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Vegetation Inventory, Mapping, and Characterization Report, Chiricahua National Monument

Volume II, Type Descriptions

Border pinyon / Alderleaf mountain mahogany Woodland Association highlighting the diversity of lifeforms and environments at Chiricahua National Monument.
NPS

Vegetation inventory, mapping, and characterization report, Chiricahua National Monument: Volume II, type descriptions

Science Report NPS/SR—2025/252

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Abstract

The Sonoran Desert Network (SODN) conducted a vegetation mapping and characterization effort at Chiricahua National Monument (CHIR) from 2008 to 2011. This project was completed under the National Park Service (NPS) Inventory and Monitoring Division Vegetation Mapping Inventory, which aims to complete baseline mapping and classification inventories at more than 270 NPS units. The vegetation map data collected provides park managers with a digital map product that meets national standards of spatial and thematic accuracy, while also placing the vegetation into a regional and national context. A total of 29 distinct vegetation communities were described. These communities ranged from lower-elevation grass and forb systems with scattered mesquite (*Prosopis velutina*) or juniper trees (*Juniperus arizonica*) to rugged, exposed wooded shrublands and to deeply shaded and mesic drainages with Madrean pines (*Pinus engelmannii, P. leiophylla*) and Douglas-fir (*Pseudotsuga menziesii*) forests. Each of the 29 communities was described at the association level, with detailed narratives that include lists of species found in each association, their abundance, landscape features, and overall community structural characteristics. Of the 29 vegetation types, only nine were pre-existing "accepted" types within the National Vegetation Classification (NVC). The remaining types are newly described, specific to CHIR, and will be proposed for formal status within the NVC. This document is Volume II of two volumes in the CHIR Vegetation Mapping Inventory. Volume I is the main project report and provides summaries of each type description, while Volume II provides the unabridged versions of the type descriptions. These detailed type descriptions include floristic and structural characteristics, species abundances and constancy values, environmental and landscape descriptions, and characterizations of the community variability across CHIR.

Introduction

The Sonoran Desert Network (SODN) conducted a vegetation mapping and characterization effort at Chiricahua National Monument (CHIR) from 2008 to 2011. This project was completed under the National Park Service (NPS) Inventory and Monitoring (I&M) Division Vegetation Mapping Inventory, which aims to complete baseline mapping and classification inventories at more than 270 NPS units. The vegetation map data were collected to provide park managers with a digital map product that meets national spatial and thematic accuracy standards while placing the vegetation into a regional and national context. Chiricahua National Monument is located in the Chiricahua Mountains of southeastern Arizona, near the border with New Mexico to the east and Mexico to the south.

Vegetation mapping and characterization project comprised three major phases. A fourth phase, accuracy assessment (AA), of the vegetation map was not completed due to a park-wide wildfire in 2011 before the AA could be conducted. The three completed phases were: (1) field-based data collection, (2) development of a classification for vegetation community types at the United States National Vegetation Classification (USNVC) association level, and (3) development of the digital vegetation map. These phases began in the fall of 2008, and fieldwork was completed in 2011, although some additional post-fire assessments were made.

A total of 29 distinct vegetation communities are described in this report. These communities range from lower-elevation grasslands with scattered mesquite or juniper trees to chaparral shrublands spanning broad, exposed mountainous expanses to deeply sheltered canyons and drainages providing habitat for mixed pine (*Pinus arizonica, P. engelmannii, P. leiophylla*) and eventually Douglas-fir (*Pseudotsuga menziesii*) forests. The deeper and steeper drainages of Rhyolite and Bonita canyons host interrupted communities of riparian vegetation but are primarily Arizona pine (*Pinus arizonica*) and Arizona cypress (*Hesperocyparis arizonica*). All 29 communities are described at the association level, each with detailed narratives, which include lists of species found in each association, their abundance, landscape features, and overall community structural characteristics. At the time of the writing of this report, only nine of the 29 vegetation types are existing, “accepted” types within the NVC. The other types are newly described, specific to CHIR, and will be proposed for formal status within the NVC.

This document is Volume II of a two-volume Chiricahua National Monument Vegetation Mapping Inventory report. This volume provides the unabridged versions of the type descriptions for the 29 associations identified and mapped during the project. Volume I contains a summary of each type. All information not identified as specific to CHIR was collected from NatureServe Explorer or from the USNVC. This includes the USNVC codes, global descriptions, vegetation hierarchy, ecological systems placement (if applicable), and references. Distinctions between floristically similar types were made based on physiognomic differences identified using the vegetation formation key, which is available in NPS’ IRMA DataStore: Vegetation Mapping Inventory Project for Chiricahua National Monument along with other supplemental materials related to this report.

Terminology and Naming Conventions

Alliances and associations are classified based on both the dominant (greatest canopy cover) species in the upper strata of a contiguous vegetation unit and on diagnostic species (any plant taxon or group of taxa whose relative constancy or abundance can be used to differentiate one vegetation type from another). Associations, which describe and identify the characteristic range of species composition, diagnostic species, and physiognomy of a community, are the most specific and basic classification units and are hierarchically subsumed within alliances (Jennings et al. 2009). Typically, each association is included in only one alliance, although each alliance may include many associations.

Associations define distinct plant compositions that repeat across the landscape and are generally named using both the dominant species in the uppermost stratum of the vegetation and one or more dominant species in the lower strata (or a diagnostic species in any stratum). The strata used in this project are defined as follows:

- Top canopy: greater than 5 meters in height
- Canopy: between 2 and 5 meters in height
- Subcanopy: between 0.5 and 2 meters in height
- Field: below 0.5 meters in height

Associations are defined as having consistent species composition, uniform physiognomy, and similar habitat conditions. Naming conventions and syntax for all NVC names are as follows:

- A hyphen with a space on either side (-) separates the names of species occurring in the same stratum.
- A slash with a space on either side (/) separates the names of species occurring in different strata.
- Species that occur in the uppermost stratum are listed first, followed successively by those in the lower strata.
- The order of species names generally reflects decreasing levels of dominance, constancy, or indicator value.
- Parentheses around a species name indicate the species is less consistently found either in all associations of an alliance or in all occurrences of an association.
- Square brackets around two species' names indicate that the species are co-dominant or trade dominance, with either or both being dominant in a given stand.
- Association names include the dominant species of the significant strata, followed by the structural class in which they are classified (e.g., Forest, Woodland, or Herbaceous).
- (P) at the end of an association name implies that the type is proposed (i.e., It was identified and described based on the results of this or another recent SODN project) and is not yet a formally accepted vegetation type within the NVC. These proposed types are reviewed on an

ongoing basis and may be added to the NVC when sufficient data have been collected and funding is available to support their addition.

- (PS) at the end of an association name implies that the type is a "park special," meaning it has been described as a unique community that is expected to be found only in that park unit. This typically occurs when an area has a unique disturbance or management history.

Vascular and nonvascular plant species nomenclature for association names follows the nationally standardized list maintained in the PLANTS Database by the US Department of Agriculture with very few exceptions. Examples of association names from CHIR include:

Pinus discolor / *Quercus toumeyi* - (*Garrya wrightii*) / *Muhlenbergia emersleyi* Wooded Shrubland Association (P)

(*Pseudotsuga menziesii* - *Hesperocyparis arizonica*) / *Quercus rugosa* - *Quercus chrysolepis* Forest Association (P)

How to Read an Association Type Description

The type descriptions in this report provide detailed insights into various ecological associations found within CHIR. These descriptions encompass a comprehensive overview of floristic and structural characteristics, species abundances and frequency values, environmental and landscape attributes, and the characterization of the variability within each community found across CHIR. Following the introductory sections on the specific distribution within CHIR and local environmental conditions, the main association vegetation description follows. This section primarily focuses on detailing the dominant species in the uppermost height strata, followed by descriptions of lower canopy levels and their floristic compositions. Less dominant but still common species are typically listed to note their presence.

For important diagnostic species, we provide constancy values, a range or average percent cover, and for trees and shrubs, we also include height class ranges. Within the description, constancy values for key species are given in parentheses following their introduction as a defining species presence. Constancy values range from zero (absent in all examples) to one (present in all examples). Below, our two species were found in 98% (0.98) and 82% (0.82), respectively, of all classification plots used to develop the classification and resulting type descriptions. For example, border pinyon (*P. discolor*) is a consistent (0.98) dominant that, on average, provides cover between 15% and 25% and occasionally up to 60% in especially densely wooded examples. Individuals of this species are present as short trees with an average height of around four meters and some individuals reaching up to six meters. Alligator juniper (*Juniperus deppeana*) is a common (0.82) associate with an average cover of less than 5%.

If a type has already been formally accepted and integrated into the NVC, its type description will contain more detailed information about the type in a regional context compared to those that have not been accepted and are only described based on observations at CHIR. An accepted type will be identified by the USNVC Community Element Global (CEGL) code beginning with CEGL, whereas a proposed type's code will begin with NPSSODN, indicating it as a National Park Service Sonoran Desert Network type. Occasionally, the authors of this report felt confident that a CHIR association would fall under an accepted alliance level in the NVCS and reported data from the alliance description for context. Such instances are clearly noted in the descriptions.

Accepted types will have additional information in the following sections:

Global Type Concept Description: A description of this type as it occurs across its entire geographic range.

Global Classification Comments: Notes regarding the completeness and confidence of the classification. Classification confidence is rated as low, medium, or high based on the amount of data available to the NVC authors.

Global Range: Description of the entire range within the United States and, to some extent, within neighboring countries.

NatureServe Conservation Status: This field may have an alphanumeric code populated that indicates the stability or rarity of the plant community as it often pertains to habitat loss, limited population numbers, climate change, altered fire regimes, fuelwood harvest, grazing, or other environmental pressures. Definitions of each code can be found in the NatureServe Conservation Status definitions.

Conservation Status Reasons: This section refers to the justification for the conservation status rating and is typically included only when the rating is G2 (Imperiled) or indicates a higher risk of loss.

NVC Upper-level Hierarchical Order

The type descriptions are presented in this report grouped by their NVC upper-level hierarchical ordering in the same way they are presented in Volume I.

Madrean Lowland Evergreen Woodlands and Wooded Shrublands

Pinus discolor / *Quercus hypoleucoides* Woodland Association

[*Pinus discolor - Juniperus deppeana - Quercus arizonica - Quercus emoryi*] / *Arctostaphylos pungens* Wooded Shrubland Association (P)

[*Robinia neomexicana - Quercus rugosa*] / *Holodiscus discolor* / *Muhlenbergia montana* Tree Savanna Association (PS)

Pinus discolor - (*Hesperocyparis arizonica*) / *Arctostaphylos pungens* Wooded Shrubland Association (P)

Pinus discolor / *Cercocarpus montanus* Wooded Shrubland Association (PS)

Pinus discolor / *Quercus toumeyi* - (*Garrya wrightii*) / *Muhlenbergia emersleyi* Wooded Shrubland Association (P)

Pinus discolor / *Quercus toumeyi - Arctostaphylos pungens* Wooded Shrubland Association (P)

Pinus discolor / *Quercus toumeyi* - *Garrya wrightii* Woodland Association (P)

Pinus discolor / *Muhlenbergia emersleyi* Woodland Association

Pinus discolor / *Piptochaetium fimbriatum* Woodland Association

Quercus emoryi / *Piptochaetium fimbriatum* Scrub Woodland Association

[*Quercus hypoleucoides* - *Quercus arizonica*] Woodland Association (P)

(*Juniperus deppeana*) / *Mimosa aculeaticarpa* Wooded Shrubland Association (PS)

Juniperus deppeana / *Bouteloua gracilis* Woodland Association

Juniperus deppeana - *Quercus emoryi* - (*Quercus arizonica*) / *Piptochaetium fimbriatum* Woodland Association (P)

Madrean Montane Forests and Woodlands

Pseudotsuga menziesii / *Quercus hypoleucoides* Forest Association

(*Pseudotsuga menziesii* - *Hesperocyparis arizonica*) / *Quercus rugosa* - *Quercus chrysolepis* Forest Association (P)

Hesperocyparis arizonica / *Quercus hypoleucoides* Forest Association

Hesperocyparis arizonica - (*Platanus wrightii*) / *Quercus* spp. Intermittently Flooded Forest Association (P)

[*Pinus engelmannii* - *Hesperocyparis arizonica* - *Quercus hypoleucoides*] Intermittently Flooded Forest Association (P)

Pinus engelmannii / *Quercus hypoleucoides* Woodland Association

[*Pinus arizonica* - *Pinus leiophylla*] / *Quercus hypoleucoides* Forest Association (P)

Interior Chaparral

Quercus hypoleucoides Shrubland Association (P)

[*Cercocarpus montanus* - *Garrya wrightii*] / Mixed Perennial Grass Wooded Shrub Savanna Association (P)

Scrub and Grasslands

Parthenium incanum / *Eragrostis lehmanniana* Shrub Savanna Association (P)

Prosopis glandulosa / Mixed Grasses Ruderal Shrubland Association

Wet Meadow

(*Carex ultra*) / *Juncus balticus* - *Solidago canadensis* Herbaceous Association (PS)

Semi-desert Grasslands

(*Dasylirion wheeleri* - *Agave palmeri*) / *Eragrostis lehmanniana* - *Muhlenbergia emersleyi* Shrub Herbaceous Association (P)

Nolina microcarpa / *Muhlenbergia emersleyi* Shrub Savanna Association (PS)

Type Descriptions, Chiricahua National Monument

1. *Pinus discolor* / *Quercus hypoleucoides* Woodland Association

Common Name: Border Pinyon / Silverleaf Oak Woodland Association

National Vegetation Classification (NVC) Name: *Pinus discolor* / *Quercus hypoleucoides* Woodland Association

Identifier: CEGL000771

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Pinus cembroides - Pinus discolor - Juniperus coahuilensis* Woodland Group [G200]

Alliance: *Pinus cembroides - Pinus discolor - Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: *Pinus discolor* / *Quercus hypoleucoides* Woodland Association [CEGL000771]

Chiricahua National Monument Type Concept Description

Distribution

This woodland association is scattered on slopes and drainages throughout Chiricahua National Monument.

Environmental Description

This woodland community occurs in drainages and steep, north-trending mountain backslopes between 1,655 and 2,130 meters (5,430–6,988 ft) elevation. Slope steepness varies, with drainage examples generally gently sloped (<15%) and slope versions typically steep, with many examples exceeding 35%. Geologic parent material usually consists either of extrusive igneous bedrock, volcanic ash bedrock, or colluvium on slopes with old or new alluvium in drainages. Surface cover is a variable mix of bedrock outcrops, rock, gravel, and litter.

Vegetation Description

This woodland community is characterized by a dense (average 40%) canopy stratum (>2 m) dominated by border pinyon (*Pinus discolor*). Silverleaf oak (*Quercus hypoleucoides*) can be present in either shrub or tree form, and though the total cover of this species is similar to that of border pinyon, it is split between the canopy and the subcanopy stratum (0.5–2 m), where it is the most consistent dominant species. Total cover in the subcanopy stratum averages approximately 25%, and silverleaf oak is usually accompanied by a mixture of other associate shrub species, which may occasionally obtain cover values similar to silverleaf oak. The field stratum (<0.5 m) is very sparse, with total cover averaging below 5%.

Total cover in the canopy stratum averages approximately 40%, with densely wooded examples reaching 80% cover and lower-cover examples, mostly located on rocky outcrops, falling below 20%. Border pinyon (*P. discolor*) is the consistent (1.0) dominant in this stratum and contributes an average cover between 20% and 30%. This species ranges in height from 3 to 12 meters. Silverleaf oak is similarly consistent (1.0), with taller individuals up to six meters in height and contributing an average of 8% cover in this stratum, approximately half of the total cover for this species. Arizona white oak (*Quercus arizonica*) is a common (0.6) canopy species which, when present, may be co-dominant with border pinyon. Alligator juniper (*Juniperus deppeana*) is also a common (0.6) canopy associate that generally accounts for less than 5% cover. Other tree species, including Chihuahuan pine (*Pinus leiophylla*), Douglas-fir (*Pseudotsuga menziesii*), Emory oak (*Quercus emoryi*), and Apache pine (*Pinus engelmannii*), are occasionally present but generate little cover overall.

The subcanopy stratum ranges from open to moderately dense (12–40%), with an average total cover of about 25%. It is most commonly dominated by shrubby silverleaf oak, which generates an average of 8% cover in this stratum. Pointleaf manzanita (*Arctostaphylos pungens*), Wright's silktassel (*Garrya wrightii*), and netleaf oak (*Quercus rugosa*) commonly occur in this community (0.8, 0.7, 0.5), and each may be co-dominant with silverleaf oak in some examples. Other notable associate species in this stratum include Toumey oak (*Quercus toumeyi*), mountain yucca (*Yucca madrensis*), beargrass (*Nolina microcarpa*), and evergreen sumac (*Rhus virens*).

The field stratum in this community is very sparse, with average total cover falling well below 5%. Bullgrass (*Muhlenbergia emersleyi*) is very common (0.8) in this stratum and generates approximately 2% cover on average. Bullgrass usually occurs with a diverse, low-cover combination of graminoids, forbs, and ferns, including cliff muhly (*Muhlenbergia polycaulis*), Arizona baccharis (*Baccharis thesioides*), fragrant snakeroot (*Ageratina herbacea*), and Canadian horseweed (*Conyza canadensis*) and many other species.

Global Type Concept Description

This Madrean conifer woodland occurs in the Animas, Peloncillo, Chiricahua, and Santa Catalina mountains in the "Borderlands" region of southwestern New Mexico and southeastern Arizona and probably occurs in the mountains of adjacent northern Mexico. Stands are small and patchy and limited to elevated plains, mountain and foothills slopes, and ridgetops. The elevation ranges from 1,890 to 2,130 meters. Soils are shallow and rocky, often with rock outcrops. This late-successional woodland association has an open tree canopy (>25% cover), co-dominated by the evergreen trees *Pinus discolor* and *Juniperus deppeana*, with occasional *Pinus ponderosa* or *Pinus leiophylla* present. The moderately dense to dense shrub layer (>25% cover) is dominated by the broad-leaved evergreen oaks *Quercus hypoleucoides* and *Quercus rugosa* but includes many other shrub species such as *Arctostaphylos pringlei*, *Arctostaphylos pungens*, *Garrya wrightii*, *Nolina microcarpa*, *Agave parryi*, *Rhus trilobata*, and *Quercus gambelii*. The herbaceous layer is generally sparse and composed of mixed grass and forb species including *Aristida schiedeana* var. *orcuttiana*, *Bouteloua* *curtipendula*, *Elymus arizonicus*, *Muhlenbergia emersleyi* (low elevations), *Geranium caespitosum*, and *Thalictrum fendleri*. The presence of *Quercus hypoleucoides* in a moderately dense shrub layer is diagnostic of this *Pinus discolor* woodland type.

Species Summary

See Tables 1 and 2 for species summary details.

Table 1. Most abundant species: *Pinus discolor* / *Quercus hypoleucoides* Woodland Association.

Stratum	Species [A]
Canopy (>5 m)	*Pinus discolor* (1.0)
Canopy (2–5 m)	*Pinus discolor* (1.0), *Quercus hypoleucoides* (1.0)
Subcanopy (0.5–2 m)	*Quercus hypoleucoides* (1.0)
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 2. Other noteworthy species: *Pinus discolor* / *Quercus hypoleucoides* Woodland Association.

Stratum	Species
Canopy (>5 m)	*Pinus leiophylla, Pseudotsuga menziesii*
Canopy (2–5 m)	*Quercus arizonica, Juniperus deppeana*
Subcanopy (0.5–2 m)	*Arctostaphylos pungens, Garrya wrightii, Quercus toumeyi, Yucca madrensis, Nolina microcarpa, Quercus rugosa, Rhus virens*
Field (0–0.5 m)	*Muhlenbergia emersleyi, Muhlenbergia polycaulis, Baccharis thesioides, Ageratina herbacea, Conyza canadensis*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 2 classification plots and 8 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: Only documented from the southwestern corner of New Mexico, but it probably occurs elsewhere in the “Borderlands” region of southeastern Arizona, southwestern New Mexico, and northern Mexico, and possibly in the Trans-Pecos region of Texas and Mexico.

NatureServe Conservation Status: G2

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP235, IP335

Chiricahua National Monument Polygons: IFF032, IFF041, W252, W266, W268, WRO053, WRO467, WS113

Local Description Author: J. Black

2. [*Pinus discolor - Juniperus deppeana - Quercus arizonica - Quercus emoryi*] / *Arctostaphylos pungens* Wooded Shrubland Association (P)

Common Name: [Border Pinyon - Alligator Juniper - Arizona White Oak - Emory Oak] / Pointleaf Manzanita Wooded Shrubland Association

NVC Name: N/A

Identifier: NPSSODN182

NVC Classification

Division: *Juniperus deppeana* - *Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana* - *Pinus cembroides* - *Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Pinus cembroides* - *Pinus discolor* - *Juniperus coahuilensis* Woodland Group [G200]

Alliance: *Pinus cembroides* - *Pinus discolor* - *Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: [*Pinus discolor* - *Juniperus deppeana* - *Quercus arizonica* - *Quercus emoryi*] / *Arctostaphylos pungens* Wooded Shrubland Association (P) [NPSSODN182]

Chiricahua National Monument Type Concept Description

Distribution

This wooded shrubland association is found on slopes and in drainages, primarily in the lower elevation western half of the monument. It is especially common on the lower slopes of Bonita and Jesse James canyons.

Environmental Description

This wooded shrubland community occurs on lower mountain slopes (backslopes, footslopes, and toeslopes) between 1,575 to 2,000 meters elevation (5,167–6,561 ft). Aspect is variable, though the majority of examples occur on north-trending slopes. Slope ranges up to 50%, with most examples falling between 1% and 35%. The substrate is rocky, with ground cover primarily a mix of gravel and rock of various sizes, interspersed with litter. Bedrock outcrops are not a common feature of this community. Geologic parent material usually consists of extrusive igneous bedrock, with some examples of volcanic ash bedrock, colluvium, and new alluvium.

Vegetation Description

This wooded shrubland community is characterized by an open-to-dense (10–55%) canopy (>2 m) dominated by a combination of border pinyon (*Pinus discolor*), alligator juniper (*Juniperus deppeana*), and oaks (*Quercus arizonica* and *Quercus emoryi*). The moderately dense (average 40%) subcanopy stratum (0.5–2 m) is strongly dominated by pointleaf manzanita (*Arctostaphylos* *pungens*). The field stratum (<0.5 m) is variably open (2–35%) and dominated by a mix of perennial grasses, with bullgrass (*Muhlenbergia emersleyi*) the most common dominant.

The canopy stratum consists of a somewhat variable mix of four tree species: border pinyon (*Pinus discolor*), alligator juniper (*Juniperus deppeana*), Arizona white oak (*Quercus arizonica*), and Emory oak (*Quercus emoryi*). Any of these may be absent, though at least three of the four are usually present in any given example of this community. Alligator juniper, border pinyon, and Arizona white oak are the most consistent (>0.9) canopy components, and when present, they usually generate between 5% and 25% cover, with occasional examples between 25% and 50% for each species. Average cover values across all examples of this community are between approximately 5% and 10% for these three species. Emory oak (*Quercus emoryi*) is slightly less consistent than the other species (0.74), contributes less cover on average (3% averaged across all examples), and does not exceed 25%, though it is still commonly co-dominant when present. Chihuahuan pine (*Pinus leiophylla*) and silverleaf oak (*Quercus hypoleucoides*) are occasional (<0.35) low-cover associates.

Pointleaf manzanita (*Arctostaphylos pungens*) is the consistent (1.0) dominant in the subcanopy stratum, contributing an average of approximately 25% cover. In very dense examples, it may rarely exceed 50%. Toumey oak is commonly present (0.65) but is usually a low-cover associate with less than 5% cover. Other notable associate species include, in order of decreasing frequency, mountain yucca (*Yucca madrensis*), beargrass (*Nolina microcarpa*), Palmer's century plant (*Agave palmeri*), common sotol (*Dasylirion wheeleri*), Wright's silktassel (*Garrya wrightii*), evergreen sumac (*Rhus virens*), and catclaw mimosa (*Mimosa aculeaticarpa*). Though these species may occasionally be locally abundant, they generally produce little cover, with cover of approximately 1% or less when averaged across all examples.

Field stratum cover ranges between 2% and 35%, with an average value between 10% and 15%, and is composed primarily of perennial grasses. The bulk of cover in this stratum is usually provided by some combination of bullgrass (*Muhlenbergia emersleyi*), pinyon ricegrass (*Piptochaetium fimbriatum*), Texas bluestem (*Schizachyrium cirratum*), or sideoats grama (*Bouteloua curtipendula*), though all four species are not always present. Other grass species, including the invasive Lehmann lovegrass (*Eragrostis lehmanniana*), as well as the native perennial grasses single threeawn (*Aristida schiedeana*), plains lovegrass (*Eragrostis intermedia*), blue grama (*Bouteloua gracilis*), spidergrass (*Aristida ternipes*), and cane bluestem (*Bothriochloa barbinodis*) may be present, but usually as low-cover associates.

Global Type Concept Description

Data not available

Species Summary

See Tables 3 and 4 for species summary details.

Table 3. Most abundant species: [*Pinus discolor* - *Juniperus deppeana* - *Quercus arizonica* - *Quercus emoryi*] / *Arctostaphylos pungens* Wooded Shrubland Association.

Stratum	Species [A]
Canopy (>5 m)	*Pinus discolor* (0.91), *Juniperus deppeana* (0.96)
Canopy (2–5 m)	*Juniperus deppeana* (0.96), *Pinus discolor* (0.91), *Quercus arizonica* (0.91), *Quercus emoryi* (0.74)
Subcanopy (0.5–2 m)	*Arctostaphylos pungens* (1.0)
Field (0–0.5 m)	*Muhlenbergia emersleyi* (0.87), *Schizachyrium cirratum* (0.7), *Piptochaetium fimbriatum* (0.7), *Bouteloua curtipendula* (0.57)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 4. Other noteworthy species: [*Pinus discolor* - *Juniperus deppeana* - *Quercus arizonica* - *Quercus emoryi*] / *Arctostaphylos pungens* Wooded Shrubland Association.

Stratum	Species
Canopy (>5 m)	*Pinus leiophylla*
Canopy (2–5 m)	*Quercus hypoleucoides*
Subcanopy (0.5–2 m)	*Quercus toumeyi, Yucca madrensis, Nolina microcarpa, Agave palmeri, Dasylirion wheeleri, Garrya wrightii, Rhus virens, Mimosa aculeaticarpa*
Field (0–0.5 m)	*Eragrostis lehmanniana, Aristida schiedeana, Eragrostis intermedia, Bouteloua gracilis, Aristida ternipes, Bothriochloa barbinoids*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 3 classification plots and 20 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP121, IP201

Chiricahua National Monument Polygons: IFW093, TS037, W048, W056, W212, W223, W233, WS109, WS124, WS126, WS136, WS144, WS145, WS147, WS157, WS179, WS185, WS187, WS193, WS195

Local Description Author: J. Black

3. [*Robinia neomexicana - Quercus rugosa*] / *Holodiscus discolor / Muhlenbergia montana* Tree Savanna Association (PS)

Common Name: [New Mexico Locust - Netleaf Oak] / Rockspirea / Mountain Muhly Tree Savanna Association

NVC Name: N/A

Identifier: NPSSODN184

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi / Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Pinus cembroides - Pinus discolor - Juniperus coahuilensis* Woodland Group [G200]

Alliance: *Pinus cembroides - Pinus discolor - Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: [*Robinia neomexicana - Quercus rugosa*] / *Holodiscus discolor / Muhlenbergia montana* Tree Savanna Association (PS) [NPSSODN184]

Chiricahua National Monument Type Concept Description

Distribution: Chiricahua National Monument
This community is restricted to the north-trending slopes near the summit of Sugarloaf Mountain.

Environmental Description
This association occurs in two locations between approximately 2,160 and 2,220 meters (7,086–7,283 ft) on the north-facing shoulder and backslope of Sugarloaf Mountain, on steep (>35%) slopes. Disturbance is primarily associated with the nearby Sugarloaf Lookout trail; some pre-2011 fire damage was observed but restricted to only one of the two polygons, which also exhibited terracing of unknown origin. Surveyors noted rare sheet erosion in both areas.

Vegetation Description
This rare association is found on steep slopes and is comprised of an open, grassy field stratum topped by tall, tree-form New Mexico locust (*Robinia neomexicana*) that are scattered in thick patches in the upper canopy (2–5 m) and netleaf oak (*Quercus rugosa*), with an irregular subcanopy (0.5–2 m) which generates a low amount of cover.

This association is indicated by the presence of New Mexico locust (*R. neomexicana*) in the canopy stratum, where it can occur either as the dominant species generating up to 33% cover or as a low-cover associate generating between 1% and 5% cover. This species trades dominance with netleaf oak (*Q. rugosa*), with generally one or the other of the two species providing most of the cover. Cover estimates for this stratum range between 15% and 30%. Border pinyon (*Pinus discolor*), which generally is short-statured in this type, occasionally reaches the canopy and contributes between 1% and 5% cover in some areas.

The subcanopy is relatively sparse in this association, with total cover estimates ranging from 8% to 10%. Rockspirea (*Holodiscus discolor*) is a dominant species throughout. Border pinyon (*Pinus discolor*) is a consistent associate in this stratum. Banana yucca (*Yucca baccata*) is common in one of the two polygons, though it still contributes less cover here than either of the other two species.

Most of the vegetative cover in this association is within the field stratum, which has between 50% and 65% total cover. Mountain muhly (*Muhlenbergia montana*) occurs either as the primary dominant or as a co-dominant species along with bullgrass (*Muhlenbergia emersleyi*) or muttongrass (*Poa fendleriana*). Common associate species in this stratum include Lemmon's sage (*Salvia lemmonii*), fragrant snakeroot (*Ageratina herbacea*), and gumhead (*Gymnosperma glutinosum*).

Global Type Concept Description
Data not available.

Species Summary
See Tables 5 and 6 for species summary details.

Table 5. Most abundant species: [*Robinia neomexicana* - *Quercus rugosa*] / *Holodiscus discolor* / *Muhlenbergia montana* Tree Savanna Association (PS).

Stratum	**Species** [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Robinia neomexicana* (1.0), *Quercus rugosa* (1.0)
Subcanopy (0.5–2 m)	*Holodiscus discolor* (1.0)
Field (0–0.5 m)	*Muhlenbergia montana* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 6. Other noteworthy species: [*Robinia neomexicana* - *Quercus rugosa*] / *Holodiscus discolor* / *Muhlenbergia montana* Tree Savanna Association (PS).

Stratum	**Species**
Canopy (>5 m)	None
Canopy (2–5 m)	*Pinus discolor*
Subcanopy (0.5–2 m)	*Pinus discolor, Yucca baccata*
Field (0–0.5 m)	*Muhlenbergia emersleyi, Poa fendleriana, Ageratina herbacea, Gymnosperma glutinosum, Salvia lemmonii*

Classification Comments
Chiricahua National Monument: This association was described from 2 classification plots and 2 classification polygons.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status
Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources
Chiricahua National Monument Plots: IP025, IP346, IP347

Chiricahua National Monument Polygons: TS025, TS026

Local Description Authors: B. Fallon, L. Crumbacher, S. Studd, J. Black

4. *Pinus discolor* - (*Hesperocyparis arizonica*) / *Arctostaphylos pungens* Wooded Shrubland Association (P)

Common Name: Border Pinyon - (Arizona Cypress) / Pointleaf Manzanita Wooded Shrubland Association

NVC Name: N/A

Identifier: NPSSODN189

NVC Classification

Division: *Juniperus deppeana* - *Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana* - *Pinus cembroides* - *Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Pinus cembroides* - *Pinus discolor* - *Juniperus coahuilensis* Woodland Group [G200]

Alliance: *Pinus cembroides* - *Pinus discolor* - *Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: *Pinus discolor* - (*Hesperocyparis arizonica*) / *Arctostaphylos pungens* Wooded Shrubland Association (P) [NPSSODN189]

Chiricahua National Monument Type Concept Description

<u>Distribution</u>
This wooded shrubland community is found primarily in the high-elevation areas in the southeast corner of the monument, with scattered examples in Little Jesse James Canyon as well as between Bonita Canyon and the northern park boundary.

<u>Environmental Description</u>
This wooded shrubland community is found from 1,765 to 2,250 meters (5,790–7,382 ft). Though it can occur on a wide variety of slope positions, the most typical examples occur on gently to moderately sloped (6–35%) mountain crests, summits, shoulders, and backslopes. Unlike other communities of similar species composition, it does not often occur in areas with hoodoos, though some examples contain significant amounts of exposed bedrock. In general, the surface cover is dominated by gravel with rock, bedrock, and boulders. The parent material throughout this community is almost always extrusive igneous rock or volcanic tuff.

<u>Vegetation Description</u>
This wooded shrubland community is characterized by a moderately open (to 30%) canopy stratum (>2 m) dominated by border pinyon (*Pinus discolor*) with consistent Arizona cypress (*Hesperocyparis arizonica*) that is not exclusively confined to drainages, as is usually the case in lower elevation communities. The dense (average 45%) subcanopy stratum (0.5–2 m) is strongly

dominated by pointleaf manzanita (*Arctostaphylos pungens*), and the field stratum (<0.5 m) is extremely sparse, with total cover never exceeding 5%.

Border pinyon (*P. discolor*) is a consistent (1.0) dominant that generates an average of 12% cover, though in some densely wooded examples this species can exceed 50% cover. Arizona cypress (*H. arizonica*) is a consistent (1.0) co-dominant or associate species with an average cover of approximately 9% but reaching over 30% in dense examples. Other species of note in the canopy stratum include, from most to least frequent, alligator juniper (*Juniperus deppeana*), Chihuahuan pine (*Pinus leiophylla*), and Arizona pine (*P. arizonica*).

The subcanopy in this community is generally dominated by dense stands of pointleaf manzanita (*A. pungens*). This species is present in all examples (1.0) and contributes an average cover of approximately 45%. Silverleaf oak (*Quercus hypoleucoides*) is a consistent (1.0) associate, with an average total cover of approximately 9%, though taller individuals of this species often reach the canopy stratum. Toumey oak (*Q. toumeyi*), which in lower elevation wooded shrubland communities often matches or exceeds the cover of pointleaf manzanita, is present here as a common (0.82) associate species, with an average of 7% cover. In rare examples, Toumey oak may become co-dominant with or even surpass the cover of pointleaf manzanita. Other common, generally low-cover associates in the subcanopy stratum include netleaf oak (*Quercus rugosa*), beargrass (*Nolina microcarpa*), Parry's agave (*Agave parryi*), and mountain yucca (*Yucca madrensis*).

The field stratum in this community is very sparse, with total cover averaging between 1% and 2% and never exceeding 5%. Bullgrass (*Muhlenbergia emersleyi*) is the most common perennial species observed in this stratum, though it is present in less than half of the examples (0.36).

Global Type Concept Description
Data not available

Species Summary
See Tables 7 and 8 for species summary details.

Table 7. Most abundant species: *Pinus discolor* - (*Hesperocyparis arizonica*) / *Arctostaphylos pungens* Wooded Shrubland Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Hesperocyparis arizonica* (1.0), *Pinus discolor* (1.0)
Canopy (2–5 m)	*Pinus discolor* (1.0), *Hesperocyparis arizonica* (1.0)
Subcanopy (0.5–2 m)	*Arctostaphylos pungens* (1.0)
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 8. Other noteworthy species: *Pinus discolor* - (*Hesperocyparis arizonica*) / *Arctostaphylos pungens* Wooded Shrubland Association (P).

Stratum	Species
Canopy (>5 m)	*Pinus leiophylla*
Canopy (2–5 m)	*Juniperus deppeana*
Subcanopy (0.5–2 m)	*Quercus hypoleucoides, Quercus toumeyi*
Field (0–0.5 m)	*Muhlenbergia emersleyi*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 6 classification plots and 16 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP014, IP016, IP024, IP045, IP063, IP071, IP092

Chiricahua National Monument Polygons: F239, IFW068, W201, W204, WS016, WS020, WS022, WS023, WS054, WS117, WS127, WS132, WS134, WS191, WS192, WS232

Local Description Author: J. Black

5. *Pinus discolor / Cercocarpus montanus* Wooded Shrubland Association (PS)

Common Name: Border Pinyon / Alderleaf Mountain Mahogany Wooded Shrubland Association

NVC Name: N/A

Identifier: NPSSODN190

NVC Classification

Division: *Juniperus deppeana* - *Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana* - *Pinus cembroides* - *Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Pinus cembroides* - *Pinus discolor* - *Juniperus coahuilensis* Woodland Group [G200]

Alliance: *Pinus cembroides* - *Pinus discolor* - *Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: *Pinus discolor* / *Cercocarpus montanus* Wooded Shrubland Association (PS) [NPSSODN190]

Chiricahua National Monument Type Concept Description

Distribution
This wooded shrubland is restricted to the northeast corner of the monument.

Environmental Description
This woodland community occurs on moderate to steep (>15%) south and southwest-facing mountain slopes between 1,865–2,300 meters (6,115–7,546 ft) elevation. Geologic parent material can consist of extrusive igneous bedrock, calcareous sedimentary rock, non-calcareous sedimentary rock, volcanic ash bedrock, and/or colluvium. The surface cover is predominantly gravel, rock, and exposed bedrock, occasionally with significant litter cover.

Vegetation Description
This wooded shrubland association is characterized by a moderately dense (average 30%) canopy stratum (>2 m) dominated by border pinyon (*Pinus discolor*) and a moderately dense (average 25%) subcanopy stratum (0.5–2 m) dominated by alderleaf mountain mahogany (*Cercocarpus montanus*). The field stratum (<0.5 m) is highly variable but averages about 30% total cover, with sideoats grama (*Bouteloua curtipendula*) and bullgrass (*Muhlenbergia emersleyi*) the most common dominants. The conspicuous dominance of alderleaf mountain mahogany and the near absence of oaks, with the exception of occasional Arizona white oak (*Quercus arizonica*), helps to distinguish this association from other border pinyon-dominated woodlands and wooded shrublands at Chiricahua National Monument.

Canopy cover in this community ranges from 10% to 50%, with an average value of approximately 30%. Border pinyon (*P. discolor*), which is present as a short to medium-height tree, usually below five meters tall but occasionally reaching seven meters, is the clear dominant in all examples (1.0). On average, this species contributes about 25% cover. Taller individuals of alderleaf mountain mahogany (*C. montanus*) sometimes reach the canopy stratum, but the bulk of cover provided by this species is in the subcanopy stratum. Alligator juniper (*Juniperus deppeana*) and Arizona white oak (*Quercus arizonica*) are occasional associates in this stratum, and each contributes, on average, below 5% cover and never surpass the cover of border pinyon.

Total subcanopy cover ranges from 10% to 35% with an average value of about 25%. Alderleaf mountain mahogany (*C. montanus*) is the consistent (1.0) dominant and generates an average of between 15% and 20% cover. Walkingstick cactus (*Cylindropuntia spinosior*) is a consistent (1.0) associate species in this stratum, generally contributing between 1% and 5% cover. Notable subcanopy associates include, in order from most to least common, Palmer's century plant (*Agave palmeri*), cactus apple (*Opuntia engelmannii*), mountain yucca (*Yucca madrensis*), banana yucca (*Yucca baccata*), common sotol (*Dasylirion wheeleri*), beargrass (*Nolina microcarpa*), californica brickellbush (*Brickellia californica*), and turpentine bush (*Ericameria laricifolia*).

The field stratum varies from very sparse to dense (5–60%), with an average total cover of about 30%. In most cases, it is dominated by perennial grasses, usually bullgrass (*M. emersleyi*) and/or sideoats grama (*B. curtipendula*). While each is present in the vast majority of examples (0.89), sideoats grama is the slightly more abundant of the two species, generating an average of 10% overall cover, compared to about 6% for bullgrass. Cliff muhly (*Muhlenbergia polycaulis*) is a somewhat common (0.44) associate that can be occasionally dominant or co-dominant in the field, averaging about 12% cover when present, and in one example, generating up to 33% cover. Other common associate native perennial grasses in this community include, in order from most to least common, bristly wolfstail (*Muhlenbergia alopecuroides*), plains lovegrass (*Eragrostis intermedia*), blue grama (*Bouteloua gracilis*), pinyon ricegrass (*Piptochaetium fimbriatum*), hairy grama (*Bouteloua hirsuta*), green sprangletop (*Leptochloa dubia*), Texas bluestem (*Schizachyrium cirratum*), mountain muhly (*Muhlenbergia montana*), and purple threeawn (*Aristida purpurea*). The non-native invasive rangeland grass Lehmann lovegrass (*Eragrostis lehmanniana*) is present in nearly half of the examples (0.44) at cover values ranging from below 1% to approximately 10%. Subshrubs, forbs, and ferns, including gumhead (*Gymnosperma glutinosum*), showy goldeneye (*Heliomeris multiflora*), and wavy scaly cloakfern (*Astrolepis sinuata*) are also commonly present as field stratum associates, though they generally contribute less cover than the grasses.

Global Type Concept Description
Data not available

Species Summary
See Tables 9 and 10 for species summary details.

Table 9. Most abundant species: *Pinus discolor* / *Cercocarpus montanus* Wooded Shrubland Association (PS).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Pinus discolor* (1.0)
Subcanopy (0.5–2 m)	*Cercocarpus montanus* (1.0)
Field (0–0.5 m)	*Bouteloua curtipendula* (0.89), *Muhlenbergia emersleyi* (0.89)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 10. Other noteworthy species: *Pinus discolor* / *Cercocarpus montanus* Wooded Shrubland Association (PS).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana, Quercus arizonica*
Subcanopy (0.5–2 m)	*Cylindropuntia spinosior, Agave palmeri, Opuntia engelmannii, Yucca madrensis, Yucca baccata, Dasylirion wheeleri, Nolina microcarpa, Brickellia californica, Mimosa aculeaticarpa, Ericameria laricifolia.*
Field (0–0.5 m)	*Gymnosperma glutinosum, Muhlenbergia alopecuroides, Eragrostis intermedia, Muhlenbergia polycaulis, Eragrostis lehmanniana, Bouteloua gracilis, Piptochaetium fimbriatum, Agave parryi, Bouteloua hirsuta, Leptochloa dubia, Schizachyrium cirratum, Muhlenbergia montana, Aristida purpurea, Astrolepis sinuate, Heliomeris multiflora*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 8 classification plots and 1 classification polygon sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>
Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

<u>Element Sources</u>
Chiricahua National Monument Plots: IP023, IP026, IP044, IP112, IP128, IP140, IP234, IP309

Chiricahua National Monument Polygons: WS197

Local Description Author: J. Black

6. *Pinus discolor* / *Quercus toumeyi* - (*Garrya wrightii*) / *Muhlenbergia emersleyi* Wooded Shrubland Association (P)

Common Name: Border Pinyon / Toumey Oak – (Wright's Silktassel) / Bullgrass Wooded Shrubland Association

NVC Name: N/A

Identifier: NPSSODN191

NVC Classification

Division: *Juniperus deppeana* - *Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana* - *Pinus cembroides* - *Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Pinus cembroides* - *Pinus discolor* - *Juniperus coahuilensis* Woodland Group [G200]

Alliance: *Pinus cembroides* - *Pinus discolor* - *Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: *Pinus discolor* / *Quercus toumeyi* – (*Garrya wrightii*) / *Muhlenbergia emersleyi* Wooded Shrubland Association (P) [NPSSODN191]

Chiricahua National Monument Type Concept Description

Distribution

This wooded shrubland is widely distributed on hillslopes in the lower elevation areas of the monument.

Environmental Description

This wooded shrubland community is generally found on moderately steep (15–50%), south-trending mountain backslopes between 1,570 and 2,100 meters (5,151–6,890 ft) in elevation. The substrate is generally rocky, consisting of a varying mix of gravel, rock, and bedrock outcrops, with sparse bare soil and litter. The parent material is, in almost all cases, extrusive igneous bedrock or volcanic ash bedrock.

Vegetation Description

This community is characterized by a very open (average 10%) canopy stratum (>2 m) dominated by border pinyon (*Pinus discolor*), an open-to-dense (10–50%) subcanopy stratum (0.5–2 m) usually dominated by Toumey oak (*Quercus toumeyi*) and containing a diverse mix of other shrub species, and an open (20%) grassy field dominated by bullgrass (*Muhlenbergia emersleyi*) with a diverse mix of associate species. It is distinguished from other wooded shrubland communities in the monument by the consistent dominance of Toumey oak, high shrub diversity, and relatively high cover and diversity of perennial grasses. Though it usually occurs as a wooded shrubland community, it can also present as an open, grassy shrubland with very low tree cover at lower elevations.

Border pinyon (*P. discolor*) is consistently present (0.98) throughout this community and, on average, contributes between 5% and 10% cover and may contribute up to 30% in higher elevation examples. It is usually the dominant canopy species, though in lower elevation examples, it presents minimal (<1%) cover and may be equaled or surpassed by other tree species, including alligator juniper (*Juniperus deppeana*), Arizona juniper (*Juniperus arizonica*), and Emory oak (*Quercus emoryi*). Arizona white oak (*Quercus arizonica*) is an occasional (0.46) associate that when present may generate up to 10% cover. Ocotillo (*Fouquieria splendens*) often occurs in low-elevation shrubland versions of this community, though it generally contributes little overall cover. Silverleaf oak (*Quercus hypoleucoides*) and Arizona cypress (*Hesperocyparis arizonica*), both common canopy associates in higher elevation wooded shrublands, occur very rarely in this community (0.06).

In the subcanopy stratum, Toumey oak (*Quercus toumeyi*) is the clear and consistent (1.0) dominant species, with an average cover between 10% and 25%. Though pointleaf manzanita (*Arctostaphylos pungens*) is almost always present (0.96), it generally contributes much lower cover than Toumey oak, averaging between 6% and 10%. Wright's silktassel (*Garrya wrightii*) is a very common (0.82) associate and often matches or surpasses the cover of manzanita, either on its own or in combination with evergreen sumac (*Rhus virens*), another common (0.70) associate shrub species. The subcanopy stratum often contains a diverse mix of other associate shrub, subshrub, and succulent species, including (in order from most to least frequent) common sotol (*Dasylirion wheeleri*), Palmer's century plant (*Agave palmeri*), beargrass (*Nolina microcarpa*), alderleaf mountain mahogany (*Cercocarpus montanus*), mountain yucca (*Yucca madrensis*), catclaw mimosa (*Mimosa aculeaticarpa*), and turpentine bush (*Ericameria laricifolia*).

The grassy field stratum is typically dominated by bullgrass (*M. emersleyi*), a consistent (0.98) species that averages between 6% and 10% cover, occasionally reaching 25% in some examples. Other native perennial grasses, including Texas bluestem (*Schizachyrium cirratum*), single threeawn (*Aristida schiedeana*), sideoats grama (*Bouteloua curtipendula*), bristly wolfstail (*Muhlenbergia alopecuroides*), plains lovegrass (*Eragrostis intermedia*), blue grama (*Bouteloua gracilis*), cane bluestem (*Bothriochloa barbinodis*), tanglehead (*Heteropogon contortus*), and slender grama (*Bouteloua repens*), contribute variable cover and may at times be co-dominant with bullgrass. The non-native invasive Lehmann's lovegrass is commonly present (0.60) and occasionally contributes cover approaching 10%. Pinyon ricegrass (*Piptochaetium fimbriatum*), a common associate in other woodland and wooded shrubland associations at Chiricahua National Monument, is conspicuously absent. In addition to the grasses, gumhead (*Gymnosperma glutinosum*) is a common (0.60) field stratum associate.

Global Type Concept Description

This proposed association is anticipated to fall under the *Pinus cembroides* - *Pinus discolor* - *Pinus edulis* / Shrub Understory Woodland Alliance [A3131]; however, the association as we have documented it is not yet an accepted and described type within the NVC. The closest accepted association is CEGL000773, *Pinus discolor* / *Quercus toumeyi* Woodland, which, while having the same dominant species, is written too broadly to capture the communities as documented at Chiricahua National Monument during this project. As such, we have designated this type as "proposed" and expect it will become an accepted NVC association in future years once our data has been included. Below is the description for CEGL000773.

This Madrean conifer woodland occurs in the "Borderlands" region in southeastern Arizona and extreme southwestern New Mexico (Animas and Peloncillo mountains) and likely occurs in adjacent northern Mexico. Stands are small and patchy in distribution and limited to mountain and foothill slopes at elevations ranging from 1,800 to 1,860 meters and are often found within a matrix of *Quercus toumeyi* chaparral. Soils are derived from rhyolite parent material. This late-successional woodland association has an open to moderately dense tree canopy (20–80% cover) co-dominated by the evergreen trees *Pinus discolor* and *Juniperus deppeana*, with occasional *Juniperus coahuilensis, Juniperus monosperma, Quercus arizonica,* or *Quercus emoryi* present. The moderately dense to dense shrub layer (>25% cover) is dominated by the broad-leaved evergreen oaks *Quercus toumeyi, Quercus toumeyi* x *grisea* hybrid, and includes many other shrub species such as *Arctostaphylos pungens, Garrya wrightii, Nolina microcarpa, Agave palmeri, Rhus trilobata, Rhus virens*, and *Dasylirion wheeleri*. The herbaceous layer is generally sparse and dominated by perennial grasses with scattered forbs. Species include *Schizachyrium cirratum*, *Aristida schiedeana* var. *orcuttiana, Bouteloua curtipendula, Muhlenbergia emersleyi, Eragrostis intermedia, Bouteloua gracilis, Piptochaetium fimbriatum, Phaseolus* spp., and *Desmodium* spp. The dominance of *Quercus toumeyi* in the shrub layer is diagnostic of this *Pinus discolor* woodland type.

Species Summary

See Tables 11 and 12 for species summary details.

Table 11. Most abundant species: *Pinus discolor* / *Quercus toumeyi* - (*Garrya wrightii*) / *Muhlenbergia emersleyi* Wooded Shrubland Association (P).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Pinus discolor* (0.98)
Subcanopy (0.5–2 m)	*Quercus toumeyi* (1.0)
Field (0–0.5 m)	*Muhlenbergia emersleyi* (0.98)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 12. Other noteworthy species: *Pinus discolor* / *Quercus toumeyi* - (*Garrya wrightii*) / *Muhlenbergia emersleyi* Wooded Shrubland Association (P).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana, Juniperus arizonica, Quercus arizonica, Quercus emoryi, Fouquieria splendens*

Table 12 (continued). Other noteworthy species: *Pinus discolor* / *Quercus toumeyi* - (*Garrya wrightii*) / *Muhlenbergia emersleyi* Wooded Shrubland Association (P).

Stratum	Species
Subcanopy (0.5–2 m)	*Arctostaphylos pungens, Garrya wrightii, Rhus virens, Dasylirion wheeleri, Agave palmeri, Nolina microcarpa, Cercocarpus montanus, Yucca madrensis, Mimosa aculeaticarpa, Ericameria laricifolia*
Field (0–0.5 m)	*Muhlenbergia emersleyi, Schizachyrium cirratum, Aristida schiedeana, Eragrostis lehmanniana, Bouteloua curtipendula, Muhlenbergia alopecuroides, Eragrostis intermedia, Bouteloua gracilis, Bothriochloa barbinodis, Heteropogon contortus, Bouteloua repens, Gymnosperma glutinosum*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 15 classification plots and 35 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Some stands reflect the late successional stage transformation of interior chaparral to pinyon woodland. Moir (1979) described two *Pinus discolor*-dominated woodlands from the Peloncillo Mountains and an interior chaparral type that may fit the current concept of this association. The woodlands occur at higher elevations on mid to upper north-facing slopes above the Madrean oak woodlands and at lower elevations in the lower slopes and draws. These descriptions need further review.

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: Only documented from the southwestern corner of New Mexico, but it probably occurs elsewhere in the "Borderlands" region of southeastern Arizona, southwestern New Mexico and northern Mexico.

NatureServe Conservation Status: G2

Conservation Status Reasons: This association is restricted to the "Borderlands" of southeastern Arizona and southwestern New Mexico, and possibly the very northern Sierra Madre Occidentale of Mexico. Stands are small and reflect the late successional stage transformation of interior chaparral to pinyon woodland. Stands continue to be impacted by fuelwood harvest and grazing throughout the association's distribution.

<u>Element Sources</u>

Chiricahua National Monument Plots: IP012, IP018, IP025, IP028, IP030, IP040, IP042, IP064, IP067, IP069, IP074, IP078, IP082, IP099, IP111, IP118, IP126

Chiricahua National Monument Polygons: S043, S056, S060, S061, S062, S065, S066, S067, S069, S070, S072, S075, S076, S077, S079, S084, W225, WRO447, WS080, WS105, WS141, WS143, WS148, WS150, WS160, WS164, WS165, WS166, WS170, WS171, WS172, WS174, WS175, WS176, WS177

Local Description Author: J. Black

7. *Pinus discolor / Quercus toumeyi - Arctostaphylos pungens* Wooded Shrubland Association (P)

Common Name: Border Pinyon / Toumey Oak - Pointleaf Manzanita Wooded Shrubland Association

NVC Name: N/A

Identifier: NPSSODN192

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi / Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: Pinus cembroides - *Pinus discolor* - Juniperus coahuilensis Woodland Group [G200]

Alliance: *Pinus cembroides - Pinus discolor - Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: *Pinus discolor* / *Quercus toumeyi* - *Arctostaphylos pungens* Wooded Shrubland Association (P) [NPSSODN192]

Chiricahua National Monument Type Concept Description

Distribution
This wooded shrubland is widely distributed throughout the monument.

Environmental Description
This wooded shrubland community is found on low-angle (<5%) to steep (>50+) mountain slopes of variable aspect from 1,595 to 2,270 meters (5,232–7,447 ft). It spans a variety of topographic positions, including crests, plateaus, backslopes, and low-elevation swales. It is commonly seen among the steep spires of the hoodoos. In general, the surface cover is dominated by gravel with rock, bedrock, and boulders. The parent material throughout this community is almost always extrusive igneous rock or volcanic tuff.

Vegetation Description
his wooded shrubland community is characterized by an open to dense (5–50%) canopy (>2 m) dominated by border pinyon (*Pinus discolor*) and a moderately dense (40% average) subcanopy (0.5–2 m) with approximately co-dominant Toumey oak (*Quercus toumeyi*) and pointleaf manzanita (*Arctostaphylos pungens*). The formation of this community can vary, ranging from woodlands heavily dominated by border pinyon (*P. discolor*) to shrublands dominated by Toumey oak (*Q. toumeyi*) and pointleaf manzanita (*A. pungens*) with minimal canopy cover. In most cases, this

community presents as a wooded shrubland with a mix of all three species. The field stratum is very sparse (average 5%) and usually consists of a mix of perennial grasses.

Border pinyon (*P. discolor*) is a consistent (0.98) dominant that, on average, provides cover between 15% and 25% and occasionally to 60% in especially densely wooded examples. Individuals of this species are present as short trees with an average height of around four meters and some individuals reaching up to six meters. Alligator juniper (*Juniperus deppeana*) is a common (0.82) associate with an average cover of less than 5%. Other noteworthy canopy associates include Arizona white oak (*Quercus arizonica*), Chihuahuan pine (*Pinus leiophylla*). Arizona cypress (*Hesperocyparis arizonica*) is also occasionally present as a canopy associate but is mostly found in association with small drainages. Tree cover generally increases with elevation and proximity to drainages.

The subcanopy stratum, which contains the bulk of the cover in this community, is dominated by pointleaf manzanita (*A. pungens*) and Toumey oak (*Q. toumeyi*). While these species are usually co-dominant when cover is averaged over larger areas, both commonly form stands in which one species is the clear dominant and the other a lower-cover associate. In some unusual examples, Toumey oak may be nearly absent and replaced by a combination of Wright's silktassel (*Garrya wrightii*) and evergreen sumac (*Rhus virens*), which together contribute total cover similar to that of manzanita. However, these two shrubs are generally low-cover associates, if present at all, in most examples of this community. Beyond these species, this stratum contains a diverse suite of shrubs and succulents. Shrubby examples of both silverleaf oak and netleaf oak are occasional associates (0.50 and 0.25, respectively) and may be locally abundant (to 20% cover) when present. In order from most to least frequent, other noteworthy subcanopy species include beargrass (*Nolina microcarpa*), Palmer's century plant (*Agave palmeri*), common sotol (*Dasylirion wheeleri*), and yucca (*Yucca madrensis*).

The field stratum in this community is very open, with total cover averaging approximately 5% and rarely exceeding 10%. Bullgrass (*Muhlenbergia emersleyi*) is present in almost all examples (0.91) but contributes an average cover of less than 5%. A variable mix of other native perennial grasses may contribute cover similar to, but rarely exceeding, that of bullgrass. In order from most to least frequent, these grass species include Texas bluestem (*Schizachyrium cirratum*), pinyon ricegrass (*Piptochaetium fimbriatum),* single threeawn (*Aristida schiedeana*), and sideoats grama (*Bouteloua curtipendula*).

Global Type Concept Description

This proposed association is anticipated to fall under the *Pinus cembroides - Pinus discolor - Pinus edulis* / Shrub Understory Woodland Alliance [A3131]. However, the association as we have documented it is not yet an accepted and described type within the NVC. The closest accepted association is CEGL000773, *Pinus discolor* / *Quercus toumeyi* Woodland, which, while having the same dominant species, is written too broadly to capture the communities as documented at Chiricahua National Monument during this project. As such, we have designated this type as "proposed" and expect it will become an accepted NVC association in future years once our data has been included. Below is the description for CEGL000773.

This Madrean conifer woodland occurs in the "Borderlands" region in southeastern Arizona and extreme southwestern New Mexico (Animas and Peloncillo mountains) and likely occurs in adjacent northern Mexico. Stands are small and patchy in distribution and limited to mountain and foothill slopes at elevations of 1800–1860 meters and are often found within a matrix of *Quercus toumeyi* chaparral. Soils are derived from rhyolite parent material. This late-successional woodland association has an open to moderately dense tree canopy (20–80% cover) co-dominated by the evergreen trees *Pinus discolor* and *Juniperus deppeana*, with occasional *Juniperus coahuilensis, Juniperus monosperma, Quercus arizonica,* or *Quercus emoryi* present. The moderately dense to dense shrub layer (>25% cover) is dominated by the broad-leaved evergreen oaks *Quercus toumeyi, Quercus toumeyi* x *grisea* hybrid, and includes many other shrub species such as *Arctostaphylos pungens, Garrya wrightii, Nolina microcarpa, Agave palmeri, Rhus trilobata, Rhus virens*, and *Dasylirion wheeleri*. The herbaceous layer is generally sparse and dominated by perennial grasses with scattered forbs. Species include *Schizachyrium cirratum*, *Aristida schiedeana* var. *orcuttiana, Bouteloua curtipendula, Muhlenbergia emersleyi, Eragrostis intermedia, Bouteloua gracilis, Piptochaetium fimbriatum, Phaseolus* spp., and *Desmodium* spp. The dominance of *Quercus toumeyi* in the shrub layer is diagnostic of this *Pinus discolor* woodland type.

Species Summary

See Tables 13 and 14 for species summary details.

Table 13. Most abundant species: *Pinus discolor* / *Quercus toumeyi - Arctostaphylos pungens* Wooded Shrubland Association.

Stratum	Species [A]
Canopy (>5 m)	*Pinus discolor* (1.0)
Canopy (2–5 m)	*Pinus discolor* (1.0)
Subcanopy (0.5–2 m)	*Arctostaphylos pungens* (1.0), *Quercus toumeyi* (1.0)
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 14. Other noteworthy species: *Pinus discolor* / *Quercus toumeyi - Arctostaphylos pungens* Wooded Shrubland Association.

Stratum	Species
Canopy (>5 m)	*Pinus leiophylla, Hesperocyparis arizonica*
Canopy (2–5 m)	*Juniperus deppeana, Quercus arizonica, Pinus leiophylla, Hesperocyparis arizonica*
Subcanopy (0.5–2 m)	*Agave palmeri, Dasylirion wheeleri,* Garrya wrightii, *Nolina microcarpa, Quercus rugosa, Rhus virens, Yucca baccata, Quercus hypoleucoides*
Field (0–0.5 m)	*Muhlenbergia emersleyi, Schizachyrium cirratum, Piptochaetium fimbriatum, Aristida schiedeana, Bouteloua curtipendula*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 17 classification plots and 44 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Some stands reflect the late-successional stage transformation of interior chaparral to pinyon woodland. Moir (1979) described two *Pinus discolor*-dominated woodlands from the Peloncillo Mountains and an interior chaparral type that may fit the current concept of this association. The woodlands occur at higher elevations on mid to upper north-facing slopes above the Madrean oak woodlands and at lower elevations in the lower slopes and draws. These descriptions need further review.

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: Only documented from the southwestern corner of New Mexico, but it probably occurs elsewhere in the "Borderlands" region of southeastern Arizona, southwestern New Mexico and northern Mexico.

NatureServe Conservation Status: G2

Conservation Status Reasons: This association is restricted to the “Borderlands” of southeastern Arizona and southwestern New Mexico, and possibly very northern Sierra Madre Occidentale of Mexico. Stands are small and reflect the interior chaparral's late successional stage transformation to pinyon woodland. Stands continue to be impacted by fuelwood harvest and grazing throughout the association's distribution.

<u>Element Sources</u>

Chiricahua National Monument Plots: IP007, IP017, IP032, IP049, IP056, IP068, IP079, IP089, IP091, IP097, IP108, IP113, IP133, IP134, IP139, IP143, IP147, IP202

Chiricahua National Monument Polygons: F241, IFW067, S051, S082, W207, W221, W228, W231, W234, W238, W240, W244, W245, W249, WRO049, WRO077, WRO079, WRO468, WS098, WS121, WS125, WS128, WS129, WS130, WS137, WS140, WS146, WS158, WS161, WS163, WS168, WS173, WS180, WS182, WS186, WS189, WS190, WS194, WS199, WS202, WS204, WS208, WS209, WS211

Local Description Authors: J. Black, B. Fallon, L. Crumbacher, S. Studd, J. Galvin

8. *Pinus discolor / Quercus toumeyi - Garrya wrightii* Woodland Association (P)

Common Name: Border Pinyon / Toumey Oak - Wright's Silktassel Woodland Association

NVC Name: N/A

Identifier: NPSSODN193

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi / Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: Pinus cembroides - *Pinus discolor* - Juniperus coahuilensis Woodland Group [G200]

Alliance: *Pinus cembroides - Pinus discolor - Pinus edulis* / Shrub Understory Woodland Alliance [A3131]

Association: *Pinus discolor* / *Quercus* toumeyi – Garrya wrightii Woodland Association (P) [NPSSODN193]

Chiricahua National Monument Type Concept Description

Distribution
This association is found primarily on north-facing slopes in Rhyolite and Bonita canyons, with a few scattered examples elsewhere in the monument.

Environmental Description
This woodland community generally occurs on steep (>35%), north-trending backslopes above large drainages between 1,680 and 2,145 meters (5,512–7,037 ft) elevation. These areas often contain large bedrock outcrops and hoodoos, and the substrate is generally rocky and gravelly with some patches of litter; bare soil is rare. The parent material usually consists of extrusive igneous bedrock, volcanic ash bedrock, and occasionally colluvium, old alluvium, or new alluvium.

Vegetation Description
This densely wooded community is characterized by a variably dense (to 45%) upper canopy (>5 m) and variably dense (5–55%) lower canopy (2–5 m) dominated by border pinyon (*Pinus discolor*). In the open (average 20%) subcanopy stratum (0.5–2 m), Toumey oak (*Quercus toumeyi*) is dominant or co-dominant with Wright's silktassel (*Garrya wrightii*). The open (average 10%) field stratum (<0.5 m) is dominated by bullgrass (*Muhlenbergia emersleyi*) and/or pinyon ricegrass (*Piptochaetium fimbriatum*). This association is differentiated from others with similar species composition mainly by its woodland form.

Border pinyon is the consistent (1.0) canopy dominant. On average, it generates about 40% cover and grows to an average of 3–4 meters in height, though some tall individuals reach 6 meters. In the most densely wooded examples, border pinyon cover may exceed 80%. Common associate species in this stratum include, in order of decreasing frequency, alligator juniper (*Juniperus deppeana*), silverleaf oak (*Quercus hypoleucoides*), Arizona white oak (*Q. arizonica*), and Arizona cypress (*Hesperocyparis arizonica*). When present, these species typically generate less than 5% cover, though Arizona white oak may occasionally approach 10%.

In the subcanopy stratum, Toumey oak (*Q. toumeyi*) is a consistent (1.0) dominant and contributes an average of 15% cover. Wright's silktassel is similarly consistent (1.0) and may be either a co-dominant species with Toumey oak or a high-cover associate. As a result of its highly variable cover values, this species averages only 7% cover across all examples of this community. Pointleaf manzanita (*Arctostaphylos pungens*) is a common (0.66) associate and occasionally approaches the cover of Toumey oak and Wright's silktassel, though its overall average cover is below 5%. Other notable subcanopy associates include beargrass (*Nolina microcarpa*), mountain yucca (*Yucca madrensis*), Palmer's century plant (*Agave palmeri*), alderleaf mountain mahogany (*Cercocarpus montanus*), netleaf oak (*Quercus rugosa*), California brickellbush (*Brickellia californica*), Utah fendlerbush (*Fendlerella utahensis*), and evergreen sumac (*Rhus virens*).

The open field stratum lacks a consistent dominant species. Bullgrass (*Muhlenbergia emersleyi*) and pinyon ricegrass (*Piptochaetium fimbriatum*) are both common (0.58) and can each provide the bulk of total field cover when present. Gumhead (*Gymnosperma* glutinosum) is present in approximately half of all examples and may be a dominant species when present. Commonly recorded associate species in this stratum include the grasses sideoats grama (*Bouteloua curtipendula*), single threeawn (*Aristida schiedeana*), as well as Arizona baccharis (*Baccharis thesioides*), fragrant snakeroot (*Ageratina herbacea*), southwestern brickellbush (*Brickellia lemmonii*) and lip ferns (*Cheilanthes* spp.).

Global Type Concept Description

This proposed association is anticipated to fall under the *Pinus cembroides - Pinus discolor - Pinus edulis* / Shrub Understory Woodland Alliance [A3131]; however, the association as we have documented it is not yet an accepted and described type within the NVC. The closest accepted association is CEGL000773, *Pinus discolor* / *Quercus toumeyi* Woodland, which, while having the same dominant species, is written too broadly to capture the communities as documented at Chiricahua National Monument during this project. As such, we have designated this type as "proposed" and expect it will become an accepted NVC association in future years once our data has been included. Below is the description for CEGL000773.

This Madrean conifer woodland occurs in the "Borderlands" region in southeastern Arizona and extreme southwestern New Mexico (Animas and Peloncillo mountains) and likely occurs in adjacent northern Mexico. Stands are small and patchy in distribution and limited to mountain and foothill slopes at elevations of 1,800 to 1,860 meters and are often found within a matrix of *Quercus toumeyi* chaparral. Soils are derived from rhyolite parent material. This late-successional woodland association has an open to moderately dense tree canopy (20–80% cover) co-dominated by the evergreen trees *Pinus discolor* and *Juniperus deppeana*, with occasional *Juniperus coahuilensis, Juniperus monosperma, Quercus arizonica,* or *Quercus emoryi* present. The moderately dense to dense shrub layer (>25% cover) is dominated by the broad-leaved evergreen oaks *Quercus toumeyi, Quercus toumeyi* x *grisea* hybrid, and includes many other shrub species such as *Arctostaphylos pungens, Garrya wrightii, Nolina microcarpa, Agave palmeri, Rhus trilobata, Rhus virens*, and *Dasylirion wheeleri*. The herbaceous layer is generally sparse and dominated by perennial grasses with scattered forbs. Species include *Schizachyrium cirratum*, *Aristida schiedeana* var. *orcuttiana, Bouteloua curtipendula, Muhlenbergia emersleyi, Eragrostis intermedia, Bouteloua gracilis, Piptochaetium fimbriatum, Phaseolus* spp., and *Desmodium* spp. The dominance of *Quercus toumeyi* in the shrub layer is diagnostic of this *Pinus discolor* woodland type.

Species Summary

See Tables 15 and 16 for species summary details.

Table 15. Most abundant species: *Pinus discolor* / *Quercus toumeyi - Garrya wrightii* Woodland Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Pinus discolor* (1.0)
Canopy (2–5 m)	*Pinus discolor* (1.0)
Subcanopy (0.5–2 m)	*Quercus toumeyi* (1.0), *Garrya wrightii* (1.0)
Field (0–0.5 m)	*Muhlenbergia emersleyi* (0.58), *Piptochaetium fimbriatum* (0.58), *Gymnosperma glutinosum* (0.50)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 16. Other noteworthy species: *Pinus discolor* / *Quercus toumeyi - Garrya wrightii* Woodland Association (P).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana, Quercus arizonica*
Subcanopy (0.5–2 m)	*Arctostaphylos pungens, Nolina microcarpa, Yucca madrensis, Agave palmeri, Cercocarpus montanus, Quercus rugosa, Brickellia californica, Fendlerella utahensis, Rhus virens*
Field (0–0.5 m)	*Bouteloua curtipendula, Aristida schiedeana, Baccharis thesioides, Ageratina herbacea, Brickellia lemmonii, Cheilanthes* spp.

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 6 classification plots and 6 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Some stands reflect the late-successional stage transformation of interior chaparral to pinyon woodland. Moir (1979) described two *Pinus discolor*-dominated woodlands from the Peloncillo Mountains and an interior chaparral type that may fit the current concept of this association. The woodlands occur at higher elevations on mid to upper north-facing slopes above the Madrean oak woodlands and at lower elevations in the lower slopes and draws. These descriptions need further review.

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>
Global Range: Only documented from the southwestern corner of New Mexico, but it probably occurs elsewhere in the “Borderlands” region of southeastern Arizona, southwestern New Mexico and northern Mexico.

NatureServe Conservation Status: G2

Conservation Status Reasons: This association is restricted to the "Borderlands" of southeastern Arizona and southwestern New Mexico, and possibly the very northern Sierra Madre Occidentale of Mexico. Stands are small and reflect the late successional stage transformation of interior chaparral to pinyon woodland. Stands continue to be impacted by fuelwood harvest and grazing throughout the association's distribution.

<u>Element Sources</u>
Chiricahua National Monument Plots: IP038, IP039, IP059, IP106, IP138, IP334

Chiricahua National Monument Polygons: F227, F246, W215, W230, W246, W247

Local Description Authors: J. Black

9. *Pinus discolor* / *Muhlenbergia emersleyi* Woodland Association

Common Name: Border Pinyon/ Bullgrass Woodland Association

NVC Name: *Pinus discolor* / *Muhlenbergia emersleyi* Woodland Association

Identifier: CEGL000767

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: Pinus cembroides - *Pinus discolor* - Juniperus coahuilensis Woodland Group [G200]

Alliance: *Pinus cembroides - Pinus discolor - Pinus edulis* / Grass Understory Woodland Alliance [A3132]

Association: *Pinus discolor* / *Muhlenbergia emersleyi* Woodland Association [CEGL000767]

Chiricahua National Monument Type Concept Description

Distribution
This woodland association is primarily found in the high-elevation northeast corner of the monument, with a few scattered examples elsewhere in the monument.

Environmental Description
This community occurs on mountain slopes of highly variable slope and aspect between 1,610 and 2,390 meters (5,282–7,841 ft) elevation. The substrate cover consists of a mix of litter, gravel, bare soil, and rock, with bedrock outcrops rarely a dominant feature. Geologic parent material is generally extrusive igneous rock, though some examples include non-calcareous sedimentary rock, colluvium, or volcanic ash bedrock.

Vegetation Description
This woodland is characterized by an open-to-dense (15–70%) canopy stratum (>2 m) with an average total cover of approximately 45%, dominated by border pinyon (*Pinus discolor*) with associate to co-dominant alligator juniper (*Juniperus deppeana*) and Arizona white oak (*Quercus arizonica*). The subcanopy stratum (0.5–2 m) is variably open (5–35%), with a variable mixture of shrubs and succulents. The field stratum (<0.5 m) is highly variable in cover (1–60%) and grassy, with bullgrass (*Muhlenbergia emersleyi*) the most consistent dominant species.

Border pinyon (*P. discolor*) is a consistent (1.0) canopy dominant, with an average cover of approximately 20%. In this community, this species ranges from less than 5 to 12 meters in height. Alligator juniper (*J. deppeana*) and Arizona white oak (*Q. arizonica*) are also present in all examples

(1.0). Though these species are often co-dominant with border pinyon, they contribute less overall cover, approximately 10–15% each, when averaged across all examples of this association. Silverleaf oak (*Quercus hypoleucoides*) and Emory oak (*Q. emoryi*) are present in about half of all examples (0.5and 0.45, respectively), generally as low-cover associates but occasionally generating cover approaching that of the other tree species. Arizona juniper (*J. arizonica*), Douglas-fir (*Pseudotsuga menziesii*), Apache pine (*Pinus engelmannii*), and Chihuahuan pine (*P. leiophylla*) are occasional canopy associates but rarely contribute significant cover.

The subcanopy stratum consists of an open mix of shrubs and succulents, with no consistent dominant species. Common species include, in order of decreasing frequency, mountain yucca (*Yucca madrensis*), beargrass (*Nolina microcarpa*), pointleaf manzanita (*Arctostaphylos pungens*), alderleaf mountain mahogany (*Cercocarpus montanus*), Wright's silktassel (*Garrya wrightii*), Toumey oak (*Quercus toumeyi*), common sotol (*Dasylirion wheeleri*), and catclaw mimosa (*Mimosa aculeaticarpa*). These species generally produce an average of less than 5% cover, though some may be relatively abundant in occasional examples.

The moderately dense (averaging 25%) field stratum consists primarily of perennial grasses. Bullgrass (*Muhlenbergia emersleyi*) is the most consistent (0.95) dominant in this stratum, producing an average of 17% cover. Common associates include (in order from most to least frequent) sideoats grama (*Bouteloua curtipendula*), pinyon ricegrass (*Piptochaetium fimbriatum*), Texas bluestem (*Schizachyrium cirratum*), single threeawn (*Aristida schiedeana*), hairy grama (*Bouteloua hirsuta*), and cliff muhly (*Muhlenbergia polycaulis*).

Global Type Concept Description

This woodland association occurs in southeastern Arizona, southern New Mexico, and likely in adjacent Mexico. Stands occur on gently to moderately sloping alluvial plains, bajadas, and canyon bottoms to steep rocky slopes in canyons, piedmont hills, and mountains. Elevation ranges from 1,460 to 2,010 meters (4,780–6,600 ft). Soils are shallow, gravelly or stony sandy loams, or sandy clay loams, derived from a mixture of alluvium and colluvium. The vegetation is characterized by an open to moderately dense tree layer (15–70% cover) dominated by *Pinus discolor* and *Juniperus deppeana*. Evergreen oaks are often present in the tree subcanopy but generally have lower cover. An open shrub layer may be present, but the understory is typically dominated by the graminoid layer. The tree canopy ranges from three to over five meters tall. Stands range from open woodlands to moderately dense woodlands at higher elevations and in canyon bottoms. Other canopy trees are *Quercus arizonica*, *Quercus emoryi*, or *Quercus grisea*. A sparse to moderately dense shrub layer may be present, but graminoids dominate the understory. Characteristic shrubs and succulents include *Acacia angustissima*, *Arctostaphylos pungens*, *Cercocarpus montanus*, *Dasylirion wheeleri*, *Fendlera rupicola*, *Garrya wrightii*, *Nolina microcarpa*, *Quercus toumeyi*, *Rhus trilobata*, *Yucca baccata*, and *Yucca madrensis*. The graminoid layer is moderate to dense (25–80% cover) and is typically dominated by medium-tall bunchgrasses such as *Bouteloua curtipendula*, *Eragrostis intermedia*, or *Muhlenbergia emersleyi*, but it can be very diverse with both forbs and grasses.

Species Summary
See Tables 17 and 18 for species summary details.

Table 17. Most abundant species: *Pinus discolor* / *Muhlenbergia emersleyi* Woodland Association.

Stratum	Species [A]
Canopy (>5 m)	*Pinus discolor* (1.0), *Juniperus deppeana* (1.0)
Canopy (2–5 m)	*Pinus discolor* (1.0), *Juniperus deppeana* (1.0), *Quercus arizonica* (1.0)
Subcanopy (0.5–2 m)	None
Field (0–0.5 m)	*Muhlenbergia emersleyi* (0.95)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 18. Other noteworthy species: *Pinus discolor* / *Muhlenbergia emersleyi* Woodland Association.

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Quercus hypoleucoides, Quercus emoryi*
Subcanopy (0.5–2 m)	*Nolina microcarpa, Arctostaphylos pungens, Cercocarpus montanus, Garrya wrightii, Quercus toumeyi, Dasylirion wheeleri, Mimosa aculeaticarpa*
Field (0–0.5 m)	*Bouteloua curtipendula, Piptochaetium fimbriatum, Schizachyrium cirratum, Aristida schiedeana, Bouteloua hirsuta, Muhlenbergia polycaulis*

Classification Comments
Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 8 classification plots and 13 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: The single plot sampled at Buenos Aires National Wildlife Refuge is co-dominated by *Quercus emoryi* in the tree subcanopy but was classified to this pinyon-juniper woodland as a "best fit" because of the high cover of *Pinus discolor* (40%) and *Juniperus deppeana* (30%), and the relatively low cover of evergreen oaks did not dominate the stand (encinal).

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: These woodlands occur in the mountains of southern New Mexico and southeastern Arizona. They likely also occur in the mountains of the Mexican states of Chihuahua and Sonora.

NatureServe Conservation Status: G5

Conservation Status Reasons: Data not available.

Element Sources

Chiricahua National Monument Plots: IP027, IP041, IP046, IP051, IP109, IP116, IP129, IP136, IP232

Chiricahua National Monument Polygons: TS028, TS032, W057, W185, W199, W214, W232, W243, W255, W258, W262, W263, WS201

Local Description Author: J. Black

10. ***Pinus discolor / Piptochaetium fimbriatum*** **Woodland Association**

Common Name: Border Pinyon / Pinyon Ricegrass Woodland Association

NVC Name: *Pinus discolor* / *Piptochaetium fimbriatum* Woodland Association

Identifier: CEGL000768

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: Pinus cembroides - *Pinus discolor* - Juniperus coahuilensis Woodland Group [G200]

Alliance: Pinus cembroides - *Pinus discolor* - Pinus edulis / Grass Understory Woodland Alliance [A3132]

Association: *Pinus discolor* / *Piptochaetium fimbriatum* Woodland Association [CEGL000768]

Chiricahua National Monument Type Concept Description

Distribution
This woodland type is restricted to the northwest slope of Sugarloaf Mountain.

Environmental Description
This community occurs on a steep (>35%) northwest-facing mountain shoulder and backslope between 2,035 and 2,190 meters (6,677–7,185 ft) elevation. The substrate is predominantly rock, with sparse bare soil, gravel, exposed bedrock, and litter. The geologic parent material is extrusive igneous bedrock, volcanic ash bedrock, and colluvium.

Vegetation Description
This woodland association consists of a very dense (70%) canopy layer dominated by border pinyon (*Pinus discolor*) with an open understory. The very sparse (5%) subcanopy is dominated by Wright's silktassel (*Garrya wrightii*) with a mix of low-cover associates. The field stratum is similarly sparse (5%) and is dominated by pinyon ricegrass (*Piptochaetium fimbriatum*), but at times has significant annual cover.

Border pinyon (P. discolor) is the clear canopy dominant in this community, contributing between 51% and 75% total cover. This species is present as a tree reaching 4 to 5 meters in height. Alligator juniper (*Juniperus deppeana*) is an associate tree of similar stature to the border pinyon and contributes between 6% and 10% cover. Netleaf oak (*Quercus rugosa*) reaches into the canopy stratum and generates between 1% and 5% cover. Canyon live oak (*Quercus chrysolepis*) and alderleaf mountain mahogany (*Cercocarpus montanus*) are present here but contribute only trace amounts of cover (<1%).

The subcanopy stratum is dominated by Wright's silktassel (*G. wrightii*), which produces between 1% and 5% cover. A diverse mix of shrubs and succulents are present but generate very little total cover. These species include mountain yucca (*Yucca madrensis*), banana yucca (*Yucca baccata),* skunkbush sumac (*Rhus trilobata*), beargrass (*Nolina microcarpa*), and Toumey oak (*Quercus toumeyi*).

Pinyon ricegrass (*P. fimbriatum*) contributes between 1% and 5% cover in the field stratum, the highest of any perennial species. Other notable associates include twistspine prickly pear (*Opuntia macrorhiza*), cliff muhly (*Muhlenbergia polycaulis*), bullgrass (*Muhlenbergia emersleyi*), hedgehog cactus (*Echinocereus* sp.), and Lemmon's sage (*Salvia lemmonii*), though none of these species exceed 1% cover. Annual forbs may seasonally contribute up to 50% cover, as was the case at the time of surveying in fall 2008.

Global Type Concept Description

This Madrean conifer woodland occurs in the "Borderlands" of southeastern Arizona, southwestern New Mexico and extends into central New Mexico and probably adjacent Texas and northern Mexico. Stands are naturally small and patchy in distribution and limited to moist microsites of canyons or cooler open slopes. It occupies alluvial slopes and benches, upper slopes, drainages and washes, often with cooler northern aspects. Elevation is roughly 1,680–2,100 meters. Sampled stands in the Animas Mountains are on 12% northwest-facing slopes. The substrate is loam derived from andesite with surface rock and gravel, together averaging 15% cover. Litter dominates the ground cover (72%). The tree canopy has 25–60% cover and is co-dominated by *Pinus discolor* and *Juniperus deppeana,* with *Quercus grisea* or *Quercus* x *organensis* [*arizonica* x *grisea*] hybrid typically present. Scattered shrubs (<10% cover) are common, often with high diversity, and may include *Nolina microcarpa*, *Rhus trilobata*, *Cercocarpus montanus*, *Yucca baccata*, *Garrya wrightii*, *Quercus toumeyi*, and *Fendlera rupicola*. The moderately dense herbaceous layer (25–45% cover) is dominated by perennial grasses, such as *Piptochaetium fimbriatum*, *Bouteloua gracilis*, *Bouteloua curtipendula*, or *Eragrostis intermedia*, but is typically diverse and includes sparse cover of many other grass and forb species. The perennial grass-dominated herbaceous layer is diagnostic of this late successional *Pinus discolor* / *Juniperus deppeana* woodland.

Species Summary

See Tables 19 and 20 for species summary details.

Table 19. Most abundant species: *Pinus discolor* / *Piptochaetium fimbriatum* Woodland Association.

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Pinus discolor* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 19 (continued). Most abundant species: *Pinus discolor* / *Piptochaetium fimbriatum* Woodland Association.

Stratum	Species [A]
Subcanopy (0.5–2 m)	*Garrya wrightii* (1.0)
Field (0–0.5 m)	*Piptochaetium fimbriatum* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 20. Other noteworthy species: *Pinus discolor* / *Piptochaetium fimbriatum* Woodland Association.

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana, Quercus rugosa, Quercus chrysolepis, Cercocarpus montanus*
Subcanopy (0.5–2 m)	*Yucca madrensis, Yucca baccata, Rhus trilobata, Nolina microcarpa, Quercus toumeyi*
Field (0–0.5 m)	*Opuntia macrorhiza, Echinocereus* sp., *Muhlenbergia emersleyi, Salvia lemmonii*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 1 classification polygon sampled during the 2007–2010 mapping and classification effort.

Global: *Piptochaetium fimbriatum* is the diagnostic perennial grass species of the graminoid layer but may not be present in all stands.

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: This Madrean conifer woodland occurs in the "Borderlands" of southeastern Arizona, southwestern New Mexico, and extends into central New Mexico and probably adjacent Texas and northern Mexico.

NatureServe Conservation Status: G2

Conservation Status Reasons: This association is limited and patchy in its distribution to the "Borderlands" of southwestern New Mexico, and possibly southeastern Arizona and very northern Sierra Madre Occidentale of Mexico. Stands are small and reflect the late successional stage of mesic pinyon woodlands. They are very high in grass and forb diversity, with a preponderance of Sierra Madrean elements that have a restricted distribution in the United States. Grazing, and to a lesser degree, fuelwood harvest, continues to impact the association throughout its range.

Element Sources

Chiricahua National Monument Plots: None

Chiricahua National Monument Polygons: F251

Local Description Author: J. Black

11. *Quercus emoryi* / *Piptochaetium fimbriatum* Scrub Woodland Association

Common Name: Emory Oak / Pinyon Ricegrass Scrub Woodland Association

NVC Name: *Quercus emoryi* / *Piptochaetium fimbriatum* Scrub Woodland Association

Identifier: CEGL000686

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Quercus arizonica* - *Quercus emoryi* - *Quercus* oblongifolia Woodland Group [G201]

Alliance: *Quercus arizonica* - *Quercus emoryi* - *Quercus* grisea Scrub Woodland Alliance [A3101]

Association: *Quercus emoryi* / *Piptochaetium fimbriatum* Scrub Woodland Association [CEGL00686]

Chiricahua National Monument Type Concept Description

Distribution

This community is found along the lower elevation and low-angle drainages in Newton, Picket and Little Picket Canyons, as well as a smaller, unnamed drainage in the northwest corner of the monument.

Environmental Description

This community is found along primarily east- to west-running ephemeral drainages from approximately 1,550 to 1,650 meters (5,100–5,400 ft). These drainages are characterized by sandy bottoms with scattered vegetated sand bar islands and low-height banks. The ground cover is predominantly sand, gravel, rock and litter, with litter collecting deeply in some areas.

Parent material is most often extrusive igneous bedrock and volcanic ash, with new alluvium in the drainage bottoms.

Vegetation Description

This intermittently flooded woodland community is characterized by open-canopied (35–40%) woodland stands with the canopy stratum (>2 m) co-dominated by Arizona white oak (*Quercus arizonica)* and Emory oak (*Quercus emoryi*) with associated low-cover alligator juniper (*Juniperus deppeana*), Arizona juniper (*J. arizonica*) and border pinyon (*Pinus discolor*).

Arizona white oak (*Quercus arizonica)* is a consistent dominant (1.0) with slightly higher average cover (17%) than Emory oak (9%), although both are found consistently along these drainages.

Emory oak tends to be more abundant on the upper terrace and floodplain adjacent to the drainage, whereas white oak more often occupies the first terraces and banks. Border pinyon (*Pinus discolor*) and Alligator juniper (*Juniperus deppeana*) are consistent (1.0), low-cover associates that normally provide less than 5% cover but may occasionally reach approximately 10%. These typically occur as top-canopy trees reaching 5–6 meters tall. Arizona cypress *(Hesperocyparis arizonica*) is usually present in this community (0.67), but the population apparently declined significantly as a result of prescribed fires in the late 1990s and early 2000s, which left most individuals as standing dead snags up to 10 meters tall. Towards the upper end of the elevation range of this type, Emory oak tends to decrease in abundance while silverleaf oak increases.

The subcanopy stratum is relatively open, with an average total cover of approximately 20%. Pointleaf manzanita (*Arctostaphylos pungens*) is the consistent (1.0) dominant species, generating an average of approximately 6% cover. Wright's silktassel (*Garrya wrightii*), evergreen sumac (*Rhus virens*), and mountain mahogany (*Cercocarpus montanus*) were present in all examples of this association, though all at low cover (5% or less). Less common subcanopy associates include Toumey oak (*Quercus toumeyi*) and Apache plume (*Fallugia paradoxa*), which contribute up to 5% cover when present.

The field stratum is open (10%) and composed primarily of a diverse mix of native perennial grasses. The two dominant species, bullgrass (*Muhlenbergia emersleyi*) and pinyon ricegrass (*Piptochaetium fimbriatum*) typically generate between 1% and 5% cover each and are present in the majority of examples of this type (0.67). Green sprangletop (*Leptochloa dubia*) and plains lovegrass (*Eragrostis intermedia*) are consistently present (1.0) but contribute less than 1% cover. Other notable associate grasses in the field stratum include deergrass (*Muhlenbergia rigens*) and alkali sacaton (*Sporobolus airoides*) along with the semidesert grassland species Texas bluestem (*Schizachyrium cirratum*), hairy grama (*Bouteloua hirsuta*), blue grama (*B. gracilis*), sideoats grama (*Bouteloua curtipendula*), and single threeawn (*Aristida schiedeana*). White sagebrush (*Artemisia ludoviciana*) is also commonly present (0.66) but contributes below 1% cover.

Global Type Concept Description

This Madrean semi-riparian woodland occurs in the "Borderlands" area of southwestern New Mexico and possibly extends into southeastern Arizona, western Texas, and the northern Sierra Madre Occidentale of Mexico. Stands are naturally small, and they are restricted to elevated alluvial stream terraces on mesic aspects. This association has only been documented from one site in the Animas Mountains at 1,770 meters elevation. The stand occurs in a narrow valley on a north-facing terrace near an intermittent stream channel. The site is gently sloping (4%) with a sandy alluvium substrate. There is high cover (96%) of plant litter. These late-successional woodlands are dominated by broad-leaved evergreen trees with a sparse shrub layer and a moderately sparse herbaceous layer (<25% cover). The tree canopy is generally between 25% and 60% cover and is co-dominated by *Quercus emoryi* and *Quercus arizonica* with scattered *Juniperus deppeana*. The shrub layer consists of scattered shrubs (<10% cover) and often has high diversity. *Rhus trilobata, Nolina microcarpa, Garrya wrightii, Juniperus deppeana, Pinus discolor, Cercocarpus montanus, Ericameria laricifolia, and Cylindropuntia imbricata* are commonly present. The herbaceous layer is co-dominated by the perennial grasses *Piptochaetium fimbriatum* and *Bouteloua curtipendula* but is typically very diverse and includes sparse cover of many other grass and forb species. The diagnostic characteristics of this late-successional oak woodland are a moderately dense tree layer that is dominated or co-dominated by *Quercus emoryi* with *Piptochaetium fimbriatum* present to dominating in the herbaceous layer.

Species Summary

See Tables 21 and 22 for species summary details.

Table 21. Most abundant species: *Quercus emoryi* / *Piptochaetium fimbriatum* Scrub Woodland Association.

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Quercus arizonica* (1.0), *Quercus emoryi* (1.0)
Subcanopy (0.5–2 m)	*Arctostaphylos pungens* (1.0)
Field (0–0.5 m)	*Muhlenbergia emersleyi* (0.67), *Piptochaetium fimbriatum* (0.67)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 22. Other noteworthy species: *Quercus emoryi* / *Piptochaetium fimbriatum* Scrub Woodland Association.

Stratum	Species
Canopy (>5 m)	*Hesperocyparis arizonica*
Canopy (2–5 m)	*Juniperus deppeana, Pinus discolor, Quercus hypoleucoides*
Subcanopy (0.5–2 m)	*Garrya wrightii, Rhus virens, Cercocarpus montanus, Fallugia paradoxa, Quercus toumeyi*
Field (0–0.5 m)	*Leptochloa dubia, Eragrostis intermedia, Muhlenbergia rigens, Sporobolus airoides, Schizachyrium cirratum, Bouteloua hirsuta, Bouteloua gracilis, Bouteloua curtipendula, Aristida schiedeana, Artemisia ludoviciana*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 3 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

<u>Element Sources</u>
Chiricahua National Monument Plots: None

Chiricahua National Monument Polygons: IFW020, IFW063, IFW094

Local Description Authors: J. Black, S. Studd

12. [*Quercus hypoleucoides - Quercus arizonica*] Woodland Association (P)

Common Name: [Silverleaf Oak - Arizona White Oak] Woodland Association

NVC Name: N/A

Identifier: NPSSODN164

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi / Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: *Quercus arizonica* - *Quercus emoryi* - *Quercus* oblongifolia Woodland Group [G201]

Alliance: *Quercus arizonica* - *Quercus emoryi* - *Quercus* grisea Scrub Woodland Alliance [A3101]

Association: [*Quercus hypoleucoides – Quercus arizonica*] Woodland Association (P) [NPSSODN164]

Chiricahua National Monument Type Concept Description

<u>Distribution</u>
This association is found in lower elevation drainages, primarily in Picket and Jesse James canyons, as well as a few smaller canyons on the western and southern boundaries of the monument.

<u>Environmental Description</u>
This woodland community occurs in low-angle to moderately steep (1–35%), often west-trending, drainages between 1,620 and 2,020 meters (5,314–6,627 ft). Surface cover is generally dominated by gravel, rock, and litter. Geologic parent material is new alluvium and extrusive volcanic bedrock.

<u>Vegetation Description</u>
This woodland community is characterized by a moderately dense to dense (35–65%) canopy stratum (>2 m) dominated by silverleaf oak (*Quercus hypoleucoides*), and to a lesser extent, Arizona white oak (*Quercus arizonica*). Large conifers are generally lacking, or if present, provide minimal cover. The subcanopy stratum (0.5–2 m) is generally open (10–15%) and contains a mix of shrubs common in other communities. The field stratum (<0.5 m) is very a sparse (<5%) mix of various graminoids, subshrubs, and forbs with no clear dominants.

Silverleaf oak (*Q. hypoleucoides*) and Arizona white oak (*Q. arizonica*) are both consistent (1.0) in the canopy. Silverleaf oak is generally the more abundant of the two species, with an average total cover of about 30%, while Arizona white oak generates about 20% on average. Border pinyon is a consistent (1.0) canopy associate that contributes an average of 5% cover, but occasionally reaches 20%. Other tree species, including Arizona cypress (*Hesperocyparis arizonica*), alligator juniper

(*Juniperus deppeana*), Arizona madrone (*Arbutus arizonica*), Emory oak (*Quercus emoryi*), and Chihuahuan pine (*Pinus leiophylla*) may be present but all generate below 5% average cover overall, and rarely exceed 10%.

The subcanopy is a generally open mix of shrubs that averages around 12% total cover, with some examples reaching 25%. Shrubby oaks, including silverleaf oak (*Q. hypoleucoides*), Toumey oak (*Q. toumeyi*), and netleaf oak (*Q. rugosa*) are common but rarely contribute more than 5% cover each. Other notable associates include pointleaf manzanita (*Arctostaphylos pungens*), Wright's silktassel (*Garrya wrightii*), and evergreen sumac (*Rhus virens*).

The field stratum is very sparse, with total cover never surpassing 5%. Cover is provided by an inconsistent mix of subshrubs, graminoids, and forbs, each of which generally contributes less than 1% cover. Notable species include Canadian horseweed (*Conyza canadensis*), plains lovegrass (*Eragrostis intermedia*), single threeawn (*Aristida schiedeana*), and pinyon ricegrass (*Piptochaetium fimbriatum*).

Global Type Concept Description
Data not available.

Species Summary
See Tables 23 and 24 for species summary details.

Table 23. Most abundant species: [*Quercus hypoleucoides - Quercus arizonica*] Woodland Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Quercus hypoleucoides* (1.0), *Quercus arizonica* (1.0)
Canopy (2–5 m)	*Quercus hypoleucoides* (1.0), *Quercus arizonica* (1.0)
Subcanopy (0.5–2 m)	None
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 24. Other noteworthy species: [*Quercus hypoleucoides - Quercus arizonica*] Woodland Association (P).

Stratum	Species
Canopy (>5 m)	*Pinus discolor, Hesperocyparis arizonica, Pinus leiophylla*
Canopy (2–5 m)	*Pinus discolor, Juniperus deppeana, Quercus emoryi, Arbutus arizonica*
Subcanopy (0.5–2 m)	*Quercus hypoleucoides, Quercus toumeyi, Quercus rugosa, Arctostaphylos pungens, Garrya wrightii, Rhus virens*
Field (0–0.5 m)	*Conyza canadensis, Eragrostis intermedia, Aristida schiedeana, Piptochaetium fimbriatum*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 3 classification plots and 5 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP019, IP066, IP359

Chiricahua National Monument Polygons: F235, F272, IFF040, IFF042, IFW092

Local Description Author: J. Black

13. (*Juniperus deppeana*) / *Mimosa aculeaticarpa* Wooded Shrubland Association (PS)

Common Name: (Alligator Juniper) / Catclaw Mimosa Wooded Shrubland Association

NVC Name: N/A

Identifier: NPSSODN179

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi / Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: Juniperus coahuilensis - *Juniperus deppeana* - Juniperus monosperma Open Woodland Group [G487]

Alliance: Juniperus coahuilensis - *Juniperus deppeana* - Juniperus monosperma / Shrub Understory Open Woodland Alliance [A3133]

Association: (*Juniperus deppeana*) / *Mimosa aculeaticarpa* Wooded Shrubland Association [NPSSODN179]

Chiricahua National Monument Type Concept Description

Distribution

This restricted community is found in two locations: along the lower slopes of Newton Canyon and a small patch north of the visitor center.

Environmental Description

This wooded shrubland community spans moderate grade (15–35%) mountain backslopes and footslopes of variable aspect from 1,620 to 1,745 meters (5,315–5,725 ft). Ground cover is a mix of gravel and rock with exposed bedrock present in all examples.

Vegetation Description

This wooded shrubland community is characterized by an open (<10% average; rarely to 15%) canopy (>2 m) of alligator juniper (*Juniperus deppeana*), a moderately dense (30%) subcanopy (0.5–2 m) dominated by catclaw mimosa (*Mimosa aculeaticarpa*), and a variable (20–75%) field layer (<0.5 m) dominated by mixed perennial grasses. These areas have obvious evidence of fire damage prior to the 2011 Horseshoe 2 fire, which seems to have heavily influenced the species community composition. Standing dead snags of alligator juniper (*J. deppeana*) were noted, and the high frequency of the catclaw mimosa (*M. aculeaticarpa*) may also be a result of fire damage.

The canopy stratum cover is generally low with an average of around 7%. The majority (5%) of this cover is provided by alligator juniper (*J. deppeana*) with the remainder from Emory oak (*Quercus emoryi*) and Arizona white oak (*Quercus arizonica*).

The subcanopy is characterized by the consistent (1.0) dominance of catclaw mimosa (*M. aculeaticarpa*) with a low-cover mix of shrubs and succulents. On average, this species contributes about 30% cover with some dense examples exceeding 80%. It presents as dense patches, sometimes covering large amounts of area with a continuous thicket. In areas where this species is not as dense, there tends to be a slight increase in cover for the common associates. Beargrass (*Nolina microcarpa*) and mountain yucca (*Yucca madrensis*) are the two most common (0.89) associates with each providing an average of 2–3% cover. Other documented subcanopy species include Palmer's century plant (*Agave palmeri*), pointleaf manzanita (*Arctostaphylos pungens*), walkingstick cactus (*Cylindropuntia spinosior*), and common sotol (*Dasylirion wheeleri*).

The field layer is dominated by a diverse mix of perennial grasses, which typically contributes 25–35% cover but reaches 75% in some examples. Sideoats grama (*Bouteloua curtipendula*) and slender grama (*Bouteloua repens*) are the most consistent (0.89) grasses with an average of 8% cover each. Bullgrass is consistent across all examples (1.0), generating on average slightly less cover than sideoats and slender grama at approximately 5%; however, in one example, it is the dominant grass and generates approximately 30% cover. The invasive rangeland grass Lehmann's lovegrass (*Eragrostis lehmanniana*) occurs in most examples (0.67) of this community and provides variable cover ranging from less than 1% to over 40%. In order from most to least frequent, other noteworthy grasses include cane bluestem (*Bothriochloa barbinodis*), green sprangletop (*Leptochloa dubia*), hairy grama (*Bouteloua hirsuta*), blue grama (*Bouteloua gracilis*), Texas bluestem (*Schizachyrium cirratum*), and single threeawn (*Aristida schiedeana*).

Global Type Concept Description

Data not available.

Species Summary

See Tables 25 and 26 for species summary details.

Table 25. Most abundant species: (*Juniperus deppeana*) / *Mimosa aculeaticarpa* Wooded Shrubland Association (PS).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana* (0.89)
Subcanopy (0.5–2 m)	*Mimosa aculeaticarpa* (1.0)
Field (0–0.5 m)	*Bouteloua curtipendula* (0.89), *Bouteloua repens* (0.89), *Muhlenbergia emersleyi* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 26. Other noteworthy species: (*Juniperus deppeana*) / *Mimosa aculeaticarpa* Wooded Shrubland Association (PS).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Quercus arizonica, Quercus emoryi*
Subcanopy (0.5–2 m)	*Nolina microcarpa, Yucca madrensis, Agave palmeri, Arctostaphylos pungens, Cylindropuntia spinosior, Dasylirion wheeleri*
Field (0–0.5 m)	*Eragrostis lehmanniana, Bothriochloa barbinodis, Leptochloa dubia, Bouteloua hirsuta, Bouteloua gracilis, Schizachyrium cirratum, Aristida schiedeana*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 5 classification plots and 4 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP313, IP314, IP315, IP316, IP317

Chiricahua National Monument Polygons: SS053, WS153, WS154, WS162

Local Description Authors: B. Fallon, L. Crumbacher, S. Studd, J. Galvin, J. Black

14. *Juniperus deppeana / Bouteloua gracilis* Woodland Association

Common Name: Alligator Juniper / Blue Grama Woodland Association

NVC Name: *Juniperus deppeana* / *Bouteloua gracilis* Woodland Association

Identifier: CEGL000693

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: Juniperus coahuilensis - *Juniperus deppeana* - Juniperus monosperma Open Woodland Group [G487]

Alliance: Juniperus coahuilensis - *Juniperus deppeana* - Juniperus monosperma / Grass Understory Open Woodland Alliance [A3134]

Association: *Juniperus deppeana* / *Bouteloua gracilis* Woodland Association [CEGL000693]

Chiricahua National Monument Type Concept Description

Distribution
This association is found at low elevations on the far west side of the monument. It is especially abundant in lower Bonita Canyon between Faraway Ranch and the monument entrance.

Environmental Description
This community occurs between 1,560 and 1,835 meters (5,118 – 6,020 ft) in elevation, either on floodplains or on north-trending hillslopes. When present on hillslopes, the slope angle is generally low to moderate, with most examples between 1% and 15%, though steeper slopes are occasionally represented. Geologic parent material is extrusive igneous bedrock and colluvium on slopes, with old and new alluvium derived from extrusive igneous bedrock common in floodplains. Ground cover is dominated by gravel and rock of various sizes on hillslopes and by litter, gravel, and bare soil on floodplains.

Vegetation Description
This woodland association is characterized by an open (usually 10–25%) canopy stratum (>2 m) dominated by alligator juniper (*Juniperus deppeana*), a sparse to moderately dense (2–30%) subcanopy (0.5–2 m) stratum composed of an inconsistent mix of shrubs, and a variably dense (30–60%), grassy field stratum (<0.5 m) usually dominated by a combination of blue grama (*Bouteloua gracilis*) and sideoats grama (*Bouteloua curtipendula*) with other associate perennial grasses.

The canopy in this association is generally open, with most examples ranging between 10% and 25% total cover. The denser stands may contain up to 35% cover, while especially open examples may have as little as 5% total cover. Alligator juniper (*J. deppeana*) is consistent across all examples (1.0) and is generally the dominant species, with an average cover of approximately 10–15%. Here, this species most often occurs as short-statured trees below 5 meters in height, though in some floodplain examples, it may reach 8 meters tall. Arizona white oak (*Quercus arizonica*) is a common (0.79) associate that occasionally approaches co-dominance with alligator juniper. Arizona juniper (*J. arizonica*) is present in about half of all examples (0.5) and occasionally outcompetes alligator juniper, though it is more commonly present as an associate and averages below 5% cover overall. Notable associate species include, from most to least common, Emory oak (*Quercus emoryi*), honey mesquite (*Prosopis glandulosa),* border pinyon (*Pinus discolor*), and Arizona walnut (*Juglans major*).

Subcanopy cover is highly variable in this community, with most examples falling between 5% and 10% total cover but some ranging as high as 30%. Species composition is also highly variable, with no consistent dominants and a diverse mix of inconsistent, low-cover associates. Turpentine bush (*Ericameria laricifolia*) and catclaw mimosa (*Mimosa aculeaticarpa*) are common and may be locally abundant, occasionally reaching 10–20% cover, but generate well below 5% overall cover when averaged across all examples. Notable associate species include (in approximate order of decreasing frequency): beargrass (*Nolina microcarpa*), mountain yucca (*Yucca madrensis*), pointleaf manzanita (*Arctostaphylos pungens*), common sotol (*Dasylirion wheeleri*), Toumey oak (*Quercus toumeyi),* evergreen sumac (Rhus virens), Palmer's century plant (*Agave palmeri*), alderleaf mountain mahogany (*Cercocarpus montanus*), and fragrant sumac (*Rhus aromatica*). Each of these associate species generally contributes less than 5% cover when present.

The field layer is relatively dense and grassy, with total cover in most examples between 30% and 60% but occasionally reaching as high as 75% and as low as 25%. Blue grama (*Bouteloua gracilis*) and/or sideoats grama (*B. curtipendula*) are most often dominant and each averages between 11% and 25% cover, though when present, blue grama generally contributes slightly higher cover than sideoats grama. Each species is present in the vast majority of examples of this community (0.86 and 0.93, respectively). These species occur with a diverse and variable combination of other perennial grasses, including (in approximate order of decreasing frequency): pinyon ricegrass (*Piptochaetium fimbriatum),* bullgrass (*Muhlenbergia emersleyi*), hairy grama (*Bouteloua hirsuta*), cane bluestem (*Bothriochloa barbinodis*), Texas bluestem (*Schizachyrium cirratum*), tobosagrass (*Hilaria mutica*), slender grama (*Bouteloua repens*), spidergrass (*Aristida ternipes*), Lehmann lovegrass (*Eragrostis lehmanniana*), and bristly wolfstail (*Muhlenbergia alopecuroides*). These species generally contribute 5% cover or less when present, with some occasionally becoming co-dominant with blue grama and/or sideoats grama. A variety of subshrubs, succulents, and forbs, including gumhead (*Gymnosperma glutinosum*), bastardsage (*Eriogonum wrightii*), tulip pricklypear (*Opuntia phaeacantha),* burroweed (*Isocoma tenuisecta*), and San Pedro daisy (*Lasianthaea podocephala*) often generate some cover in this stratum as well, usually below 5% total.

Global Type Concept Description

This type is characterized as a juniper woodland wherein *Juniperus deppeana* is dominant with a scarce (<1% cover) or common (>1% cover) shrubby understory. *Quercus* grisea is scarce (< 1% cover).

Species Summary

See Tables 27 and 28 for species summary details.

Table 27. Most abundant species: *Juniperus deppeana* / *Bouteloua gracilis* Woodland Association.

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana* (1.0)
Subcanopy (0.5–2 m)	None
Field (0–0.5 m)	*Bouteloua curtipendula* (0.93), *Bouteloua gracilis* (0.86)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 28. Other noteworthy species: *Juniperus deppeana* / *Bouteloua gracilis* Woodland Association.

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Quercus arizonica, Juniperus arizonica, Quercus emoryi, Prosopis glandulosa, Pinus discolor, Juglans major*
Subcanopy (0.5–2 m)	*Nolina microcarpa, Yucca madrensis, Ericameria laricifolia, Arctostaphylos pungens, Mimosa aculeaticarpa, Dasylirion wheeleri, Quercus toumeyi, Rhus virens, Agave palmeri, Cercocarpus montanus, Rhus aromatica*
Field (0–0.5 m)	*Piptochaetium fimbriatum, Muhlenbergia emersleyi, Bouteloua hirsuta, Bothriochloa barbinodis, Schizachyrium cirratum, Hilaria mutica, Bouteloua repens, Aristida ternipes, Eragrostis lehmanniana, Gymnosperma glutinosum, Eriogonum wrightii, Opuntia phaecantha, Muhlenbergia alopecuroides, Isocoma tenuisecta, Lasianthaea podocephala*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 1 classification plot and 13 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Two phases are recognized. The typic phase is slightly moister and cooler and tends to support more pinyon and Utah juniper than the mesquite phase. The mesquite phase is warmer and drier and supports a higher percentage of mesquite cover (Stuever and Hayden 1997b).

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: This woodland association is known from southern New Mexico and Arizona south of the Mogollon Rim at approximately 1,600 meters (5,200 ft) elevation on the north aspects and up to 2,610 meters (6,600 ft) on the south aspects.

NatureServe Conservation Status: G5

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP141

Chiricahua National Monument Polygons: SS073, TS003, TS006, TS012, TS013, TS018, TS019, TS020, TS024, TS029, TS030, W161, W248

Local Description Author: J. Black

15. *Juniperus deppeana* - *Quercus emoryi* - (*Quercus arizonica*) / *Piptochaetium fimbriatum* Woodland Association (P)

Common Name: Alligator Juniper - Emory Oak - (Arizona White Oak) / Pinyon Ricegrass Woodland Association

NVC Name: N/A

Identifier: NPSSODN186

NVC Classification
Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Juniperus deppeana - Pinus cembroides - Quercus arizonica* Madrean Lowland Evergreen Woodland Macrogroup [M010]

Group: Juniperus coahuilensis - *Juniperus deppeana* - Juniperus monosperma Open Woodland Group [G487]

Alliance: Juniperus coahuilensis - *Juniperus deppeana* - Juniperus monosperma / Grass Understory Open Woodland Alliance [A3134]

Association: *Juniperus deppeana – Quercus emoryi* – (*Quercus arizonica*) / *Piptochaetium fimbriatum* Woodland Association (P) [NPSSODN186]

Chiricahua National Monument Type Concept Description

Distribution
This woodland association is found primarily in lower Bonita Canyon between Bonita Canyon campground and the monument entrance.

Environmental Description
This community occurs on low-angle (<15%) mountain footslopes and toeslopes and on floodplains and alluvial terraces in lower Bonita Canyon. Slope and aspect are variable, and elevation ranges from 1,570 to 1,725 meters (5,150–5,659 ft). Geologic parent material generally consists of alluvium derived from extrusive igneous bedrock. Surface cover is predominantly gravel and litter.

Vegetation Description
This woodland association is characterized by a dense (average 50%) canopy (>2 m) stratum primarily dominated by alligator juniper (*Juniperus deppeana*) and Emory oak (*Quercus emoryi*), with Arizona white oak (*Quercus arizonica*) consistently present and occasionally obtaining co-dominance. The subcanopy stratum (0.5–2 m) is sparse, with cover usually below 10%. The field stratum (<0.5 m) has highly variable cover (5–50%), which is predominantly provided by perennial grasses, especially Pinyon ricegrass (*Piptochaetium fimbriatum*).

The canopy stratum in this association is densely vegetated, with an average total cover of approximately 50%. Total cover may range as low as 30% in open, grassy examples or may reach approximately 70% in the most densely wooded versions. Alligator juniper (*Juniperus deppeana*), Emory oak (*Quercus emoryi*), and Arizona white oak (*Quercus arizonica*) are consistently present (1.0) across all examples of this community and grow here as trees between 5 and 10 meters in height. Of the three species, alligator juniper is the primary dominant, with an average cover of 30%. Emory oak is the more dominant of the oaks and generates an average of 20% cover. Arizona white oak, though always present, generally contributes cover similar to or less than that of Emory oak, with an average cover value of about 13%. Border pinyon (*Pinus discolor*), a common dominant in other woodland types at Chiricahua National Monument, is a common (0.9) associate but contributes far less cover here than alligator juniper, Emory oak, and Arizona white oak. Other tree species, such as Chihuahuan pine (*Pinus leiophylla*), Arizona cypress (*Hesperocyparis arizonica*), silverleaf oak (*Quercus hypoleucoides*), and Arizona sycamore (*Platanus wrightii*), may be present but rarely contribute significant overall cover.

Shrub cover is generally low in this community, with total subcanopy cover averaging below 10%. Pointleaf manzanita (*Arctostaphylos pungens*) is consistent (1.0) and the most abundant species in this stratum with an average cover of approximately 8%. Common low-cover associates include mountain yucca (*Yucca madrensis*), beargrass (*Nolina microcarpa*), Wright's silktassel (*Garrya wrightii*), and catclaw mimosa (*Mimosa aculeaticarpa*).

The field stratum is variable, ranging from 5% in densely wooded examples to 50% in examples with a more open canopy. Pinyon ricegrass (*Piptochaetium fimbriatum*) is generally the dominant species and occurs in almost all examples (0.9). It is accompanied by a variable mix of other perennial grass species, including, in order from most to least common, sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), bullgrass (*Muhlenbergia emersleyi*), hairy grama (*Bouteloua hirsuta*), and spidergrass (*Aristida ternipes*). When present, each of these species, on average, contributes between 5% and 10% cover.

Global Type Concept Description

Data not available.

Species Summary

See Tables 29 and 30 for species summary details.

Table 29. Most abundant species: *Juniperus deppeana* - *Quercus emoryi* - (*Quercus arizonica*) / *Piptochaetium fimbriatum* Woodland Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Juniperus deppeana* (1.0), *Quercus emoryi* (1.0), *Quercus arizonica* (1.0)
Canopy (2–5 m)	*Juniperus deppeana* (1.0), *Quercus emoryi* (1.0), *Quercus arizonica* (1.0)
Subcanopy (0.5–2 m)	*Arctostaphylos pungens* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 29 (continued). Most abundant species: *Juniperus deppeana* - *Quercus emoryi* - (*Quercus arizonica*) / *Piptochaetium fimbriatum* Woodland Association (P).

Stratum	Species [A]
Field (0–0.5 m)	*Piptochaetium fimbriatum* (0.9)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 30. Other noteworthy species: *Juniperus deppeana* - *Quercus emoryi* - (*Quercus arizonica*) / *Piptochaetium fimbriatum* Woodland Association (P).

Stratum	Species
Canopy (>5 m)	*Pinus leiophylla, Hesperocyparis arizonica, Pinus discolor*
Canopy (2–5 m)	*Pinus discolor*
Subcanopy (0.5–2 m)	*Yucca madrensis, Nolina microcarpa, Garrya wrightii, Mimosa aculeaticarpa*
Field (0–0.5 m)	*Bouteloua curtipendula, Muhlenbergia emersleyi, Bouteloua hirsuta, Aristida ternipes*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 10 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: None

Chiricahua National Monument Polygons: F087, F113, F206, F208, F210, F212, W210, W216, W242, W253

Local Description Author: J. Black

16. ***Pseudotsuga menziesii / Quercus hypoleucoides*** **Forest Association**

Common Name: Douglas-fir / Silverleaf Oak Forest Association

NVC Name: *Pseudotsuga menziesii* / *Quercus hypoleucoides* Forest Association

Identifier: CEGL000453

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Pinus leiophylla - Pseudotsuga menziesii* / *Quercus hypoleucoides* Madrean Montane Forest & Woodland Macrogroup [M011]

Group: *Pseudotsuga menziesii* - Pinus strobiformis / *Quercus hypoleucoides* Forest & Woodland Group [G202]

Alliance: *Pseudotsuga menziesii* / *Quercus hypoleucoides* - *Quercus rugosa* Forest & Woodland Alliance [A3108]

Association: *Pseudotsuga menziesii* / *Quercus hypoleucoides* Forest Association [CEGL000453]

Chiricahua National Monument Type Concept Description

Distribution
This community occupies the upper Rhyolite drainage and high elevation, steep, north-facing slopes in the Monument.

Environmental Description
This forest association occurs between 1,860 and 2,265 meters in elevation (6,102–7,431 ft). Slope is variable. In examples that include the major drainage, slope is gradual because of the gentle rise of rhyolite. Examples in upper tributaries and on the walls rising above the drainages are generally steep, rising above 50% slope. However, the type will extend onto the upper edges of these slopes and at ridge shoulders where the slope becomes gradual again. Litter is the dominant ground cover in most examples creating a cover ranging from 35% to greater than 60%. Rocks and bedrock generate most of the remaining ground cover. Boulders and larger rocks gather in drainages and hoodoos line the minor drainage edges. Rocks are both extrusive igneous (rhyolite) and volcanic tuff in origin, and hoodoos are composed of volcanic tuff.

Vegetation Description
This forested community is characterized by a closed canopy, wherein the upper stratum, on its own, creates a cover greater than 60% in almost all drainage-associated examples. Trees greater than five meters in height (the upper stratum) are the dominant cover in all drainage examples and on many of the slopes near Rhyolite drainage. Douglas-fir (*Pseudotsuga menziesii)* and Arizona pine (*Pinus arizonica*) usually trade dominance in the examples. In most examples the less present of the two

species is still considered a lesser dominant. Douglas-fir, when dominant, creates cover in the 34–75% range; as an associate, the cover averages within the 11–25% range. Arizona pine is the weaker dominant of the two, occurring as dominant in fewer of the examples and occasionally absent (0.71). It generates 26–33% cover as a dominant and about 5–10% as an associate. In examples where the associated trees Arizona cypress (*Hesperocyparis arizonica*), silverleaf oak (*Quercus hypoleucoides*), and Chihuahuan pine (*Pinus leiophylla*) are dominant, either Douglas-fir, Arizona pine, or both will be a lesser dominant. Large conifers are the tallest trees of this type. Heights upward of 25 meters were recorded. In the uplands forest examples (i.e., outside of major drainages), tree heights remained tall, but within a 7–12-meter range for their upper heights. Arizona cypress, a common tree in drainages within Chiricahua National Monument, occurs in many examples (0.45), as does Chihuahuan pine (0.45).

As the tall trees are well-spaced basally, the lower canopy has an opportunity to create a second, less dense, wooded canopy. Silverleaf oak (*Quercus hypoleucoides*) is a tree that bridges all strata, from sprawling shrub among the few herbaceous plants to a lesser height member of the upper stratum. At its tallest, the oak is recorded as 11 meters in height. It is most commonly found in the lower canopy stratum (2–5 m), where it co-dominates with netleaf oak (*Quercus rugosa*). Lower canopy dominants generate, on average, 11–25% total cover (ranging from 1% upwards to 34–50%) in each of the primary and secondary dominant ranks. Netleaf oak is present in almost all examples (0.96) and when present, generates an average of 15% cover. Canyon live oak (*Quercus chrysolepis*) is an infrequent (0.33) associate and in almost all cases generates cover well below 5%. Border pinyon (*Pinus discolor*), ubiquitous in most of Chiricahua National Monument, is a less frequent contributor to this stratum. Frequently, younger recruits of the tallest conifers comprise the lower canopy populations.

The subcanopy layer (0.5–2 m) is generally occupied by the recruits and shrub-forms of the lower canopy dominants. Mountain yucca (*Yucca madrensis*) and beargrass (*Nolina microcarpa*) will also occupy the litter strewn drainage islands and forests floors.

In uplands examples, the height difference between the lower and upper canopies is reduced and cover numbers are similar between the strata as well. On steep-north facing slopes, especially those away from Rhyolite, the upper canopy creates a much sparser tree layer (10–25%) over a subcanopy that features a stronger presence of border pinyon (*Pinus discolor*). Netleaf oak (*Quercus rugosa*) and silverleaf oak (*Quercus hypoleucoides*) can then create a dense subcanopy with 25-45% in the few examples of this variety.

The field stratum (<0.5 m) is primarily occupied by shrub-forms of the dominant species of the upper strata, the woody-stemmed Oregon boxleaf (*Paxistima myrsinites*), and occasional perennial grasses. Longtongue muhly (*Muhlenbergia longiligula*) was observed many examples (0.62), while the shade and litter-loving pinyon ricegrass (*Piptochaetium fimbriatum*), abundant in many other woodland and forest types at the monument, is relatively rare.

Global Type Concept Description
This highly diverse Madrean woodland association is restricted to the isolated "sky island" mountain ranges of southwestern New Mexico, southern Arizona, and northern Mexico. It is specifically known from the Chiricahua, Pinaleno and Santa Catalina mountains, and occasionally along the rim of the Natanes Plateau. It is also present in the Mogollon Mountains in New Mexico. Stands typically occur at elevations ranging from 2,010 to 2,350 meters (6,600–7,700 ft) on northerly to east-facing, mid to upper slopes. *Pseudotsuga menziesii* dominates the overstory with *Pinus ponderosa* as a major seral or, in some instances, a co-climax dominant. *Abies concolor* is absent or accidental. *Juniperus deppeana* is common as a subcanopy tree or shrub. Undergrowth is characterized by Madrean species, with *Quercus hypoleucoides* ranging from well-represented to abundant. *Quercus arizonica* and *Quercus rugosa* are common to well-represented but are subordinate to *Quercus hypoleucoides*. Other shrubs include *Ceanothus fendleri, Cercocarpus montanus*, and *Garrya wrightii*. The robust grass *Muhlenbergia longiligula* is well-represented and typically dominates the ground cover. *Bromus ciliatus var. richardsonii, Carex geophila, Koeleria macrantha*, and *Poa fendleriana* can also be present. Forbs are poorly represented; the most constant species are *Comandra umbellata, Ageratina herbacea, Mirabilis comata*, and *Packera neomexicana*.

Diagnostic Characteristics: Oaks are well-represented and dominated by *Quercus hypoleucoides*. *Pseudotsuga menziesii* is a dominant tree at late succession, often co-dominant with *Pinus ponderosa*.

Species Summary
See Tables 31 and 32 for species summary details.

Table 31. Most abundant species: *Pseudotsuga menziesii* / *Quercus hypoleucoides* Forest Association.

Stratum	Species [A]
Canopy (>5 m)	*Pseudotsuga menziesii* (1.0), *Pinus arizonica* (0.71), *Quercus hypoleucoides* (1.0)
Canopy (2–5 m)	*Quercus hypoleucoides* (1.0)
Subcanopy (0.5–2 m)	*Quercus rugosa* (1.0)
Field (0–0.5 m)	*Muhlenbergia longiligula* (0.62)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 32. Other noteworthy species: *Pseudotsuga menziesii* / *Quercus hypoleucoides* Forest Association.

Stratum	Species
Canopy (>5 m)	*Hesperocyparis arizonica, Pinus leiophylla*
Canopy (2–5 m)	*Pinus discolor, Quercus chrysolepis, Pinus engelmannii, Arbutus arizonica, Juniperus deppeana, Quercus arizonica*
Subcanopy (0.5–2 m)	*Yucca madrensis, Nolina microcarpa, Garrya wrightii, Arctostaphylos pungens, Quercus toumeyi, Quercus turbinella*
Field (0–0.5 m)	*Piptochaetium fimbriatum, Paxistima myrsinites*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 6 classification plots and 18 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: Data not available

NatureServe Conservation Status: G3

Conservation Status Reasons: This is a restricted Southwest regional endemic community and scattered within its range. *Pseudotsuga menziesii*-dominated Madrean communities are uncommon and unusual, occupying unique habitats. Stands tend to be small; many have been impacted by logging, fuelwood removal and altered fire regimes, leading to increased fragmentation and loss. In addition, the majority of the remaining high-quality occurrences are found in remote areas where livestock impacts are minimal.

<u>Element Sources</u>

Chiricahua National Monument Plots: IP033, IP081, IP230, IP233, IP244, IP353

Chiricahua National Monument Polygons: F067, F215, F243, F245, F258, F262, IFF013, IFF015, IFF017, IFF019, IFF021, IFF023, IFF025, IFF027, IFW077, W241, W272, WS139

Local Description Authors: B. Fallon, L. Crumbacher, S. Studd, J. Black

17. (*Pseudotsuga menziesii - Hesperocyparis arizonica*) / *Quercus rugosa - Quercus chrysolepis* Forest Association (P)

Common Name: (Douglas-fir - Arizona Cypress) / Netleaf Oak - Canyon Live Oak Forest Association

NVC Name: N/A

Identifier: NPSSODN180

NVC Classification
Division: Madrean-Balconian Forest & Woodland [1.B.1.Nd]

Macrogroup: Madrean Montane Forest & Woodland [M011]

Group: Madrean Upper Montane Conifer – Oak Forest & Woodland [G202]

Alliance: Madrean Douglas-fir / Oak Forest & Woodland [A3108]

Association: (*Pseudotsuga menziesii – Hesperocyparis arizonica*) / *Quercus rugosa – Quercus chrysolepis* Forest Association (P) [NPSSODN180]

Chiricahua National Monument Type Concept Description

Distribution
This community is scattered in drainages and north-facing slopes near Sugarloaf Mountain and in the upper part of the Rhyolite canyon watershed.

Environmental Description
This forest association occurs between 1,885 and 2,110 meters in elevation (6,184–6,923 ft). It can be found either in drainages, where slope and aspect are variable, or on steep (>35%), rocky, north-trending upper mountain slopes. In both forms of this community, rock, bedrock outcrops, and litter are the dominant surface cover. Parent material consists of extrusive igneous and volcanic ash bedrock, with new alluvium common in the drainage versions of this community.

Vegetation Description
This forested community is characterized by a closed canopy stratum (>2 m) dominated by a combination of Arizona cypress (*Hesperocyparis arizonica*), Douglas-fir (*Pseudotsuga menziesii*), canyon live oak (*Quercus chrysolepis*), and netleaf oak (*Q. rugosa*). The subcanopy (0.5–2 m) stratum is open (<25%) and contains shrubby oaks with a mix of other low-cover associate shrubs. The field stratum is similarly open with pinyon ricegrass (*Piptochaetium fimbriatum*) the most abundant species in this stratum.

The upper layer of the canopy (>5 m) is dominated by tall (up to 18 m) Douglas-fir (*P. menziesii*) and Arizona cypress (*H. arizonica*), which generally trade dominance, with either species potentially the clear dominant while the other species may be an associate or entirely absent. Though neither species is consistently present, each is present in the majority of examples (0.83) and at least one of the two is present in any given example. Across all examples, each species provides an average of 10–25% cover but can easily exceed 50% cover when dominant. Total canopy cover above 5 meters in height ranges between 35% and 50%.

Canyon live oak (*Q. chrysolepis*) and netleaf oak (*Q. rugosa*) form a lower canopy layer below the large conifers. Both species are present in all examples of this association (1.0). Though taller individuals of both species, especially canyon live oak, sometimes reach above 5 meters, they each generate most of their cover between 2 and 5 meters in height. In this stratum, they are generally co-dominant, each contributing between 10% and 25% cover in most examples. Total cover in this lower canopy stratum is similar to that of the upper canopy, ranging between 40% and 50%.

The subcanopy stratum is relatively open with total cover generally falling between 10% and 25%. Shorter-stature netleaf oak individuals generally account for much of this cover, contributing 5–10%, but occasionally up to 25%. Common subcanopy associates include, in order from most to least common, Oregon boxleaf (*Paxistima myrsinites*), silverleaf oak (*Quercus hypoleucoides*), mountain yucca (*Yucca madrensis*), Sonoran scrub oak (*Quercus turbinella*), beargrass (*Nolina microcarpa*), mountain ninebark (*Physocarpus monogynus*), and rockspirea (*Holodiscus discolor*).

The field stratum ranges from 10% to 25% cover in most examples, though it may be extremely sparse in places where canopy cover is highest. Pinyon ricegrass (*P. fimbriatum*) is the consistent (1.0) dominant in this stratum. Notable associate species include longtongue muhly (*Muhlenbergia longiligula*), Fendler's meadow-rue (*Thalictrum fendleri*), and sedges (*Carex* sp.).

Global Type Concept Description

This association in many respects resembles the currently accepted USNVC association CEGL000454 (*Pseudotsuga menziesii* / *Quercus rugosa forest*). However, given the prevalence of *Hesperocyparis arizonica* in examples of this association at Chiricahua National Monument and its apparent absence from CEGL000454 elsewhere, we believe that our association should be described separately, rather than as a variation of the existing association. The global type concept description for CEGL000454 is included below.

This minor conifer forest association occurs in mid-elevations of mountain ranges of southwestern New Mexico (Animas Mountains) and southeastern Arizona (Santa Catalina, Santa Rita, and Huachuca mountains with outliers in the Mogollon Mountains), and likely occurs in adjacent Texas and northern Mexico. Stands are found in rugged, steep topography and restricted to cool, dry-mesic sites from 1,980 to 2,285 meters elevation on northerly aspects and from 2,285 to 2,440 meters on warmer aspects. Soils are shallow and very rocky and are derived from rhyolite and granite parent materials. Rock outcrops are common. At higher elevations the association occurs on steep, mid and upper slopes with convex topography and windy exposures. Stands can also occur as a topo-edaphic climax at lower elevations in ravines and canyons, which have significant cold air drainage. These sites have deeper soil but remain cool. The tree canopy is dominated by *Pseudotsuga menziesii* with Pinus ponderosa or *Pinus arizonica* often co-dominant. *Pinus strobiformis* and *Pinus* *discolor* may be present in some stands. The shrub layer is dominated by the broad-leaved evergreen oak *Quercus rugosa*, often with >60% cover. *Quercus hypoleucoides* is also commonly present, but with <5% cover. On very rocky sites *Quercus chrysolepis* can be abundant, with cover up to 20%. The herbaceous layer has low cover and moderate diversity. Perennial grasses may include *Koeleria macrantha*, *Muhlenbergia longiligula*, and *Poa fendleriana*. Forbs typically present include *Galium tinctorium, Hedeoma hyssopifolia*, *Lathyrus graminifolius*, *Packera neomexicana*, *Thalictrum fendleri*, and *Vicia americana*. The dominance of *Quercus rugosa* in the shrub layer distinguishes this association from other *Pseudotsuga menziesii*-dominated forests.

Species Summary

See Tables 33 and 34 for species summary details.

Table 33. Most abundant species: (*Pseudotsuga menziesii* - *Hesperocyparis arizonica*) / *Quercus rugosa* - *Quercus chrysolepis* Forest Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Hesperocyparis arizonica* (0.83), *Pseudotsuga menziesii* (0.83), *Quercus chrysolepis* (1.0)
Canopy (2–5 m)	*Quercus rugosa* (1.0), *Quercus chrysolepis* (1.0)
Subcanopy (0.5–2 m)	*Quercus rugosa* (1.0)
Field (0–0.5 m)	*Piptochaetium fimbriatum* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 34. Other noteworthy species: (*Pseudotsuga menziesii* - *Hesperocyparis arizonica*) / *Quercus rugosa* - *Quercus chrysolepis* Forest Association (P).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Pinus discolor, Quercus hypoleucoides*
Subcanopy (0.5–2 m)	*Quercus hypoleucoides, Holodiscus discolor, Paxistima myrsinites, Yucca madrensis, Quercus turbinella, Nolina microcarpa, Physocarpus monogynus*
Field (0–0.5 m)	*Muhlenbergia longiligula, Thalictrum fendleri, Carex* sp.

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 6 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: This association (CEGL000454) is treated as a *Quercus rugosa* phase of *Pseudotsuga menziesii* / *Quercus hypoleucoides* Forest (CEGL000453) by Bassett et al. (1987) and Stuever and Hayden (1997a). Muldavin et al. (1996) classified this community as the *Pseudotsuga menziesii* / *Quercus rugosa* habitat type.

NVC Classification Confidence: Low

Distribution and Conservation Status
Global Range: Data not available

NatureServe Conservation Status (CEGL000454): G2

Conservation Status Reasons (CEGL000454): This association is limited in its distribution to the "Borderlands" of southwestern New Mexico, southeastern Arizona and possibly in the Trans-Pecos region of western Texas and the northern Sierra Madre Occidentale of Mexico. Stands are small and reflect the late successional stage of mesic Sierra Madrean Forest. They have very high grass and forb diversity, with a preponderance of Sierra Madrean elements that have a restricted distribution in the United States. Grazing, and to a lesser degree timber harvest, continues to impact the association throughout its range.

Element Sources
Chiricahua National Monument Plots: None

Chiricahua National Monument Polygons: F070, IFF005, IFF011, IFF038, IFW030, WRO047

Local Description Authors: J. Black

18. ***Hesperocyparis arizonica / Quercus hypoleucoides*** **Forest Association**

Common Name: Arizona Cypress / Silverleaf Oak Forest Association

NVC Name: *Hesperocyparis arizonica* / *Quercus hypoleucoides* Forest Association

Identifier: CEGL000352

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Pinus leiophylla - Pseudotsuga menziesii* / *Quercus hypoleucoides* Madrean Montane Forest & Woodland Macrogroup [M011]

Group: *Pinus engelmannii* - *Pinus leiophylla* - *Pinus arizonica* Forest & Woodland Group [G203]

Alliance: *Hesperocyparis arizonica* Forest & Woodland Alliance [A0163]

Association: *Hesperocyparis arizonica* / *Quercus hypoleucoides* Forest Association [CEGL000352]

Chiricahua National Monument Type Concept Description

Distribution

This association is found on north-facing slopes and drainages throughout much of the monument.

Environmental Description

This woodland/intermittently flooded forest association generally occurs on north-trending mountain backslopes and in small drainages from 1,630 to 2,150 meters (5,347–7,054 ft) elevation. Slopes range from gentle (<5%) to very steep (50%), though most examples fall between 6% and 35%. Surface cover mainly consists of bedrock outcrops, rock, and gravel, with occasional litter and bare soil. Parent material is generally extrusive igneous rock, volcanic ash bedrock, or new alluvium, with occasional examples containing intrusive igneous bedrock, colluvium, and old alluvium.

Vegetation Description

This wooded shrubland community is characterized by a dense (average 50%) canopy (>2 m) dominated by Arizona cypress (*Hesperocyparis arizonica*) and border pinyon (*Pinus discolor*) and an open (average 25%) subcanopy (0.5–2 m) dominated by shrubby netleaf and silverleaf oaks (*Quercus rugosa* and *Q. hypoleucoides*). The field layer (<0.5 m) is sparse (<10%) with no clear dominants.

Arizona cypress (*H. arizonica*) and border pinyon (*P. discolor*) are both consistent (1.0 and 0.96, respectively) dominants in the canopy strata that each generate approximately 20% to 25% average cover. Arizona cypress generally ranges from 3 to 17 meters in height, while border pinyon ranges from approximately 2.5 to 11 meters. Netleaf oak (*Q. rugosa*) and silverleaf oak (*Q. hypoleucoides*) provide substantial cover spanning both the canopy and subcanopy strata. The generally tree-like silverleaf oak is present in almost all examples of this community (0.88) and generates on average

7% cover in the canopy and 3% to 4% in the subcanopy. Netleaf oak, which grows as a large shrub, is found in all examples (1.0) and generates an average of 14% total cover, approximately evenly split between the canopy and subcanopy. Alligator juniper (*Juniperus deppeana*), canyon live oak (*Q. chrysolepis*), Chihuahuan pine (*P. leiophylla*), and Arizona white oak (*Q. arizonica*) are occasional (≤0.35) associates that on average contribute 5% cover or less but may be locally abundant.

Toumey oak (*Q. toumeyi*) and pointleaf manzanita (*Arctostaphylos pungens*) are common associates (0.81, 0.70) that each contribute between 5% and 10% cover across all examples of the community but can each be present in dense inclusions up to approximately 40% cover. Wright's silktassel (*Garrya wrightii*) is another common (0.70) associate species with cover values typically falling below those of Toumey oak and pointleaf manzanita. Other noteworthy subcanopy species include, in order of decreasing frequency, beargrass (*Nolina microcarpa*), mountain yucca (*Yucca madrensis*), and banana yucca (*Y. baccata*). Alderleaf mountain mahogany (*Cercocarpus montanus*) and evergreen sumac (*Rhus virens*) are relatively rare in this community, with frequency values of 0.15 and 0.11, respectively.

The very open field stratum has no clear dominants. Pinyon ricegrass (*Piptochaetium fimbriatum*) is the most common (0.63) field occupant, followed by the slightly less common (0.44) longtongue muhly (*Muhlenbergia longiligula*). Average cover for both species is below 1%, though each may occasionally reach 5–10% cover in some examples.

Global Type Concept Description
This forest association is found on slopes and in drainages in the Dragoon, Santa Catalina, and Chiricahua mountains in southeastern Arizona. Sites tend to be cool and moist with northern or eastern aspects, elevations 1,460–1,770 meters. Dominant trees are *Hesperocyparis arizonica*, *Pinus discolor*, *Quercus hypoleucoides, Quercus palmeri*, and *Quercus arizonica*. The shrub layer is heavy and diverse. Common shrubs include *Quercus rugosa, Arctostaphylos pungens, Cercocarpus montanus, Fendlera rupicola, Garrya wrightii, Ceanothus fendleri, Nolina microcarpa, Fraxinus anomala,* and *Prunus virginiana*. The herbaceous layer is also diverse with many graminoids such as *Bouteloua curtipendula, Poa fendleriana, Carex geophila, Koeleria macrantha, Piptochaetium pringlei, Elymus elymoides, Schizachyrium scoparium, Muhlenbergia longiligula,* and *Muhlenbergia richardsonis*. The forb *Packera neomexicana* is typical. Fires may be important for *Hesperocyparis arizonica* seed to germinate.

Species Summary
See Tables 35 and 36 for species summary details.

Table 35. Most abundant species: *Hesperocyparis arizonica* / *Quercus hypoleucoides* Forest Association.

Stratum	Species [A]
Canopy (>5 m)	*Pinus discolor* (1.0), *Hesperocyparis arizonica* (0.96)
Canopy (2–5 m)	*Pinus discolor* (1.0), *Hesperocyparis arizonica* (0.96), *Quercus hypoleucoides* (0.89)
Subcanopy (0.5–2 m)	*Quercus rugosa* (1.0), *Quercus hypoleucoides* (0.89)
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 36. Other noteworthy species: *Hesperocyparis arizonica* / *Quercus hypoleucoides* Forest Association.

Stratum	Species
Canopy (>5 m)	*Pinus leiophylla*
Canopy (2–5 m)	*Juniperus deppeana, Quercus chrysolepis*, *Pinus leiophylla*, *Quercus arizonica*
Subcanopy (0.5–2 m)	*Quercus toumeyi, Arctostaphylos pungens, Garrya wrightii, Nolina microcarpa, Yucca madrensis, Yucca baccata, Cercocarpus montanus, Rhus virens*
Field (0–0.5 m)	*Piptochaetium fimbriatum, Muhlenbergia longiligula*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 7 classification plots and 20 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: This association is restricted to cool and moist slopes and drainages with northern or eastern aspects, at elevations of 1,460–1,770 meters in the Dragoon, Santa Catalina, and Chiricahua mountains in southeastern Arizona. Stands tend to be small, occurring in pockets of habitat.

NatureServe Conservation Status: G2

Conservation Status Reasons: This association is restricted to cool and moist slopes and drainages with northern or eastern aspects, elevations 1,460–1,770 meters in the Dragoon, Santa Catalina, and Chiricahua mountains in southeastern Arizona. The cool, moist habitat conditions required by *Hesperocyparis arizonica* are not common in southern Arizona. Stands tend to be small occurring in pockets of suitable habitat that are protected from fire. *Hesperocyparis arizonica* is a non-sprouter without fire adaptations. It is considered relictual and few occurrences of this association have been documented.

Element Sources
Chiricahua National Monument Plots: IP006, IP008, IP020, IP105, IP148, IP236, IP340, IP357

Chiricahua National Monument Polygons: F057, F119, F134, F140, F155, F157, F211, F217, F231, IFF034, IFF035, IFF057, IFW070, IFW071, IFW075, IFW089, IFW090, W236, W237, W239

Local Description Authors: J. Black, B. Fallon, L. Crumbacher, S. Studd, J. Galvin

19. ***Hesperocyparis arizonica* - (*Platanus wrightii*) / *Quercus* spp. Intermittently Flooded Forest Association (P)**

Common Name: Arizona Cypress - (Arizona Sycamore) / Oak Species Intermittently Flooded Forest Association

NVC Name: N/A

Identifier: NPSSODN185

NVC Classification
Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Pinus leiophylla - Pseudotsuga menziesii* / *Quercus hypoleucoides* Madrean Montane Forest & Woodland Macrogroup [M011]

Group: *Pinus engelmannii* - *Pinus leiophylla* - *Pinus arizonica* Forest & Woodland Group [G203]

Alliance: *Hesperocyparis arizonica* Forest & Woodland Alliance [A0163]

Association: *Hesperocyparis arizonica* - (*Platanus wrightii*) / *Quercus* spp. Intermittently Flooded Forest Association (P) [NPSSODN185]

Chiricahua National Monument Type Concept Description

Distribution
This community spans the Bonita Creek drainage from the western boundary to the King of Lead Mine Road, including the North Bonita Canyon.

Environmental Description
This community spans low-angle (<10%), west to southwest trending drainages from 1,565 to 2,110 meters (5,134–6,922 ft). Tributary drainages such as North Bonita Canyon tend to have steeper slopes as they descend along mountain backslopes. Ground cover reflects the dense canopies with leaf litter contributing 35% to greater than 60% of the ground cover and gathers on islands of accumulated gravel and rock. Rocks of volcanic tuff and rhyolite create the most common ground cover with large rocks and boulders deposited along the drainage channels.

Vegetation Description
This intermittently flooded forest community is characterized by a dense (average 45%) upper canopy (>5 m) dominated by Arizona cypress (*Hesperocyparis arizonica*) and silverleaf oak (*Quercus hypoleucoides*) with scattered Arizona sycamore (*Platanus wrightii*) throughout. As this community spans a broad elevational range and bisects the monument, variations in canopy density and associate species are expected. In general, canopy density increases from the lowest elevation example near the entrance station to the highest elevation example near King of Lead Mine Road.

In the upper canopy, Arizona cypress (*H. arizonica*) is a consistent (1.0) dominant, typically providing 30–35% cover with some examples approaching 70%. This species is present as large, 10–20 meter tall trees. Silverleaf oak (*Q. hypoleucoides*) is a consistent (1.0) secondary dominant with average cover around 20%, with some examples up to 70%. While the bulk of its cover occurs in the upper canopy, this species is present in multiple strata with an average of 7% in the lower canopy (2–5 m) and 5% in the subcanopy (0.5–2 m) as shrubby individuals. Throughout the elevational gradient of this community a series of oak species may appear as associates, and occasionally approach or exceed the cover of silverleaf oak. From low elevation to high, these species include, Emory oak (*Quercus emoryi*), Arizona white oak (*Quercus arizonica*), netleaf oak (*Quercus rugosa*), canyon live oak (*Quercus chrysolepis*). Of these, Arizona white oak (*Q. arizonica*) is the most consistent (0.90) with average cover of approximately 10%. Arizona sycamore (*Platanus wrightii*) is indicative of this association at Chiricahua National Monument and is present in almost all examples (0.9) of this community, at cover ranging from less than 1% to 10%. Other riparian tree species, including Arizona walnut (*Juglans major*) and velvet ash (*Fraxinus velutina*), which are uncommon elsewhere in the monument, are occasional (≤0.2) in this association, and may be locally abundant in some examples. Border pinyon (*Pinus discolor*), alligator juniper (*Juniperus deppeana*), and Arizona madrone (*Arbutus arizonica*) are common associates that generally each contribute below 10% cover, though alligator juniper occasionally may reach 20% in some examples.

The subcanopy stratum in and immediately adjacent to the watercourse is typically sparse (< 10%) and lacks clear dominants. In these areas species such as Wright's silktassel (*Garrya wrightii*), shrubby silverleaf oak (*Q. hypoleucoides*), yucca (*Yucca madrensis*). On the adjacent slopes, as the forest transitions to the more xeric, adjacent upland habitats, density increases (10–30%, rarely to 50%) and species composition changes. In these areas uplands species, such as pointleaf manzanita (*Arctostaphylos pungens*) begin to dominate.

The sparse (usually < 10%) field layer (< 0.5 m) is characterized by a low-cover mix of perennial graminoids. As in most forested areas, pinyon ricegrass (*Piptochaetium fimbriatum*) and longtongue muhly (*Muhlenbergia longiligula*) are the most common grasses, with pinyon ricegrass most abundant in shaded areas and longtongue muhly more common in more open areas. Other less common and generally low cover species in this stratum include sideoats grama (*Bouteloua curtipendula*), Texas bluestem (*Schizachyrium cirratum*), and sedges (*Carex* spp.).

Global Type Concept Description
Data not available.

Species Summary
See Tables 37 and 38 for species summary details.

Table 37. Most abundant species: *Hesperocyparis arizonica* - (*Platanus wrightii*) / *Quercus* spp. Intermittently Flooded Forest Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Hesperocyparis arizonica* (1.0), *Quercus hypoleucoides* (1.0), *Platanus wrightii* (0.9)
Canopy (2–5 m)	*Quercus hypoleucoides* (1.0)
Subcanopy (0.5–2 m)	None
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 38. Other noteworthy species: *Hesperocyparis arizonica* - (*Platanus wrightii*) / *Quercus* spp. Intermittently Flooded Forest Association (P).

Stratum	Species
Canopy (>5 m)	*Juniperus deppeana*, *Pinus discolor*, *Arbutus arizonica*, *Juglans major*, *Quercus arizonica, Quercus emoryi, Quercus rugosa, Quercus chrysolepis*
Canopy (2–5 m)	*Arbutus arizonica*, *Pinus discolor*, *Quercus rugosa, Juniperus deppeana*, *Quercus emoryi*, *Quercus chrysolepis*
Subcanopy (0.5–2 m)	*Garrya wrightii*, *Quercus rugosa*, *Quercus toumeyi, Arctostaphylos pungens, Yucca madrensis*
Field (0–0.5 m)	*Piptochaetium fimbriatum, Muhlenbergia longiligula, Bouteloua curtipendula, Schizachyrium cirratum, Carex sp.*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 5 classification plots and 5 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP242, IP325, IP326, IP327, IP328, IP329

Chiricahua National Monument Polygons: IFF014, IFF016, IFF018, IFF020, IFF022

Local Description Authors: B. Fallon, L. Crumbacher, S. Studd, J. Galvin

20. [*Pinus engelmannii - Hesperocyparis arizonica - Quercus hypoleucoides*] Intermittently Flooded Forest Association (P)

Common Name: [Apache Pine - Arizona Cypress - Silverleaf Oak] Intermittently Flooded Forest Association

NVC Name: N/A

Identifier: NPSSODN183

NVC Classification

Division: *Pinus leiophylla - Pseudotsuga menziesii / Quercus hypoleucoides* Madrean Montane Forest & Woodland Macrogroup [M011]

Macrogroup: *Pinus engelmannii* - *Pinus leiophylla* - *Pinus arizonica* Forest & Woodland Group [G203]

Group: *Hesperocyparis arizonica* Forest & Woodland Alliance [A0163]

Association: [*Hesperocyparis arizonica - Quercus hypoleucoides - Pinus engelmannii*] Intermittently Flooded Forest Association (PS) [NPSSODN183]

Chiricahua National Monument Type Concept Description

<u>Distribution</u>
This community is restricted to Rhyolite and Sarah Deming Canyons.

<u>Environmental Description</u>
This community occurs in wide (up to 100 m), west- or northwest-trending drainages between 1,635 and 2,005 meters (5,364–6,578 ft) in elevation. The sloped banks of the drainages are generally low-angle (<15%) or occasionally moderately steep (up to 35%), with variable aspect. Ground cover consists primarily of rock and gravel in the active channels of the drainage and litter elsewhere. Soil is new alluvium.

<u>Vegetation Description</u>
This intermittently flooded forest community is characterized by a tall, dense (60–70%) canopy stratum (>2 m) dominated by a mixture of silverleaf oak (*Quercus hypoleucoides*), Arizona cypress (*Hesperocyparis arizonica*), Apache pine (*Pinus engelmannii*), with associate to co-dominant Arizona pine (*Pinus arizonica*). The lower strata are generally open with no clear, consistent dominants, though shrubby oaks can occasionally form a moderately dense subcanopy layer.

Arizona cypress (*H. arizonica*) and Apache pine (*P. engelmannii*) are present in all examples (1.0) and dominate the upper reaches of the canopy in this community. Apache pine is present in the form of large (16–30 m) trees scattered throughout the community, and on average generates between 11% and 25% cover. Arizona cypress (*H. arizonica*) is generally a slightly shorter tree (12–20 m) and contributes between 11% and 33% cover, generally concentrated immediately next to drainage channels. Silverleaf oak is a consistent (1.0) co-dominant with the conifers that forms a slightly lower-stature layer at approximately 10m in height. On average, this species generates over 20% cover, though occasionally this cover is spread between the canopy and the lower strata. Arizona pine (*Pinus arizonica*) is a consistent (1.0) associate commonly generating between 6% and 10% cover, though it occasionally occurs as a co-dominant with the other conifers and in one example surpasses Apache pine. Arizona madrone (*Arbutus arizonica*), Border pinyon (*Pinus discolor*), and Arizona white oak (*Quercus arizonica*) are consistent (1.0) associates in the canopy and each generate between 1% and 5% cover. Douglas-fir (*Pseudotsuga menziesii*), Chihuahuan pine (*Pinus leiophylla*), and Emory oak (*Quercus emoryi*) are less common (0.67), low-cover associates.

The subcanopy (0.5–2 m) stratum is generally very open in this community, with the majority of examples having less than 5% total cover. This stratum has no clear dominant species, and much of the recorded cover is generated by short individuals of canopy-dominant species. Commonly recorded species include netleaf oak (*Quercus rugosa*), mountain yucca (*Yucca madrensis*), beechleaf frangula (*Frangula betulifolia*), and western white honeysuckle (*Lonicera albiflora*), which each typically contribute less than 1% cover. However, one notable variation of this type includes a moderately dense subcanopy (35%), dominated by shrubby oaks (*Q. hypoleucoides and Q. rugosa*).

The field stratum (<0.5 m) is similarly sparse, rarely, if ever, generating above 5% total cover. Again, there are no consistent dominant species for this stratum, though brackenfern (*Pteridium aquilinum*), nodding brome (*Bromus anomalus*), and *Muhlenbergia* spp. are commonly reported in examples of this community.

Global Type Concept Description
Data not available.

Species Summary
See Tables 39 and 40 for species summary details.

Table 39. Most abundant species: [*Pinus engelmannii* - *Hesperocyparis arizonica* - *Quercus hypoleucoides*] Intermittently Flooded Forest Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Hesperocyparis arizonica* (1.0), *Quercus hypoleucoides* (1.0), *Pinus engelmannii* (1.0)
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	None
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 40. Other noteworthy species: [*Pinus engelmannii* - *Hesperocyparis arizonica* - *Quercus hypoleucoides*] Intermittently Flooded Forest Association (P).

Stratum	Species
Canopy (>5 m)	*Pinus arizonica, Arbutus arizonica, Quercus arizonica*
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	*Frangula betulifolia, Yucca madrensis, Quercus rugosa*
Field (0–0.5 m)	*Pteridium aquilinum, Bromus anomalus, Muhlenbergia* spp.

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 1 classification plot and 2 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

Global Range: Data not available

<u>Distribution and Conservation Status</u>

NVC Classification Confidence: Low

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

<u>Element Sources</u>

Chiricahua National Monument Plots: IP239, IP338

Chiricahua National Monument Polygons: IFF031, IFF048

Local Description Author: J. Black

21. *Pinus engelmannii / Quercus hypoleucoides* Woodland Association

Common Name: Apache Pine / Silverleaf Oak Woodland Association

NVC Name: *Pinus engelmannii* / *Quercus hypoleucoides* Woodland Association

Identifier: CEGL000801

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Pinus leiophylla – Pseudotsuga menziesii* / *Quercus hypoleucoides* Madrean Montane Forest & Woodland Macrogroup [M011]

Group: *Pinus engelmannii – Pinus leiophylla – Pinus arizonica* Forest & Woodland Group [G203]

Alliance: *Pinus arizonica – Pinus engelmannii – Pinus leiophylla* Woodland Alliance [A3112]

Association: *Pinus engelmannii* / *Quercus hypoleucoides* Woodland Association [CEGL000801]

Chiricahua National Monument Type Concept Description

Distribution

This community is scattered across the monument with the most prominent examples occurring on the slopes west of Bonita Park, near Picket Park, and the northeast-trending slopes to the north of Massai Point.

Environmental Description

This community is found on moderate (35%), north-trending mountain backslopes and drainages from 1,715 to 2,095 meters (5,626–6,873 ft). The surface cover is characterized by the dominance of rock, gravel, and litter, with the litter occurring most heavily on drainage banks. Parent material is most often extrusive igneous and volcanic ash, with new alluvium in the drainage bottoms.

Vegetation Description

This community is characterized by dense (50%) canopy strata (>2m) dominated by silverleaf oak (*Quercus hypoleucoides*) with emergent Apache pine (*Pinus engelmannii*). Chihuahuan pine (*Pinus leiophylla*) can be present either as an associate or as an upper-canopy co-dominant with Apache pine.

Silverleaf oak (*Q. hypoleucoides*) is a consistent (0.97) dominant throughout this community with average cover of 25% split across all height strata. The bulk of this cover is found as trees in the lower (2–5 m) and upper (>5 m) canopy strata, with the remainder accounted for by shrubby individuals in the understory strata. When present as trees, individuals of this species range in height from 4 to 13 meters with an average around 8 meters. Apache pine (*P. engelmannii*) is consistently present (1.0) in the form of tall (12 m) emergent trees, exceeding the height of the surrounding oaks, with average cover around 10%. Alligator juniper (*Juniperus deppeana*) is a common (0.94) associate tree with average an average cover of approximately 8%. Chihuahuan pine is present in most examples (0.83) and generally contributes less cover than Apache pine (average 7%), though it is commonly co-dominant with this species and can occasionally surpass it as the dominant tall tree. Arizona white oak (*Quercus arizonica*) is a common (0.75) associate tree that splits an average of 7% cover across both canopy strata. Other common canopy trees include border pinyon (*Pinus discolor*) and Arizona madrone (*Arbutus arizonica*). Emory oak (*Quercus emoryi*) and Arizona cypress (*Hesperocyparis arizonica*) are uncommon (<0.25) associates, though when present each may contribute significant cover.

The subcanopy stratum (0.5–2 m) is characterized by a mix of shrubby oaks, typically silverleaf oak (*Q. hypoleucoides*) and netleaf oak (*Quercus rugosa*), with a low-cover mix of shrubs and succulents. In order from most to least frequent, these species include pointleaf manzanita (*Arctostaphylos pungens*), beargrass (*Nolina microcarpa*), yucca (*Yucca madrensis*), and Wright's silktassel (*Garrya wrightii*). Total cover in this stratum averages about 10% but may occasionally reach 50%.

The field stratum (<0.5 m) is generally sparse, averaging below 10% cover, though in particularly grassy examples of this association it may reach 50%. Species composition is variable: in the most densely wooded examples, the most abundant grasses are longtongue muhly (*Muhlenbergia longiligula*) and pinyon ricegrass (*Piptochaetium fimbriatum*), while bullgrass (*Muhlenbergia emersleyi*) appears more commonly in steep, rocky, and open versions of this association.

Global Type Concept Description

This highly diverse "Madrean" woodland association is restricted to the isolated "sky island" mountain ranges of southern Arizona and northern Mexico. This association may also occur in the Animas Mountains of New Mexico. In the U.S., it is known only from the Santa Rita and Chiricahua mountains, but it may be more prevalent in Mexico. This association occurs on moderate to steep slopes of northerly aspects or on benches. Elevations range from 1,770 to 2,165 meters (5,800–7,100 ft). Soils are predominantly skeletal *Ustochrepts*. Generally, sites are warm and dry. The vegetation is characterized by open stands of *Pinus engelmannii* with *Pinus leiophylla* as an occasional co-dominant. *Quercus hypoleucoides* dominates the subcanopy and shrub layer; *Quercus arizonica* is common, but never dominant. Other shrubs may include *Arbutus arizonica* and *Garrya wrightii. Muhlenbergia longiligula* is well-represented and dominates the herb layer, which is otherwise diverse, variable, and sparse.

Species Summary

See Tables 41 and 42 for species summary details.

Table 41. Most abundant species: *Pinus engelmannii* / *Quercus hypoleucoides* Woodland Association.

Stratum	Species [A]
Canopy (>5 m)	*Pinus engelmannii* (1.0), *Quercus hypoleucoides* (0.97)
Canopy (2–5 m)	*Quercus hypoleucoides* (0.97)
Subcanopy (0.5–2 m)	None
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 42. Other noteworthy species: *Pinus engelmannii* / *Quercus hypoleucoides* Woodland Association.

Stratum	Species
Canopy (>5 m)	*Quercus arizonica, Juniperus deppeana, Pinus leiophylla*
Canopy (2–5 m)	*Arbutus arizonica, Pinus discolor, Quercus arizonica*
Subcanopy (0.5–2 m)	*Arctostaphylos pungens, Quercus hypoleucoides, Quercus rugosa, Nolina microcarpa, Yucca madrensis, Garrya wrightii*
Field (0–0.5 m)	*Muhlenbergia longiligula, Piptochaetium fimbriatum, Muhlenbergia emersleyi*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 17 classification plots and 19 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available.

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Limited number of plots in the US and none in Mexico.

NatureServe Conservation Status: G3

Conservation Status Reasons: This is a limited local endemic community of the isolated ‘sky island' mountain ranges of southern Arizona and northern Mexico. Stands tend to be small and impacted by fuelwood removals and altered fire regimes, leading to significant fragmentation. The number of high-quality occurrences is not likely to exceed 20 in the United States. Occurrence numbers in Mexico are unknown. In addition, the majority of the remaining high-quality occurrences are found in remote areas where livestock impacts are minimal.

Element Sources

Chiricahua National Monument Plots: IP036, IP058, IP060, IP083, IP115, IP231, IP237, IP240, IP241, IP303, IP304, IP305, IP342, IP343, IP344, IP345, IP354, IP355

Chiricahua National Monument Polygons: F250, F253, F255, F257, F260, F263, IFF039, IFF043, IFF044, IFF045, IFF047, IRR049, IFF051, TS027, W229, W251, WS183, WS198, WS207

Local Description Authors: B. Fallon, L. Crumbacher, S. Studd, J. Galvin, J. Black

22. [*Pinus arizonica - Pinus leiophylla*] / *Quercus hypoleucoides* Forest Association (P)

Common Name: [Arizona Pine - Chihuahuan Pine] / Silverleaf Oak Forest Association

NVC Name: N/A

Identifier: NPSSODN181

NVC Classification

Division: *Juniperus deppeana - Quercus buckleyi* / *Rhus virens* Madrean-Balconian Forest & Woodland Division [D060]

Macrogroup: *Pinus leiophylla – Pseudotsuga menziesii* / *Quercus hypoleucoides* Madrean Montane Forest & Woodland Macrogroup [M011]

Group: *Pinus engelmannii – Pinus leiophylla – Pinus arizonica* Forest & Woodland Group [G203]

Alliance: *Pinus arizonica – Pinus engelmannii – Pinus leiophylla* Woodland Alliance [A3112]

Association: [*Pinus arizonica* - *Pinus leiophylla*] / *Quercus hypoleucoides* Forest Association (P) [NPSSODN181]

Chiricahua National Monument Type Concept Description

Distribution

This community occurs primarily in association with drainages in the high-elevation southeast corner of the monument, in the upper portions of the Rhyolite and Jesse James watersheds. An isolated example occurs on the upper slopes of Whitetail Canyon in the northeast corner of the monument.

Environmental Description

This forest association occurs on mountain slopes and in drainages from 1,780 to 2,235 meters (5,839–7,332 ft) elevation. Slope and aspect are highly variable, though north-trending slopes are most commonly represented, and most examples have slopes below 35%. Litter is almost always the dominant ground cover and is often interspersed with rock, bedrock, and occasional gravelly areas. Parent material consists mostly of extrusive igneous bedrock and volcanic ash bedrock, colluvium, as well as old and new alluvium.

Vegetation Description

This community is characterized by a dense (average 60%) canopy stratum (>2 m) dominated by silverleaf oak (*Quercus hypoleucoides*), Arizona pine (*Pinus arizonica*) and/or Chihuahuan pine (*Pinus leiophylla*). The generally open to very sparse understory strata contain an inconsistent mixture of species.

Silverleaf oak (*Q. hypoleucoides*) is a consistent (1.0) dominant throughout this community with average cover of about 25% split across all height strata, with trees reaching up to 12 meters in height. In the canopy stratum, this species is typically co-dominant with Arizona pine (*P. arizonica*), Chihuahuan pine (*P. leiophylla*), or a combination of these two species, which are both generally above six meters in height. Arizona pine (*P. arizonica*) is a common (0.82) co-dominant species and generates an average of approximately 16% cover. Chihuahuan pine (*P. leiophylla*) is slightly more common (0.91), though on average its cover (approximately 8%) is less than that of Arizona pine. Taller individuals of netleaf oak (*Quercus rugosa*), which is present in almost all examples (0.91) of this community, often reach the canopy, and contribute an average of about 12% cover in this stratum. Arizona cypress (*Hesperocyparis arizonica*) is commonly (0.82) present as an 8–20 meters tall tree and can be a conspicuous feature of this community, with highly variable cover values. Though the average cover value for this species is approximately 5%, it is occasionally a dominant species with cover values approaching 20%. Border pinyon (*Pinus discolor*) is a very common (0.91) canopy associate species, which generates an average of only 4–5% cover but in some examples can have cover values as high as 25%. Douglas-fir (*Pseudotsuga menziesii*) occurs in most examples (0.82), but generally at very low cover (average <2%), distinguishing this community from adjacent areas where it presents as a dominant species. Other notable but inconsistent (≤0.5) associate species in the canopy strata include alligator juniper (*Juniperus deppeana*), Arizona white oak (*Quercus arizonica*), and Arizona madrone (*Arbutus arizonica*), all with average cover values of less than 4%.

The subcanopy stratum (0.5–2 m) is relatively open, ranging between 5% and 25% total cover. It is generally composed of shrubby oaks, especially netleaf oak (*Q. rugosa*), which contributes between 8% and 10% cover in this stratum. Smaller silverleaf oak individuals also contribute significant cover. Other shrubs and succulents are often, but not universally, present; these include pointleaf manzanita (*Arctostaphylos pungens*), Wright's silktassel (*Garrya wrightii*), Toumey oak (*Quercus toumeyi*), beargrass (*Nolina microcarpa*), and yucca (*Yucca madrensis*).

The sparse (< 10%) field layer (< 0.5 m) contains a couple low-cover graminoids including longtongue muhly (*Muhlenbergia longiligula*) and pinyon ricegrass (*Piptochaetium fimbriatum*).

Global Type Concept Description

Data not available.

Species Summary

See Tables 43 and 44 for species summary details.

Table 43. Most abundant species: [*Pinus arizonica - Pinus leiophylla*] / *Quercus hypoleucoides* Forest Association (P).

Stratum	Species [A]
Canopy (>5 m)	*Pinus leiophylla* (0.91), *Pinus arizonica* (0.82), *Quercus hypoleucoides* (1.0)
Canopy (2–5 m)	*Quercus hypoleucoides* (1.0)
Subcanopy (0.5–2 m)	*Quercus rugosa* (0.91)
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 44. Other noteworthy species: [*Pinus arizonica - Pinus leiophylla*] / *Quercus hypoleucoides* Forest Association (P).

Stratum	Species
Canopy (>5 m)	*Hesperocyparis arizonica, Arbutus arizonica, Pseudotsuga menziesii*
Canopy (2–5 m)	*Pinus discolor*
Subcanopy (0.5–2 m)	*Arctostaphylos pungens, Quercus hypoleucoides, Nolina microcarpa, Yucca madrensis, Garrya wrightii*
Field (0–0.5 m)	*Muhlenbergia longiligula, Piptochaetium fimbriatum*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 1 classification plot and 10 classification polygons sampled during the 2007-2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP341

Chiricahua National Monument Polygons: F071, F207, F209, F223, F233, IFF029, IFF033, IFW085, W203, W257

Local Description Authors: J. Black

23. *Quercus hypoleucoides* Shrubland Association (P)

Common Name: Silverleaf Oak Shrubland Association

NVC Name: N/A

Identifier: NPSSODN194

NVC Classification

Division: Arctostaphylos patula - Ceanothus cordulatus - *Quercus* turbinella Interior Chaparral Division [D061]

Macrogroup: *Quercus* turbinella - Arctostaphylos pungens - Ceanothus greggii Warm Interior Chaparral Macrogroup [M091]

Group: *Quercus* turbinella - Ceanothus greggii - Arctostaphylos pungens Chaparral Group [G281]

Alliance: Cercocarpus montanus Madrean Montane Chaparral [A3791]

Association: *Quercus hypoleucoides* Shrubland Association (P) [NPSSODN194]

Chiricahua National Monument Type Concept Description

Distribution
This shrubland association is limited to the slopes of Whitetail Canyon.

Environmental Description
This shrubland association occurs on variably steep (1–50%), east-trending mountain slopes from 1,910 to 2,185 meters (6,266–7,168 ft) elevation. The substrate consists mostly of gravel, rock, and bedrock derived from extrusive igneous bedrock or volcanic ash bedrock.

Vegetation Description
This shrubland community is characterized by a dense (average 50%) subcanopy stratum (0.5–2 m) dominated by silverleaf oak (*Quercus hypoleucoides*). The canopy stratum is sparse (5–10%, occasionally to 30%), and usually contains scattered conifers that are abundant in surrounding communities. The field stratum is likewise very sparse (<5%), with consistent bullgrass (*Muhlenbergia emersleyi*).

When present, canopy cover in this community usually consists of scattered alligator juniper (*Juniperus deppeana*) or Chihuahuan pine (*Pinus leiophylla*), with rare Apache pine (*Pinus engelmannii*), and Douglas-fir (*Pseudotsuga menziesii*). Average cover for all species is well below 1%.

Silverleaf oak (*Q. hypoleucoides*) is the consistent (1.0) subcanopy dominant, and generates an average of 40% cover, though it may exceed 80% in some dense examples. Beargrass (*Nolina microcarpa*) is consistently present (1.0) and generates below 5% cover on average. Common associate shrubs include pointleaf manzanita (*Arctostaphylos pungens*), Toumey oak (*Quercus toumeyi*), and Fendler's ceanothus (*Ceanothus fendleri*), which each generate an average of approximately 5% cover when present. Mountain yucca (*Yucca madrensis*) and Wright's silktassel are also often present at low cover.

The field stratum is very sparse (<5%). Bullgrass (*Muhlenbergia emersleyi*) is the consistent (1.0) dominant with an average cover of 2–3%. Oakwoods prairie clover (*Dalea versicolor*) and Bigelow's bristlehead (*Carphochaete bigelovii*) are common low-cover associates in this stratum.

Global Type Concept Description
Data not available.

Species Summary
See Tables 45 and 46 for species summary details.

Table 45. Most abundant species: *Quercus hypoleucoides* Shrubland Association (P).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	*Quercus hypoleucoides* (1.0)
Field (0–0.5 m)	None

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 46. Other noteworthy species: *Quercus hypoleucoides* Shrubland Association (P).

Stratum	Species
Canopy (>5 m)	*Pinus leiophylla*
Canopy (2–5 m)	*Juniperus deppeana*
Subcanopy (0.5–2 m)	*Arctostaphylos pungens, Quercus toumeyi, Ceanothus fendleri, Nolina microcarpa*
Field (0–0.5 m)	*Muhlenbergia emersleyi, Dalea versicolor, Carphochaete bigelovii*

Classification Comments
Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 4 classification plots and 4 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP145, IP348, IP349, IP350, IP351

Chiricahua National Monument Polygons: S057, S058, S059, S083

Local Description Authors: J. Black

24. [*Cercocarpus montanus - Garrya wrightii*] / Mixed Perennial Grass Wooded Shrub Savanna Association (P)

Common Name: [Alderleaf Mountain Mahogany - Wright's Silktassel] / Mixed Perennial Grass Wooded Shrub Savanna Association

NVC Name: N/A

Identifier: NPSSODN050

NVC Classification

Division: Arctostaphylos patula - Ceanothus cordulatus - *Quercus* turbinella Interior Chaparral Division [D061]

Macrogroup: *Quercus* turbinella - Arctostaphylos pungens - Ceanothus greggii Warm Interior Chaparral Macrogroup [M091]

Group: *Quercus* turbinella - Ceanothus greggii - Arctostaphylos pungens Chaparral Group [G281]

Alliance: *Cercocarpus montanus* Madrean Montane Chaparral Alliance [A3791]

Association: [*Cercocarpus montanus - Garrya wrightii*] / Mixed perennial grass Wooded Shrub Savanna Association (P) [NPSSODN050]

Chiricahua National Monument Type Concept Description

<u>Distribution</u>
This association is found on north-facing slopes at lower elevations in the western half of the monument.

<u>Environmental Description</u>
This shrub savanna occurs on moderately steep north-trending slopes hillslopes between 1,600 and 1,930 meters (5,249–6,332 ft) elevation. Slope ranges from 6% to over 50%, but most examples fall between 35% and 50%. The substrate is rocky, with rock, gravel, and bedrock accounting for a majority of ground cover. Parent material is usually extrusive igneous bedrock or, less commonly, volcanic ash bedrock.

<u>Vegetation Description</u>
This shrub savanna is characterized by an open (average 20%) subcanopy stratum (0.5–2 m) dominated by alderleaf mountain mahogany (*Cercocarpus montanus*) and Wright's silktassel (*Garrya wrightii*) with a diverse suite of associate shrubs and succulents. The moderately dense (average 30%) field stratum (<0.5 m) contains a diverse mix of perennial grasses, with sideoats grama (*Bouteloua curtipendula*) and bullgrass (*Muhlenbergia emersleyi*) the two most abundant species. Canopy cover is generally sparse and consists of a variable mixture of junipers (*Juniperus* spp.), border pinyon (*Pinus discolor*), and oaks (*Quercus* spp.).

Canopy cover in this association is highly variable, ranging between 0% and 25%, with an average value of approximately 10%. Arizona white oak (*Quercus arizonica*) is a common (0.72) tree reaching four meters in height, and contributes an average of 6% cover when present, or 4% averaged across all examples. Other common tree species include, in order from most to least frequent, alligator juniper (*Juniperus deppeana*), border pinyon (*Pinus discolor*), and Arizona juniper (*J. arizonica*). These species all generate average cover values well below 5%.

Alderleaf mountain mahogany (*Cercocarpus montanus*) is consistently present (1.0) and is the diagnostic species for association. It is generally co-dominant with Wright's silktassel (*Garrya wrightii*), a similarly consistent (0.94) shrub. Each species generates an average cover between 5% and 10%. Beargrass (*Nolina microcarpa*) is a consistent (1.0) low-cover associate generating an average of approximately 1% cover. Other common associate shrub and succulent species include, in order from most to least frequent, mountain yucca (*Yucca madrensis*), evergreen sumac (*Rhus virens*), Toumey oak (*Quercus toumeyi*), Palmer's century plant (*Agave palmeri*), common sotol (*Dasylirion wheeleri*), pointleaf manzanita (*Arctostaphylos pungens*), catclaw mimosa (*Mimosa aculeaticarpa*), and California brickellbush (*Brickellia californica*).

The field stratum in this community is generally moderately dense, with total cover ranging between 12% and 45% cover with an average around 30%. The vegetation in this stratum consists of a diverse mix of perennial grasses. Sideoats grama (*Bouteloua curtipendula*) is generally most abundant, with an average cover of 14%, and is present in almost all examples (0.94). Bullgrass (*Muhlenbergia emersleyi*) is a very common (0.89) associate species and contributes on average about half the cover of sideoats grama (7%). These two species are generally accompanied by a diverse suite of other grasses, including Texas bluestem (*Schizachyrium cirratum*), single threeawn (*Aristida schiedeana*), pinyon ricegrass (*Piptochaetium fimbriatum*), plains lovegrass (*Eragrostis intermedia*), cliff muhly (*Muhlenbergia polycaulis*), and slender grama (*Bouteloua repens*). The invasive rangeland grass Lehmann's lovegrass (*Eragrostis lehmanniana*) is present in some examples (0.28), sometimes approaching 25% cover.

Global Type Concept Description
Data not available.

Species Summary
See Tables 47 and 48 for species summary details.

Table 47. Most abundant species: [*Cercocarpus montanus - Garrya wrightii*] / Mixed Perennial Grass Wooded Shrub Savanna Association (P).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	*Cercocarpus montanus* (1.0), *Garrya wrightii* (0.94)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 47 (continued). Most abundant species: [*Cercocarpus montanus - Garrya wrightii*] / Mixed Perennial Grass Wooded Shrub Savanna Association (P).

Stratum	Species [A]
Field (0–0.5 m)	*Bouteloua curtipendula* (0.94), *Muhlenbergia emersleyi* (0.89)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 48. Other noteworthy species: [*Cercocarpus montanus - Garrya wrightii*] / Mixed Perennial Grass Wooded Shrub Savanna Association (P).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Quercus arizonica, Juniperus deppeana, Pinus discolor, Juniperus arizonica*
Subcanopy (0.5–2 m)	*Nolina microcarpa, Yucca madrensis, Rhus virens, Agave palmeri, Dasylirion wheeleri, Quercus toumeyi, Arctostaphylos pungens, Mimosa aculeaticarpa, Brickellia californica*
Field (0–0.5 m)	*Schizachyrium cirratum, Aristida schiedeana, Piptochaetium fimbriatum, Eragrostis intermedia, Muhlenbergia polycaulis, Eragrostis intermedia, Bouteloua repens*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 5 classification plots and 13 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP055, IP095, IP114, IP144, IP146

Chiricahua National Monument Polygons: S064, S078, SS058, SS068, TS033, TS034, WS149, WS151, WS152, WS155, WS156, WS167, WS169

Local Description Author: J. Black

25. *Parthenium incanum / Eragrostis lehmanniana* Shrub Savanna Association (P)

Common Name: Mariola / Lehmann Lovegrass Shrub Savanna Association

NVC Name: N/A

Identifier: NPSSODN188

NVC Classification

Division: *Acacia greggii - Cylindropuntia leptocaulis - Muhlenbergia porteri* North American Warm Desert Scrub & Grassland Division [D039]

Macrogroup: *Prosopis glandulosa* / *Bromus rubens - Eragrostis lehmanniana* Desert Ruderal Scrub & Grassland Macrogroup [M512]

Group: *Eragrostis lehmanniana* - Bromus rubens - Brassica tournefortii Warm Desert Ruderal Grassland Group [G677]

Alliance: *Eragrostis lehmanniana - Eragrostis curvula* Ruderal Desert Grassland Alliance [A2687]

Association: *Parthenium incanum* / *Eragrostis lehmanniana* Shrub Savanna Association (P) [NPSSODN188]

Chiricahua National Monument Type Concept Description

Distribution

This shrub savanna community is found on mountain and hillslopes on the western side of the monument. The largest examples occur on the south-facing slopes above lower Picket and lower Bonita Canyons, with isolated instances in Rhyolite and Jesse James Canyons.

Environmental Description

This community most often occurs on moderate to steep (15–50%), south-trending mountain backslopes from 1,570 to 1,930 meters (5,151–6,332 ft) elevation. Geologic parent material consists of extrusive igneous bedrock, volcanic ash bedrock, or colluvium. The substrate is rocky, with the bulk of surface cover consisting of gravel, rock, and exposed bedrock.

Vegetation Description

This association is defined by an open (10–35%) subcanopy stratum (0.5–2 m) with dominant mariola (*Parthenium incanum*), and a grassy, variably dense (10–75%), field layer (<0.5 m) almost always invaded by Lehmann lovegrass (*Eragrostis lehmanniana*), which usually far outcompetes native grasses as the dominant species. The canopy stratum (>2m) is very sparse to empty (<5%).

Species in the canopy stratum (>2 m) are sparse to absent in almost all examples of this community. In examples with notable tree cover (10%), species composition is quite diverse with individuals typically restricted to the edges of rock outcrops. Documented species include alligator juniper (*Juniperus deppeana*), Arizona white oak (*Quercus arizonica*), and Emory oak (*Quercus emoryi*).

Ocotillo (*Fouquieria splendens*) is a common (0.67) associate that is often restricted to dry, rocky slopes and areas of exposed bedrock.

The suffrutescent and fragrant shrub mariola (*P. incanum*) is a consistent (1.0) dominant in the subcanopy stratum, where it usually generates between 10% and 20% cover or occasionally as much as 30%. This drought-deciduous shrub is, for much of the year, little more than leafless branches, making it difficult to discern among the tall, old grass inflorescences. However, when it does leaf, *P. incanum* is a waxy teal that is visible from a distance. Though in most instances it is the clear dominant, it may occasionally share dominance with a number of other shrub species, especially catclaw mimosa (*Mimosa aculeaticarpa),* evergreen sumac (*Rhus virens*), Toumey oak (*Quercus toumeyi*), or alderleaf mountain mahogany (*Cercocarpus montanus*), each of which may contribute up to 10% cover when present. Palmer's century plant is a consistent (1.0) associate that may generate up to 5% cover. Other notable subcanopy associates include common sotol (*Dasylirion wheeleri*), Wright's beebush (*Aloysia wrightii*), beargrass (*Nolina microcarpa*), turpentine bush (*Ericameria laricifolia*), pointleaf manzanita (*Arctostaphylos pungens*), Wright's silktassel (*Garrya wrightii*), and California brickellbush (*Brickellia californica*). On average, these species each contribute 1–2% with occasional examples above 5%.

The non-native invasive rangeland grass Lehmann lovegrass (*E. lehmanniana*) is present in almost all examples (0.87) of this community, and almost always matches or surpasses the cover of native grasses. Overall average cover for Lehmann lovegrass is approximately 20%, and it reaches up to 50% cover in some examples. In the rare examples where this species is absent or a low-cover associate, a variety of native grasses may be dominant. A mix of three, consistent (> 0.85) perennial grasses provide the most conspicuous cover, each contributing an average of 3–5%. These species include bullgrass (*Muhlenbergia emersleyi*), Texas bluestem (*Schizachyrium cirratum*), and sideoats grama (*Bouteloua curtipendula*). Other common associate grasses include, in order from most to least frequent, cane bluestem (*Bothriochloa barbinodis*), tanglehead (*Heteropogon contortus*), blue grama (*Bouteloua gracilis*), tanglehead (*Aristida schiedeana*), single threeawn (*Aristida schiedeana*), plains lovegrass (*Eragrostis intermedia*), and hairy grama (*Bouteloua hirsuta*). Subshrubs and forbs, such Arizona bluecurls (*Trichostema arizonicum*) and gumhead (*Gymnosperma glutinosum*) are often present in this stratum but rarely contribute significant cover.

Global Type Concept Description

Data not available.

Species Summary

See Tables 49 and 50 for species summary details.

Table 49. Most abundant species: *Parthenium incanum* / *Eragrostis lehmanniana* Shrub Savanna Association (P).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	*Parthenium incanum* (1.0)
Field (0–0.5 m)	*Eragrostis lehmanniana* (0.87)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 50. Other noteworthy species: *Parthenium incanum* / *Eragrostis lehmanniana* Shrub Savanna Association (P).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Fouquieria splendens*, *Quercus arizonica, Juniperus deppeana, Quercus emoryi, Juniperus arizonica*
Subcanopy (0.5–2 m)	*Agave palmeri, Dasylirion wheeleri, Aloysia wrightii, Mimosa aculeaticarpa, Nolina microcarpa, Ericameria laricifolia, Rhus virens, Quercus toumeyi, Arctostaphylos pungens, Garrya wrightii, Cercocarpus montanus, Brickellia californica*
Field (0–0.5 m)	*Muhlenbergia emersleyi, Bouteloua curtipendula, Schizachyrium cirratum, Bothriochloa barbinodis, Trichostema arizonicum, Heteropogon contortus, Bouteloua gracilis, Aristida schiedeana, Bouteloua hirsuta, Eragrostis intermedia, Gymnosperma glutinosum*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 2 classification plots and 13 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP302, IP333

Chiricahua National Monument Polygons: S068, S071, S073, S074, SS009, SS020, SS025, SS029, SS052, SS055, SS064, SS067, WS159

Local Description Authors: J. Black, B. Fallon, L. Crumbacher, S. Studd, J. Galvin

26. *Prosopis glandulosa* / Mixed Grasses Ruderal Shrubland Association

Common Name: Honey Mesquite / Mixed Grasses Ruderal Shrubland Association

NVC Name: *Prosopis glandulosa* / Mixed Grasses Ruderal Shrubland Association

Identifier: CEGL001384

NVC Classification

Division: *Acacia greggii - Cylindropuntia leptocaulis - Muhlenbergia porteri* North American Warm Desert Scrub & Grassland Division [D039]

Macrogroup: *Prosopis glandulosa* / *Bromus rubens - Eragrostis lehmanniana* Desert Ruderal Scrub & Grassland Macrogroup [M512]

Group: *Prosopis glandulosa - Prosopis velutina* Warm Desert Ruderal Scrub Group [G819]

Alliance: *Prosopis glandulosa* Ruderal Desert Scrub Alliance [A3162]

Association: *Prosopis glandulosa* / Mixed Grasses Ruderal Shrubland Association [CEGL001384]

Chiricahua National Monument Type Concept Description

<u>Distribution</u>
This community is restricted to the mouths of canyons on the far west side of the monument.

<u>Environmental Description</u>
This shrub savanna association occurs on low-angle hill toeslopes, floodplains, and alluvial terraces between 1,560 and 1,635 meters (5,118–5,364 ft) in elevation. Geologic parent material usually consists of alluvium derived from extrusive igneous or volcanic ash bedrock. Surface cover is typically a mixture of bare soil and gravel, with occasional dense litter cover.

<u>Vegetation Description</u>
This highly variable ruderal shrub savanna association is characterized by an absent to open (<15%) canopy stratum (>2 m) and variably open (1–20%) subcanopy stratum (0.5–2 m) dominated by honey mesquite (*Prosopis glandulosa*). The field stratum (<0.5 m) is open to dense (25–65%) and features a variety of native perennial grasses and subshrubs and is commonly invaded by the exotic invasive Lehmann's lovegrass (*Eragrostis lehmanniana*).

Honey mesquite (*Prosopis glandulosa*) is present in most examples of this community (0.86) as a shrub or short-statured tree. When present, it generates a maximum of 11–25% cover split between the canopy and subcanopy strata, though its overall average cover across all examples is below 5%. Alligator juniper (*Juniperus deppeana*) is an occasional (0.23) canopy associate that when present, contributes up to 5% cover. In the subcanopy, notable associate species include walkingstick cactus (*Cylindropuntia spinosior*), mountain yucca (*Yucca madrensis*), pale desert-thorn (*Lycium pallidum*), turpentine bush (*Ericameria laricifolia*), and catclaw mimosa (*Mimosa aculeaticarpa*).

The field stratum encompasses the majority of vegetative cover in this association. Total cover ranges from 25% to 65%, with an average value of about 45%. Blue grama (*Bouteloua gracilis*) is the most common dominant species, and is present in most examples (0.86), and when present, generates between 15% and 20% cover on average. The rangeland invasive Lehmann's lovegrass (*Eragrostis lehmanniana*) is present in the majority of examples (0.77), and though cover is below 5% in most examples, it occasionally occurs at high density, occasionally approaching 50% cover. Sideoats grama (*Bouteloua curtipendula*) is present in more than half of the examples (0.55) and is occasionally a dominant species, contributing up to about 30% cover, though overall average cover for this species is approximately 5%. Other common associates in the field stratum include native grasses such as cane bluestem (*Bothriochloa barbinodis*), tobosagrass (*Hilaria mutica*), bush muhly (*Muhlenbergia porteri*), spidergrass (*Aristida ternipes*), and small shrubs and subshrubs such as broom snakeweed (*Gutierrezia sarothrae*), burroweed (*Isocoma tenuisecta*), and *yerba de pasmo* (*Baccharis pteronioides*). Uncommon associates (<0.1) include single threeawn (*Aristida schiedeana*), black grama (*Bouteloua eriopoda*), and San Pedro daisy (*Lasianthaea podocephala*).

Global Type Concept Description
Data not available.

Species Summary
See Tables 51 and 52 for species summary details.

Table 51. Most abundant species: *Prosopis glandulosa* / Mixed Grasses Ruderal Shrubland Association.

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	*Prosopis glandulosa* (0.86)
Subcanopy (0.5–2 m)	*Prosopis glandulosa* (0.86)
Field (0–0.5 m)	*Bouteloua gracilis* (0.86), *Eragrostis lehmanniana* (0.77), *Bouteloua curtipendula* (0.54)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 52. Other noteworthy species: *Prosopis glandulosa* / Mixed Grasses Ruderal Shrubland Association.

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana*
Subcanopy (0.5–2 m)	*Cylindropuntia spinosior, Yucca madrensis, Lycium pallidum, Ericameria laricifolia, Mimosa aculeaticarpa*
Field (0–0.5 m)	*Bothriochloa barbinodis, Hilaria mutica, Muhlenbergia porteri, Aristida ternipes, Aristida schiedeana, Bouteloua eriopoda, Lasianthaea podocephala, Baccharis pteronioides, Isocoma tenuisecta, Gutierrezia sarothrae*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 10 classification plots and 12 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

<u>Element Sources</u>

Chiricahua National Monument Plots: IP125, IP300, IP306, IP307, IP308, IP320, IP321, IP322, IP323, IP324

Chiricahua National Monument Polygons: H004, H005, H008, H010, H011, SS028, SS031, SS038, SS039, SS043, SS050, SS056

Local Description Authors: J. Black, S. Studd

27. (*Carex ultra*) / *Juncus balticus* - *Solidago canadensis* Herbaceous Association (PS)

Common Name: (Cochise Sedge) / Mountain Rush - Canada Goldenrod Herbaceous Association

NVC Name: Not available. This type is not described or placed within the NVCS at this time. The placement shown below within the NVC hierarchy is based on the authors' expertise, but the final classification may change. This type is described as a 'park-special' meaning it is thought to be a unique community resulting from site-specific historical disturbances and may not exist in this same combination elsewhere in Arizona.

Identifier: NPSSODN177

NVC Classification

Division: *Alnus viridis* ssp. *sinuata - Salix boothii / Carex* spp. Western North American Freshwater Marsh, Wet Meadow & Shrubland Division [D031]

Macrogroup: Western North American Ruderal Marsh, Wet Meadow & Shrubland Macrogroup [M301]

Group: *Poa pratensis* - *Conyza canadensis* - *Cirsium arvense* Ruderal Marsh, Wet Meadow & Shrubland Group [G524]

Association: (*Carex ultra*) */ Juncus balticus* - *Solidago canadensis* Herbaceous Association (PS) [NPSSODN177]

Chiricahua National Monument Type Concept Description

<u>Distribution</u>
This Herbaceous type is restricted to the Silver Spur meadow.

<u>Environmental Description</u>
This community spans a low-angle (1%) spring-fed meadow at 1,620 meters (5,315 ft). The area ranges from a marshy wetland at the north-west end to a drier area with increased species diversity at the south-east end. The meadow itself is situated on a floodplain adjacent to Bonita Creek. The parent material here is new alluvium.

<u>Vegetation Description</u>
This herbaceous community is characterized by a sparse canopy and subcanopy with a very dense (90%) field layer (<0.5 m) dominated by mountain rush (*Juncus balticus*) and Canada goldenrod (*Solidago canadensis*) in the wetland portion and a mixture of Canada goldenrod, Indiangrass (*Sorghastrum nutans*), and invasive non-native bermudagrass (*Cynodon dactylon*) along the drier margins of the meadow.

The canopy stratum (>2 m) contains a few large (9 m) individuals of alligator juniper (*Juniperus deppeana*). These individuals are typically along the margins of the community, but a single large tree occurs within the meadow.

The subcanopy stratum (0.5–2 m) is largely empty, with approximately 1% total cover. The most abundant species in this stratum is Cochise sedge (*Carex ultra*), which occurs in several large patches around the margins of the meadow but generates less than 1% total cover.

This association is defined by a dense field layer dominated by graminoids and herbaceous perennials. Mountain rush (*J. balticus*) is the overall dominant species, contributing an estimated 35–40% cover in the meadow as a whole, though it is restricted to the lowest, wettest portion on the west side. Canada goldenrod (*S. canadensis*) is more widely distributed throughout the meadow and generates between 26 and 33% cover. Indiangrass (*S. nutans*) and bermudagrass (*C. dactylon*) each contribute between 5 and 10% overall cover, but Indiangrass is particularly dense on the relatively dry eastern side of the meadow and bermudagrass occurs in dense patches in the intermediate zone and along the southern edge of the meadow. Horehound (*Marrubium vulgare*), another non-native species, occurs in patches in shaded areas, and generates 1–5% total cover. Other documented field stratum species include horsetail (*Equisetum sp.*), pinyon ricegrass (*Piptochaetium fimbriatum*), common mullein (*Verbascum thapsus*), muttongrass (*Poa fendleriana*), squirreltail grass (*Elymus elymoides*), and blue grama (*Bouteloua gracilis*).

Global Type Concept Description
Data not available.

Species Summary
See Tables 53 and 54 for species summary details.

Table 53. Most abundant species: (*Carex ultra*) / *Juncus balticus* - *Solidago canadensis* Herbaceous Association (PS).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	*Carex ultra* (1.0)
Field (0–0.5 m)	*Cynodon dactylon (1.0), Juncus balticus (1.0), Solidago canadensis (1.0), Sorghastrum nutans* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 54. Other noteworthy species: (*Carex ultra*) / *Juncus balticus* - *Solidago canadensis* Herbaceous Association (PS).

Stratum	Species
Canopy (>5 m)	*Juniperus deppeana*
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	None
Field (0–0.5 m)	*Piptochaetium fimbriatum, Verbascum thapsus, Poa fendleriana, Bouteloua gracilis, Elymus elymoides, Equisetum* sp.

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from one classification polygon sampled during the 2007–10 mapping and classification effort and again in May 2022. This community has been described as a "park-special" and is not thought to necessarily occur elsewhere in Arizona.

Global: Data not available

NVC Classification Confidence: Data not available

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: None

Chiricahua National Monument Polygons: H020

Local Description Authors: J. Black, B. Fallon, L. Crumbacher

28. (*Dasylirion wheeleri - Agave palmeri*) / *Eragrostis lehmanniana - Muhlenbergia emersleyi* Shrub Herbaceous Association (P)

Common Name: (Common Sotol - Palmer's Century Plant) / Lehmann Lovegrass - Bullgrass Shrub Herbaceous Association

NVC Name: N/A

Identifier: NPSSODN178

NVC Classification

Division: *Acacia greggii - Cylindropuntia leptocaulis - Muhlenbergia porteri* North American Warm Desert Scrub & Grassland Division [D039]

Macrogroup: *Bouteloua eriopoda - Muhlenbergia emersleyi - Pleuraphis mutica* Chihuahuan Semi-Desert Grassland Macrogroup [M087]

Group: Bouteloua eriopoda - Bouteloua ramosa - Muhlenbergia porteri Semi-Desert Grassland Group [G490]

Alliance: *Dasylirion* spp. / *Bouteloua curtipendula* - *Muhlenbergia setifolia* Foothill Desert Grassland Alliance [A3205]

Association: (*Dasylirion wheeleri – Agave palmeri*) / *Eragrostis lehmanniana – Muhlenbergia emersleyi* Shrub Herbaceous Association (P) [NPSSODN178]

Chiricahua National Monument Type Concept Description

<u>Distribution</u>
This community is widespread along the southwest boundary of the monument, below Erikson Ridge, and occurs in scattered patches throughout the low hills adjacent to Picket and Little Picket Canyons.

<u>Environmental Description</u>
This community spans moderately steep (30–50%) slopes from 1,580 to 1,880 meters (5,183–6,167 ft). Aspect can vary, but usually trends to the south. Ground cover is characterized by a mix of rock, bedrock, and gravel. Soil is a sandy loam for most examples of this community where soil type has been indicated. Parent material was recorded as extrusive igneous bedrock, volcanic ash bedrock, or both.

<u>Vegetation Description</u>
This shrub herbaceous community is characterized by a variably open (10–15%, rarely to 35%) subcanopy (0.5–2 m) layer of common sotol (*Dasylirion wheeleri*) and Palmer's century plant (*Agave palmeri*) and a dense (30–50%, rarely to 85%) field layer (<0.5 m) dominated by Lehmann lovegrass (*Eragrostis lehmanniana*) and bullgrass (*Muhlenbergia emersleyi*). There are a small

number of these community types found on rock outcrops that generate low amounts of vegetative cover across all strata but still retain the characteristic community species.

Species in the canopy layer (>2 m), while present, generally contribute less than 5% overall vegetative cover. Of these species, alligator juniper (*Juniperus deppeana*) is the most consistent (0.68) with average cover less than 1%, including one example above 5%. Ocotillo (*Fouquieria splendens*) is patchy (0.45), typically occurring in areas of high exposed bedrock. Other documented canopy species include red berry juniper (*Juniperus arizonica*)*,* border pinyon (*Pinus discolor*)*,* and Arizona white oak (*Quercus arizonica*).

The subcanopy is defined by a mix of two common succulents, common sotol (*D. wheeleri*) Palmer's century plant (*A. palmeri*), each present in almost all examples (0.89 and 0.84, respectively) with a diverse mix of low-cover succulents, shrubs, and subshrubs. On average, these species contribute cover between 2% and 3% each, with some dense areas reaching up to 10%. Turpentine bush (*Ericameria laricifolia*) is an occasional (0.63) associate with average cover around 2%. At times, this species can provide cover similar to, or greater than, Palmer's century plant (*A. palmeri*) and common sotol (*D. wheeleri*). In order from most to least frequent, other noteworthy species include, beargrass (*Nolina macrocarpa, 0.68*), catclaw mimosa (*Mimosa aculeaticarpa, 0.47*), Wright's beebush (*Aloysia wrightii, 0.44*), evergreen sumac (*Rhus virens, 0.47*), alderleaf mountain mahogany (*Cercocarpus montanus*), and yucca (*Yucca madrensis*). Toumey oak (*Quercus toumeyi*) and pointleaf manzanita (*Arctostaphylos pungens*) occur from neighboring communities and are not consistent components of this association.

The field layer is characterized by the overwhelming dominance of the invasive Lehmann lovegrass (*E. lehmanniana*) with a diverse suite of less abundant native perennial grasses, most notably bullgrass (*M. emersleyi*). Found in most (0.82) examples of this community, Lehmann lovegrass (*E. lehmanniana*) contributes an average of about 20% cover with dense examples above 60%. Bullgrass (*M. emersleyi*) is a consistent (0.95) native grass with average cover around 7% with dense inclusions approaching 40%. At times, this species outcompetes Lehmann lovegrass (*E. lehmanniana*) and presents as the sole field dominant. Sideoats grama (*Bouteloua curtipendula*) is an occasional (0.61) native grass with average cover around 4%. In one example, this species became the sole field dominant with cover above 60%. In order from most to least frequent, other noteworthy grasses include cane bluestem (*Bothriochloa barbinodis*), Texas bluestem (*Schizachyrium cirratum*), hairy grama (*Bouteloua hirsuta*), slender grama (*Bouteloua repens*), blue grama (*Bouteloua gracilis*), tanglehead (*Heteropogon contortus*), and Arizona muhly (*Muhlenbergia arizonica*). Taken together, native perennial bunchgrasses recorded in these sites average 20% cover which is roughly equal to the average cover provided by the non-native perennial grasses, in this case solely represented by Lehmann's lovegrass. Subshrubs and forbs, such as gumhead (*Gymnosperma glutinosum*) and Arizona bluecurls (*Trichostema arizonicum*) are often present in the field stratum, but generally contribute negligible cover when compared to the grasses (< 5% each).

Global Type Concept Description

Data not available. This community has not yet been described within the NVCS but we anticipate it will be placed within the *Dasylirion* spp. / *Bouteloua curtipendula* - *Muhlenbergia setifolia* Foothill Desert Grassland Alliance [A3205].

Species Summary

See Tables 55 and 56 for species summary details.

Table 55. Most abundant species: (*Dasylirion wheeleri - Agave palmeri*) / *Eragrostis lehmanniana - Muhlenbergia emersleyi* Shrub Herbaceous Association (P).

Stratum	**Species** [A]
Canopy (>5 m)	None
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	*Agave palmeri* (0.84), *Dasylirion wheeleri* (0.89)
Field (0–0.5 m)	*Eragrostis lehmanniana* (0.82), *Muhlenbergia emersleyi* (0.95)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 56. Other noteworthy species: (*Dasylirion wheeleri - Agave palmeri*) / *Eragrostis lehmanniana - Muhlenbergia emersleyi* Shrub Herbaceous Association (P).

Stratum	**Species**
Canopy (>5 m)	None
Canopy (2–5 m)	*Fouquieria splendens*, *Juniperus deppeana*, *Juniperus monosperma*, *Pinus discolor*, *Quercus arizonica*
Subcanopy (0.5–2 m)	*Ericameria laricifolia*, *Mimosa aculeaticarpa*, *Nolina microcarpa*, *Aloysia wrightii, Rhus virens, Yucca madrensis, Arctostaphylos pungens, Quercus toumeyi*
Field (0–0.5 m)	*Bouteloua curtipendula, Bouteloua repens, Bouteloua hirsuta, Bouteloua gracilis, Heteropogon contortus, Schizachyrium cirratum*, *Bothriochloa barbinodis, Trichostema arizonica, Gymnosperma glutinosum.*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 10 classification plots and 26 classification polygons sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

Distribution and Conservation Status

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

Element Sources

Chiricahua National Monument Plots: IP053, IP054, IP076, IP080, IP119, IP301, IP318, IP319, IP330, IP331, IP332

Chiricahua National Monument Polygons: H018, H019, S080, S081, SRO003, SRO004, SS002, SS015, SS016, SS017, SS021, SS022, SS049, SS051, SS057, SS059, SS060, SS061, SS062, SS063, SS065, SS066, SS069, SS070, TS031, WS178

Local Description Authors: B. Fallon, L. Crumbacher, S. Studd., J. Galvin, J. Black

29. ***Nolina microcarpa / Muhlenbergia emersleyi*** **Shrub Savanna Association (PS)**

Common Name: Beargrass / Bullgrass Shrub Savanna Association

NVC Name: N/A

Identifier: NPSSODN187

NVC Classification

Division: *Acacia greggii - Cylindropuntia leptocaulis - Muhlenbergia porteri* North American Warm Desert Scrub & Grassland Division [D039]

Macrogroup: *Bouteloua eriopoda* - *Muhlenbergia emersleyi* - *Pleuraphis mutica* Chihuahuan Semi-Desert Grassland Macrogroup [M087]

Group: Bouteloua eriopoda - Bouteloua ramosa - Muhlenbergia porteri Semi-Desert Grassland Group [G490]

Alliance: *Muhlenbergia emersleyi* - Muhlenbergia setifolia - Hesperostipa neomexicana Madrean Lower Montane Grassland Alliance [A3206]

Association: *Nolina microcarpa* / *Muhlenbergia emersleyi* Shrub Savanna Association (PS) [NPSSODN187]

Chiricahua National Monument Type Concept Description

Distribution
This community is restricted to the southeast-trending half of Sugarloaf Mountain.

Environmental Description
This community spans steep (50+ %), southeast-trending mountain backslopes from 2,080 to 2,225 meters (6,824–7,300 ft). Towards the summit of Sugarloaf Mountain, slopes become more gradual and aspects more varied. This type is continuous across all portions of the slope that have any south-facing component. The surface cover is characterized by loose, unstable rocks overlaying dry, silty loam. The top of Sugarloaf is a dacite cap over volcanic tuff.

Vegetation Description
This shrub savanna is characterized by a very sparse (5%) canopy (>2 m), an open (10–30%) subcanopy (0.5–2 m) dominated by beargrass (*Nolina microcarpa*), and a dense (50%) field layer (<0.5 m) dominated by bullgrass (*Muhlenbergia emersleyi*). Prior to the 2011 Horseshoe Two Fire, this community showed ample evidence of historic fire disturbance, likely from prescribed burns in the 1990s, with many charred snags throughout.

The sparse canopy stratum is characterized by a low cover mix of trees that include Arizona white oak (*Quercus arizonica*), alligator juniper (*Juniperus deppeana*), and border pinyon (*Pinus discolor*). Arizona white oak (*Q. arizonica*) provides the most cover with an average around 5%. This species was also documented with a shrubby growth form in the lower strata (< 2 m). The remaining two tree species contributed around 1–2% each. In general, trees within this community are short (2–3.5 m) with stunted version most commonly appearing toward the shoulder of Sugarloaf summit.

The subcanopy stratum is characterized by the consistent dominance (1.0) of beargrass (*N. microcarpa*) with a low-cover mix of shrubs, succulents, and shrubby trees. On average, this species provides cover around 15% with dense inclusions up to 20%. Mountain mahogany (*Cercocarpus montanus*) is a common (0.75) associate shrubs that provides average cover around 3%, occasionally reaching into the canopy stratum. Yucca (*Yucca madrensis*) is a very consistent (1.0) associate that provides average cover around 2%. In order from most to least frequent, other noteworthy subcanopy species include, dollarjoint pricklypear (*Opuntia chlorotica*), catclaw mimosa (*Mimosa aculeaticarpa*), gumhead (*Gymnosperma glutinosum*), Toumey oak (*Quercus toumeyi*), and cactus apple (*Opuntia engelmannii*).

The field stratum is characterized by the overwhelming dominance of bullgrass (*M. emersleyi*) with a diverse suite of low-cover perennial grasses, subshrubs, and forbs. On average, this species provides cover around 30% with some dense inclusions up to 40%. In order from most to least frequent, other noteworthy field species include, sideoats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*), plains lovegrass (*Eragrostis intermedia*), bristly wolftail (*Muhlenbergia alopecuroides*), Texas bluestem (*Schizachyrium cirratum*), and bastardsage (*Eriogonum wrightii*).

Global Type Concept Description

Data not available.

Species Summary

See Tables 57 and 58 for species summary details.

Table 57. Most abundant species: *Nolina microcarpa* / *Muhlenbergia emersleyi* Shrub Savanna Association (PS).

Stratum	Species [A]
Canopy (>5 m)	None
Canopy (2–5 m)	None
Subcanopy (0.5–2 m)	*Nolina microcarpa* (1.0)
Field (0–0.5 m)	*Muhlenbergia emersleyi* (1.0)

[A] Values in () indicate the frequency a species occurs in the classification plots used to describe the association.

Table 58. Other noteworthy species: *Nolina microcarpa* / *Muhlenbergia emersleyi* Shrub Savanna Association (PS).

Stratum	Species
Canopy (>5 m)	None
Canopy (2–5 m)	*Juniperus deppeana*, *Quercus arizonica, Pinus discolor*

Table 58 (continued). Other noteworthy species: *Nolina microcarpa* / *Muhlenbergia emersleyi* Shrub Savanna Association (PS).

Stratum	Species
Subcanopy (0.5–2 m)	*Cercocarpus montanus, Opuntia chlorotica, Gymnosperma glutinosum, Opuntia engelmannii, Quercus toumeyi, Mimosa aculeaticarpa*
Field (0–0.5 m)	*Bouteloua gracilis, Eriogonum wrightii, Bouteloua curtipendula, Eragrostis intermedia, Muhlenbergia alopecuroides, Schizachyrium cirratum*

Classification Comments

Chiricahua National Monument: This association has been described based solely on data collected during this inventory project and other recent studies and is based on data from 3 classification plots and 1 classification polygon sampled during the 2007–2010 mapping and classification effort.

Global: Data not available

NVC Classification Confidence: Low

<u>Distribution and Conservation Status</u>

Global Range: Data not available

NatureServe Conservation Status: Data not available

Conservation Status Reasons: Data not available

<u>Element Sources</u>

Chiricahua National Monument Plots: IP310, IP311, IP312

Chiricahua National Monument Polygons: SS054

Local Description Authors: B. Fallon, L. Crumbacher, S. Studd, J. Galvin, J. Black

Literature Cited

Jennings, M. D., D. Faber-Langendoen, O. L. Loucks, R. K. Peet, and D. Roberts. 2009. Standards for the Associations and Alliances of the U.S. National Vegetation Classification. Ecological Monographs 79(2): 173–199.

National Park Service. Inventory and Monitoring (I&M) Division, Vegetation Mapping Inventory.

National Park Service. Vegetation Mapping Inventory Project for Chiricahua National Monument. National Park Service Integrated Resource Management Applications (IRMA) DataStore.

NatureServe. NatureServe Explorer Database.

United States Department of Agriculture. PLANTS Database.

United States National Vegetation Classification (USNVC). USNVC Database.

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