing the necessary sand movement that fame flowers require. Should the National Park Service and Indiana Division of Nature Preserves let these species decline locally while knowing that they have a future in other landscape scale restorations?

Hydrological Changes And Restoration

Hydrological issues have been of great interest within Indiana Dunes, especially when local surface water levels (Buszka et al. 2011) and Great Lakes levels are high. The dunes were extensively ditched beginning in the 1880s and extending into the 1930s (Cook and Jackson 1978) to decrease water levels and allow agriculture and development of human habitation (Apfelbaum et al. 1983, Cook and Jackson 1978). Today, some of these wetlands that existed previously are being restored. It is not clear how climate change will impact these restored wetlands. Will spring flooding become annual, thus preventing the successional dominance of blue-joint grass in coastal plain meadows? Will the timing of drawdowns from summer droughts allow germination of the rich coastal plain flora? Will the ponds dry up regularly in early to mid-summer and cause the reproductive failure of floating aquatic herbs? Monitoring and adaptive management of wetlands will be critical as the climate warms to understand the impacts of increased temperatures and alterations of hydroperiods on these habitats. Rejuvenating the Howes Prairie well system (Buszka et al. 2011) or installing a new system across the park adjacent to vegetation monitoring plots could aid our understanding of the surface water and hydrological changes occurring during this century and in turn lead to better understanding of how soil moisture is influencing vegetation changes.

Pollution

Chemical pollution is pervasive in northwest Indiana, as demonstrated by numerous research studies, which is ironic since it is often said that the Indiana Dunes is where industry and natural areas coexist. Heavy metals have accumulated especially in organic soils (Patterson and Fenn 1978; Cole et al. 1990; Esser et al. 1991a, 1991b, 1992; Dollar et al. 2001; Mastalerz et al. 2001; Pavlovic et al. 2009). In some areas, the soil, groundwater, and wetland substrates are contaminated with polycyclic aromatic hydrocarbons (Stewart et al. 2003).

Nazareth (2008) showed the heavy metal concentration and nutrient levels in panne substrates were positively correlated with the level of organic matter. While Nazareth did not demonstrate that this resulted in an increased probability of invasive plants becoming established, numerous studies have provided a stronger link to invasion of plants like hybrid cattail and *Phragmites*. Many invasive plant species are tolerant of heavy metal concentrations in acidic soils. For instance, Bird and Choi (2017) demonstrated that nitrogen pollution increases the abundance of grasses over forbs.

Cleanup and restoration of the Grand Calumet River provides hope for remediating the aquatic substrate contamination in the Grand Calumet Lagoons at Miller Woods and Marquette Park. Less clear is whether anything can be done to minimize the impacts of iron and heavy metals in the dunal uplands, such as occurs at Miller Woods (Pavlovic, personal observation).

Fragmentation

Two components of fragmentation are relevant at the Indiana Dunes: 1) fragments defined by the transportation corridors separating units and subunits of the park from each other, and 2) fragments of degraded habitats isolating high quality remnants as islands embedded in parcels smaller than the units and subunits. These two types of fragmentation affect the persistence of the native flora because they are barriers to dispersal and because they impact species diversity as expressed in species area relationships. Ecologists tell us that there is a linear relationship between the proportion of biodiversity that is destroyed and the proportion of biodiversity that survives in the remaining area, although other studies suggest that, as with exotic invasion, fragmentation has greater effects at the local scale (Collins et al. 2017). These effects of fragmentation suggest two approaches to maintaining plant diversity in the dunes: reduction of barriers from transportation corridors and restoration of degraded habitats. In the short-term, the former is more difficult compared to the restoration of degraded habitats. Transportation corridors provide habitat for invasive species establishment and/or

provide corridors for dispersal and spread of invasive plant species throughout the park (Christen and Matlack 2009; Pavlovic, personal observation).

At INDU, railroads are the primary dispersal corridors for spotted knapweed, baby's breath, and mugwort, but roads and trails are secondary and tertiary dispersal corridors, respectively. In addition, former homesites were sources for introducing invasive species (Gavier-Pizarro et al. 2010a, 2010b). Oriental bittersweet floral arrangements have been discarded at homesites and the fruits are thus consumed by birds, which then disperse the seed along roadsides and edge habitats. Asiatic bush honeysuckles, burning bush, and Japanese barberry were planted at homesites and subsequently the seeds were dispersed by birds as well.

Analysis of habitat connectivity can aid in setting priorities and planning for restoration in strategic locations in the dunes, where actions might enhance connectivity and species survival. Recent long-term experimental fragmentation research at the Savannah River Plant in Georgia has demonstrated the importance of habitat connectivity in plant dispersal and in maintaining plant diversity (Damschen et al. 2019).

Poaching and Overexploitation

We chose to omit specific plant location information within this report due to the threat of potential plant poaching. Here is a short observational record of poaching events made by Pavlovic between 1983 and 2020:

1. Removal of the last *Commelina erecta* from Howes Prairie in the late 1980s;
2. Collection of a pitcher plant from Cowles Bog in 1985;
3. Removal of *Diphasiastrum tristachyum* in the permanent monitoring plot in 1980s;
4. A family caught by NPS law enforcement harvesting *Opuntia cespitosa* pads for consumption at West Beach in the 1980s;
5. Removal of butterfly weed planted in restoration sites along U.S. 12 by individuals involved in the Chicago plant trade in the early 1990s;
6. Removal of bracken fern stems from the north of Howes Prairie in the 1990s;
7. Cutting of shoots from *Eurybia macrophylla* in 2012;
8. Poaching of Pitcher's thistle plants, native plants, and orchids from natural areas to grow in a private residence in Whiting, Indiana; and
9. Poaching of the last pitcher plant from Cowles Bog in 2012.

Pavlovic et al. (1992) published a short note about the negative aspects of collecting specimens. Lois Howes' daughter, Francis Howes Hancock, wrote in 2020 (pers. comm. shared with Pavlovic by Rich Hawkesworth),

> *Mother would often take botanists from the Univ. of Chicago out to the bog to see rare orchids, but stopped doing it when she suspected that the head of the department removed a rare specimen (Lois surmised this as she had shown it to him and then returned a few days later to find that it had been dug out or "collected"). Lois never took out anyone after that to those isolated areas unless she trusted them implicitly as once the plant is removed it is a death knell because one cannot replicate the intricate biological system to support the plant in a greenhouse. Lois had an incredible visual memory so would "guide" others to rare plants that she had noted years before in the boggy areas between the South Shore RR and gate house which stretched from the steel mills in the west to the State Park in the east and which were accessible only on foot.*

The dunes have been a commons, land open to all with resources for the taking, for many years as pointed out by Bailey (1924), who noted the dunes enthusiast whose "arms were laden with American holly [*Ilex verticillata*] and bunches of bitter-sweet for his holiday home decoration." The tragedy of the commons is that the resources are held for all in trust, but no one oversees their use, so that the cumulative result is to drive that resource (species) to be extirpated or destroyed through individual and collective use (Dietz et al. 2003, Kennedy 2003, Sugden

et al. 2003). It is a challenge for the National Park Service to prevent poaching of plants, especially when species may be taken as individual specimens by multiple individuals.

Another kind of poaching—indirect poaching—involves for example enthusiastic photographers of rare plants trampling circles around spectacular specimens and trampling younger plants in the process. It is for these reasons that researchers consider the impacts of their work on plants and animals.

Continued and repeated plant poaching, in combination with other threats, can cause the decline of habitat quality in the Indiana Dunes and can decrease the significance of the Indiana Dunes as a repository for plant biological diversity. Poaching could continue to erode biological diversity without adequate enforcement, public education and penalties to match the financial or personal gain from taking biological resources from the natural areas (Muth and Bowe 1998, Young et al. 2011, Holden and McDonald-Madden 2017). Aldo Leopold (1949) decried the absence of a land ethic in our society as the root cause of habitat destruction and wildlife species loss. A Miami elder's perspective on the indigenous land ethic was presented in Toupal (2006) (see also Diaz et al. 2019):

> *What we can say with some degree of assurance is that we seek to maintain mutually respectful relationships with all those living entities that we share the land with, including the plants and animals. This requires four essential things: that we be knowledgeable of the inhabitants of the land, we respect life as it is and do not seek to control it, we maintain a sense of humility about ourselves so that we remember our place in the larger scheme of life, and that we possess the ability to heal these relationships when the balance is upset or when conflict arises. These principles are fundamental to our traditional culture.*

Seed banks and propagation of species threatened by plant poaching could help maintain and augment populations. Dan Mason has done this type of work for some orchids and other species at INDU and native plant nurseries and native plant seed sources are being preserved through efforts of the Bureau of Land Management (2015).

Recreation

The enabling legislation of the Indiana Dunes highlights

> *The purpose of Indiana Dunes National Lakeshore is to preserve for the educational, inspirational, and recreational use of the public, the diverse resources of the Indiana dunes, and other areas of scenic, scientific, and historic interest and recreational value* (Indiana Dunes National Lakeshore 2014).

This legislation suggests that recreation is tertiary to educational use, but an important component of the mission. In contrast, the National Park Service's enabling legislation, the Organic Act of 1916, states the purpose of the agency is to

> *conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations* (National Park Service 2016; 39 Stat. 535; 16 U.S.C. 1, 2, 3, and 4).

Thus, there has always been a tension in the NPS concerning recreational use, the reason people care about the parks, and leaving them unimpaired for future generations. In an urban park where human pressure is greatest, local tourism agencies aggressively promote the dunes, and fragmentation impairs the long-term survival of species, thus determining limitations to visitation is important in not destroying the things that bring people to the park in the first place. Many plant species are disturbance-dependent, and their conservation requires an understanding of the processes that favor their persistence (Pavlovic 1994). For example, excessive human trampling of sand dunes creates bare sand conditions that Pitcher's thistle find suitable for germination; however, plants growing in chronically trampled areas are themselves susceptible to trampling and higher mortality. In this case,

trampling is not a conservation solution for this species. Thus, restoration of the sand dune disturbance regimes is important in the context of species evolution for some species, while avoidance of disturbance is important in the preservation of others. Thus, human trampling disturbance that kills vegetation and loosens sand is not the same as coastal processes that move sand in coastal ecosystems.

Restoration and Reconciliation

Restoring native species will continue to be of great importance in conserving the flora and vegetation of the Indiana Dunes. Landscape scale restoration efforts of the NPS (Daniel Mason, INDU Botanist) in the Great Marsh and Cowles Bog wetland complex have demonstrated the holistic vegetation approach to restoration that is required for success. Successful restoration in these areas has required understanding how physical, biological, and pedological (soil) conditions have changed; how to mitigate those changes; how to effectively remove and control invasive species; and how to encourage native plants to flourish.

Reconciliation ecology invokes us to create conditions in human-dominated landscapes that are conducive to the survival of non-human species (Rosenzweig 2003). One simple example of reconciliation at INDU is the construction of the green roof on the office/fire fitness building at park headquarters, which provides habitat for native plants that can help foster pollinators (Cook-Patton and Bauerle 2012). Doug Tallamy's *Bringing Nature Home* (Tallamy 2007) provides justification for planting native species as being important in fostering native insects that many fledgling birds require for rapid growth (Burghardt et al. 2009) and that pollinate crops.

One drawback to this approach is that unless some sort of conservation easement or long-term protection exists for the private property, there is no guarantee that the native species that previous owners planted will be protected after the private landowners sell or pass away. This is relevant to the inholding communities of Miller, Ogden Dunes, Dune Acres and Beverly Shores, private lands that could be additional habitat for native plant and animal species rather than sources of invasive plants. Native plants in these towns could benefit the adjacent protected Indiana Dunes wetland, savanna and prairie ecosystems. In addition, not all native species can persist in this context. For example, habitat specialists (e.g., lake-side daisy on dolomite (DeMauro 1982)), species requiring unusual disturbance regimes (e.g., furbish lousewort in Maine (Macior 1980) or plantain in the Midwest (Bowles and Apfelbaum 1989)), special mutualists (e.g., orchids), or species dependent on landscape scale processes across large areas of habitat. It is for these reasons that we need preserves in interconnected landscapes.

Floristic Considerations

Here we present ideas the NPS might consider to ensure the long-term viability of the flora of the dunes.

1. Continue invasive species removal and native ground layer restoration throughout the dunes.
2. Survey for plants in overlooked areas such as Bailly subunits J and K (Unit 6) and subunit Tamarack A (Unit 11),
3. Restore all the savanna complex and the Great Marsh ecosystems. Thin woody species on north and northeast slopes in the Tolleston-aged dunes to allow greater ecological breadth for oak savanna species.
4. Integrate wetland and terrestrial restoration, one component of heterogeneity that some species may utilize, e.g., eastern massasauga and the Karner blue butterfly.
5. Increase management based on integration of GIS data, ecological models, and predictive scenario testing.
6. Complete all taxonomic inventories of less understood groups including mosses, lichens, and difficult plant groups.
7. Develop a spatially and ecologically based fire tracking and modeling system that assists park management

in conducting prescribed fires and managing after severe intensity prescribed fires and wildfires. Integrate this system with rare plant monitoring and understanding of impacts on fire-sensitive tree and forb species.

8. Explore opportunities to reduce fragmentation from roads and other dispersal impediments. Identify such locations using connectivity analysis.
9. Investigate opportunities for landscape scale connectivity on public and private lands to connect the dune ecosystems to the natural areas within the Valparaiso Moraine, Kankakee Valley, and Michigan dune remnants.
10. Initiate a plant pathogen inventory and monitoring system.
11. Initiate a comprehensive analysis of the potential for reintroducing extirpated herbivores and carnivores to the dunes ecosystem.

Conclusion

Floristically, the Indiana Dunes is the most plant species-rich location in the Midwest and Great Lakes regions (BONAP 2021). The preservation and maintenance of healthy and viable populations of plant species is an important management goal. However, achieving this goal is daunting due to the impediments imposed by urban and industrial fragmentation, global climate change, pollution, poaching, recreation, and past land use (Diaz et al. 2019). The National Park Service has made great strides in wetland and oak savanna/prairie restoration and the Dunes State Park and Division of Nature Preserves have made progress in prairie restoration. More could be done, as suggested in the previous section on Floristic Considerations. The survival of this area's rich plant diversity will depend on future restoration activities as well as the effects of climate change

What happens to the plant diversity of the Indiana Dunes will be a testament to our society's relationship and commitment to the nonhuman living world (Diaz et al. 2019). We are dependent on the services provided by the living plant diversity that the remnant Indiana Dunes so aptly represents. We can work to continue wise management based on science to perpetuate this "treasure land of plant diversity" into the 22nd century.

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Appendix A. Affiliations of people cited in this report.

Table A1. Affiliations of people cited in this report along with years of birth and death, activity dates, and expertise or contribution, if known.

Name	Affiliation	Title	Expertise/Contribution
Ahrens, Anita	National Park Service (NPS)	GIS Specialist	Geographic Information System (GIS)
Alix, Mitch	Purdue Northwest University	Associate Professor	Aquatic biology, flora, and conservation
Almoduvar, L.	–	–	Collected specimen of *Agrostis stolonifera* with Drouet and Louderback in 1956 at the Dunes State Park
Argus, George	Museum of Natural Sciences, Ottawa, Canada	Former curator of National Herbarium	Expert on willow taxonomy
Argyilan, Erin	Indiana University, Northwest	Geology professor	Coastal dune geologist
Armstrong, Alvah C.	–	Botanist	Botanist
Bagby, Susan	Local resident	–	Dunes enthusiast and ornithologist
Balzar, Adam	Cardno	Botanist	Midwest flora
Bassett, Tyler	Michigan State University, PhD; Michigan Natural Features Inventory	Plant Ecologist	Oak savanna restoration and Great Lakes flora
Beamer, David	U.S. Geological Survey (USGS) (2000-2002)	Biology professor/ Biological technician	Herpetologist
Bechtel, Albert Reiff (1882-1955)	Wabash College	Botanist	Botanist
Benke, Hermann C. (1869-1946)	University of Chicago	Botanist	Botanist and photographer
Bennett, H. R.	Eastern Illinois University?	–	Collected various specimens in the 1950s and 1960s
Bergendahl, Norman (1921-1989)	Local resident	–	Dunes enthusiast
Bess, Jim	3D Environmental Consulting Firm	–	Restoration ecologist
Betz, Robert F. (1923-2007)	Northern Illinois University	Professor	Prairie remnants in Illinois and central west Indiana
Blair, Chauncey (1810-1891)	Local entrepreneur	–	Farmed cranberries in the Great Marsh in the 1800s
Blink, Daryl	NPS	Retired park ranger	–
Bolesch, Barbara	Illinois Native Plant Society	Botanist	Accompanied Gerould Wilhelm on surveys
Bonace, Terry	Shirley Heinze Land Trust	Volunteer	Writer and birder
Botka, Douglas	Shirley Heinze Land Trust, Indiana Dune State Park	Former DSP employee	Botanist
Bowles, Marlin	The Morton Arboretum	Retired rare plant and plant community ecologist	Ecologist and botanist specializing in orchid ecology
Brenan, Laura	NPS, Indiana Dunes	Resource Management Specialist	Invasive species management and GIS
Butkovitch, Dianne	–	–	Accompanied Gerould Wilhelm on surveys
Caldwell, Kelly	USGS	Student contractor (1994)	Found *Mullago verticillata* in DSP with Nicole Kalkbrenner
Carlson, Peter	USGS	Biological Technician (2007)	Found *Bromus squarrossus* with Stacey Leicht-Young
Casebere, Lee	Indiana Division of Nature Preserves	Retired	
Chappelle, Justin	USGS	Field assistant (2017)	Botany and rare plants

Table A1 (continued). Affiliations of people cited in this report along with years of birth and death, activity dates, and expertise or contribution, if known.

Name	Affiliation	Title	Expertise/Contribution
Chase, Agnes (1869-1963)	U.S. Department of Agriculture	Curator of grass collections	Expert in grasses
Choi, Young	Purdue Northwest	Professor	Restoration ecology
Churchill, Joseph R. (1845-1933)	–	Lawyer, judge, and plant collector	Collected in Missouri and environs
Clark, Ross	Indiana Department of Natural Resources	–	Accompanied Gerould Wilhelm on surveys
Cole, Kenneth	NPS/USGS	Retired plant ecologist	Packrat middens, paleoecology
Conley, Morgen	NPS	Biological Technician (2011)	Found *Plantanthera psycodes* at West Beach
Cottam, Walter P. (1894-1988)	University of Utah	Professor of Botany	Floristics, oak hybridization, doctoral student of H. C. Cowles
Cremin, Laura	USGS	Biological Technician (2009)	–
Dassler, Cynthia	Ohio State University	Curator of State of Ohio cryptogram collections	Cryptogram expert (moss, lichen, lycopod, and fern)
Day, Dan L.	Natural Resource Conservation Service (NRCS)	–	Conservation Reserve Program restoration
Dell, Noah	Missouri Botanical Garden	Science Specialist	Plant ecology
DeMauro, Marcella (DeMauro-Roth)	Forest Preserve District of Will County, Illinois	Executive Director of Conservation and Management	Conservation, plant ecology
Dieck, Jennifer	USGS Upper Mississippi Ecological Science Center (UMESC)	GIS specialist	Vegetation mapping
Dollard, John	NPS/United States Forest Service (USFS)	Biological Technician and Restoration Specialist	Beach pea and restoration
Dove, Stacey and K.	NPS	–	–
Drake, John	The Nature Conservancy	Restoration coordinator	Dune and swale restoration
Dritz, Ken	Argonne National Laboratory	Mathematician	Mathematics/computer science, regional botany
Drouet, F.	The Field Museum	Botanist	Collected specimen of *Agrostis stolonifera* with Louderback and Almoduvar in 1956
Emetario, Sarah	NPS	Biological Technician (2009)	–
Erdelac, Samantha	NPS/Erdelac Land Management	Co-owner	Restoration of northwest Indiana vegetation, exotic removal
Ervin, John	Indiana Division of Nature Preserves	Former northwest Indiana field ecologist	–
Fisher-Dunham, Mary	NPS	Fire Effects Monitor	Vegetation sampling and fire management
Forste, LuAnn	USGS	Biological Technician (1999-2004)	–
Fortelka, Mark	USGS	Biological Technician (2011-2012)	–
Fox, Kristy	NPS	Biological Technician (1983-1984)	Botanist who surveyed Tolleston Dunes and Campground area of INDU
Frohnapple, Krystalynn	USGS	Biological Technician and Administrative Assistant	–
Fultz, Jean	Dune Acres resident	–	Dune enthusiast
Garza, Eric	USGS	Biological Technician (2001-2002)	Collected plants with Lisa Schelling and LuAnn Forste
Glassman, Sidney (1919-2008)	University of Illinois at Chicago	Professor	Botanist, expert in palms

Table A1 (continued). Affiliations of people cited in this report along with years of birth and death, activity dates, and expertise or contribution, if known.

Name	Affiliation	Title	Expertise/Contribution
Grass, Randy	NPS	Biological Technician	Wildlife management
Greiner, E.	NPS	Biological Technician? (2003)	Collected specimens with Karen Quinlan in 2003
Grow, Ray	–	–	Accompanied Gerould Wilhelm on surveys
Grube, B.	Local resident	–	–
Grube, Peter	–	Photographer	Plant photography
Hacker, Molly	NPS/Orbis	Biological Science Technician	Plant identification, wetland plants, and vegetation ecology
Halperin, Marilyn	The Morton Arboretum	Volunteer coordinator (1981-1992)	Accompanied Gerould Wilhelm on surveys
Halsey, Samniqueka	Missouri University	Assistant Professor	Ecological modeler and analytical demographer of rare plants
Hannon, Noreen	–	–	Accompanied Gerould Wilhelm on surveys
Hanson-Lucas, Lindy	–	Beverly Shore resident	Accompanied Mark Klein, Plampin, and Mary Wagner in 2005
Hassert, Rita	The Morton Arboretum	Library Collections Manager	Accompanied Gerould Wilhelm on surveys
Hawksworth, Rich	Dune Acres resident, owner of native plant nursery Special Vegetation	Owner	Plant propagator
Hedge, Cloyce	Indiana Division of Nature Preserves	–	–
Hedge, Roger	Indiana Division of Nature Preserves	–	–
Herlocker, Irene (1921-2014)	–	Resident of Griffith and Beverly Shores, Indiana	Dunes and prairie enthusiast who spearheaded Hoosier Prairie
Hess, Bill (1934-2021)	The Morton Arboretum	Herbarium Curator	Plant systematics
Hiebert, Ron	NPS	Science Division Chief Scientist/Regional Chief Scientist/Director of Northern Arizona University CPCESU	Geneticist and botanist
Hinbshman, Doug	–	Local resident	Found *Mimulus alatus* growing in DSP
Hipp, Andrew L.	The Morton Arboretum	Geneticist and Herbarium Curator	Genetics of oaks and sedges
Hoiland, Caleigh	USGS	Biological Technician (2011-2012)	–
Homoya, Michael	Indiana Division of Nature Preserves	Botanist for State of Indiana, retired	Professional botanist and author of three books
Hopp, Kevin	USGS UMESC	GIS specialist and principal vegetation mapper for the NPS Park Vegetation Mapping Program	–
Howes, Lois F. (1914-1985)	–	Dune Acres resident (1940-1986)	Amateur botanist
Huft, Michael	Great Lakes Botanist (scientific journal)	Editor, former lawyer and botanist	–
Hunter, Jan	Save The Dunes	–	Ecological restoration
Johnson, Barbara	The Morton Arboretum	Volunteer	Accompanied Gerould Wilhelm on surveys
Johnson, Richard	Local resident	Pharmacist	Plant enthusiast
Kalkbrenner, Nicole	Former intern working with Charlotte Wolfe /Cardno	–	–
Kangas, Katie	USGS	Biological Technician (2009-2010)	–

Table A1 (continued). Affiliations of people cited in this report along with years of birth and death, activity dates, and expertise or contribution, if known.

Name	Affiliation	Title	Expertise/Contribution
Kinsman, Samantha	NPS	INDU Resource management technician	–
Kjellmark, Eric	INDU/Florida Southern College	Biological Technician (1987-1988)/Professor of Biology	Ecologist
Klein, Mark	–	Local resident? (2004-2005)	Accompanied Plampin, B., M. Wagner, L. Hanson-Lucas, W. Robinson, and K. Robinson in searching for plants
Kobal, Scott N.	NPS	Biological Technician (1999)	
Konz, Leon	NPS	Fire Management Offficer	Saved Ogden Dunes from 1986 wildfire
Korte, Megan	NPS/USGS	Seasonal technician /Biological Technician (2012-2016)	–
Kwilosz, John	NPS	Resource Management Specialist at INDU	Restoration and invasive plant management
Lace, Ed.	–	–	Accompanied Gerould Wilhelm on surveys
Lamp, Herbert F. (1991-2006)	Northeastern Illinois University	Ecologist	Dune and prairie flora
Lampa, Wayne A.	Forest Preserve District of DuPage County, The Morton Arboretum	Resource Naturalist Specialist, Research associate	Mosses of DuPage County, Illinois
Langlie, Robert	NPS	INDU Biological Technician (2011)	–
LeBlanc, Sheryl	Indiana Division of Nature Preserves	–	–
Lehmann, Naida	–	Botanist	Plant taxonomy
Leicht Young, Stacey	USGS (2005-2011)	Biological Technician/Plant Ecologist	Liana ecology; conducted significant research on that and Asiatic American bittersweet at the Dunes
Livovitch, Greg	–	Resident of Lake County, Indiana	–
Louderback, H. B.	Illinois Natural History Survey?	–	Collected specimen of *Agrostis stolonifera* with Almoduvar and Drouet in 1956 at the Dunes State Park
Madany, Mike	–	Local resident	Cited in Swink and Wilhelm (1979), page 178.
Manke, Amy	USGS/NPS/USFS	Biological Technician and Fire Specialist	Botany and prescribed fire
Marburger, Joy (1946-2021)	Great Lakes Research and Education Center	Research Coordinator	Environmental scientist, hybrid cattail
Masi, Susan	Chicago Botanic Garden	Volunteer and Herbarium Curator	Rare plants and Asteraceae
Mason, Daniel	NPS	Botanist	Expertise in wetland restoration and aquatic plants
Masters, Linda	The Morton Arboretum	–	Accompanied Wilhelm on surveys
McAvoy, Katie	USGS	Biological Technician (2009)	–
McBride, Jenny	The Morton Arboretum, now with Alaska DNR	GIS Technician	Presettlement GIS vegetation mapper
McClain, William	Illinois Natural History Survey	Botanist	–
Medley, Max	–	–	Accompanied Gerould Wilhelm on botanical searches
Mickey, D.	NPS	Biological Technician	Explored the Inland Marsh with Karen Quinlan

Table A1 (continued). Affiliations of people cited in this report along with years of birth and death, activity dates, and expertise or contribution, if known.

Name	Affiliation	Title	Expertise/Contribution
Minney, Coleman	NPS	Biological Technician	–
Miramontes -Loyd, Lydia	NPS/Soil Solutions, Inc.	MSc from Eastern Illinois Univ. INDU Biological Technician, botanist/ecologist	Wetland delineation and rare plants
Mohr, Peg	Shirley Heinze Land Trust	Volunteer, Former resident of northwest Indiana	Dunes and natural area enthusiast and volunteer for SHLT; wrote book about early botanical observations.
Namestnik, Scott	Indiana Division of Nature Preserves	Indiana State Botanist	Botanist
Neuffer, Elleen	USGS	Biological Technician (2012)	Accompanied Pavlovic, C. Weiskerger, C. J. Hoiland, M. Fortelka, and K. Pitstick in searching for plants
Newgent, Myrna	Shirley Heinze Land Trust	Board Member, amateur botanist	Surveyed for rare plants with and without Plampin
Nieuwland, Julius (1878-1936)	University of Notre Dame	Priest and Botanist	Botanist
Olsen, Lorain	–	Local resident	Dunes enthusiast
Orport, P. A.	Indiana University	–	Collected specimen in 1956
Otto, Dale K.	NPS	INDU Biological Technician	–
Palmquist, Emily	NPS	Rare Plant Monitoring Intern with Chicago WIlderness (2005)	INDU rare plants
Parry, Betsy	University of Wisconsin, Madison	Masters Thesis student (1989)	Vegetation of abandoned homesites
Pasternack, L.	USGS	Student Contractor (2015)	Found *Thalictrum thalictroides* with Tammy Patterson in 2015
Patterson, Tamatha	NPS/USGS/USFWS	INDU Biological Technician/Term Employee/Data Manager	Conservation planner, GIS specialist, data manager, and hydrologist
Pavlovic, Sarah	U.S. Environmental Protection Agency (USEPA)/Duneland School Corporation/ Discovery Charter School	Environmental Scientist/High Ability Aid/School Naturalist	–
Payton, JoAnn	NPS	INDU Biological Technician (1981-1082)	Started INDU herbarium for Ron Hiebert
Pearsall, Gordon	–	Botanist	Orchids
Pecararo, Sam	USGS	Ecologist	Vegetation dynamics and remote sensing
Peterkin, A.	NPS	INDU Biological Technician (2001)	Found *Ilex opaca*
Peterson, Raymond L.	–	Botanist	–
Pilla, Nathanael	NPS/Save The Dunes/Orbis	Biological Science Technician/Ecologist	Botanist and plant blogger
Pitcher, Emma "Bickie" (1915-2010)	–	Dunes resident	Ornithologist, botanist, natural history writer, and poet
Pitstick, Katie	USGS	Biological Technician (2012)	Accompanied N. B. Pavlovic, C. Weiskerger, C. J. Hoiland, M. Fortelka, and E. Neuffer
Pordrasky, Norma	The Morton Arboretum	–	Accompanied Wilhelm on surveys
Post, Tom	Indiana Division of Nature Preserves	Nature preserve manager and northwest Indiana Field Ecologist	Flora and vegetation
Potts, K. (see Frohnapple, Krystalynn)	–	–	–

Table A1 (continued). Affiliations of people cited in this report along with years of birth and death, activity dates, and expertise or contribution, if known.

Name	Affiliation	Title	Expertise/Contribution
Poulson, Thomas	University of Illinois at Chicago	Professor, retired	Ecology, cave ecology
Putnam, A.	–	–	Surveyed plants with Plampin in 1990
Quinlan, Karen (2004-2005)	USGS	Biological Technician	–
Quinlan, Paul	Shirley Heinze Land Trust	Stewardship Director	–
Resetar, Alan	The Field Museum	Herpetologist	Field ecologist
Resetar, Donna	Valparaiso University	Librarian	Field ecologist
Ring, Jennifer	USGS	Biological Technician (1999)	Accompanied Pavlovic while searching for plants
Robinson, W. and K.	–	Local residents?	Accompanied Plampin, B., M. Klein, M. Wagner, and L. Hanson-Lucas in searching for plants
Rothrock, Paul	Taylor University/Indiana University	Professor/Associate herbarium curator	Systematist and sedge expert
Rowlatt, Ursula	University of Illinois	Botanical collector	Aquatic plants, accompanied Wilhelm on surveys
Satkowski, Carie	NPS	INDU Resource Protection Specialist	–
Schelling, Lisa	USGS	Biological Technician (2001-2003)	–
Schulenberg, Ray (1921-2003)	The Morton Arboretum	Curator of Plant Collections	Prairie restorationist
Schwartz, Valdemar	–	–	Accompanied Gerould Wilhelm on surveys
Scribailo, Robin	Purdue Northwest University	Professor and Chairman of Department of Biology	Aquatic plant ecologist
Serynek, Tom and Carol	Save the Dunes	Residents of the Town of Miller, former director of Save the Dunes	–
Sherff, Earl E. (1886-1966)	The Field Museum	Research Associate, Teacher and Botanist	Floras of Chicago Region and Hawaii
Shields Moose, Rebecca	USGS	Biological Technician (2004)	–
Shimp, Elizabeth	The Morton Arboretum	–	Accompanied Gerould Wilhelm on surveys
Simonin, Howard	NPS	Biological Technician (1983-1984)	–
Spingarn, Art	Indiana Division of Nature Preserves employee	–	–
Squires, Bobbie	–	Local resident	Dunes enthusiast
Stewart, Paul Micheal	USGS, Troy State University	Aquatic Ecologist, Professor of Biology, now retired	Phycology and indices of biotic integrity
Stork, Emily	Indiana Division of Nature Preserves	Ecologist, Lake County	Botanist
Strand, Paul	–	Naturalist	Accompanied Gerould Wilhelm on surveys
Streuker, Brock	USGS/Cardno	Field Assistant in 2017/Staff Ecologist	Herpetologist and ecologist
Stumpf, Julie	NPS	Biological Technician/Ecologist	Pitcher's thistle, mammals, NPS internal funding and grants
Swink, Floyd A. (1921-2000)	The Morton Arboretum	Botanist	Author of three floras of the Chicago Region
Thomas, J.	NPS?	Biological Technician?	–
Thompson, Todd	Indiana Geological Survey	–	Conducted first vibracoring in the dunes to elucidate Indiana Dunes history at Cowles Bog and elsewhere for his dissertation

Table A1 (continued). Affiliations of people cited in this report along with years of birth and death, activity dates, and expertise or contribution, if known.

Name	Affiliation	Title	Expertise/Contribution
Troche, Tony	Stantec (Cardno)	Senior Project Scienticst/Botanist	–
Tryon, Rolla M. jr. (1916-2001)	University of Wisconsin, Washington university, University of California - Berkely, Harvard University	Professor of Botany	Ferns. He was 18 when he published his fern flora of the Dunes.
Umbach, Levi (1853-1918)	Northwestern University	Biological Scientist	Botanist
Visclosky, Peter	Congress of the United States (1985-2021)	1st Congressional District Representative	–
von Oettingen, Susan	NPS	INDU Biological Technician (1981-82)	Botany
Wagner, Gia	NPS	INDU Chief Division of Resource Management, (2009-2020)	–
Wagner, Mary	–	Local resident	Accompanied Plampin, B., M. Klein, L. Hanson-Lucas, W. Robinson, and K. Robinson in searching for plants
Walkons, Chris	NPS	INDU Biological Technician (2009)	Found *Conopholis americana* at Howes Prairie with Noel Pavlovic and Sarah Emeterio
Weatherwax, Paul (1888-1976)	University of Georgia and Indiana University	Professor of Botany	Grasses and corn
Weiskerger, Chelsea	USGS	Biological Technician (2011-2012)	–
Weller, Steve	University of Illinois at Chicago, now at University of California - Irvine	Professor of Biology	Plant breeding systems and rare plant demography
Wells, Dawn Ann	–	Local resident	Dunes enthusiast
Wetstein, Linda (see Masters, Linda)	–	–	–
Wilcox, Doug	NPS/USFWS/USGS/State University of New York, Brockport	Former aquatic ecologist at INDU Science Division/ Wetland Ecologist/Professor	Retired Great Lakes wetland expert; studied Pinhook Bog and salt pile impacts for PhD
Wilhelm, Gerould	The Morton Arboretum/Conservation Design Forum	Botanist/Owner	Flora of the Chicago Region
Wilhelm, Mary	–	Chicago area resident	Accompanied Wilhelm on surveys
Wilmor, Sandy	Save The Dunes/Earthsoft	Director/QA Lead	Wildlife biology and management
Wolcott, Albert B. (1869-1950)	The Field Museum	Preparator	Entomologist
Yatskievytch, George A.	Missouri Botanical Garden/University of Texas	Curator of Herbaria	Botanist
Yatskievytch, Kay	Missouri Botanical Garden	Research Associate, Flora of North America Project	Indiana flora
Zaya, David	USGS/Illinois Natural History Survey	Biological Technician/Associate Scientist, Plant Ecology	Plant ecology, Asiatic bittersweet
Zill, Casey	NPS	INDU Biological Technician (2014-2016)	–

Appendix B. Flora of the Indiana Dunes.

Table B1. Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
ad *Abies concolor* (Gordon & Glendinning) Lindley ex Hildebrand	white fir
ex *Abutilon theophrasti* Medikus	velvetleaf
Acalypha rhomboidea Rafinesque	Virginia threeseed mercury
Acer negundo Linnaeus	boxelder
Acer nigrum F. Michaux	black maple
ex *Acer platanoides* Linnaeus	Norway maple
Acer rubrum Linnaeus	red maple
Acer saccharinum Linnaeus	silver maple
Acer saccharum Marshall	sugar maple
ex *Achillea millefolium* Linnaeus	common yarrow
ex *Achillea ptarmica* Linnaeus	sneezeweed
ad *Acmispon americanus* (Nuttall) Rydberg	American bird's-foot trefoil
Amaranthus tuberculatus (Moquin-Tandon) J.D. Sauer	roughfruit amaranth
Acorus americanus (Rafinesque) Rafinesque	calamus
Acorus calamus Linnaeus	calamus
Actaea pachypoda Elliott	white baneberry
Actaea rubra (Aiton) Willdenow	red baneberry
Adiantum pedatum Linnaeus	northern maidenhair
Aesculus glabra Willdenow	Ohio buckeye
ex *Aesculus hippocastanum* Linnaeus	horse chestnut
Agalinis auriculata (Michaux) S.F. Blake	earleaf false foxglove
Agalinis purpurea (Linnaeus) Pennell	purple false foxglove
Agalinis purpurea (Linnaeus) Pennell var. *parviflora* (Bentham) B. Boivin	smallflower false foxglove
Agalinis skinneriana (Alphonso Wood) Britton	Skinner's false foxglove
Agalinis tenuifolia (Vahl) Rafinesque	slenderleaf false foxglove
Agastache nepetoides (Linnaeus) Kuntze	yellow giant hyssop
Agastache scrophulariifolia (Willdenow) Kuntze	purple giant hyssop
Ageratina altissima (Linnaeus) R.M. King & H. Robinson var. *altissima*	white snakeroot
Agrimonia gryposepala Wallroth	tall hairy agrimony
Agrimonia parviflora Aiton	harvestlice
Agrimonia pubescens Wallroth	soft agrimony
ad *Agropyron cristatum* (Linnaeus) Gaertn.	crested wheatgrass
ex *Agrostis gigantea* Roth	redtop
Agrostis hyemalis (Walter) Britton, Sterns & Poggenburg	winter bentgrass
Agrostis perennans (Walter) Tuckerman	upland bentgrass
Agrostis scabra Willdenow	rough bentgrass
Agrostis stolonifera Linnaeus	creeping bentgrass
ex *Ailanthus altissimus* (MIller) Swingle	tree of heaven
ex *Ajuga reptans* Linnaeus	common bugle
ex *Akebia quinata* (Houttuyn) Decaisne	chocolate vine
Aletris farinosa Linnaeus	white colicroot
Alisma subcordatum Rafinesque	American water plantain
Alisma triviale Pursh	northern water plantain

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
ex *Alliaria petiolata* (M. Bieberstein) Cavara & Grande	garlic mustard
Allium canadense Linnaeus. var. *canadense*	meadow garlic
Allium cernuum Roth	nodding onion
ex *Allium schoenoprasum* Linnaeus	sand leek
Allium tricoccum Aiton	wild leek
Allium tricoccum Aiton var. *burdickii* Hanes	narrowleaf wild leek
ex *Allium vineale* Linnaeus	wild garlic
ex *Alnus glutinosa* (Linnaeus) Gaertner	European alder
Alnus incana (L.) Moench ssp. *rugosa* (Du Roi) Clausen	speckled alder
Alnus serrulata (Aiton) Willdenow	hazel alder
Alopecurus aequalis Sobolewsky.	shortawn foxtail
Alopecurus carolinianus Walter	Carolina foxtail
ex *Alopecurus pratensis* Linnaeus	meadow foxtail
ex *Amaranthus albus* Linnaeus	prostrate pigweed
ad *Amaranthus blitoides* S. Watson	prostrate pigweed
ad *Amaranthus hybridus* Linnaeus	slim amaranth
ad *Amaranthus powellii* S. Watson	Powell's amaranth
ad *Amaranthus retroflexus* Linnaeus	redroot amaranth
Amaranthus tuberculatus (Moq.) Sauer	rough-fruit amaranth
Ambrosia artemisiifolia Linnaeus	annual ragweed
ad *Ambrosia psilostachya* de Candolle	Cuman ragweed
Ambrosia trifida Linnaeus	great ragweed
Amelanchier arborea (F. Michaux) Fernald	common serviceberry
Amelanchier interior E. L. Nielsen	Pacific serviceberry
Amelanchier laevis Wiegand	Allegheny serviceberry
ad *Amelanchier* × *grandiflora* Rehder	Allegheny serviceberry
Amelanchier spicata (Lamarck) K. Koch	
Ammannia robusta Heer & Regel	grand redstem
Ammophila breviligulata Fernald	American beachgrass
Amorpha canescens Pursh	leadplant
Amphicarpaea bracteata (Linnaeus) Fernald	American hogpeanut
Andromeda polifolia Linnaeus var. *latifolia* Aiton	bog rosemary
Andropogon gerardii Vitman	big bluestem
ad *Andropogon virginicus* Linnaeus	broomsedge bluestem
Anemone acutiloba (de Candolle) G. Lawson	sharplobe hepatica
Anemone americana (de Candolle) H. Hara	roundlobe hepatica
ex *Anemone blanda* Schott & Kotschy	Greek thimbleweed
Anemone canadensis Linnaeus	Canadian anemone
Anemone cylindrica A. Gray	candle anemone
Anemone quinquefolia Linnaeus var. *quinquefolia*	nightcaps
Anemone virginiana Linnaeus var. *alba*	tall thimbleweed
Anemone virginiana Linnaeus var. *virginiana*	tall thimbleweed
Angelica atropurpurea Linnaeus	purplestem angelica
Antennaria howellii Greene subsp. *petaloidea* (Fernald) R.J. Bayer	small pussytoes
Antennaria parlinii Fernald	woman's tobacco
ex *Anthemis cotula* Linnaeus	stinking chamomile

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp	alpine sweetgrass
ex *Anthoxanthum odoratum* Linnaeus	sweet vernal grass
ex *Anthriscus caucalis* M. Bieberstein	burr chervil
ex *Apera interrupta* (Linnaeus) P. Beauvois	dense silkybent
Apios americana Medikus	groundnut
Aplectrum hyemale (Muhlenburg ex Willdenow) Torrey	Adam and Eve
Apocynum androsaemifolium Linnaeus	spreading dogbane
Apocynum cannabinum Linnaeus	Indianhemp
Aquilegia canadensis Linnaeus	red columbine
ex *Aquilegia vulgaris* Linnaeus	European columbine
Arabidopsis lyrata (Linnaeus) O'Kane & Al-Shehbaz	lyrate rockcress
ex *Arabidopsis thaliana* (Linnaeus) Heynhold	mouseear cress
Aralia hispida Vent.	bristly sarsaparilla
Aralia nudicaulis Linnaeus	wild sarsaparilla
Aralia racemosa Linnaeus	American spikenard
ex *Arctium lappa* Linnaeus	great burdock
ex *Arctium minus* (Hill) Bernhardi	lesser burdock
Arctostaphylos uva-ursi (Linnaeus) Spreng. var. *coactilis* Fernald & J.F. Macbr.	kinnikinnick
ex *Arenaria serpyllifolia* Linnaeus	thymeleaf sandwort
Arisaema dracontium (Linnaeus) Schott	green dragon
Arisaema triphyllum (Linnaeus) Schott	Jack in the pulpit
Aristida longespica Poiret var. *geniculata* (Rafinesque) Fernald	slimspike threeawn
Aristida oligantha Michaux	prairie threeawn
Aristida purpurascens Poiret	arrowfeather threeawn
Aristida tuberculosa Nuttall	seaside threeawn
Aristolochia serpentaria Linnaeus	Virginia snakeroot
Arnoglossum atriplicifolium (Linnaeus) H. Robinson	pale Indian plantain
Arnoglossum plantagineum Rafinesque	groovestem Indian plantain
Aronia melanocarpa (Michaux) Elliot	black chokeberry
Aronia × *prunifolia* (Marshall) Rehder	purple chokeberry
ex *Artemisia absinthium* Linnaeus	absinthium
ad *Artemisia biennis* Willdenow	biennial wormwood
Artemisia campestris Linnaeus ssp. *caudata* (Michaux) H.M. Hall & Clements	field sagewort
ad *Artemisia ludoviciana* Nuttall subsp. *ludoviciana*	white sagebrush
ex *Artemisia vulgaris* Linnaeus	common wormwood
Asarum canadense Linnaeus	Canadian wildginger
Asclepias amplexicaulis Smith	clasping milkweed
Asclepias exaltata Linnaeus	poke milkweed
Asclepias hirtella (Pennell) Woodson	green milkweed
Asclepias incarnata Linneaus	swamp milkweed
Asclepias purpurascens Linnaeus	purple milkweed
Asclepias sullivantii Engelm. ex A. Gray	prairie milkweed
Asclepias syriaca Linnaeus	common milkweed
Asclepias tuberosa Linnaeus	butterfly milkweed

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Asclepias tuberosa Linnaeus ssp. *interior* Woodson	butterfly milkweed
Asclepias verticillata Linnaeus	whorled milkweed
Asclepias viridiflora Rafinesque	green comet milkweed
Asimina triloba (Linnaeus) Dunal	pawpaw
ex *Asparagus officinalis* Linnaeus	garden asparagus
Asplenium platyneuron (Linnaeus) Britton, Sterns & Poggenburg	ebony spleenwort
Athyrium filix-femina (Linnaeus) Roth ex Mertens var. *angustum* (Willdenow) G. Lawson	common ladyfern
ex *Atriplex patula* Linnaeus	spear saltbush
ex *Atriplex prostrata* Boucher ex de Candolle	triangle orache
Aureolaria flava (Linnaeus) Farwell	smooth yellow false foxglove
Aureolaria pedicularia (Linnaeus) Rafinesque ex Pennell	fernleaf yellow false foxglove
Aureolaria virginica (Linnaeus) Pennell	downy false foxglove
ex *Avena sativa* Linnaeus	common oat
Baptisia lactea (Rafinesque) Thieret	largeleaf wild indigo
Baptisia tinctoria (Linnaeus) R. Brown	horseflyweed
ex *Barbarea vulgaris* W.T. Aiton	garden yellowrocket
Bartonia virginica (Linnaeus) Britton, Sterns & Poggenburg.	yellow screwstem
ad *Berberis repens* Lindley	hollyleaved barberry
ex *Berberis thunbergii* de Candolle	Japanese barberry
ex *Berteroa incana* (Linnaeus) de Candolle	hoary false madwort
Betula alleghaniensis Britton	yellow birch
ad *Betula nigra* Linnaeus	river birch
Betula papyrifera Marshall	paper birch
ex *Betula pendula* Roth	European white birch
Betula populifolia Marshall	gray birch
Betula pumila Linnaeus	bog birch
Betula × *purpusii* C.K. Schneider	birch
Bidens aristosa (Michaux) Britton	bearded beggarticks
ad *Bidens bipinnata* Linnaeus	Spanish needles
Bidens cernua Linnaeus	nodding beggartick
Bidens connata Muhlenberg ex Willdenow	purplestem beggarticks
Bidens discoidea (Torr. & A. Gray) Britton	small beggarticks
Bidens frondosa Linnaeus	devil's beggartick
Bidens polylepis S.F. Blake	bearded beggarticks
Bidens trichosperma (Michaux) Britton	crowned beggarticks
Bidens tripartita Linnaeus	threelobe beggarticks
Bidens vulgata Greene	big devils beggartick
Blephilia hirsuta (Pursh) Bentham	hairy pagoda-plant
Boechera canadensis (Linnaeus) Al-Shehbaz	sicklepod
Boechera laevigata (Muhlenberg ex Willdenow) Al-Shehbaz	smooth rockcress
Boehmeria cylindrica (Linnaeus) Swartz	smallspike false nettle
Bolboschoenus fluviatilis (Torrey) SojA.k	river bulrush
Boltonia asteroides (Linnaeus) L'Héritier var. *recognita* (Fernald & Griscom) Cronquist	white doll's daisy
Botrychium matricariifolium (Retz) A. Braun ex W.D.J. Koch	matricary grapefern

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Scientific Name	Common Name
Botrychium rugulosum W.H. Wagner	ternate grapefern
Botrychium simplex E. Hitchcock	little grapefern
Botrychium virginianum (Linnaeus) Swartz	rattlesnake fern
ad *Bouteloua curtipendula* (Michaux) Torrey	side-oats grama
Brachyelytrum aristosum (Michaux) P. Beauvois ex Branner & Coville	northern shorthusk
Brachyelytrum erectum (Schreber) P. Beauvois	bearded shorthusk
Brasenia schreberi J.F. Gmelin	watershield
ex *Brassica nigra* (Linnaeus) W.D.J. Koch	black mustard
ex *Brassica rapa* Linnaeus	field mustard
Brickellia eupatorioides (Linnaeus) Shinners var. *corymbulosa* (Torrey & A. Gray) Shinners	false boneset
Bromus ciliatus Linnaeus	fringed brome
ex *Bromus commutatus* Schrader	meadow brome
ex *Bromus horeaceus* Linnaeus subsp. *pseucothomineii* (P.M. Smith) H. Scholz	soft brome
ex *Bromus inermis* Leysser	smooth brome
ex *Bromus japonicus* Thunberg	Japanese brome
Bromus kalmii A. Gray	arctic brome
Bromus latiglumis (Scribner ex Shear) Hitchcock	arctic brome
Bromus nottowayanus Fernald	satin brome
Bromus pubescens Sprengel	hairy woodland brome
ex *Bromus secalinus* Linnaeus	rye brome
ex *Bromus squarrosus* Linnaeus	corn brome
ex *Bromus sterilis* Linnaeus	poverty brome
ex *Bromus tectorum* Linnaeus	cheatgrass
Buchnera americana Linnaeus	American bluehearts
ex *Buglossoides arvensis* (Linnaeus) I.M. Johnston	corn gromwell
Bulbostylis capillaris (Linnaeus) C.B. Clarke	densetuft hairsedge
Cakile edentula (Bigelow) Hooker ssp. *edentula* var. *lacustris* Fernald	American searocket
Calamagrostis canadensis (Michaux) P. Beauvois	bluejoint
Calamagrostis stricta (Timm) Koeler ssp. *inexpansa* (A. Gray) C.W. Greene	northern reedgrass
Calamovilfa longifolia (Hooker) Hacker ex Scribner & Southw. var. *magna* Scribner & Merrill	prairie sandreed
Calla palustris Linnaeus	water arum
Callitriche heterophylla Pursh	twoheaded water-starwort
Calopogon tuberosus (Linnaeus) Britton, Sterns & Poggenburg var. *tuberosus*	tuberous grasspink
Caltha palustris Linnaeus	yellow marsh marigold
ad *Calycanthus floridus* Linnaeus	eastern sweetshrub
Calystegia sepium (Linnaeus) R. Brown ssp. *sepium*	hedge false bindweed
Calystegia spithamaea ssp. *spithamaea* (Linnaeus) Pursh	low false bindweed
Camassia scilloides (Rafinesque) Cory	Atlantic camas
Campanula americana Linnaeus	American bellflower
Campanula aparinoides Pursh	marsh bellflower
Campanula aparinoides Pursh ssp. *uliginosa* (Rydberg) Cochrane	marsh bellflower
ex *Campanula rapunculoides* Linnaeus	rampion bellflower
Campanula rotundifolia Linnaeus	bluebell bellflower

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Scientific Name	Common Name
ad *Campsis radicans* (Linnaeus) Bureau	trumpet creeper
ex *Cannabis sativa* Linnaeus	marijuana
ex *Capsella bursa-pastoris* (Linnaeus) Medikus	shepherd's purse
Cardamine bulbosa (Schreber ex Muhlenberg) Britton, Sterns & Poggenburg	bulbous bittercress
Cardamine concatenata (Michaux) O. Schwarz	cutleaf toothwort
Cardamine douglassii Britton	limestone bittercress
ex *Cardamine hirsuta* Linnaeus	hairy bittercress
ex *Cardamine impatiens* Linnaeus	narrowleaf bittercress
Cardamine parviflora Linnaeus var. *arenicola* (Britton) O.E. Schulz	sand bittercress
Cardamine pensylvanica Muhlenberg ex Willdenow	Pennsylvania bittercress
ex *Carduus nutans* Linnaeus	nodding plumeless thistle
Carex × *subimpressa* Clokey [*C. hyanoplepis* × *C. pellita*]	common lake sedge
Carex aggregata Mackenzie	smooth clustered sedge
Carex alata Torrey	broadwing sedge
Carex albicans var. *emmonsii* (Dewey ex. Torrey) Rettig	Emmons' sedge
Carex albicans Willdenow ex Sprengel var. *albicans*	whitetinge sedge
Carex albolutescens Schweinitz	greenwhite sedge
Carex albursina E. Sheldon	white bear sedge
Carex amphibola Steudel	gray sedge
Carex annectens (E.P. Bicknell) E.P. Bicknell	yellowfruit sedge
Carex aquatilis Wahlenberg var. *substricta* Kükenthal	water sedge
Carex atherodes Sprengel	wheat sedge
Carex atlantica L.H. Bailey ssp. *capillacea* (L.H. Bailey) Reznicek	prickly bog sedge
Carex aurea Nuttall	golden sedge
Carex bebbii (L.H. Bailey) Olney ex Fernald	Bebb's sedge
Carex bicknellii Britton	Bicknell's sedge
Carex blanda Dewey	common wood sedge
Carex brevior (Dewey) Mackenzie ex Lunell	shortbeak sedge
Carex bromoides Schkuhr ex Willdenow	bromelike sedge
ad *Carex bushii* Mackenzie	long-scaled green sedge
Carex buxbaumii Wahlenberg	Buxbaum's sedge
Carex canescens Linnaeus. ssp. *disjuncta* (Fernald) Toivonen	silvery sedge
Carex careyana Torrey ex Dewey	Carey's sedge
Carex castanea Whalenberg	chestnut sedge
Carex cephalophora Muhlenberg ex Willdenow	oval-leaf sedge
Carex chordorrhiza Linnaeus f.	creeping sedge
Carex communis L.H. Bailey	fibrousroot sedge
Carex comosa Boott	longhair sedge
Carex conoidea Schkuhr. ex Willdenow	openfield sedge
Carex crawei Dewey ex Torrey	Craw's sedge
Carex crinita Lamarck var. *crinita*	fringed sedge
Carex cristatella Britton	crested sedge
Carex crus-corvi Shuttleworth Ex Kunze	ravenfoot sedge
Carex cryptolepis Mackenzie	yellow sedge
Carex debilis Michaux	white edge sedge

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Carex debilis Michaux var. *rudgei* L.H. Bailey	white edge sedge
Carex digitalis Willdenow	slender woodland sedge
Carex eburnea Boott	bristleleaf sedge
Carex echinodes (Fernald) P. Rothrock, Reznicek & Hipp	
Carex emoryi Dewey	Emory's sedge
Carex festucacea Schkuhr ex Willdenow	fescue sedge
Carex folliculata Linnaeus	northern long sedge
ad *Carex frankii* Kunth	Frank's sedge
Carex garberi Fernald	elk sedge
ad *Carex glaucodea* Tuckerman ex Olney	blue sedge
Carex gracilescens Steudel	slender looseflower sedge
Carex gracillima Schweinitz	graceful sedge
Carex granularis Muhlenberg ex Willdenow	limestone meadow sedge
Carex gravida L.H. Bailey	heavy sedge
Carex grayi J. Carey	Gray's sedge
Carex grisea Wahlenberg	eastern narrowleaf sedge
Carex haydenii Dewey	Hayden's sedge
Carex hirsutella Mackenzie	fuzzy wuzzy sedge
Carex hirtifolia Mackenzie	pubescent sedge
Carex hitchcockiana Dewey	Hitchcock's sedge
Carex hyalinolepis Steudel	shoreline sedge
Carex hystericina Muhlenberg ex Willdenow	bottlebrush sedge
Carex interior Bailey	inland sedge
Carex intumescens Rudge	greater bladder sedge
Carex jamesii Schweinitz	James' sedge Carex lacustris Willdenow
Carex lacustris Willdenow	hairy sedge
Carex laevivaginata (Kükenthal) Mackenzie	smoothsheath sedge
Carex lasiocarpa Ehrhart	woollyfruit sedge
Carex laxiculmis Schweinitz	spreading sedge
Carex laxiflora Lamarck	broad looseflower sedge
Carex leptalea Wahlenberg	bristlystalked sedge
Carex leptonervia (Fernald) Fernald	nerveless woodland sedge
Carex limosa Linnaeus	mud sedge
Carex longii Mackenzie	Long's sedge
Carex lupulina Willdenow	hop sedge
Carex lurida Wahlenberg	shallow sedge
Carex meadii Dewey	Mead's stiff sedge
Carex molesta Mackenzie ex Bright	field oval sedge
Carex muehlenbergii Schkuhr ex Willdenow	Muhlenberg's sedge
Carex muskingumensis Schweinitz	swamp oval sedge
Carex normalis Mackenzie	greater straw sedge
Carex oligocarpa Schkuhr ex Willdenow	richwoods sedge
Carex oligosperma Michaux	fewseed sedge
Carex pauciflora Lightfoot	fewflower sedge
Carex pedunculata Muhlenberg ex Willdenow	longstalk sedge
Carex pellita Willdenow	woolly sedge

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Carex pensylvanica Lamarck	Pennsylvania sedge
Carex prairea Dewey	prairie sedge
Carex prasina Wahlenberg	drooping sedge
Carex projecta Mackenzie	necklace sedge
Carex radiata (Wahlenberg) Small	straight-styled wood sedge
Carex rosea Schkuhr ex Willdenow	rosy sedge
Carex sartwellii Dewey	Sartwell's sedge
Carex scoparia Schkuhr ex Willdenow var. *scoparia*	broom sedge
Carex seorsa Howe	weak stellate sedge
Carex shortiana Dewey	Short's sedge
Carex siccata Dewey	dryspike sedge
Carex sparganioides Muhlenberg ex Willdenow	burr reed sedge
Carex squarrosa Linnaeus	squarrose sedge
Carex sterilis Willdenow	dioecious sedge
Carex stipata Muhlenberg ex Willdenow	owlfruit sedge
Carex stipata var. *maxima* Chapman ex Boott	stalkgrain sedge
Carex stricta Lamarck	upright sedge
Carex suberecta (Olney) Britton	prairie straw sedge
Carex swanii (Fernald) Mackenzie	Swan's sedge
Carex tenera Dewey	quill sedge
Carex tetanica Schkuhr	rigid sedge
Carex tonsa (Fernald) E.P. Bicknell	shaved sedge
Carex tonsa (Fernald) E.P. Bicknell var. *rugosperma* (Mackenzie) Crins	parachute sedge
Carex tribuloides Wahlenberg	blunt broom sedge
Carex trichocarpa Muhlenberg ex Willdenow	hairy-fruited lake sedge
Carex trisperma Dewey	threeseeded sedge
Carex typhina Michaux	cattail sedge
Carex umbellata Schkuhr ex Willdenow	parasol sedge
Carex utriculata Boott	beaked sedge
Carex vesicaria Linnaeus	blister sedge
Carex virescens Muhlenburg ex Willdenow	ribbed sedge
Carex viridula Michaux ssp. *viridula*	little green sedge
Carex vulpinoidea Michaux	fox sedge
Carex woodii Dewey	Wood's stiff sedge
Carpinus caroliniana Walter ssp. *virginiana* (Marshall) Furlow	American hornbeam
Carya cordiformis (Wangenheim) K. Koch	bitternut hickory
Carya glabra (MIller) Sweet (includes *Carya ovalis*)	pignut hickory
Carya laciniosa (F. Michaux) G. Don	shellbark hickory
Carya ovata (MIller) K. Koch	shagbark hickory
ad *Castanea dentata* (Marshall) Borkhausen	American chestnut
Castilleja coccinea (Linnaeus) Sprengel	scarlet Indian paintbrush
ad *Catalpa bignonoides* Walter	southern catalpa
ad *Catalpa speciosa* Teas	northern catalpa
Caulophyllum thalictroides (Linnaeus) Michaux	blue cohosh
Ceanothus americanus Linnaeus	New Jersey tea
ex *Celastrus orbiculatus* Thunberg	Asian bittersweet

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Celastrus scandens Linnaeus	American bittersweet
Celtis occidentalis Linnaeus	common hackberry
Celtis tenuifolia Nuttall	dwarf hackberry
Cenchrus longispinus (Hackel) Fernald	mat sandbur
ex *Centaurea stoebe* L. ssp. *micranthos* (S.G. Gmelin ex Gugler) Hayek	spotted knapweed
ex *Centaurium pulchellum* (Swartz) Druce	branched centaury
Cephalanthus occidentalis Linnaeus	common buttonbush
ex *Cerastium brachypodum* (Engelmann ex A. Gray) B.L. Robinson	shortstalk chickweed
ex *Cerastium fontanum* Baumgarten ssp. *vulgare* (Hartman) Greuter & Burdet	big chickweed
ex *Cerastium semidecandrum* Linnaeus	fivestamen chickweed
Ceratophyllum demersum Linnaeus	coon's tail
Ceratophyllum echinatum A. Gray	spineless hornwort
ad *Cercis canadensis* Linnaeus	eastern redbud
ex *Chaenorrhinum minus* (Linnaeus) Lange	dwarf snapdragon
Chaerophyllum procumbens (Linnaeus) Crantz	spreading chervil
Chamaecrista fasciculata (Michaux) Greene var. *fasciculata*	sleepingplant
Chamaecrista nictitans (Linnaeus) Moench ssp. *nictitans* var. *nictitans*	partridge pea
Chamaedaphne calyculata (Linnaeus) Moench	leatherleaf
Chamerion angustifolium (Linnaeus) Holub	fireweed
ex *Chelidonium majus* Linnaeus	celandine
Chelone glabra Linnaeus	white turtlehead
ex *Chenopodium album* Linnaeus	lambsquarters
Chenopodium pratericola Rydberg	narrowleaf goosefoot
Chenopodium simplex (Torrey) Rafinesque	mapleleaf goosefoot
Chenopodium standleyanum Aellen	pitseed goosefoot
ad *Chenopodium subglabrum* (S. Watson) A. Nelson	smooth goosefoot
Chimaphila maculata (Linnaeus) Pursh	striped prince's pine
Chimaphila umbellata (Linnaeus) W.P.C. Barton ssp. *umbellata*	pipsissewa
ex *Chionodoxa lochiae* Meikle	Loch's glory-of-the-snow
ex *Chionodoxa luciliae* Boissier	Lucile's glory-of-the-snow
Chrysosplenium americanum Schweinitz ex Hooker	American golden saxifrage
ex *Cichorium intybus* Linnaeus	chicory
Cicuta bulbifera Linnaeus	bulblet-bearing water hemlock
Cicuta maculata Linnaeus	spotted water hemlock
Cinna arundinaceae Linnaeus	sweet woodreed
Circaea alpina Linnaeus	small enchanter's nightshade
Circaea canadensis (Linnaeus) Hill ssp. *canadensis*	broadleaf enchanter's nightshade
Cirsium altissimum (Linnaeus) Sprengel	tall thistle
ex *Cirsium arvense* (Linnaeus) Scopoli	Canadian thistle
Cirsium discolor (Muhlenberg ex Willdenow) Sprengel	field thistle
Cirsium muticum Michaux	swamp thistle
Cirsium pitcheri (Torrey ex Eaton) Torrey & A. Gray	sand dune thistle
ex *Cirsium vulgare* (Savi) Tenore	bull thistle
ex *Citrullus lanatus* (Thunberg) Matsumura & Nakai	watermelon
Cladium mariscoides (Muhlenberg) Torrey	smooth sawgrass

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Claytonia virginica Linnaeus	Virginia springbeauty
Clematis virginiana Linnaeus	devil's darning needles
Clinopodium arkansanum (Nuttall) House	limestone calamint
Clinopodium vulgare Linnaeus	wild basil
Clintonia borealis (Aiton) Rafinesque	bluebead
ad *Collinsia parviflora* Lindley	maiden blue eyed mary
Collinsia verna Nuttall	spring blue eyed Mary
Comandra umbellata (Linnaeus) Nuttall ssp. *umbellata*	bastard toadflax
Comarum palustre Linnaeus	purple marshlocks
ex *Commelina communis* Linnaeus	Asiatic dayflower
Commelina erecta Linnaeus	whitemouth dayflower
Comptonia peregrina (Linnaeus) J.M. Coulter	sweet fern
ad *Conoclinium coelestinum* (Linnaeus) de Candolle	
Conopholis americana (Linnaeus) Wallroth	American squawroot
ex *Convallaria majalis* Linnaeus	bristleflower collomia
ex *Convolvulus arvensis* Linnaeus	field bindweed
Conyza canadensis (Linnaeus) Cronquist	Canadian horseweed
Conyza ramosissima Cronquist	dwarf fleabane
Coptis trifolia (Linnaeus) Salisbury	threeleaf goldthread
Corallorhiza maculata (Rafinesque) Rafinesque	summer coralroot
Corallorhiza odontorhiza (Willdenow) Poiret	autumn coralroot
Coreopsis lanceolata Linnaeus	lanceleaf tickseed
Coreopsis palmata Nuttall	stiff tickseed
Coreopsis tripteris Linnaeus	tall tickseed
Corispermum americanum (Nuttall) Nuttall	American bugseed
ex *Corispermum nitidum* Kitaibel ex Schultes	shiny bugseed
Corispermum pallasii Steven	Siberian bugseed
Cornus alternifolia Linnaeus f.	alternateleaf dogwood
Cornus canadensis Linnaeus	bunchberry dogwood
Cornus florida Linnaeus	flowering dogwood
Cornus obliqua Rafinesque	silky dogwood
Cornus racemosa Lamarck	gray dogwood
Cornus rugosa Lamarck	roundleaf dogwood
Cornus sericea Linnaeus	redosier dogwood
Corydalis sempervirens (Linnaeus) Persoon	rock harlequin
Corylus americana Walter	American hazelnut
ex *Cotinus coggygria* Scopoli	European smoke tree
ex *Cotoneaster lucidus* Schlechtendal	shiny cotoneaster
Crataegus calpodendron (Ehrhart) Medikus	pear hawthorn
Crataegus chrysocarpa Ashe	fireberry hawthorn
Crataegus coccinea Linnaeus	fireberry hawthorn
Crataegus crus-galli Linnaeus	cockspur hawthorn
Crataegus macrosperma Ashe	bigfruit hawthorn
Crataegus mollis (Torrey & A. Gray) Scheele var. *mollis*	Arnold hawthorn
Crataegus pruinosa (H.L. Wendland) K. Koch	waxyfruit hawthorn
Crataegus punctata Jacquin	dotted hawthorn

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Crataegus succulenta Schrader ex Link	fleshy hawthorn
ex *Crepis capillaris* (Linnaeus) Wallroth	smooth hawksbeard
ex *Crepis tectorum* Linnaeus	narrowleaf hawksbeard
Crocanthemum bicknellii Fernald	hoary frostweed
Crocanthemum canadense (Linnaeus) Britton	longbranch frostweed
ex *Crocus vernus* (Linnaeus) Hill	dutch crocus
Crotalaria sagittalis Linnaeus	arrowhead rattlebox
ad *Croton capitatus* Michaux	hogwort
ad *Croton glandulosus* Linnaeus var. *septentrionalis* Müeller Argoviensis	vente conmigo
Cryptotaenia canadensis (Linnaeus) de Candolle	Canadian honewort
Cuscuta cephalanthi Engelmann	buttonbush dodder
Cuscuta coryli Engelmann	hazel dodder
Cuscuta glomerata Choisy	rope dodder
Cuscuta gronovii Willdenow ex Schultes	scaldweed
Cuscuta pentagona Engelmann	fiveangled dodder
Cuscuta polygonorum Engelmann	knotweed dodder
Cycloloma atriplicifolium (Sprengel) J.M. Coulter	winged pigweed
ex *Cynoglossum officinale* Linnaeus	gypsyflower
Cyperus bipartitus Torrey	slender flatsedge
Cyperus diandrus Torrey	umbrella flatsedge
Cyperus erythrorhizos Muhlenberg	redroot flatsedge
Cyperus esculentus Linnaeus	chufa flatsedge
Cyperus houghtonii Torrey	Houghton's flatsedge
Cyperus lupulinus (Sprengel) Marcks ssp. *lupulinus*	Great Plains flatsedge
Cyperus odoratus Linnaeus (*C. engelmanii* and *C. ferruginescens*)	fragrant flatsedge
Cyperus schweinitzii Torrey	Schweinitz's flatsedge
Cyperus squarrosus Linnaeus	bearded flatsedge
Cyperus strigosus Linnaeus	strawcolored flatsedge
Cyperus × *mesochorus* Geise [*C. lupulinus* × *C. schweinitzii*]	midland sand sedge
Cypripedium acaule Aiton	moccasin flower
Cypripedium candidum Muhlenberg ex Willdenow	white lady's slipper
Cypripedium parviflorum Salisbury var. *makasin* (Farwell) Sheviak	lesser yellow lady's slipper
Cypripedium parviflorum Salisbury var. *pubescens* (Willdenow) O.W. Knight	greater yellow lady's slipper
Cypripedium reginae Walter	showy lady's slipper
Cypripedium × *andrewsii* A.M. Fuller [*C. candidum* × *C. parviflorum*]	hybrid lady's slipper
Cystopteris protrusa (Weatherby) Blasdell	brittle bladderfern
Cystopteris tenuis (Michaux) Desvaux	upland brittle bladderfern
ex *Dactylis glomerata* Linnaeus	orchardgrass
Dactylorhiza viridis (Linnaeus) R.M. Bateman, A.M. Pridgeon & M.W. Chase	longbract frog orchid
Dalea candida Willdenow	white prairie clover
Dalea purpurea Ventenat var. *purpurea*	violet prairie clover
Danthonia compressa Austin	flattened oatgrass
Danthonia spicata (Linnaeus) P. Beauvois ex Roem. & Schultes	poverty oatgrass
Dasiphora fruticosa (Linnaeus) Rydberg	shrubby cinquefoil

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Dasistoma macrophylla (Nuttall) Rafinesque	mullein foxglove
ad *Datura stramonium* Linnaeus	jimsonweed
ex *Daucus carota* Linnaeus	Queen Anne's lace
Decodon verticillatus (Linnaeus) Elliott	swamp loosestrife
Dendrolycopodium dendroidium (Michaux) A. Hanes	rare clubmoss
Dendrolycopodium hickeyi (W.H. Wagner, Beitel & B.C. Moran) A. Haines	Pennsylvania clubmoss
Deparia acrostichoides (Swartz) M. Kato	silver false spleenwort
ex *Descurainia sophia* (Linnaeus) Webb ex Prantl	herb sophia
Desmanthus illinoensis (Michaux) McMillan ex B.L. Robinson & Fernald	Illinois bundle flower
Desmodium canadense (Linnaeus) de Candolle	showy ticktrefoil
Desmodium canescens (Linnaeus) de Candolle	hoary tick trefoil
Desmodium ciliare (Muhlenberg ex Willdenow) de Candolle	hairy small-leaf tick trefoil
Desmodium cuspidatum (Muhl. ex Willd.) DC. ex G. Don	bracted tick trefoil
Desmodium glabellum (Michaux) de Candolle	smooth tck trefoil
Desmodium illinoense A. Gray	Illinois ticktrefoil
Desmodium marilandicum (Linnaeus) de Candolle	smooth small-leaf ticktrefoil
Desmodium paniculatum (Linnaeus) de Candolle	panicledleaf ticktrefoil
Desmodium perplexum B.G. Schubert	perplexed ticktrefoil
Desmodium rotundifolium de Candolle	prostrate ticktrefoil
Desmodium sessilifolium (Torrey) Torrey & A. Gray	sessileleaf ticktrefoil
ex *Dianthus armeria* Linnaeus	Deptford pink
ex *Dianthus barbatus* Linnaeus	sweetwilliam
Dicentra canadensis (Goldie) Walpers	squirrel corn
Dicentra cucullaria (Linnaeus) Bernhardi	dutchman's breeches
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark ssp. *fasciculatum* (Torrey) Freckmann & Lelong	western panicgrass
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark ssp. *implicatum* (Scribner) Freckmann & Lelong	tapered rosette grass
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark ssp. *columbianum* (Scribner) Freckmann & Lelong	hemlock rosette grass
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark ssp. *lindheimeri* (Nash) Freckmann & Lelong	Lindheimer panicgrass
Dichanthelium acuminatum (Swartz) Gould & C.A. Clark ssp. *spretum* (Schultes) Freckmann & Lelong	Eaton's rosette grass
Dichanthelium boreale (Nash) Freckmann	northern panicgrass
Dichanthelium clandestinum (Linnaeus) Gould	deertongue
Dichanthelium depauperatum (Muhlenberg) Gould	starved panicgrass
Dichanthelium dichotomum (Linnaeus) Gould ssp. *dichotomum*	cypress panicgrass
Dichanthelium dichotomum (Linnaeus) Gould ssp. *lucidum* (Ashe) Freckmann & Lelong (*Panicum lucidum* Ashe)	cypress panicgrass
Dichanthelium latifolium (Linnaeus) Harvill	broadleaf rosette grass
Dichanthelium linearifolium (Scribner) Gould	slimleaf panicgrass
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *oligosanthes*	Heller's rosette grass
Dichanthelium oligosanthes (J.A. Schultes) Gould ssp. *scribnerianum* (Nash) Freckmann & Lelong	Scribner's rosette grass
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *pseudopubescens* (Nash) Freckmann & Lelong	whitehair rosette grass

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Scientific Name	Common Name
Dichanthelium ovale (Elliott) Gould & C.A. Clark ssp. *villosissimum* (Nash) Freckmann & Lelong	whitehair rosette grass
Dichanthelium perlongum (Nash) Freckmann	slimleaf panicgrass
Dichanthelium sphaerocarpon (Elliott) Gould	roundseed panicgrass
Diervilla lonicera Miller	northern bush honeysuckle
Digitaria cognata (J.A. Schultes) Pilger	Carolina crabgrass
ex *Digitaria ischaemum* (Schreber) Muhlenberg	smooth crabgrass
ex *Digitaria sanguinalis* (Linnaeus) Scopoli	hairy crabgrass
ad *Diodia teres* Walter	poorjoe
ex *Dioscorea oppositifolia* Linnaeus	Chinese yam
Dioscorea villosa Linnaeus	wild yam
Diphasiastrum digitatum (Dillenius ex A. Braun) Holub	groundcedar
Diphasiastrum tristachyum (Pursh) Holub	deeproot clubmoss
ex *Diplotaxis muralis* (Linnaeus) de Candolle	annual wallrocket
ex *Dipsacus fullonum* Linnaeus	Fuller's teasel
Doellingeria umbellata (Miller) Nees var. *umbellata*	parasol whitetop
Draba reptans (Lamarck) Fernald	common whitlow grass
ex *Draba verna* Linnaeus	spring draba
ad *Dracocephalum parviflorum* Nuttall	American dragonhead
Drosera intermedia Hayne	spoonleaf sundew
Drosera rotundifolia Linnaeus	roundleaf sundew
Drymocallis arguta (Pursh) Rydberg	tall cinquefoil
Dryopteris × *boottii* (Tuckerman) Underwood (pro sp.) [*D. cristata* × *D. intermedia*]	woodfern
Dryopteris × *uliginosa* (A. Braun ex Dowell) Druce [*D. carthusiana* × *D. cristata*]	woodfern
Dryopteris carthusiana (Villars) H.P. Fuchs	spinulose woodfern
Dryopteris clintoniana (D.C. Eaton) Dowell	Clinton's woodfern
Dryopteris cristata (Linnaeus) A. Gray	crested woodfern
Dryopteris goldiana (Hooker ex Goldie) A. Gray	Goldies fern
Dryopteris intermedia (Muhlenberg ex Willdenow) A. Gray	intermediate woodfern
ex *Duchesnea indica* (Andrews) Teschemacher	Indian strawberry
Dulichium arundinaceum (Linnaeus) Britton	threeway sedge
ex *Dysphania botrys* (Linnaeus) Mosyakin & Clemants	Jerusalem oak goosefoot
ad *Echinacea purpurea* (Linnaeus) Moench	eastern purple coneflower
Echinochloa crusgalli (Linnaeus) P. Beauvois	barnyardgrass
Echinochloa muricata (P. Beauvois) Fernald	rough barnyardgrass
Echinochloa muricata (P. Beauvois) Fernald var. *microstachya* Wiegand	rough barnyardgrass
Echinocystis lobata (Michaux) Torrey & A. Gray	wild cucumber
ex *Echium vulgare* Linnaeus	common vipersbugloss
ex *Elaeagnus angustifolia* Linnaeus	Russian olive
ex *Elaeagnus umbellata* Thunberg	autumn olive
Eleocharis acicularis (Linnaeus) Roemer & Schultes	needle spikerush
Eleocharis atropurpurea (Retz) J. Presl & C. Presl	purple spikerush
Eleocharis compressa Sullivant	flatstem spikerush
Eleocharis elliptica Kunth	elliptic spikerush
Eleocharis engelmannii Steudel	Engelmann's spikerush

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Eleocharis erythropoda Steudel	bald spikerush
Eleocharis flavescens (Poiret) Urban var. *olivacea* (Torrey) Gleason	bright green spikerush
Eleocharis geniculata (Linnaeus) Roemer & Schultes	Canada spikesedge
Eleocharis intermedia Schultes	matted spikerush
Eleocharis melanocarpa Torrey	blackfruit spikerush
Eleocharis microcarpa Torrey var. *filiculmis* Torrey	smallfruit spikerush
Eleocharis obtusa (Willdenow) Schultes	blunt spikerush
Eleocharis palustris (Linnaeus) Roemer & Schultes	common spikerush
Eleocharis quadrangulata (Michaux) Roemer & Shultes	squarestem spikerush
Eleocharis quinqueflora (Hartmann) O. Schwarz	fewflower spikerush
Eleocharis rostellata (Torrey) Torrey	beaked spikerush
Eleocharis tenuis (Willdenow) Schultes var. *verrucosa* (Svenson) Svenson	slender spikerush
Eleocharis wolfii (A. Gray) A. Gray	Wolf's spikerush
ex *Eleusine indica* (Linnaeus) Gaertner	Indian goosegrass
Ellisia nyctelea (Linnaeus) Linnaeus	aunt lucy
Elodea canadensis Michaux	Canadian waterweed
Elodea nuttallii (Planchon) H. St. John	western waterweed
Elymus canadensis Linnaeus	Canada wildrye
Elymus hystrix Linnaeus	eastern bottlebrush grass
ex *Elymus repens* (Linnaeus) Gould	quackgrass
Elymus riparius Wiegand	riverbank wildrye
Elymus trachycaulus (Link) Gould ex Shinners ssp. *subsecundus* A. Löve & D. Löve	slender wheatgrass
Elymus villosus Muhlenberg ex Willdenow	hairy wildrye
Elymus virginicus Linnaeus	Virginia wildrye
Enemion biternatum Rafinesque	eastern false rue anemone
Epifagus virginiana (Linnaeus) W.P.C. Barton	beechdrops
Epigaea repens Linnaeus	trailing arbutus
Epilobium ciliatum Rafinesque	fringed willowherb
Epilobium coloratum Biehler	purpleleaf willowherb
ex *Epilobium hirsutum* Linnaeus	codlins and cream
Epilobium leptophyllum Rafinesque	bog willowherb
ex *Epilobium parviflorum* Schreber	sanllflower hairy willowherb
Epilobium strictum Muhlenberg ex Sprengel	downy willowherb
ex *Epipactis helleborine* (Linnaeus) Crantz	broadleaf helleborine
Equisetum arvense Linnaeus	field horsetail
Equisetum fluviatile Linnaeus	water horsetail
Equisetum hyemale Linnaeus ssp. *affine* (Engelmann) Calder & Roy L. Taylor	scouringrush horsetail
Equisetum laevigatum A. Braun	tall scouring rush
Equisetum variegatum Schleicher ex F. Weber & D. Mohr	variegated scouring rush
Equisetum × *ferrissii* Clute [*E. hyemale* × *E. laevigatum*]	Joliet horsetail
Equisetum × *nelsonii* (A.A. Eaton) J.H. Schaffner [*E. laevigatum* × *E. variegatum*]	horsetail
ex *Eragrostis cilianensis* (Allioni) Vignolo ex Janchen	stinkgrass
ex *Eragrostis minor* Host	little lovegrass
Eragrostis pectinacea (Michaux) Nees	tufted lovegrass

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Eragrostis spectabilis (Pursh) Steudel	purple lovegrass
ad *Eragrostis trichodes* (Nuttall) Alphonso Wood	sand lovegrass
ex *Eranthis hyemalis* (Linnaeus) Salisbury	winter aconite
Erechtites hieraciifolius (Linnaeus) Rafinesque ex de Candolle var. *hieraciifolius*	American burnweed
Erigenia bulbosa (Michaux) Nuttall	harbinger of spring
Erigeron annuus (Linnaeus) Persoon	eastern daisy fleabane
Erigeron philadelphicus Linnaeus	Philadelphia fleabane
Erigeron pulchellus Michaux	robin's plantain
Erigeron strigosus Muhlenberg ex Willdenow	prairie fleabane
Eriocaulon aquaticum (Hill) Druce	sevenangle pipewort
ad *Eriogonum annuum* Nuttall	wild buckwheat
Eriophorum angustifolium Honckeny	tall cottongrass
Eriophorum tennellum Nuttall	fewnerved cottongrass
Eriophorum vaginatum Linnaeus	tussock cottongrass
Eriophorum virginicum Linnaeus	tawny cottongrass
ex *Erodium cicutarium* (Linnaeus) L'Heritier de Brutelle ex Aiton	redstem stork's bill
ex *Erucastrum gallicum* (Willdenow) O. E. Schulz	common dogmustard
Eryngium yuccifolium Michaux	button eryngo
ex *Erysimum repandum* Linnaeus	spreading wallflower
Erythronium albidum Nuttall	white fawnlily
Erythronium americanum Ker Gawler	dogtooth violet
ex *Euonymus alatus* (Thunberg) Siebold	winged burning bush
Euonymus atropurpureus Jacquin	eastern wahoo
ex *Euonymus europaeus* Linnaeus	European spindle tree
ex *Euonymus fortunei* (Turczaninow) Handel-Mazzerti	wintercreeper
ex *Euonymus hamiltonianus* Wallich	Japanese spindle tree
Euonymus obovatus Nuttall	running strawberry bush
Eupatorium altissimum Linnaeus	tall thoroughwort
Eupatorium perfoliatum Linnaeus	common boneset
Eupatorium serotinum Michaux	lateflowering thoroughwort
Eupatorium sessilifolium Linnaeus	upland boneset
Euphorbia corollata Linnaeus	flowering spurge
ex *Euphorbia cyparissias* Linnaeus	cypress spurge
ex *Euphorbia davidii* Subils	
ad *Euphorbia dentata* Michaux	toothed spurge
Euphorbia maculata Linnaeus	spotted sandmat
Euphorbia nutans Lagasca y Segura	spotted sandmat
Euphorbia polygonifolia Linnaeus	seaside sandmat
ex *Euphorbia* × *pseudoesula* Schur (pro sp.) [*E. cyparissias* × *E. esula*]	
Eurybia furcata (E.S. Burgess) G.L. Nesom	forked aster
Eurybia macrophylla (Linnaeus) Cassini	bigleaf aster
Eurybia schreberii (Nees) Nees	Schreber's aster
Euthamia caroliniana (Linnaeus) Greene ex Porter & Britton	slender goldentop
Euthamia graminifolia (Linnaeus) Nuttall var. *nuttallii*	Texas goldentop
Euthamia gymnospermoides Greene	Texas goldentop

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Scientific Name	Common Name
Eutrochium fistulosum (Barratt) E.E. Lamont	trumpetweed
Eutrochium maculatum (Linnaeus) E.E. Lamont	spotted joepyeweed
Eutrochium purpureum (Linnaeus) E.E. Lamont	sweetscented joepyeweed
ex *Fagopyrum esculentum* Moench	buckwheat
Fagus grandifolia Ehrhart	American beech
ex *Fallopia convolvulus* (Linnaeus) A.. Löve	black bindweed
ex *Fallopia japonica* (Houttuyn) Ronse Decraene	Japanese knotweed
Fallopia scandens (Linnaeus) Holub	climbing false buckwheat
ex *Festuca ovina* Linnaeus	sheep fescue
ex *Festuca rubra* Linnaeus	red fescue
Festuca subverticillata (Persoon) E.B. Alexeev	nodding fescue
ex *Filipendula vulgaris* Moench	dropwort
Fimbristylis autumnalis (Linnaeus) Roemer & Schultes	slender fimbry
Fimbristylis puberula (Michaux) Vahl var. *puberula*	hairy fimbry
Floerkea proserpinacoides Willdenow	false mermaidweed
ex *Forsythia suspensa* (Thunberg) Vahl	weeping forsythia
ex *Forsythia* × *intermedia* Zabel [*F. suspensa* × *F. viridissima*]	showy forsythia
Fragaria virginiana Miller	Virginia strawberry
ex *Frangula alnus* MIller	glossy buckthorn
Frasera caroliniensis Walter	American columbo
Fraxinus americana Linnaeus	white ash
Fraxinus nigra Marshall	black ash
Fraxinus pennsylvanica Marshall	green ash
ad *Froelichia gracilis* (Hooker) Moquin-Tandon	slender snakecotton
Fuirena pumila (Torrey) Sprengel	dwarf umbrella-sedge
ex *Galanthus elwesii* Hooker f.	giant snowdrop
ex *Galanthus nivalis* Linnaeus	snowdrop
ad *Galearis spectabilis* (Linnaeus) Rafinesque	showy orchis
ex *Galinsoga quadriradiata* Ruiz & Pavón	shaggy-soldier
Galium aparine Linnaeus	stickywilly
Galium asprellum Michaux	rough bedstraw
Galium boreale Linnaeus	northern bedstraw
Galium circaezans Michaux var. *hypomalacum* Fernald	licorice bedstraw
Galium concinnum Torrey & A. Gray	shining bedstraw
Galium labradoricum (Wiegand) Wiegand	northernBog bedstraw
Galium lanceolatum (Torrey) Torrey	lanceleaf wild licorice
ex *Galium mollugo* Linnaeus	false baby's breath
Galium obtusum Bigelow	bluntleaf bedstraw
Galium pilosum Aiton	hairy bedstraw
Galium tinctorium Linnaeus	stiff marsh bedstraw
Galium trifidum Linnaeus	threepetal bedstraw
Galium triflorum Michaux	fragrant bedstraw
Gaultheria procumbens Linnaeus	eastern teaberry
Gaylussacia baccata (Wangenheim) K. Koch	black huckleberry
Gentiana alba Muhlenberg ex Nuttall	plain gentian
Gentiana andrewsii Grisebach	closed bottle gentian

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Gentiana puberulenta J.S. Pringle	harvestbells
Gentiana saponaria Linnaeus	harvestbells
Gentianopsis crinita (Froelich) Ma	greater fringed gentian
Gentianopsis virgata (Rafinesque) Holub ssp. *virgata*	lesser fringed gentian
Geranium bicknellii Britton	Bicknell's cranesbill
Geranium carolinianum Linnaeus	Carolina geranium
Geranium maculatum Linnaeus	spotted geranium
ex *Geranium pusillum* Linnaeus	small geranium
Geum aleppicum Jacquin	yellow avens
Geum canadense Jacquin	white avens
Geum laciniatum Murray	rough avens
ex *Glechoma hederacea* Linnaeus	ground ivy
Gleditsia triacanthos Linnaeus	honeylocust
Glyceria borealis (Nash) Batchelder	small floating mannagrass
Glyceria canadensis (Michaux) Trinius	rattlesnake mannagrass
Glyceria grandis S. Watson	American mannagrass
Glyceria septentrionalis Hitchcock	floating mannagrass
Glyceria striata (Lamarck) Hitchcock	fowl mannagrass
ex *Glycyrrhiza lepidota* Pursh	American licorice
Goodyera pubescens (Willdenow) R. Brown	downy rattlesnake plantain
Gratiola neglecta Torrey	clammy hedgehyssop
Gratiola virginiana Linnaeus	roundfruit hedgehyssop
Gymnocladus dioicus (Linnaeus) K. Koch	Kentucky coffeetree
ex *Gypsophila scorzonerifolia* Seringe	big baby's breath
Hackelia virginiana (Linnaeus) I.M. Johnston	beggarslice
Hamamelis virginiana Linnaeus	American witchhazel
Hasteola suaveolens (Linnaeus) Pojarkova	sweet indian plantain
ex *Hedera helix* Linnaeus	English ivy
Helenium autumnale Linnaeus	common sneezeweed
ad *Helenium flexuosum* Rafinesque	purplehead sneezeweed
ad *Helianthus annuus* Linnaeus	common sunflower
Helianthus decapetalus Linnaeus	thinleaf sunflower
Helianthus divaricatus Linnaeus	woodland sunflower
Helianthus giganteus Linnaeus	giant sunflower
Helianthus grosseserratus M. Martens	sawtooth sunflower
Helianthus hirsutus Rafinesque	hairy sunflower
ad *Helianthus maximiliani* Schrader	maximilian sunflower
Helianthus mollis Lamarck	ashy sunflower
Helianthus occidentalis Riddell	fewleaf sunflower
Helianthus pauciflorus Nuttall ssp. *pauciflorus*	stiff sunflower
ad *Helianthus petiolaris* Nuttall ssp. *petiolaris*	prairie sunflower
Helianthus strumosus Linnaeus	paleleaf woodland sunflower
Helianthus tuberosus Linnaeus	Jerusalem artichoke
Heliopsis helianthoides (Linnaeus) Sweet	smooth oxeye
ex *Hemerocallis fulva* (Linnaeus) Linnaeus	orange daylily
Heracleum spondylium Linnaeus	common cowparsnip

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Scientific Name	Common Name
ex *Hesperis matronalis* Linnaeus	dames rocket
Hesperostipa spartea (Trinius) Barkworth	porcupinegrass
Heteranthera dubia (Jacquin) McMillan	grassleaf mudplantain
ad *Heterotheca camporum* (Greene) Shinners	lemon yellow false goldenaster
ad *Heterotheca subaxillaris* (Lamarck) Britton & Rusby ssp. *latifolia* (Buckley) Semple	camphorweed
Heuchera richardsonii R. Brown	Richardson's alumroot
ad *Hibiscus laevis* Allioni	Halberdleaf rosemallow
ad *Hibiscus moscheutos* Linnaeus ssp. *moscheutos*	crimsoneyed rosemallow
ex *Hibiscus trionum* Linnaeus	flower of an hour
ex *Hieracium aurantiacum* Linnaeus	orange hawkweed
ex *Hieracium caespitosum* Dumortier	meadow hawkweed
Hieracium gronovii Linnaeus	queendevil
Hieracium longipilum Torrey ex Hooker	hairy hawkweed
ex *Hieracium piloselloides* Villars	king devil
Hieracium scabrum Michaux	rough hawkweed
Hieracium umbellatum Linnaeus	Canadian hawkweed
ex *Holcus lanatus* Linnaeus	common velvetgrass
ex *Holosteum umbellatum* Linnaeus	jagged chickweed
ex *Hordeum jubatum* Linnaeus	foxtail barley
ex *Hordeum vulgare* Linnaeus	common barley
Houstonia caerulea Linnaeus	island hazardia
Hudsonia tomentosa Nuttall	woolly beachheather
ex *Humulus japonicus* Siebold & Zuccarini	Japanese hop
Humulus lupulus Linnaeus	common hop
Huperzia lucidula (Michaux) Trevisan	shining clubmoss
ex *Hyacinthoides non-scripta* (Linnaeus) Chouard	English bluebell
ad *Hydrangea arborescens* Linnaeus	hills-of-snow
Hydrocotyle umbellata Linnaeus	manyflower marshpennywort
Hydrophyllum appendiculatum Michaux	great waterleaf
Hydrophyllum virginianum Linnaeus	Shawnee salad
Hylodesmum glutinosum (Muhlenberg ex Willdenow) H. Ohashi & R.R. Mill	pointedleaf ticktrefoil
Hylodesmum nudiflorum H. Ohashi & R.R. Mill	nakedflower ticktrefoil
ex *Hylotelephium erythrostictum* (Miquel) H. Ohba	garden stonecrop
ex *Hylotelephium telephium* (Linnaeus) H. Ohba	witch's moneybags
Hypericum boreale (Britton) E.P. Bicknell	northern St. Johnswort
Hypericum canadense Linnaeus	lesser Canadian St. Johnswort
Hypericum gentianoides (Linnaeus) Britton, Sterns & Poggenburg	orangegrass
Hypericum kalmianum Linnaeus	Kalm's St. Johnswort
Hypericum majus (A. Gray) Britton	large St. Johnswort
Hypericum mutilum Linnaeus	dwarf St. Johnswort
ex *Hypericum perforatum* Linnaeus	common St. Johnswort
Hypericum punctatum Lamarck	spotted St. Johnswort
Hypericum sphaerocarpum Michaux	rough-fruited St. Johnswort
ex *Hypochaeris radicata* Linnaeus	hairy catsear

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Scientific Name	Common Name
Hypopitys monotropa Crantz (*Monotropa hypopitys* Linnaeus)	pinesap
Hypoxis hirsuta (Linnaeus) Coville	common goldstar
Ilex mucronata (Linnaeus) Powell, Savolainen & S. Andrews	catberry
ad *Ilex opaca* Aiton	American holly
Ilex verticillata (Linnaeus) A. Gray	common winterberry
Impatiens capensis Meerburgh	jewelweed
Impatiens pallida Nuttall	pale touch-me-not
ex *Inula helenium* Linnaeus	elecampane inula
Ionactis linariifolia (Linnaeus) Greene	flaxleaf whitetop aster
ex *Ipomoea hederacea* Jacquin	ivyleaf morning-glory
Ipomoea pandurata (Linnaeus) G. Meyer	wil sweet potato
ad *Ipomoea purpurea* (Linnaeus) Roth	tall morning-glory
ex *Iris germanica* Linnaeus	German iris
ex *Iris pseudacorus* Linnaeus	paleyellow iris
Iris virginica Linnaeus	Shreve's iris
Isotria verticillata (Muhlenberg ex Willdenow) Rafinesque	purple fiveleaf orchid
Juglans cinerea Linnaeus	butternut
Juglans nigra Linnaeus	black walnut
Juncus acuminatus Michaux	tapertip rush
Juncus alpinoarticulatus Chaix	northern green rush
Juncus anthelatus (Wiegand) R.E. Brooks	greater poverty rush
Juncus arcticus Willdenow var. *balticus* (Willdenow) Trautvetter	Baltic rush
Juncus articulatus Linnaeus	jointleaf rush
Juncus brachycarpus Engelmann	whiteroot rush
Juncus brachycephalus (Engelmann) Buchenau	smallhead rush
Juncus bufonius Linnaeus	toad rush
Juncus canadensis J. Gay ex Laharpe	Canadian rush
Juncus diffusissimus Buckley	slimpod rush
Juncus dudleyi Wiegand	Dudley's rush
Juncus effusus Linnaeus	lamp rush
Juncus greenei Oakes & Tuckerman	Greene's rush
Juncus interior Wiegand	inland rush
Juncus marginatus Rostkovius (*J. biflorus*)	bog rush
Juncus militaris Bigelow	bayonet rush
Juncus nodosus Linnaeus	knotted rush
Juncus pelocarpus E. Meyer	brownfruit rush
Juncus pylaei Laharpe	common rush
Juncus scirpoides Lamarck	needlepod rush
Juncus tenuis Willdenow	poverty rush
Juncus torreyi Coville	Torrey's rush
Juniperus communis Linnaeus	common juniper
Juniperus virginiana Linnaeus var. *virginiana*	eastern redcedar
ex *Kerria japonica* (Linnaeus) de Candolle	Japanese rose
ex *Kochia scoparia* (Linnaeus) Schrader	Mexican-fireweed
Koeleria macrantha (Ledebour) Schultes	prairie Junegrass
ex *Kolkwitzia amabilis* Graebner	beautybush

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Scientific Name	Common Name
Krigia biflora (Walter) S.F. Blake	twoflower dwarfdandelion
Krigia virginica (Linnaeus) Willdenow	Virginia dwarfdandelion
Lactuca biennis (Moench) Fernald	tall blue lettuce
Lactuca canadensis Linnaeus	Canada lettuce
Lactuca floridana (Linnaeus) Gaertner	woodland lettuce
Lactuca hirsuta Muhlenberg ex Nuttall	hairy lettuce
ex *Lactuca serriola* Linnaeus	prickly lettuce
ex *Lamiastrum galeobdolon* (Linnaeus) Linnaeus	yellow archangel
ex *Lamium amplexicaule* Linnaeus	henbit deadnettle
ex *Lamium purpureum* Linnaeus	purple deadnettle
Laportea canadensis (Linnaeus) Weddell	Canadian woodnettle
Larix laricina (Du Roi) K. Koch	tamarack
Lathyrus japonicus Willdenow var. *maritimus* (Linnaeus) Kartesz & Gandhi	beach pea
ex *Lathyrus latifolius* Linnaeus	perennial pea
Lathyrus ochroleucus Hooker	cream pea
Lathyrus palustris Linnaeus	marsh pea
Lathyrus venosus Muhlenberg ex Willdenow	veiny pea
Lechea minor Linnaeus	thymeleaf pinweed
Lechea mucronata Rafinesque	hairy pinweed
Lechea pulchella Rafinesque var. *moniliformis* (E.P. Bicknell ex Britton) Mohlenbrock	Leggett's pinweed
Lechea stricta Leggett ex Britton	prairie pinweed
Lechea tenuifolia Michaux	narrowleaf pinweed
Leersia oryzoides (Linnaeus) Swartz	rice cutgrass
Leersia virginica Willdenow	whitegrass
Lemna minor Linnaeus	common duckweed
Lemna minuta Kunth	least duckweed
Lemna trisulca Linnaeus	star duckweed
Lemna turionifera Landolt	turion duckweed
ex *Leontodon saxatilis* Lamarck	lesser hawkbit
ex *Leonurus cardiaca* Linnaeus	common motherwort
ex *Lepidium campestre* (Linnaeus) W.T. Aiton	field pepperweed
ex *Lepidium densiflorum* Schrader	common pepperweed
ex *Lepidium perfoliatum* Linnaeus	clasping pepperweed
Lepidium virginicum Linnaeus	Virginia pepperweed
Lespedeza capitata Michaux	roundhead lespedeza
ex *Lespedeza cuneata* (Dumont de. Courset.) G. Don	Chinese lespedeza
Lespedeza frutescens (Linnaeus) Hornem.	violet lespedeza
Lespedeza hirta (Linnaeus) Hornem.	hairy lespedeza
ex *Lespedeza thunbergii* (de Candolle) Nakai	Thunberg's lespedeza
Lespedeza virginica (Linnaeus) Britton	slender lespedeza
Lespedeza × *longifolia* de Candolle	lespedeza
ex *Leucanthemum vulgare* Lamarck	oxeye daisy
ex *Leucojum aestivum* Linnaeus	summer snowflake
ex *Leymus arenarius* (Linnaeus) Hochstetter	lyme grass
Liatris aspera Michaux	tall blazing star

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Scientific Name	Common Name
Liatris cylindracea Michaux	Ontario blazing star
Liatris scariosa (Linnaeus) Willdenow var. *nieuwlandii* (Lunell) E.G. Voss	Nieuwland's blazing star
Liatris spicata (Linnaeus) Willdenow	dense blazing star
ex *Ligustrum obtusifolium* Siebold & Zuccarini	border privet
ex *Ligustrum vulgare* Linnaeus	European privet
Lilium michiganense Farwell	Carolina lily
Lilium philadelphicum Linnaeus	wood lily
ex *Linaria vulgaris* Miller	butter and eggs
Lindera benzoin (Linnaeus) Blume	northern spicebush
Lindernia dubia (Linnaeus) Pennell	yellowseed false pimpernel
Linnaea borealis L. var. *longiflora* Torrey	twinflower
Linum medium (Planch.) Britton var. *texanum* (Planch.) Fernald	stiff yellow flax
Linum striatum Walter	ridged yellow flax
ex *Linum usitatissimum* Linnaeus	common flax
Linum virginianum Linnaeus	woodland flax
Liparis liliifolia (Linnaeus) Richard ex Lindley	brown widelip orchid
Liparis loeselii (Linnaeus) Richard	yellow widelip orchid
Lipocarpha drummondii (Nees) G.C. Tucker	Drummond's halfchaff sedge
Lipocarpha micrantha (Vahl) G.C. Tucker	smallflower halfchaff sedge
Liriodendron tulipifera Linnaeus	tuliptree
Lithospermum canescens (Michaux) Lehmann	hoary puccoon
Lithospermum caroliniense (Walter ex J.F. Gmelin) McMillan var. *croceum* (Fernald) Cronquist	Carolina puccoon
Lobelia cardinalis Linnaeus	cardinalflower
Lobelia inflata Linnaeus	Indian-tobacco
Lobelia kalmii Linnaeus	Ontario lobelia
Lobelia siphilitica Linnaeus	great blue lobelia
Lobelia spicata Lamarck	palespike lobelia
ex *Lolium multiflorum* Lamarck	Italian ryegrass
ex *Lolium perenne* Linnaeus	perennial ryegrass
Lonicera dioica Linnaeus	limber honeysuckle
ex *Lonicera japonica* Thunberg	Japanese honeysuckle
ex *Lonicera maackii* (Ruprecht) Maximowicz	Amur honeysuckle
Lonicera reticulata Rafinesque	grape honeysuckle
ex *Lonicera ruprechtiana* Regel	Manchurean honeysuckle
ex *Lonicera tatarica* Linnaeus	Tatarian honeysuckle
ex *Lonicera* × *bella* Zabel [*L. tartarica* × *L. morrowii*]	Bell's honeysuckle
ex *Lonicera* × *minutiflora* Zabel [*L. morrowii* × *L. xylosteoides*]	honeysuckle
ex *Lonicera* × *notha* Zabel [*L. tartarica* × *L. ruprechtiana*]	honeysuckle
ex *Lonicera* × *xylosteoides* Tauch [*L. tatarica* × *L. xylosteum*]	fly honeysuckle
ex *Lotus corniculatus* Linnaeus	birdfoot deervetch
Ludwigia alternifolia Linnaeus	seedbox
Ludwigia palustris (Linnaeus) Elliott	marsh seedbox
Ludwigia polycarpa Short & R. Peter	manyfruit primrose-willow
Ludwigia sphaerocarpa Elliott	globefruit primrose-willow
ex *Lunaria annua* Linnaeus	annual honesty

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Lupinus perennis Linnaeus var. *occidentalis* S. Watson	sundial lupine
Luzula multiflora (Ehrhart) Lejeune ssp. *multiflora*	common woodrush
Lycopodiella inundata (Linnaeus) Holub	inundated clubmoss
Lycopodiella subapressa J.G. Bruce, W.H. Wagner & Beitel	northern bog clubmoss
Lycopodium clavatum Linnaeus	running clubmoss
Lycopus americanus Muhlenberg ex W.P.C. Barton	American water horehound
Lycopus asper Greene	rough bugleweed
Lycopus rubellus Moench	taperleaf water horehound
Lycopus uniflorus Michaux	northern bugleweed
Lycopus virginicus Linnaeus	Virginia water horehound
Lysimachia ciliata Linnaeus	fringed loosestrife
Lysimachia lanceolata Walter	lanceleaf loosestrife
ex *Lysimachia nummularia* Linnaeus	creeping jenny
Lysimachia quadriflora Sims	fourflower yellow loosestrife
Lysimachia terrestris (Linnaeus) Britton, Sterns & Poggenburg	earth loosestrife
Lysimachia thyrsiflora Linnaeus	tufted loosestrife
Lysimachia × *commixta* Fernald [*L. terrestris* × *L. thyrsiflora*]	yellow loosestrife
Lysimachia × *producta* (A. Gray) Fernald	yellow loosestrife
Lythrum alatum Pursh	winged lythrum
ex *Lythrum salicaria* Linnaeus	purple loosestrife
ad *Maclura pomifera* (Rafinesque) C.K. Schneider	osage orange
ad *Madia sativa* Molina	coast tarweed
Maianthemum canadense Desfontaines	Canada mayflower
Maianthemum racemosum (Linnaeus) Link ssp. *racemosum*	feathery false lily of the vally
Maianthemum stellatum (Linnaeus) Link	starry false lily of the vally
Malaxis unifolia Michaux	green adder's-mouth orchid
Malus coronaria (Linnaeus) Miller	sweet crabapple
ex *Malus domestica* (Suckow) Borkhausen	European crabapple
Malus ioensis (Alphonso Wood) Britton	prairie crabapple
ex *Malus prunifolia* (Willdenow) Borkhausen	plumleaf crabapple
ex *Malva neglecta* Wallroth	common mallow
ex *Marrubium vulgare* Linnaeus	horehound
ex *Matricaria discoidea* de Candolle	disc mayweed
Matteuccia struthiopteris (Linnaeus) Todaro var. *pensylvanica* (Willdenow) C.V. Morton	ostrich fern
Medeola virginiana Linnaeus	Indian cucumber
ex *Medicago lupulina* Linnaeus	black medick
ex *Medicago sativa* Linnaeus	alfalfa
Melampyrum lineare Desrousseaux	narrowleaf cowwheat
ex *Melilotus alba* Medikus	yellow sweetclover
ex *Melilotus officinalis* (Linnaeus) Lamarck	yellow sweetclover
Menispermum canadense Linnaeus	common moonseed
Mentha arvensis Linnaeus	wild mint
ex *Mentha spicata* Linnaeus	spearmint
ex *Mentha* × *piperita* Linnaeus (pro. Sp.) [*M. aquatica* × *M spicata*]	peppermint
ad *Mentzelia decapetala* (Pursh ex Sims) Urban & Gilg	tenpetal blazingstar

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Scientific Name	Common Name
Menyanthes trifoliata Linnaeus	buckbean
ad *Mertensia virginica* (Linnaeus) Persoon ex Link	Virginia bluebells
Micranthes pensylvanica (Linnaeus) Haworth	eastern swamp saxifrage
Milium effusum var. *cisatlanticum* Fernald	American milletgrass
Mimulus alatus Aiton	sharpwing monkeyflower
Mimulus ringens Linnaeus	Allegheny monkeyflower
Minuartia michauxii (Fenzl) Farwell	Michaux's stitchwort
ad *Mirabilis jalapa* Linnaeus	marvel of Peru
ad *Mirabilis nyctaginea* (Michaux) MacMillan	heartleaf four o'clock
ex *Miscanthus sinensis* Andersson	Chinese silvergrass
Mitchella repens Linnaeus	partridgeberry
Mitella diphylla Linnaeus	twoleaf miterwort
Moehringia lateriflora (Linnaeus) Fenzl	bluntleaf sandwort
ad *Mollugo verticillata* Linnaeus	green carpetweed
ad *Monarda didyma* Linnaeus	scarlet beebalm
Monarda fistulosa Linnaeus	wild bergamot
Monarda punctata Linnaeus	spotted beebalm
Monotropa uniflora Linnaeus	Indianpipe
ex *Morus alba* Linnaeus	white mulberry
Morus rubra Linnaeus	red mulberry
Muhlenbergia frondosa (Poiret) Fernald	wirestem muhly
Muhlenbergia glomerata (Willdenow) Trinius	spiked muhly
Muhlenbergia mexicana (Linnaeus) Trinius	Mexican muhly
ad *Muhlenbergia racemosa* (Michaux) Britton, Sterns & Poggenburg	marsh muhly
Muhlenbergia schreberi J.F. Gmelin	nimblewill
Muhlenbergia tenuiflora (Willdenow) Britton, Sterns & Poggenburg	slender muhly
Myosotis laxa Lehmann	bay forget-me-not
ex *Myosotis scorpioides* Linnaeus	true forget-me-not
ex *Myosotis stricta* Link ex Roem. & J.A. Schultes	strict forget-me-not
Myosotis verna Nuttall	spring forget-me-not
ex *Myosurus minimus* Linnaeus	tiny mousetail
ex *Myosoton aquaticum* (Linnaeus) Moench	giant chickweed
Myriophyllum sibiricum Komarov	shortspike watermilfoil
ex *Myriophyllum spicatum* Linnaeus	Eurasain watermilfoil
Myriophyllum verticillatum Linnaeus	whorl-leaf watermilfoil
Najas flexilis (Willdenow) Rostkovius & W.L.E. Schmidt	nodding waternymph
Najas guadalupensis (Sprengel) Magnus	southern waternymph
ex *Narcissus* × *incomparabilis* Miller [*N. poeticus* × *N. pseudonarcissus*]	nonesuch daffodil
ex *Narcissus poeticus* Linnaeus	Poet's narcissus
ex *Narcissus pseudonarcissus* Linnaeus	daffodil
ex *Nasturtium officinale* W.T. Aiton	watercress
ex *Nepeta cataria* Linnaeus	catnip
ex *Nepeta racemosa* Lamarck	raceme catnip
Nuphar advena (Aiton) W.T. Aiton	yellow pond-lily
Nuphar variegata Durand	varigated yellow pond-lily
Nuttallanthus canadensis (Linnaeus) D.A. Sutton	Canada toadflax

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Nymphaea odorata Aiton ssp. *tuberosa* (Paine) Wiersema & Hellquist	American white waterlily
Nyssa sylvatica Marshall	blackgum
Oenothera biennis Linnaeus	common evening-primrose
Oenothera clelandii W. Dietrich, P.H. Raven & W.L. Wagner	fourpoint evening-primrose
Oenothera fruticosa ssp. *tetragona* (Roth) W.L. Wagner	narrowleaf evening-primrose
Oenothera gaura W.L. Wagner & Hoch	biennial beeblossom
ad *Oenothera glaucifolia* W.L. Wagner & Hoch	false gaura
Oenothera laciniata Hill	cutleaf evening-primrose
Oenothera oaksiana (A. Gray) J.W. Robbins ex S. Watson & J.M. Coulter	
Oenothera perennis Linnaeus	little evening-primrose
Oenothera pilosella Rafinesque	meadow evening-primrose
Onoclea sensibilis Linnaeus	sensitive fern
ex *Onopordum acanthium* Linneaus	Scotch cottonthistle
Ophioglossum pusillum Rafinesque	southern adderstongue
Opuntia caespitosa Rafinesque	devil's-tongue
ex *Origanum vulgare* Linnaeus	oregano
ex *Ornithogalum umbellatum* Linnaeus	sleepydick
Orobanche fasciculata Nuttall	clustered broomrape
Orobanche uniflora Linnaeus	oneflowered broomrape
Orthilia secunda (Linnaeus) House	sidebells wintergreen
Oryzopsis asperifolia Michaux	roughleaf ricegrass
Osmorhiza claytonii (Michaux) C.B. Clarke	Clayton's sweetroot
Osmorhiza longistylis (Torrey) de Candolle	longstyle sweetroot
Osmunda claytoniana Linnaeus	interrupted fern
Osmunda regalis var. *spectabilis* (Willdenow) A. Gray	royal fern
Osmundastrum cinnamomea (Linnaeus) C. Presl	cinnamon fern
Ostrya virginiana (Miller) K. Koch	hophornbeam
Oxalis dillenii Jacquin	common yellow oxalis
Oxalis stricta Linnaeus	common yellow oxalis
Oxalis violacea Linnaeus	violet woodsorrel
Oxypolis rigidior (Linnaeus) Rafinesque	stiff cowbane
ex *Pachysandra terminalis* Siebold & Zuccarini	Japanese pachysandra
Packera aurea (Linnaeus) A. Löve & D. Löve	golden ragwort
ad *Packera glabella* (Poiret) C. Jeffrey	butterweed
Packera paupercula (Michaux) A. Löve & D. Löve	balsam groundsel
Packera plattensis (Nuttall) W.A. Weber & A. Löve	prairie groundsel
Packera pseudaurea (Rydberg) W.A. Weber & A. Löve var. *semicordata* (Mackenzie & Bush) D.K. Trock & T.M. Barkley	falsegold groundsel
Panax quinquefolius Linnaeus	American ginseng
Panax trifolius Linnaeus	dwarf ginseng
Panicum capillare Linnaeus	witchgrass
Panicum dichotomiflorum Michaux	fall panicgrass
Panicum dichotomiflorum Michaux ssp. *puritanorum* Robert W. Freckmann & Michael G. Lelong	fall panicgrass
Panicum flexile (Gattinger.) Scribner	wiry panicgrass
Panicum rigidulum Bosc ex Nees	redtop panicgrass

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Panicum verrucosum Muhlenberg	warty panicgrass
Panicum virgatum Linnaeus	switchgrass
Parietaria pensylvanica Muhlenberg ex Willdenow	Pennsylvania pellitory
Parnassia glauca Rafinesque	fen grass of Parnassus
Parthenium integrifolium Linnaeus	wild quinine
Parthenocissus quinquefolia (Linnaeus) Planchon	Virginia creeper
Parthenocissus vitacea (Kneer) Hitchcock	Virginia creeper
ad *Pascopyrum smithii* (Rydberg) A. Love	western wheatgrass
Paspalum setaceum Michaux var. *muhlenbergii* (Nash) D.J. Banks	thin paspalum
Paspalum setaceum Michaux var. *stramineum* (Nash) D.J. Banks	thin paspalum
ex *Pastinaca sativa* Linnaeus	wild parsnip
Pedicularis canadensis Linnaeus	Canadian lousewort
Pedicularis lanceolata Michaux	swamp lousewort
Peltandra virginica (Linnaeus) Schott	green arrow arum
Penstemon calycosus Small	longsepal beardtongue
Penstemon digitalis Nuttall ex Sims	talus slope penstemon
ad *Penstemon grandiflorus* Nuttall	large beardtongue
Penstemon tubaeflorus Nuttall	white wand beard tongue
Penthorum sedoides Linnaeus	ditch stonecrop
Persicaria amphibia (Linnaeus) Delarbre	water smartweed
Persicaria arifolia (Linnaeus) Haraldson	halberdleaf tearthumb
Persicaria careyi (Olney) Greene	Carey's smartweed
Persicaria hydropiper (Linnaeus) Spach	marshpepper knotweed
Persicaria hydropiperoides (Michaux) Small and *P. opelousanum* var. *adenocalyx* Stanford	swamp smartweed
Persicaria lapathifolia (Linnaeus) Delarbre	curlytop knotweed
ex *Persicaria longiseta* (Bruijn) Kitagawa	oriental ladysthumb
ex *Persicaria maculosa* Gray	spotted ladysthumb
Persicaria pensylvanica (Linnaeus) M. Gómez	Pennsylvania smartweed
Persicaria punctata (Elliott) Small	dotted smartweed
Persicaria robustior (Small) E.P. Bicknell	stout smartweed
Persicaria sagittata (Linnaeus) H. Gross	arrowleaf tearthumb
Persicaria virginiana (Linnaeus) Gaertner	jumpseed
ex *Petunia* × *atkinsiana* (Sweet) D. Don ex Loud. [*P. axillaris* × *P. integrifolia*]	garden petunia
ex *Phalaris arundinacea* Linnaeus	reed canarygrass
Phegopteris hexagonoptera (Michaux) Fée	broad beechfern
Phemeranthus rugospermus (Holzinger) Kiger	prairie fameflower
ex *Philadelphus coronarius* Linnaeus	sweet mock orange
ex *Phleum pratense* Linnaeus ssp. *pratense*	timothyPhlox bifida L. C. Beck cleft phlox
Phlox bifida L.C. Beck	cleft phlox
Phlox divaricata Linnaeus	wild blue phlox
ad *Phlox drummondii* Hooker	annual phlox
Phlox glaberrima Linnaeus ssp. *interior* (Wherry) Wherry	smooth phlox
ad *Phlox paniculata* Linnaeus	fall phlox
Phlox pilosa Linnaeus	downy phlox

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Scientific Name	Common Name
Phlox pilosa Linnaeus ssp. *fulgida* (Wherry) Wherry	downy phlox
ex *Phragmites australis* (Cav.) Trinius ex Steudel	common reed
Phragmites australis ssp. *americanus* Saltonstall, Peterson & Soreng	common reed
Phryma leptostachya Linnaeus var. *leptostachya*	American lopseed
Phyla lanceolata (Michaux) Greene	lance-leaf fogfruit
Physalis heterophylla Nees	clammy groundcherry
Physalis longifolia Nuttall var. *subglabrata* (Mackenzie & Bush) Cronquist	longleaf groundcherry
ad *Physalis pubescens* Linnaeus	husk tomato
Physalis virginiana Miller	Virginia groundcherry
Physocarpus opulifolius (Linnaeus) Maximowicz	common ninebark
Physostegia virginiana (Linnaeus) Bentham	obedient plant
Physostegia virginiana (Linnaeus) Bentham ssp. *praemorsa* (Shinners) P.D. Cantino	obedient plant
Phytolacca americana Linnaeus	American pokeweed
ex *Picea abies* (Linnaeus) H. Karsten	Norway spruce
Pilea fontana (Lunell) Rydberg	lesser clearweed
Pilea pumila (Linnaeus) A. Gray	Canadian clearweed
Pinus banksiana Lambert	jack pine
ex *Pinus nigra* J.F. Arnold	Austrian pine
Pinus resinosa Aiton	red pine
ad *Pinus rigida* Miller	pitch pine
Pinus strobus Linnaeus	eastern white pine
ex *Pinus sylvestris* Linnaeus	Scotch pine
Piptatheropsis pungens (Spreng.) Romasch., P.M. Peterson & Soreng	mountain ricegrass
Patis racemosa (Sm.) Romasch, P.M. Peterson & Soreng	blackseed ricegrass
Piptochaetium avenaceum (Linnaeus) Parodi	blackseed speargrass
ex *Plantago lanceolata* Linnaeus	narrowleaf plantain
ex *Plantago major* Linnaeus	common plantain
Plantago rugelii Decaisne	blackseed plantain
Plantago virginica Linnaeus	Virginia plantain
Platanthera aquilonis Sheviak	Huron green orchid
Platanthera ciliaris (Linnaeus) Lindley	yellow fringed orchid
Platanthera clavellata (Michaux) Luer	small green wood orchid
Platanthera flava (Linnaeus) Lindley var. *herbiola* (R. Brown) Luer	palegreen orchid
Platanthera hookeri (Torrey ex A. Gray) Lindley	Hooker's orchid
Platanthera lacera (Michaux) G. Don	green fringed orchid
Platanthera psycodes (Linnaeus) Lindley	lesser purple fringed orchid
Platanus occidentalis Linnaeus	American sycamore
Poa alsodes A. Gray	grove bluegrass
ex *Poa annua* Linnaeus	annual bluegrass
ex *Poa bulbosa* Linnaeus	bulbous bluegrass
ex *Poa compressa* Linnaeus	Canada bluegrass
ex *Poa nemoralis* Linnaeus	wood bluegrass
Poa paludigena Fernald & Wiegand	bog bluegrass
Poa palustris Linnaeus	fowl bluegrass
ex *Poa pratensis* Linnaeus	Kentucky bluegrass

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Scientific Name	Common Name
Poa saltuensis Fernald & Wiegand ssp. *languida* (Hitchcock) A. Haines	oldpasture bluegrass
ex *Poa trivialis* Linnaeus	rough bluegrass
Podophyllum peltatum Linnaeus	mayapple
Pogonia ophioglossoides (Linnaeus) Ker Gawler	snakemouth orchid
Polanisia dodecandra (Linnaeus) de Candolle ssp. *dodecandra*	redwhisker clammyweed
Polemonium reptans Linnaeus	Greek valerian
Polygala cruciata Linnaeus var. *aquilonia* Fernald & B.G. Schubert	drumheads
Polygala paucifolia Willdenow	gaywings
Polygala polygama Walter	racemed milkwort
Polygala sanguinea Linnaeus	purple milkwort
Polygala senega Linnaeus	Seneca snakeroot
Polygala verticillata L. var. *isocycla* Fernald	whorled milkwort
Polygonatum biflorum (Walter) Elliott	smooth Solomon's seal
Polygonatum pubescens (Willdenow) Pursh	hairy Solomon's seal
Polygonella articulata (Linnaeus) Meisner	coastal jointweed
Polygonum articulatum Linnaeus	coastal jointweed
ex *Polygonum aviculare* Linnaeus	prostrate knotweed
Polygonum tenue Michaux	pleatleaf knotweed
Polypodium virginianum Linnaeus	rock polypody
Polystichum acrostichoides (Michaux) Schott	Christmas fern
Polytaenia nuttallii de Candolle	Nuttall's prairie parsley
Pontederia cordata Linnaeus	pickerelweed
ex *Populus alba* Linnaeus	white poplar
Populus balsamifera Linnaeus	balsam poplar
Populus deltoides W. Bartram ex Marshall	eastern cottonwood
Populus grandidentata Michaux	bigtooth aspen
ex *Populus nigra* Linnaeus	Lombardy poplar
Populus tremuloides Michaux	quaking aspen
Populus × *jackii* Sargent	balm-of-Gilead
ex *Portulaca oleracea* Linnaeus	little hogweed
Potamogeton amplifolius Tuckerman	largeleaf pondweed
Potamogeton bicupulatus Fernald	snailseed pondweed
ex *Potamogeton crispus* Linnaeus	curly pondweed
Potamogeton diversifolius Rafinesque	waterthread pondweed
Potamogeton foliosus Rafinesque	leafy pondweed
Potamogeton gramineus Linnaeus	variableleaf pondweed
Potamogeton illinoensis Morong	Illinois pondweed
Potamogeton natans Linnaeus	floating pondweed
Potamogeton nodosus Poiret	longleaf pondweed
Potamogeton pulcher Tuckerman	spotted pondweed
Potamogeton pusillus Linnaeus	small pondweed
Potamogeton robbinsii Oakes	Robbins' pondweed
Potamogeton strictifolius A. Bennett	narrowleaf pondweed
Potamogeton zosteriformis Fernald	flatstem pondweed
Potentilla anserina Linnaeus	silverweed cinquefoil
ex *Potentilla argentea* Linnaeus	silver cinquefoil

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Scientific Name	Common Name
ex *Potentilla inclinata* Villars	ashy cinquefoil
Potentilla norvegica Linnaeus	Norwegian cinquefoil
ex *Potentilla recta* Linnaeus	sulphur cinquefoil
Potentilla simplex Michaux	common cinquefoil
Prenanthes alba Linnaeus	white rattlesnakeroot
Prenanthes altissima Linnaeus	tall rattlesnakeroot
Prenanthes aspera Michaux	rough rattlesnakeroot
Prenanthes crepidinea Michaux	nodding rattlesnakeroot
Prenanthes racemosa Michaux	purple rattlesnakeroot
Primula meadia (L.) A.R. Mast & Reveal	pride of Ohio
Proserpinaca palustris Linnaeus	marsh mermaidweed
Prunella vulgaris Linnaeus ssp. *lanceolata* (W.P.C. Barton) Hulten	lance selfheal
ex *Prunella vulgaris* Linnaeus ssp. *vulgaris*	common selfheal
Prunus americana Marshall	American plum
ad *Prunus angustifolia* Marshall	Chickasaw plum
ex *Prunus avium* (Linnaeus) Linnaeus	sweet cherry
ex *Prunus cerasus* Linnaeus	sour cherry
ex *Prunus hortulana* L.H. Bailey	Hortulan plum
Prunus nigra Aiton	Canadian plum
ex *Prunus padus* Linnaeus	European bird cherry
Prunus pensylvanica Linnaeus f.	pin cherry
Prunus pumila Linnaeus	sandcherry
Prunus serotina Ehrhart	black cherry
Prunus virginiana Linnaeus	chokecherry
Pseudognaphalium obtusifolium (Linnaeus) Hilliard & B.L. Burtt	rabbittobacco
ad *Pseudotsuga menziesii* (Mirbel) Franco	Douglas-fir
Ptelea trifoliata Linnaeus ssp. *trifoliata*	common hoptree
Ptelea trifoliata Linnaeus ssp. *trifoliata* var. *mollis* Torrey & A. Gray	common hoptree
Pteridium aquilinum (Linnaeus) Kuhn var. *latiusculum* (Desvaux) L. Underwood ex A. Heller	western brackenfern
ex *Puccinellia distans* (Jacquin) Parlatore	weeping alkaligrass
Pycnanthemum tenuifolium Schrader	narrowleaf mountainmint
Pycnanthemum virginianum (Linnaeus) B.L. Robinson & Fernald	Virginia mountainmint
Pyrola americana Sweet	American wintergreen
Pyrola elliptica Nuttall	waxflower shinleaf
ex *Pyrus communis* Linnaeus	common pear
Quercus alba Linnaeus	white oak
Quercus bicolor Willdenow	swamp white oak
Quercus coccinea Münchhausen	northern pin oak
Quercus ellipsoidalis E.J. Hill	northern pin oak
Quercus imbricaria Michaux	shingle oak
Quercus macrocarpa Michaux	bur oak
Quercus palustris Münchhausen	pin oak
Quercus rubra Linnaeus	northern red oak
Quercus velutina Lamarck	black oak
Ranunculus abortivus Linnaeus	littleleaf buttercup

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Scientific Name	Common Name
ex *Ranunculus acris* Linnaeus	tall buttercup
Ranunculus aquatilis Linnaeus var. *diffusus* Withering	longbeak buttercup
Ranunculus fascicularis Muhlenberg ex J.M. Bigelow	early buttercup
Ranunculus flabellaris Rafinesque	yellow water buttercup
Ranunculus hispidus Michaux	bristly buttercup
Ranunculus hispidus Michaux var. *nitidus* (Chapman) T. Duncan	bristly buttercup
Ranunculus hispidus Michaux var. *caricetorum* (Greene) T. Duncan	
Ranunculus pensylvanicus Linnaeus f.	Pennsylvania buttercup
Ranunculus recurvatus Poiret	blisterwort
ex *Ranunculus repens* Linnaeus	creeping buttercup
Ranunculus sceleratus Linnaeus	cursed buttercup
ex *Ranunculus testiculatus* Crantz	curveseed butterwort
Ratibida pinnata (Ventenat) Barnhart	pinnate prairie coneflower
Rhamnus alnifolia L'Héritier de Brutelle	alderleaf buckthorn
ex *Rhamnus cathartica* Linnaeus	common buckthorn
ex *Rhamnus davurica* Pallas ssp. *davurica*	Dahurian buckthorn
Rhexia mariana Linnaeus var. *mariana*	Maryland meadow beauty
Rhexia virginica Linnaeus	handsome Harry
ex *Rhodotypos scandens* (Thunberg) Makino	jetbead
Rhus aromatica Aiton	fragrant sumac
Rhus aromatica Aiton var. *arenaria* (Greene) Fernald	fragrant sumac
Rhus copallinum Linnaeus var. *latifolia* Englmann	winged sumac
Rhus glabra Linnaeus	smooth sumac
Rhus typhina Linnaeus	staghorn sumac
Rhynchospora alba (Linnaeus) Vahl	white beaksedge
Rhynchospora capillacea Torrey	needle beaksedge
Rhynchospora capitellata (Michaux) Vahl	brownish beaksedge
Rhynchospora macrostachya Torrey ex A. Gray	tall horned beaksedge
Rhynchospora nitens (Vahl) A. Gray	shortbeak beaksedge
Rhynchospora recognita (Gale) Kral	globe beaksedge
Rhynchospora scirpoides (Torrey) Grisebach	longbeak beaksedge
Ribes americanum Miller (includes var. *mesochorum*)	American black currant
ad *Ribes aureum* Pursh var. *villosum* de Candolle	golden currant
Ribes cynosbati Linnaeus	eastern prickly gooseberry
Ribes hirtellum Michaux	hairystem gooseberry
Ribes missouriense Nuttall	Missouri gooseberry
ex *Ribes rubrum* Linnaeus	cultivated currant
ad *Robinia hispida* Linnaeus	bristly locust
ad *Robinia hispida* Linnaeus var. *fertilis* (Ashe) R.T. Clausen	bristly locust
ad *Robinia neomexicana* A. Gray var. *neomexicana*	bristly locust
ad *Robinia pseudoacacia* Linnaeus	black locust
Rorippa palustris (Linnaeus) Besser ssp. *hispida* (Desvaux) Jonsell	hispid yellowcress
Rorippa palustris (Linnaeus) Besser ssp. *palustris*	Fernald's yellowcress
Rorippa sessiliflora (Nuttall) Hitchcock	stalkless yellowcress
Rosa blanda Aiton	smooth rose
ex *Rosa canina* Linnaeus	dog rose

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Scientific Name	Common Name
Rosa carolina Linnaeus	Carolina rose
Rosa carolina Linnaeus ssp. *subserulata* (Rydberg) W.H. Lewis	Carolina rose
ex *Rosa multiflora* Thunberg	multiflora rose
Rosa palustris Marshall	swamp rose
Rosa setigera Michaux	climbing rose
Rotala ramosior (Linnaeus) Koehne	lowland rotala
Rubus allegheniensis Porter	Allegheny blackberry
ex *Rubus bifrons* Vest	Himalayan berry
Rubus flagellaris Willdenow	northern dewberry
Rubus hispidus Linnaeus	bristly dewberry
Rubus idaeus Linnaeus ssp. *strigosus* (Michaux) Focke	grayleaf red raspberry
Rubus occidentalis Linnaeus	black raspberry
ad *Rubus odoratus* Linnaeus	purpleflowering raspberry
Rubus pensilvanicus Poiret	Pennsylvania blackberry
Rubus pubescens Rafinesque	dwarf red blackberry
Rubus setosus Bigelow	setose blackberry
Rubus × *avipes* L.H. Bailey [*R. pensilvanicus* × *R. allegheniensis*]	upland blackberry
Rudbeckia hirta Linnaeus	blackeyed Susan
Rudbeckia laciniata Linnaeus var. *laciniata*	cutleaf coneflower
Rudbeckia subtomentosa Pursh	sweet coneflower
Rudbeckia triloba Linnaeus	browneyed Susan
Ruellia humilis Nuttall	fringeleaf wild petunia
ex *Rumex acetosella* Linnaeus	common sheep sorrel
Rumex altissimus Alph. Wood	pale dock
Rumex britannica Linnaeus	greater water dock
ex *Rumex crispus* Linnaeus	curly dock
ex *Rumex obtusifolius* Linnaeus	bitter dock
Rumex triangulivalvis (Danser) Rechinger f.	Mexican dock
Rumex verticillatus Linnaeus	swamp dock
Sabatia angularis (Linnaeus) Pursh	rosepink
Sagittaria brevirostra Mackenzie & Bush	shortbeak arrowhead
Sagittaria graminea Michaux	grassy arrowhead
Sagittaria latifolia Willdenow	broadleaf arrowhead
Sagittaria rigida Pursh	sessilefruit arrowhead
Salix × *glatfelteri* C.K. Schneider [*S. amygdaloides* × *S. nigra*]	hybrid willow
ex *Salix* × *fragilis* Linnaeus [*S. alba* × *S. euxina*]	crack willow
ex *Salix alba* Linnaeus	white willow
Salix amygdaloides Andersson	peachleaf willow
ex *Salix babylonica* Linnaeus	Wisconsin weeping willow
Salix bebbiana Sargent	Bebb willow
Salix candida Flüggé ex Willdenow	sageleaf willow
ex *Salix cinerea* Linnaeus	large gray willow
Salix cordata Michaux	heartleaf willow
Salix discolor Muhlenberg	pussy willow
Salix eriocephala Michaux	Missouri River willow
ex *Salix euxina* J. Belyaeva	crack willow

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Scientific Name	Common Name
Salix humilis Marshall	prairie willow
Salix interior Rowlee	sandbar willow
Salix lucida Muhlenberg	shining willow
Salix myricoides Muhlenberg	bayberry willow
Salix nigra Marshall	black willow
Salix pedicellaris Pursh	bog willow
Salix petiolaris Smith (includes *S.* × *subsericea* (Andersson) Schneid.)	meadow willow
Salix sericea Marshall	silky willow
ex *Salsola tragus* Linnaeus	prickly Russian thistle
Sambucus nigra Linnaeus ssp. *canadensis* (Linnaeus) R. Bolli	common elderberry
Sambucus racemosa Linnaeus ssp. *pubens* (Michaux) Hultén	red elderberry
Samolus parviflorus Rafinesque	seaside brookweed
Sanguinaria canadensis Linnaeus	bloodroot
Sanicula canadensis Linnaeus	Canadian blacksnakeroot
Sanicula marilandica Linnaeus	Maryland sanicle
Sanicula odorata (Rafinesque) Pryer & Phillippe	clustered blacksnakeroot
Sanicula trifoliata E.P. Bicknell	largefruit blacksnakeroot
ex *Saponaria officinalis* Linnaeus	bouncingbet
Sarracenia purpurea Linnaeus	purple pitcherplant
Sassafras albidum (Nuttall) Nees	sassafras
ex *Satureja hortensis* Linnaeus	summer savory
Saururus cernuus Linnaeus	lizard's tail
Sceptridium dissectum (Sprengel) Lyon	cutleaf grapefern
Sceptridium multifidum (S.G. Gmeln) M. Nishida	leathery grapefern
Sceptridium oneidense (Gilbert) Holub	bluntlobe grapefern
Sceptridium rugulosum (W.H. Wagner) Skoda & Holub	ternate grapefern
ex *Schedonorus arundinaceus* (Schreber) Dumort.	meadow ryegrass
ex *Schedonorus pratensis* (Hudson) P. Beauvois	meadow fescue
Scheuchzeria palustris Linnaeus	rannoch-rush
Schizachyrium littorale (Nash.) E.P. Bicknell	shore little bluestem
Schizachyrium scoparium (Michaux) Nash	
Schoenoplectus acutus (Muhlenberg ex Bigelow) A. Löve & D. Löve var. *acutus*	hardstem bulrush
Schoenoplectus pungens (Vahl) Palla	chairmaker's bulrush
Schoenoplectiella hallii (A. Gray) Lye	Hall's bulrush
Schoenoplectiella purshiana (Fernald) Lye	weakstalk bulrush
Schoenoplectiella smithii (A. Gray) Hayasaka	Smith's bulrush
Schoenoplectus subterminalis (Torrey) Sojak	swaying bulrush
Schoenoplectus tabernaemontani (C.C. Gmelin) Palla	softstem bulrush
ex *Scilla siberica* Andrews	Siberian squill
Scirpus atrovirens Willdenow	green bulrush
Scirpus cyperinus (Linnaeus) Kunth	woolgrass
Scirpus expansus Fernald	woodlandbulrush
Scirpus georgianus R.M. Harper	Georgia bulrush
Scirpus hattorianus Makino	mosquito bulrush
Scirpus pendulus Muhlenberg	drooping bulrush

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Scientific Name	Common Name
Scirpus polyphyllus Vahl	leafy bulrush
ex *Scleranthus annuus* Linnaeus	German knotgrass
Scleria muehlenbergii Steudel	Muhlenger's nutrush
Scleria pauciflora Muhlenberg ex Willdenow var. *caroliniana* Alph. Wood	Carolina nutrush
Scleria reticularis Michaux	netted nutrush
Scleria triglomerata Michaux	whip nutrush
Scleria verticillata Muhlenberg ex Willdenow	low nutrush
Scrophularia lanceolata Pursh	lanceleaf figwort
Scrophularia marilandica Linnaeus	carpenter's square
Scutellaria galericulata Linnaeus	marsh skullcap
Scutellaria lateriflora Linnaeus	mad dog skullcap
Scutellaria parvula Michaux var. *missouriensis* (Torrey) Goodman & C.A. Lawson	Leonard's skullcap
ex *Secale cereale* Linnaeus	cereal rye
ex *Securigera varia* (L.) Lassen	purple crownvetch
ex *Sedum acre* Linnaeus	goldmoss stonecrop
ex *Sedum album* Linnaeus	white stonecrop
ex *Sedum rupestre* Linnaeus	Jenny's stonecrop
ex *Sedum sarmentosum* Bunge	stringy stonecrop
Sedum ternatum Michaux	woodland stonecrop
Selaginella eclipes W.R. Buck	meados selaginella
Selaginella rupestris (Linnaeus) Spring	northern selaginella
ad *Senna hebecarpa* (Fernald) H.S. Irwin & Barnaby	American senna
ex *Setaria faberi* R.A.W. Herrmann	Japanese bristlegrass
ex *Setaria italica* (Linnaeus) P. Beauvois	foxtail bristlegrass
ex *Setaria pumila* (Poiret) Roem. & Schultes ssp. *pumila*	pearl millet
ex *Setaria viridis* (Linnaeus) P. Beauvois	green bristlegrass
Sicyos angulatus Linnaeus	
Silene antirrhina Linnaeus	sleepy silene
ex *Silene armeria* Linnaeus	sweet William silene
ex *Silene coronaria* (Linnaeus) Clairville	rose campion
ex *Silene csereii* Baumgarten	Balkan catchfly
ex *Silene dioica* (Linnaeus) Clairville	red catchfly
ex *Silene latifolia* Poiret	bladder campion
ex *Silene noctiflora* Linnaeus	nightflowering silene
Silene stellata (Linnaeus) W.T. Aiton	widowsfrill
Silene virginica Linnaeus	fire pink
ex *Silene vulgaris* (Moench) Garcke	maidenstears
Silphium integrifolium Michaux	wholeleaf rosinweed
Silphium laciniatum Linnaeus	compassplant
Silphium perfoliatum Linnaeus var. *perfoliatum*	cup plant
Silphium terebinthinaceum Jacquin var. *terebinthinaceum*	prairie rosinweed
Sinapis arvensis Linnaeus	charlock mustard
ex *Sisymbrium altissimum* Linnaeus	tall tumblemustard
ex *Sisymbrium officinale* (Linnaeus) Scopoli	hedge mustard
Sisyrinchium albidum Rafinesque	white blue-eyed grass

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Sisyrinchium angustifolium Miller	narrowleaf blue-eyed grass
Sisyrinchium atlanticum E.P. Bicknell	eastern blue-eyed grass
Sium suave Walter	hemlock waterparsnip
Smilax ecirrata (Engelmann ex Kunth) S. Watson	upright carrionflower
Smilax illinoensis Mangaly	Illinois greenbrier
Smilax lasioneura Hooker	Blue Ridge carrion flower
Smilax rotundifolia Linnaeus	roundleaf greenbrier
Smilax tamnoides Linnaeus	bristly greenbrier
ad *Solanum carolinense* Linnaeus	Carolina horsenettle
ex *Solanum dulcamara* Linnaeus	climbing nightshade
Solanum ptychanthum Dunal	American black nightshade
Solidago altissima Linnaeus	Canada goldenrod
Solidago caesia Linnaeus	wreath goldenrod
Solidago canadensis Linnaeus	Canada goldenrod
Solidago flexicaulis Linnaeus	zigzag goldenrod
Solidago gigantea Aiton	giant goldenrod
Solidago juncea Aiton	early goldenrod
Solidago missouriensis Nuttall	Missouri goldenrod
Solidago nemoralis Aiton	gray goldenrod
Solidago nemoralis Aiton ssp. *decemflora* (de Candolle) Brammall ex Semple	gray goldenrod
Solidago ohioensis Riddell	Ohio goldenrod
Solidago patula Muhlenberg ex Willdenow	roundleaf goldenrod
Solidago ptarmicoides (Torrey & A. Gray) B. Boivin	prairie goldenrod
Solidago riddellii Frank	Riddell's goldenrod
Solidago rigida Linnaeus	stiff goldenrod
Solidago rugosa Miller	wrinkleleaf goldenrod
ad *Solidago sempervirens* Linnaeus	seaside goldenrod
Solidago simplex Kunth var. *gillmanii* (A. Gray) G.S. Ringius	Rand's goldenrod
Solidago speciosa Nuttall	showy goldenrod
Solidago uliginosa Nuttall	bog goldenrod
Solidago ulmifolia Muhlenberg ex Willdenow	elmleaf goldenrod
ex *Sonchus arvensis* Linnaeus ssp. *uliginosus* (M. Bieberstein) Nyman	moist sowthistle
ex *Sonchus asper* (Linnaeus) Hill	spiny sowthistle
ex *Sonchus oleraceus* Linnaeus	common sowthistle
Sorghastrum nutans (Linnaeus) Nash	Indiangrass
ex *Sorghum halepense* (Linnaeus) Persoon	Johnsongrass
Sparganium americanum Nuttall	American bur-reed
Sparganium androcladum (Engelmann) Morong	branched bur-reed
Sparganium emersum Rehmann	simplestem bur-reed
Sparganium eurycarpum Engelmann	broadfruit bur-reed
Spartina pectinata Link	prairie cordgrass
ex *Spergularia media* (Linnaeus) C. Presl	media sandspurry
Sphenopholis intermedia (Rydberg) Rydberg	slender wedgescale
Sphenopholis nitida (Biehler) Scribner	shiny wedgescale
Sphenopholis obtusata (Michaux) Scribner	prairie wedgescale

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Spiraea alba Du Roi	white meadowsweet
Spiraea tomentosa Linnaeus var. *rosea* (Rafinesque) Fernald	steeplebush
Spiranthes cernua (Linnaeus) Richard	nodding ladies'-tresses
Spiranthes lacera (Rafinesque) Rafinesque	northern slender ladies'-tresses
Spiranthes lucida (H.H. Eaton) Ames	shining ladies'-tresses
Spiranthes magnicamporum Sheviak	Great Plains lady's tresses
Spiranthes ovalis Lindley var. *erostellata* Catling	October lady's tresses
Spirodela polyrrhiza (Linnaeus) Schleiden	common duckmeat
Sporobolus clandestinus (Biehler) Hitchcock	rough dropseed
ad *Sporobolus compositus* (Poiret) Merrill	composite dropseed
Sporobolus cryptandrus (Torrey) A. Gray	sand dropseed
Sporobolus heterolepis (A. Gray) A. Gray	prairie dropseed
Sporobolus neglectus Nash	puffsheath dropseed
Sporobolus vaginiflorus (Torrey ex A. Gray) Alphonso Wood	poverty dropseed
Stachys aspera Michaux	hyssopleaf hedgenettle
Stachys hispida Pursh	smooth hedgenettle
Stachys hyssopifolia Michaux	hyssopleaf hedgenettle
Stachys pilosa Nuttall	hairy hedgenettle
Staphylea trifolia Linnaeus	American bladdernut
ex *Stellaria graminea* Linnaeus	grasslike starwort
Stellaria longifolia Muhlenberg ex Willdenow	longleaf starwort
ex *Stellaria media* (Linnaeus) Villars	common chickweed
Strophostyles helvola (Linnaeus) Elliott	trailing fuzzybean
Strophostyles leiosperma (Torrey & A. Gray) Piper	slickseed fuzzybean
Stuckenia pectinata (Linnaeus) Borner	sago pondweed
ad *Stylophorum diphyllum* (Michaux) Nuttall	celandine poppy
ad *Symphoricarpos albus* (L.) S.F. Blake var. *laevigatus* (Fernald) S.F. Blake	common snowberry
ad *Symphoricarpos orbiculatus* Moench	coralberry
Symphyotrichum boreale (Torrey & A. Gray) A. Löve & D. Löve	northernBog aster
Symphyotrichum cordifolium (Linnaeus) G.L. Nesom	common blue wood aster
Symphyotrichum drummondii (Lindley) G.L. Nesom var. *drummondii*	Drummond's aster
Symphyotrichum dumosum (Linnaeus) G.L. Nesom	rice button aster
Symphyotrichum ericoides (Linnaeus) G.L. Nesom	white heath aster
Symphyotrichum firmum (Nees) G.L. Nesom	purplestem aster
Symphyotrichum laeve (Linnaeus) A. Löve & D. Löve var. *laeve*	smooth blue aster
Symphyotrichum lanceolatum (Willdenow) G.L. Nesom var. *interior* (Wiegand) G.L. Nesom	white panicle aster
Symphyotrichum lanceolatum (Willdenow) G.L. Nesom var. *lanceolatum* (Wiegand) G.L. Nesom	white panicle aster
Symphyotrichum lateriflorum (Linnaeus) A. Löve & D. Löve	calico aster
Symphyotrichum novae-angliae (Linnaeus) G.L. Nesom	New England aster
Symphyotrichum ontarionis (Wiegand) G.L. Nesom	bottomeland aster
Symphyotrichum oolentangiense (Riddell) G.L. Nesom	skyblue aster
Symphyotrichum pilosum (Willdenow) G.L. Nesom	hairy white oldfield aster
Symphyotrichum praealtum (Poiret) G.L. Nesom	willowleaf aster
Symphyotrichum puniceum (Linnaeus) A. Löve & D. Löve	purplestem aster

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Symphyotrichum racemosum (Elliott) G.L. Nesom	smooth white oldfield aster
Symphyotrichum sericeum (Vent.) G.L. Nesom	western silver aster
Symphyotrichum shortii (Lindley) G.L. Nesom	Short's aster
Symphyotrichum urophyllum (Lindley) G.L. Nesom	common blue wood aster
Symplocarpus foetidus (Linnaeus) W. Salisbury	skunk cabbage
ex *Syringa vulgaris* Linnaeus	common lilac
Taenidia integerrima (Linnaeus) Drude	yellow pimpernel
ex *Tanacetum balsamita* Linnaeus	costmary
ex *Tanacetum parthenium* (Linnaeus) Schultz-Bipontinus	feverfew
ex *Tanacetum vulgare* Linnaeus	common tansy
ex *Taraxacum erythrospermum* Andrzejowski ex Besser	rock dandelion
ex *Taraxacum officinale* F. H. Wiggers	common dandelion
ad *Taxodium distichum* (Linnaeus) Richard	bald cypress
ex *Taxus cuspidata* Siebold & Zuccarini	Japanese yew
ex *Teesdalia nudicaulis* (Linnaeus) W.T. Aiton	barestem teesdalia
Tephrosia virginiana (Linnaeus) Persoon	Virginia tephrosia
Teucrium canadense Linnaeus	Canada germander
Teucrium canadense Linnaeus var. *occidentale* (A. Gray) E.M. McClintock & Epling	western germander
Thalictrum amphibolum Greene	waxyleaf meadow-rue
Thalictrum dasycarpum Fischer & Avé Lallemant	purple meadow-rue
Thalictrum dioicum Linnaeus	early meadow-rue
Thalictrum thalictroides (Linnaeus) A.J. Eames & B. Boivin	rue anemone
Thaspium barbinode (Michaux) Nuttall	hairyjoint meadowparsnip
ad *Thelesperma megapotamicum* (Sprengel) Kuntze	Hopi tea greenthread
Thelypteris noveboracensis (Linnaeus) Nieuwland	New York fern
Thelypteris palustris Schott var. *pubescens* (Lawson) Fernald	eastern marsh fern
ex *Thlaspi arvense* Linnaeus	field pennycress
Thuja occidentalis Linnaeus	arborvitae
ex *Thymus pulegioides* Linnaeus	lemon thyme
Tilia americana Linnaeus	American basswood
ex *Torilis japonica* (Houtt.) de Candolle	erect hedgeparsley
Torreyochloa pallida (Torrey) G.L. Church var. *pallida*	pale false mannagrass
Toxicodendron radicans (Linnaeus) Kuntze	eastern poison ivy
Toxicodendron rydbergii (Small ex Rydberg) Greene	western poison ivy
Toxicodendron vernix (Linnaeus) Kuntze	poison sumac
Tradescantia ohiensis Rafinesque	bluejacket
Tradescantia subaspera Ker Gawler	zigzag spiderwort
ex *Tragopogon dubius* Scopoli	yellow salsify
ex *Tragopogon pratensis* Linnaeus	Jack-go-to-bed-at-noon
Triadenum fraseri (Spach) Gleason	Fraser's marsh St. Johnswort
Triadenum virginicum (Linnaeus) Rafinesque	Virginia marsh St. Johnswort
Trichostema dichotomum Linnaeus	forked bluecurls
ad *Tridens flavus* (Linnaeus) Hitchcock	purpletop tridens
Trientalis borealis Rafinesque	starflower
ex *Trifolium arvense* Linnaeus	rabbitfoot clover

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
ex *Trifolium aureum* Pollich	golden clover
ex *Trifolium campestre* Schreber	field clover
ex *Trifolium dubium* Sibthorp	suckling clover
ex *Trifolium hybridum* Linnaeus	alsike clover
ex *Trifolium pratense* Linnaeus	red clover
ex *Trifolium repens* Linnaeus	white clover
Triglochin maritima Linnaeus	seaside arrowgrass
Trillium cernuum Linnaeus	whip-poor-will flower
Trillium erectum Linnaeus	red trillium
Trillium flexipes Rafinesque	nodding wakerobin
Trillium grandiflorum (Michaux) Salisbury	snow trillium
Trillium recurvatum L.C. Beck	bloody butcher
Trillium recurvatum L.C. Beck forma *shayi* E.J. Palmer & Steyermark	bloody butcher
Triodanis perfoliata (Linnaeus) Nieuwland	clasping Venus' looking-glass
Triosteum aurantiacum E.P. Bicknell	orangefruit horse-gentian
Triphora trianthophoros (Swartz) Rydberg	threebirds
Triplasis purpurea (Walter) Chapman	purple sandgrass
ex *Triticum aestivum* Linnaeus	common wheat
ad *Tsuga canadensis* (Linnaeus) Carrière	eastern hemlock
Turritis glabra Linnaeus	tower rockcress
ex *Typha angustifolia* Linnaeus	narrowleaf cattail
Typha latifolia Linnaeus	broadleaf cattail
Typha × *glauca* Godr. [*T. angustifolia* × *T. latifolia*]	hybrid cattail
Ulmus americana Linnaeus	American elm
ex *Ulmus pumila* Linnaeus	Siberian elm
Ulmus rubra Muhlenberg	slippery elm
ex *Ulmus* × *notha* G. Wilhelm. & G. Ware [*U. pumila* × *U. rubra*]	hybrid elm
ex *Urtica dioica* Linnaeus	stinging nettle
Urtica dioica Linnaeus ssp. *gracilis* (Aiton) Selander	California nettle
Utricularia cornuta Michaux	horned bladderwort
Utricularia geminiscapa Benjamin	hiddenfruit bladderwort
Utricularia gibba Linnaeus	humped bladderwort
Utricularia intermedia Hayne	flatleaf bladderwort
Utricularia minor Linnaeus	lesser bladderwort
Utricularia purpurea Walter	eastern purple bladderwort
Utricularia subulata Linnaeus	zigzag bladderwort
Utricularia vulgaris Linnaeus ssp. *macrorhiza* (Leconte) R.T. Clausen	common bladderwort
Uvularia grandiflora Smith	largeflower bellwort
Uvularia sessilifolia Linnaeus	sessileleaf bellwort
Vaccinium angustifolium Aiton	lowbush blueberry
Vaccinium corymbosum Linnaeus (includes *V. atrococcum* A. Gray)	highbush blueberry
Vaccinium macrocarpon Aiton	cranberry
Vaccinium myrtilloides Michaux	velvetleaf huckleberrry
Vaccinium oxycoccos Linnaeus	small cranberry
Vaccinium pallidum Aiton	Blue Ridge blueberry
Valerianella chenopodiifolia (Pursh) de Candolle	goosefoot cornsalad

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Vallisneria americana Michaux	American eelgrass
ex *Verbascum blattaria* Linnaeus	moth mullein
ex *Verbascum thapsus* Linnaeus ssp. *thapsus*	common mullein
Verbena bracteata Cavanilles ex Lagasca y Segura & Rodriguez	bigbract verbena
Verbena hastata Linnaeus	swamp verbena
Verbena simplex Lehmann	narrowleaf vervain
Verbena stricta Ventenat	hoary verbena
Verbena urticifolia Linnaeus	white vervain
Verbena urticifolia Linnaeus var. *leiocarpa* L.M. Perry & Fernald	velvety white vervain
Verbena × *rydbergii* Moldenke [*V. hastata* × *V. stricta*]	vervain
Verbesina alternifolia (Linnaeus) Britton ex Kearney	wingstem
Vernonia fasciculata Michaux	prairie ironweed
Vernonia gigantea (Walter) Trelease ex Branner & Coville	giant ironweed
Vernonia missurica Rafinesque	Missouri ironweed
Veronica americana Schweinitz ex Bentham	American speedwell
ex *Veronica arvensis* Linnaeus	corn speedwell
Veronica catenata Pennell	water speedwell
ex *Veronica officinalis* Linnaeus	common gypsyweed
Veronica peregrina Linnaeus	neckweed
Veronica scutellata Linnaeus	skullcap speedwell
ex *Veronica serpyllifolia* Linnaeus	thymeleaf speedwell
ex *Veronica verna* Linnaeus	spring speedwell
Veronicastrum virginicum (Linnaeus) Farwell	Culver's root
Viburnum acerifolium Linnaeus	mapleleaf viburnum
ad *Viburnum dentatum* Linnaeus var. *lucidum* Aiton (*V. recognitum* Fernald)	southern arrowwood
Viburnum lentago Linnaeus	nannyberry
Viburnum opulus Linnaeus var. *americanum* Aiton	American cranberry bush
ex *Viburnum opulus* Linnaeus var. *opulus*	European cranberrybush
Viburnum prunifolium Linnaeus	blackhaw
Viburnum rafinesqueanum Schultes	downy arrowwood
Vicia americana Muhlenberg ex Willdenow	American vetch
Vicia caroliniana Walter	Carolina vetch
ex *Vicia villosa* Roth	winter vetch
ex *Vinca minor* Linnaeus	common periwinkle
ex *Vincetoxicum nigrum* (Linnaeus) Moench	Louise's swallow-wort
Viola affinis Leconte	sand violet
ex *Viola arvensis* Murray	European field pansy
Viola blanda Willdenow	sweet white violet
Viola canadensis Linnaeus	Canadian white violet
Viola cucullata Aiton	marsh blue violet
Viola labradorica Schrank	American dog violet
Viola lanceolata Linnaeus	bog white violet
Viola macloskeyi F.E. Lloyd	smooth white violet
Viola missouriensis Greene	sand violet
ex *Viola odorata* Linnaeus	sweet violet

Table B1 (continued). Flora of the Indiana Dunes. Scientific names are shown by genus and species, with authority. Prefixes before genus names indicate adventive (ad) and exotic (ex) species. Common names are per the U.S. Department of Agriculture.

Scientific Name	Common Name
Viola pedata Linnaeus	birdfoot violet
Viola primulifolia Linnaeus	primrose leaved violet
Viola pubescens Aiton	downy yellow violet
Viola pubescens Aiton var. *scabriuscula* Schweinitz ex Torrey & A. Gray	smooth yellow violet
Viola rostrata Pursh	longspur violet
Viola sagittata Aiton var. *ovata* (Nuttall) Torrey & A. Gray	arrowleaf violet
Viola sagittata Aiton var. *sagittata*	arrowleaf violet
Viola sororia Willdenow	common blue violet
Viola striata Aiton	striped cream violet
ex *Viola tricolor* Linnaeus	johnny jumpup
Vitis aestivalis Michaux	summer grape
Vitis labrusca Linnaeus	fox grape
Vitis riparia Michaux	riverbank grape
Vitis vulpina Linnaeus	frost grape
ex *Vulpia myuros* (L.) C.C. Gmelin	rat-tail fescue
Vulpia octoflora (Walter) Rydberg	sixweeks fescue
ad *Wisteria frutescens* (L.) Poiret	American wisteria
Wolffia brasiliensis Weddell	Brazilian watermeal
Wolffia columbiana H. Karsten	Columbian watermeal
Woodwardia areolata (Linnaeus) T. Moore	netted chainfern
Woodwardia virginica (Linnaeus) Smith	Virginia chainfern
ex *Xanthium strumarium* Linnaeus	rough cockleburr
Xyris difformis Chapman var. *difformis*	Carolina yelloweyed grass
Xyris torta Smith	slender yelloweyed grass
ad *Yucca flaccida* Haworth	Adam's needle
Zanthoxylum americanum MIller	common pricklyash
ad *Zea mays* Linnaeus	corn
Zizania aquatica Linnaeus var. *aquatica*	annual wildrice
Zizania palustris Linnaeus	northern wildrice
Zizia aurea (Linnaeus) W.D.J. Koch	golden zizia

Appendix C. Species not included in the special flora, but should be elevated to special flora status in future revisions.

The coefficients of conservatism (CoC) assigned to the following species increased from <10 to 10, or they were previously listed as a CoC of 10 but were not included in the special flora. This represents the change in CoC values from Swink and Wilhelm (1994) to Wilhelm and Rericha (2017). Consequently, these species should be elevated to special flora status in future revisions of the special flora report.

Table C1. Species to include in future revisions of the special flora.

Species	Common Name	Former CoC Value
Amorpha canescens Pursh	lead plant	9
Asclepias exaltata L.	poke milkweed	9
Asimina triloba (L.) Dunal	pawpaw	9
Aureolaria virginica (L.) Pennell	downy false foxglove	10
Bidens discoidea (Torr. & A. Gray) Britton	swamp beggar's ticks	9
Bromus ciliatus L.	fringed brome	10
Bromus pubescens Sprengel	woodland brome	10
Carex albolutescens Schweinitz	long-fruited oval sedge	8
Carex buxbaumii Wahlenberg	dark-scaled sedge	9
Carex meadii Dewey	Mead's-stiff sedge	9
Carex virescens Muhlenberg ex Willdenow	slender green sedge	10
Coreopsis palmata Nuttall	prairie coreopsis	6
Cornus alternifolia L. f.	alternate-leaved dogwood	9
Cornus sericea L. (*Cornus baileyi* J. M. Coult. & W. H. Evans)	red sticks	6
Cypripedium × *andrewsii* A.M. Fuller [*C. candidum* × *C. parviflorum*]	Andrew's lady-slipper	10
Cystopteris tenuis (Michaux) Desvaux	slender fragile fern	10
Desmodium glabellum (Michx.) DC.	smooth tick trefoil	5
Dichanthelium dichotomum (L.) Gould ssp. *microcarpon* (Muhl. ex Elliott) Freckmann & Lelong		10
Dryopteris × *boottii* (Tuck.) Underw. (pro sp.) [*D. cristata* × *D. intermedia*]	Boott's shield fern	10
Dulichium arundinaceum (L.) Britton	three-way sedge	9
Eleocharis elliptica Kunth	golden-seeded spikerush	8
Epilobium leptophyllum Raf.	fen willowherb	10
Erigenia bulbosa (Michx.) Nutt.	salt and pepper	10
Erythronium americanum Ker Gawler	yellow toothed dogviolet	8
Galium asprellum Michx.	rough bedstraw	10
Glyceria canadensis (Michx.) Trin.	rattlesnake grass	10
Gratiola virginiana L.	rough-fruited hedge hyssop	10
Helianthus giganteus L.	tall sunflower	9
Heuchera richardsonii R. Brown	prairie alum root	8
Ilex verticillata (L.) A. Gray	winterberry	9
Juncus brachycephalus (Engelmann) Buchenau	short-headed rush	9
Lechea tenuifolia Michaux	slender-leaved pinweed	8
Lespedeza frutescens (L.) Hornem.	violet bushclover	8
Liatris cylindracea Michaux	cylindric blazingstar	8

Table C1 (continued). Species to include in future revisions of the special flora.

Species	Common Name	Former CoC Value
Lobelia kalmii L.	Kalm's lobelia	10
Lycopus rubellus Moench	stalked water horehound	10
Lysimachia quadriflora Sims	fen loosestrife	9
Micranthes pensylvanica (L.) Haworth	swamp saxifrage	10
Oenothera pilosella Raf.	prairie sundrops	10
Parnassia glauca Raf.	grass of Parnassus	10
Pedicularis lanceolata Michx.	fen betony	9
Pinus resinosa Aiton	red pine	10
Polygala cruciata L. var. *aquilonia* Fernald & B. G. Schub.	cross milkwort	10
Polygala senega L.	Seneca snakeroot	8
Polygonatum pubescens (Willdenow) Pursh	downy Solomon's seal	7
Potamogeton amplifolius Tuckerman	large-leaved pondweed	10
Prenanthes racemosa Michaux	smooth prairie lettuce	8
Ranunculus hispidus Michaux var. *caricetorum* (Greene) T. Duncan	rough crowfoot	10
Rhus aromatica Aiton var. *arenaria* (Greene) Fernald	fragrant sumac	9
Ribes americanum Miller var. *mesochorum* (Nieuwl.) Peattie	Hoosier black currant	10
Rubus pensilvanicus Poiret	eastern bramble	3
Sambucus racemosus Linnaues var. *pubens* (Michx.) Koehne	red elderberry	10
Solidago ohioensis Riddell	Ohio goldenrod	9
Solidago uliginosa Nuttall	bog goldenrod	10
Sphenopholis nitida (Biehler) Scribn.	shining wedge grass	10
Taenidia integerrima (L.) Drude	yellow pimpernel	9
Triglochin maritima L.	saside arrowgrass	10

Appendix D. Towns, roads, and hydrologic features (lakes, ponds, and rivers) in and around Indiana Dunes National Park.

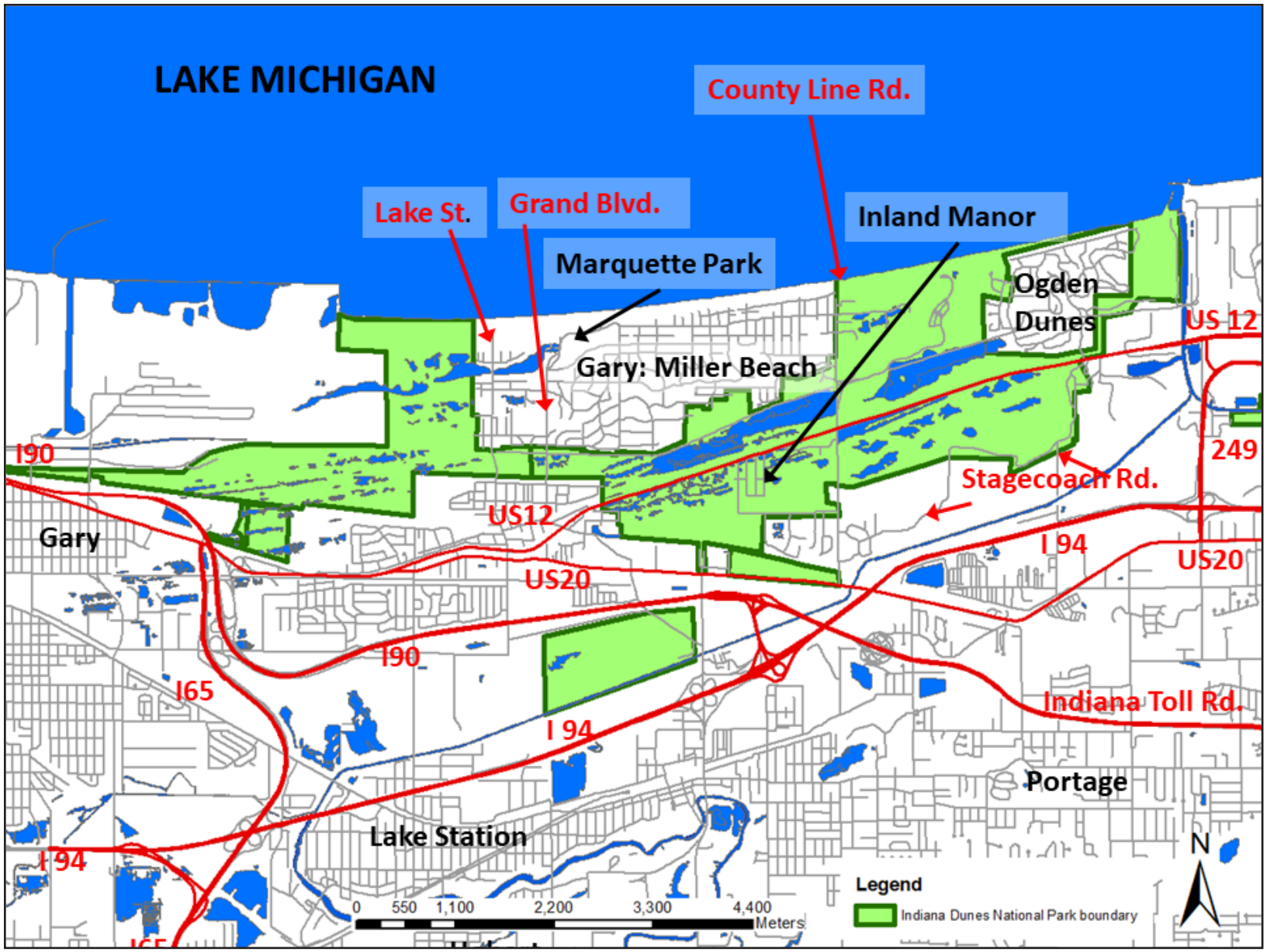


Figure D1. Towns and roads in the west unit of Indiana Dunes National Park.

Appendix D (continued). Towns, roads, and hydrologic features (lakes, ponds, and rivers) in and around Indiana Dunes National Park.

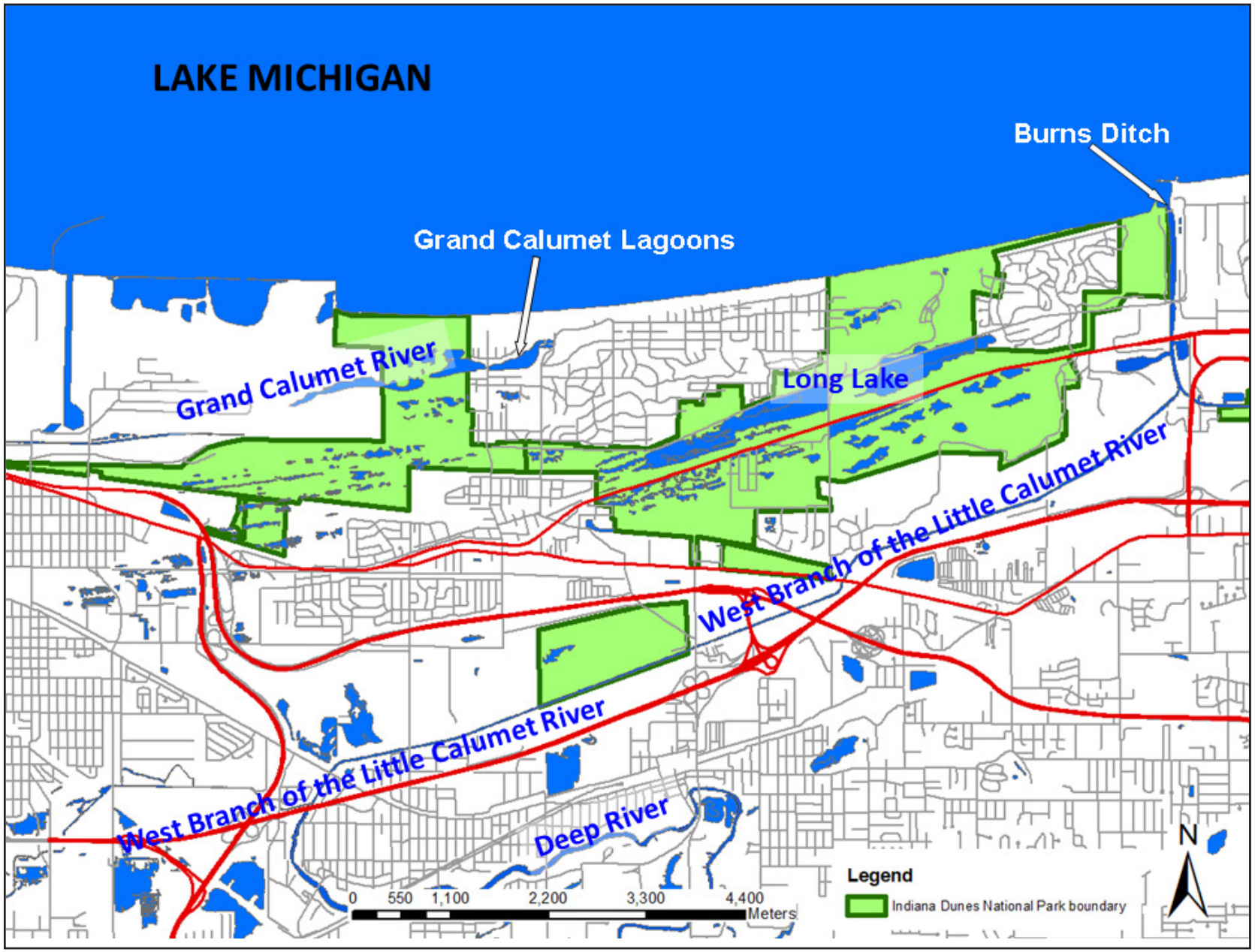


Figure D2. Lakes, ponds, and rivers in the west unit of Indiana Dunes National Park.

Appendix D (continued). Towns, roads, and hydrologic features (lakes, ponds, and rivers) in and around Indiana Dunes National Park.

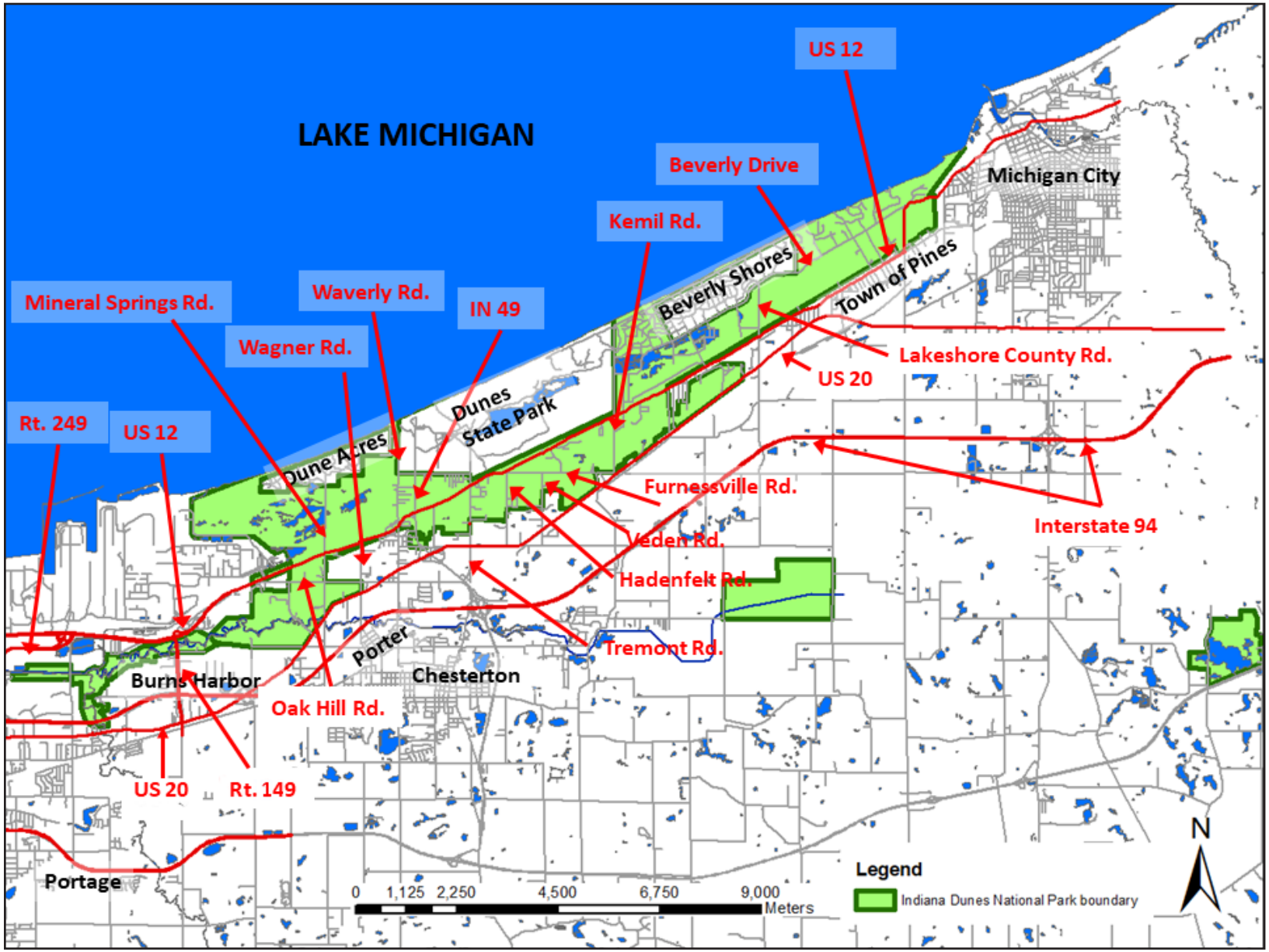


Figure D3. Towns and roads in the east unit of Indiana Dunes National Park.

Appendix D (continued). Towns, roads, and hydrologic features (lakes, ponds, and rivers) in and around Indiana Dunes National Park.

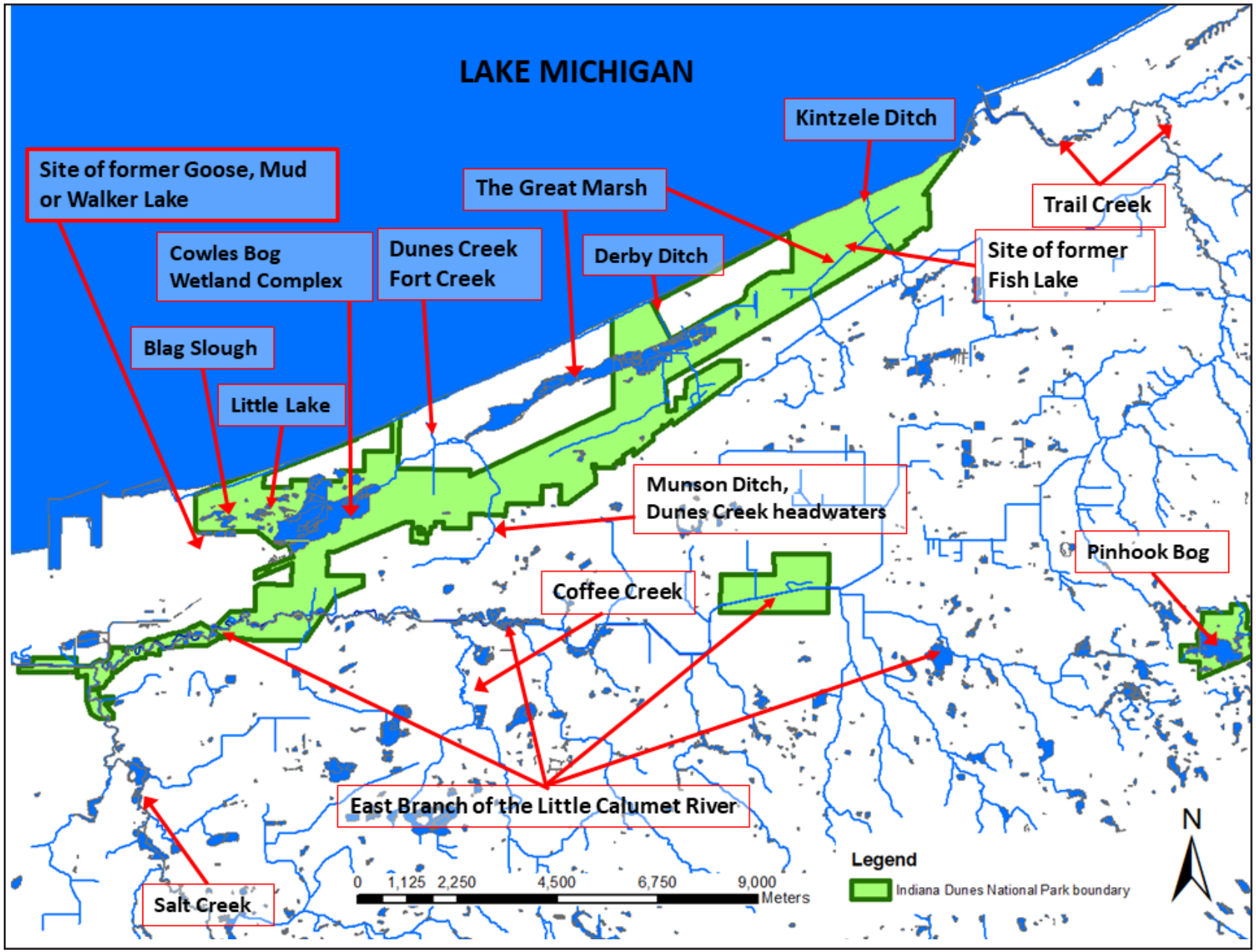


Figure D4. Lakes, ponds, and rivers in the east unit of Indiana Dunes National Park.

Appendix E. Flora of the Indiana Dunes by the numbers.

Table E1. Unique characteristics of Indiana Dunes flora and the numbers of each.

Number	Category
0	Species endemic to Indiana Dunes National Park.
1	Number of federally listed endangered and threatened plant species: Pitcher's thistle (*Cirsium pitcheri*)—*Threatened*.
2	Largest plant families in the dunes: sedges (Cyperaceae) and asters (Asteraceae).
9	Number of lycopod species (clubmosses) in the Indiana Dunes.
10	Number of State-listed extirpated species known from the Dunes, and the rank of native plant diversity at INDU compared to other national parks.
11	Number of native lianas (woody vines) found in the Indiana Dunes.
16	Number of vines (herbaceous) found in the Indiana Dunes.
26	Number of native orchids found in the dunes. This is reduced to species if we exclude extirpated species. There are 43 orchids native to Indiana, so the dunes are home to at least 60% of all the orchids found in Indiana.
29	Number of species that have been extirpated or lost from the Indiana Dunes separate from the State-listed extirpated plants.
37	Number of ferns (including horsetails) in the Indiana Dunes.
61	Number of shrubs native to the Indiana Dunes.
85	Number of adventive species, introduced from elsewhere in North America, found in the Indiana Dunes. Total is 87 if we include one hybrid (*Amelanchier* × *grandiflora*) and one variety (*Robinia hispida* var. *fertilis*).
93	Number of tree species native to Indiana Dunes National Park.
153	Number of species in the Cyperaceae family (sedges) in the Dunes.
332	Number of exotic plant species found in the Indiana Dunes.
682	Number of herbs (forbs) native to the Indiana Dunes.
1,183	Number of native plant species present in the Indiana Dunes excluding the 29 species believed to be extirpated.
1,206	Number of native plants in Indiana Dunes National Park.
1,212	Number of native species known from the Indiana Dunes based on *Flora of North America* and the Integrated Taxonomic Information System. This represents at least 70% of the flora of the Chicago Region.
1,350	For comparison, the number of native, adventive, and exotic species recorded from Manitoulin Island in Lake Huron, Ontario, Canada (Morton and Venn 2000).
1,672	Total native, adventive, and exotic species recorded from the Indiana Dunes.
1,733	Number of native species in the Chicago Region based on Wilhelm and Rericha (2017).
3,693	Number of native, adventive, and exotic species found in Indiana (Dolan et al. 2020).

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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