

Alaska Rare Plant Field Guide



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Alaska Natural Heritage Program



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In cooperation with:

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Recommended Citation:

Nawrocki, T., J. Fulkerson, and M. Carlson. 2013. Alaska Rare Plant Field Guide. Alaska Natural Heritage Program, University of Alaska Anchorage. 352 pp.

Cover illustration: *Claytonia arctica* by Matthew L. Carlson

Acknowledgements

Funding for the *Alaska Rare Plant Field Guide* was provided by the Bureau of Land Management and the University of Alaska Anchorage. The current version of the guide is an update of the 1997 *Alaska Rare Plant Field Guide* by Robert Lipkin and David F. Murray.

Prior to the production of this field guide, Alaska Natural Heritage Program revised the list and conservation status ranks of vascular plants considered rare in Alaska. Helen Cortés-Burns led the ranking and revision effort for the Alaska Rare Vascular Plant List and laid the foundations for this field guide. Erin Johnson conducted many of the rank revisions and contributed additional information to the guide.

Anton Reznicek, Bruce Bennett, Carl Roland, Carolyn Parker, David F. Murray, Donald Farrar, Ian Jones, Ihsan Al-Shehbaz, Janet Jorgenson, Jason Grant, Karen Dillman, Mary Stensvold, Mike Duffy, Randall Bayer, Rob Lipkin, Robert Soreng, and Sylvia Kelso reviewed species accounts and provided invaluable feedback regarding taxonomy, distribution, ecology, and morphology for the species in this guide. Their review has greatly enhanced the accuracy, scope, and detail of the species accounts given here.

Special thanks are due to the many photographers who graciously donated their pictures for use in this field guide. The pictures are the result of the research and work of many botanists and ecologists throughout the state and are invaluable resources for identification. Please see pages 323-324 for an index of photograph credits.

All herbarium specimen images were taken from the online database of the University of Alaska Museum of the North Herbarium (ALA) and are labeled with the specimen's unique catalog number.

The illustrations from the 1997 version of the *Alaska Rare Plant Field Guide* are retained here where possible. Matthew Carlson provided new illustrations for the current version of the guide. Flora of North America Association, Intermountain Herbarium, Stanford University Press, Canadian Science Publishing, Missouri Botanical Garden, Province of British Columbia, American Fern Society, University of Washington Press, New York Botanical Garden, and Botanical Research Institute of Texas, and Canadian Museum of Nature graciously allowed previously published illustrations to be reprinted within this guide. Please see pages 325-327 for an index of illustration credits.

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Introduction

Since the inception of the Endangered Species Act of 1973 (ESA), conservation and management of rare, sensitive, threatened, and endangered species has become a goal of many land management organizations and agencies and is a growing public concern. The ability to identify rare plants is essential to conserving and collecting data on these species. This guide is intended to assist federal and state personnel, and other interested parties, in the identification of Alaska's rare vascular plants.

The conservation statuses of many vascular plants in Alaska have been clarified since the previous *Alaska Rare Plant Field Guide* was published in 1997. Federal agencies such as the Bureau of Land Management and the Forest Service have revised which species are considered sensitive according to their individual policies. In 2012, Alaska Natural Heritage Program completed a major revision of the vascular plant species considered rare in Alaska (<http://aknhp.uaa.alaska.edu/botany/rare-plants-species-lists/>). Species included in this guide reflect these recent revisions.

A considerable number of species previously considered rare in Alaska have been removed from the Alaska Rare Plant List after being merged into more common taxa. For example, *Draba kananaskis* was included in the 1997 version of the guide but is not included in the current version as it has recently been synonymized with *Draba juvenilis*, a commonly occurring species in Alaska. Some species that are currently considered rare, such as *Cochlearia sessilifolia*, still have major taxonomic questions surrounding them and could possibly be merged into more common taxa in the future. Further taxonomic investigation, especially through genetic methods, is necessary to clarify the conservation status of several of the species selected for this guide.

Rare plants are part of our natural heritage and biodiversity. They are unique for their own value, contribute to the ecology and beauty of the landscape, and serve as indicators of unusual or rare communities and habitats. Since many rare plant species have limited geographic range or depend on a narrow range of suitable habitats, they are at higher risk for extirpation than common species in Alaska. Therefore, they are a greater concern for future conservation.

Increasing Ecosystem Pressure

While Alaska is a large region with many relatively unaltered natural areas, its ecosystems are still susceptible to change and pressure

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generated by the increasing impacts of human activity. Natural resource extraction, infrastructure development, human population expansion, tourism, and outdoor recreational activities increasingly threaten the health and diversity of natural ecosystems in Alaska. Predicted climate shifts, increased natural disturbances, and competition from invasive species have the potential to place rare plant populations under high stress.

Predicted climate shifts are most severe at high latitudes and not only substantial changes in temperature and precipitation, but also shifts in habitats are anticipated.^{1, 2, 3} Climate modeling predictions indicate that over the next century, arctic regions are likely to shrink with interior boreal and taiga regions advancing northward. Additionally, current climate-biomes in southern British Columbia are likely to shift northward, becoming prevalent in parts of Alaska.⁴ The frequency and extent of natural disturbances, such as wildfires and floods, is projected to increase as a result of global climate change.^{5, 6, 7} The shifting of habitat and increased natural disturbances will undoubtedly affect the viability of Alaska's rare plant species.

Invasion of non-native plant species is an increasing threat to biodiversity in Alaska.^{8, 9} It has been recognized as the second greatest threat to biodiversity in the United States, superseded only by the direct destruction of habitat.^{10, 11, 12, 13, 14} In the U.S., approximately 42% of threatened and endangered species are primarily impacted by invasive species.¹⁵ While most infestations in Alaska are located in areas of anthropogenic disturbance, invasive plant species have been increasingly documented in naturally disturbed or undisturbed areas as well.⁹ Several rare plant populations in Alaska have been found in anthropogenically disturbed habitats, in some cases in direct competition with invasive plant species.



Cypripedium parviflorum var. *pubescens* (ranked ‘S1’) competing with *Phalaris arundinacea* and *Trifolium hybridum* in the Tongass National Forest.

Factors Driving Plant Rarity

Understanding the population demography and identifying limiting life history stages of a rare plant species is critical for their preservation.¹⁶ For many of Alaska’s rare plant species, the paucity of distribution, biological, and ecological data is the single most important factor hampering their effective management and/or conservation. A significant portion of the rare plant species of Alaska are likely to be found to be much smaller conservation risks when more populations are identified and their ecological contexts are better understood. Common species with ecological specialization can become rare due to habitat loss, habitat fragmentation, or competition from invasive plant species amongst other reasons.

While there may be several causes for rarity, recent speciation and ecological specialization are likely important factors. Newly evolved species are naturally rare and are often found in more recently formed geologic areas since they have had less time to expand their potential range. Areas with rare plants may be centers of high biodiversity, or they

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may be refugial areas where species survived the last ice age and the rare ones remain restricted today.

Rare plant taxa can be divided into eight different classes of rarity, a scheme based on Rabinowitz’s (1981) plant rarity classification.¹⁷ The rarity types presented in the table below are determined according to geographic range (large vs. small), habitat specificity (broad vs. restricted), and population size (large at least in one place vs. small everywhere). The “disjunct” category of rarity contains widely disjunct taxa that, though often being common in other areas, are rare in Alaska. This category is partially formed by the limitations imposed by the regional boundaries under consideration. Examples of these species include several rare taxa that are relatively common in the Pacific Northwest but barely extend into Southeast Alaska.

Classifications of Plant Rarity

		Geographic Range			
		Small		Large	
Population Size	Sometimes large	Unlikely: Locally abundant but restricted geographically in spite of occurring in a broad range of habitats	Endemic: Locally abundant, restricted geographically and occurring in a narrow range of habitats	Predictable: Locally abundant over a large range, but restricted to a specific habitat	Common Disjunct: widely disjunct taxa that are rare in Alaska but are broadly distributed on a global scale
	Always small	Very unlikely: Constantly sparse, restricted geographically, but found in several habitats	Endemic: Constantly sparse, restricted geographically and occurring in a narrow range of habitats	Predictable: Constantly sparse over a large range, but restricted to a specific habitat	Sparse: Constantly sparse, over a large range and found in several habitats
		Broad	Restricted	Restricted	Broad
		Habitat Specificity			

Rare Plant Observations

Information correlated to species rarity generally includes distribution, number of occurrences, population size, population trends, habitat specificity, general ecology, identification, and systematics. This

information is gained through directed inventories,^{18, 19, 20} directed ecological studies,²¹ peer-reviewed publications, and herbarium specimen collections. The Alaska Natural Heritage Program serves as the central repository of information on rare species of Alaska by maintaining the BIOTICS database. As new data becomes available, the conservation status of a species can be updated and tracked. The collection of accurate information enables Alaska Natural Heritage Program to assign appropriate conservation status ranks to rare plant species.

When a rare plant is encountered, a detailed description of the population and habitat is needed. Land management agencies often have specific forms for the collection of such information. The Alaska Natural Heritage Program provides a Rare Plant Observation Form, which can be obtained at <http://aknhp.uaa.alaska.edu/botany/submit-data/>. In addition, collecting a specimen to verify the identification is usually required. However, rare plants should only be collected if the removal of a few plants will not significantly reduce the population. If there is any question, do not collect but take photographs of the habitat and clear close-up images of pertinent plant features. Also be aware that a permit or permission is often required for collecting in protected areas, native corporation lands, and other private lands.

Listed below are general guidelines for making a rare plant herbarium collection. The method outlined below assumes access to a herbarium plant press.

1. Remove at least three plants from the population. Do not collect if this will result in a significant reduction of the local population.
2. Collect the entire plant including as much of the root as reasonable (a notable exception is for *Botrychium* species, which should be cut with a knife at ground level).
3. Try to gather representatives of the range of present morphological features and phenological states (if possible, gather vegetative, flowering, and fruiting specimens).
4. Assign a collection number for tracking purposes. An example format would be the three initials of the collector's name followed by the last two numbers of the year, then a dash, and then the sequential three digit number of collections made that year (JDN13-017).
5. Label sheet of newspaper with collection number, date, taxon, and site name.
6. Place specimens inside sheet of newspaper so that they do not overlap. Lay them as flat as possible in such a way that they will display well after being pressed (flowers/fruits/leaves will show in their entirety and not be folded or covered).

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7. Place blotting paper on either side of newspaper. Sandwich between card board sheets. Insert into plant press. Periodically insert foam sheets to absorb deformities from plant mass.
8. Tighten straps on plant press as much as possible.
9. Change the newspaper after several days if specimens are very wet or very large.
10. After specimen has dried for adequate amount of time, glue plant surface to acid-free herbarium paper. If none is available, leave specimens loose in the newspaper when mailing.
11. An excel file should be emailed to the receiving herbarium with the following information: taxon, family, collection date, collectors' names, determination date, determiner's name, GPS coordinates, elevation, site name, locality information and description, habitat information, population size, and any other notable observations.

Collected specimens should be mounted and labeled (if possible). Pressed specimens should be protected between sheets of cardboard and placed in a box, then sent to the University of Alaska Museum Herbarium (ALA) at the address below.

University of Alaska Museum Herbarium
P.O. Box 756960
Fairbanks, AK 99775

Conservation Status Ranks and Definitions

There are several lists that pertain to the conservation status of at-risk species. The Alaska Natural Heritage Program determines the conservation status of rare species within Alaska while NatureServe designates the global conservation status of the species. However, the status of species listed by these programs provides no legal designation or mandate for the conservation of the species. State and federal agencies each have their own criteria for the listing of special status species, but they often take Alaska Natural Heritage Program conservation status ranks into consideration. The Bureau of Land Management and U.S. Forest Service each designate sensitive species that occur on land under their management. The U.S. Fish and Wildlife Service maintains the list of legally protected species designated as endangered or threatened according to the Endangered Species Act.

Alaska State Conservation Status Ranks

The Alaska Natural Heritage Program assigns state conservation status designations to taxa in Alaska by using the NatureServe Conservation Status Assessment Methodology for assigning ranks.²² A standardized method ensures rank consistency and transparency between all ranked species within a state or province and between states or provinces. A conservation status rank is calculated for a species based on its range extent, area of occupancy, number of occurrences, population sizes and trends, and current and predicted threats. This data is gathered from field inventories, publications, reports, herbaria specimens, and the knowledge of botanists and taxonomic experts. Conservation ranks produced by Alaska Natural Heritage Program are reviewed by Alaskan botanical experts to ensure accuracy based on current information.

The state rank (S-Rank) only defines the conservation status of a species within the state boundary. NatureServe assigns the global rank (G-Rank) based on the collective state ranks (see below). Species are assigned a numeric rank from 1 (species of highest conservation concern) to 5 (species of very low conservation concern), which categorizes the risk to the viability of the species.

State Conservation Rank Definitions

Rank	Definition
S1	Critically imperiled within the state; at very high risk of extirpation because of very few occurrences, declining populations, or extremely limited range and/or habitat.
S2	Imperiled within the state; at high risk of extirpation because of few occurrences, declining populations, or limited range and/or habitat.
S3	Rare within the state; at moderate risk of extirpation because of restricted range, narrow habitat specificity, recent population decline, small population sizes, or a moderate number of occurrences.
S4	Apparently secure, but uncommon, within the state; may be a long-term conservation concern.
S5	Secure and widespread within the state; not at risk for extirpation because of widespread abundance.
S#S#	Status of species within a region is best described as a range between two ranks.
S#Q	Taxon is questionable or uncertain as currently defined, but records assigned to that taxon are not questionable.
SP	Species is likely to occur in Alaska in a natural context based on its natural occurrence in adjacent territories near the Alaska border in habitat that is also present within Alaska.
SNA	Species cannot be considered rare because all reports are erroneous or based on material from cultivated or introduced contexts (these ranks do not appear on the Rare Plant Tracking List).
SU	Species occurs in Alaska in a natural context and is likely rare but cannot be assigned an accurate conservation rank because of substantial uncertainty in the relevant data (i.e. specimens are likely incorrectly identified, records are ambiguous and indefinite, or specimens have not yet been re-determined after recent taxonomic rearrangements).
SH	Possibly extirpated; species is known only from records more than 50 years old (historical sources) that are either so vague that they cannot be relocated or that have been searched for unsuccessfully, although not thoroughly enough to presume that the species has been extirpated.
SX	Presumed extirpated; species is known only from historical sources and has not been relocated despite intensive searches of historical sites and other appropriate habitat (no species in Alaska meet the criteria for this rank).

Global Conservation Status Ranks

NatureServe compiles regional ranks assigned by the network of Natural Heritage Programs and Conservation Data Centers to assign global conservation status designations. The range and abundance of species in

areas not monitored by Natural Heritage Programs and Conservation Data Centers, such as the Russian Far East, is also taken into consideration. Therefore, the global rank provides an indication of the overall rarity of a species, given its entire range extent. Species are assigned a numeric rank from 1 (species of highest conservation concern) to 5 (species of very low conservation concern), which categorizes the overall risk to the viability of the species within its entire range.

The global rank for any particular species is theoretically never assigned a lower numeric value than the highest numeric value assigned by a region. However, many of the revised state ranks for rare vascular plants of Alaska have not yet been reflected in the corresponding global ranks simply because the global ranks have not been updated as recently. Global ranks numerically lower than the state ranks should therefore be viewed as outdated.

Global Conservation Rank Definitions

Rank	Definition
G1	Critically imperiled; at very high risk of extinction because of extreme rarity, very steep declines, or other factors.
G2	Imperiled; at high risk of extinction because of very restricted range, few occurrences, small populations, steep declines, or other factors.
G3	Vulnerable; at moderate risk of extinction because of restricted range, relatively few occurrences, small populations, recent and widespread declines, or other factors.
G4	Apparently secure, but uncommon; some cause for long-term concern because of declines or other factors.
G5	Secure; common, widespread, and abundant.
G#G#	Global status of species is best described as a range between two ranks.
G#Q	Questionable taxonomy that may reduce conservation value; resolution of taxonomic uncertainty may result in within another taxon resulting in an increase in the numeric value of the conservation rank.
G#?	Inexact numeric rank reflecting inexact data
T#	Indicates the global rank of a subspecies or variety and is appended to the end of the G rank for the species.
GNA	Not applicable; a conservation rank is not applicable because the species is not a suitable target for conservation activities.
GNR	Global rank not yet assessed.
GU	Unrankable because of lack of information or because of substantially conflicting information about status and trends.
GH	Possibly extinct; known only from historical occurrences but still some hope of rediscovery.
GX	Presumed extinct; not located despite intensive searches and virtually no likelihood of rediscovery.

Federal Listings and Status Definitions

The Bureau of Land Management and U.S. Forest Service each designate species that warrant protective management as sensitive species. The Bureau of Land Management also maintains a watch list of species that may meet the sensitive status criteria in the future but currently lack adequate data to justify such a status. The general objective is to provide proactive protection to species by minimizing or eliminating threats on federally managed lands, thus reducing the chances of federal listings under the Endangered Species Act. The U.S. Fish and Wildlife Service maintains the list of legally protected species designated as endangered or threatened according to the Endangered Species Act. It is also responsible

for the national enforcement and implementation of the Endangered Species Act. Alaska currently has one plant, *Polystichum aleuticum*, listed as endangered.

Federal Designations for Protected Species

Agency	Designation	Description
BLM	Sensitive	Native species that occur on BLM lands, that either have a known or predicted downward decline or depend on threatened habitat, and for which the BLM has significant management capability to affect their conservation status.
BLM	Watch	Not considered sensitive and sensitive species policy does not apply. Species may be added to the Sensitive list if new information concerning threats and species biology or statewide trends warrants listing.
USFS	Sensitive	Plant species identified by a regional forester for which population viability is a concern, as evidenced by significant current or predicted downward trend in population number, population density, or habitat capability.
USFWS	Endangered	Taxa formally listed as endangered (one plant species in Alaska)
USFWS	Threatened	Taxa formally listed as threatened (no plant species in Alaska)
USFWS	Proposed	Taxa formally proposed for listing as threatened or endangered (no plant species in Alaska)
USFWS	Candidate	Taxa for which the USFWS has sufficient information on biological vulnerability and threat to support proposals to list as endangered or threatened (no plant species in Alaska)

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Note on Species Selection

Species were primarily selected for inclusion in the *Alaska Rare Plant Field Guide* based on their designation by the Bureau of Land Management as sensitive or watch list species. Additional species of high conservation concern were selected because of global ranks from G1 to G3 or state ranks from S1 to S3. Many of the species in this guide ranked G1 to G3 are endemic to Alaska or are Amphi-Beringian in distribution, meaning that they range from the Russian Far East through Alaska to Yukon and sometimes also including northern British Columbia and western Northwest Territories. Many of the S1 to S3 species in this guide that are not also G1 to G3 are disjunct and rare in Alaska but more common in Asia, Europe, or the Rocky Mountains of Canada or the contiguous 48 states.

Some Bureau of Land Management sensitive or watch list species were not included in the guide because they are no longer considered to be of high conservation concern. The table below shows the justifications for the sensitive and watch list species not included.

Taxon	BLM List	Justification
<i>Aphragmus eschscholtzianus</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Arenaria longipedunculata</i>	Watch	Currently ranked S3S4, but the number of occurrences and range extent are large enough that this species is close to being ranked S4.
<i>Cardamine blaisdellii</i>	Watch	Currently ranked S3S4; removed to include species of higher conservation concern.
<i>Cerastium regelii</i> ssp. <i>regelii</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Douglasia alaskana</i>	Sensitive	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Douglasia gormanii</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Draba paysonii</i>	Watch	Reports of <i>Draba paysonii</i> (now accepted as <i>D. novolympica</i>) in Alaska were based on misidentified material.
<i>Draba porsildii</i>	Watch	Reports of <i>Draba porsildii</i> in Alaska were based on misidentified material that has been referred to <i>Draba mulliganii</i> .
<i>Erigeron porsildii</i>	Watch	Currently ranked S3S4; removed to include species of higher conservation concern.

Note on Species Selection

Taxon	BLM List	Justification
<i>Erigeron yukonensis</i>	Sensitive	This taxon needs further study to confirm that it is a distinct taxon.
<i>Gentianopsis detonsa</i> ssp. <i>detonsa</i>	Sensitive	Alaskan materials of <i>Gentianopsis richardsonii</i> and <i>G. barbata</i> ssp. <i>barbata</i> were misidentified as <i>G. detonsa</i> ssp. <i>detonsa</i> .
<i>Minuartia yukonensis</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Oxytropis arctica</i> var. <i>barnebyana</i>	Sensitive	Taxonomic uncertainty; material from western Alaska needs further study.
<i>Oxytropis huddelsonii</i>	Sensitive	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Oxytropis tananensis</i>	Watch	Currently ranked S3S4; removed to include species of higher conservation concern.
<i>Papaver alboroseum</i>	Sensitive	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Phlox richardsonii</i>	Watch	Specimens need to be reviewed for accurate determinations because this species has been the subject of some confusion.
<i>Poa macrantha</i>	Watch	Species is globally secure (G5) and is dominant in many areas of the west coast of North America.
<i>Poa norbergii</i>	Watch	Species (now merged into <i>Poa macrocalyx</i>) is a common taxon and not a species of concern.
<i>Potamogeton robbinsii</i>	Watch	Species is globally secure (G5) and occurs in much of North America.
<i>Potamogeton subsibiricus</i>	Watch	Currently ranked S3S4; removed to include species of higher conservation concern.
<i>Potentilla drummondii</i>	Watch	Species is globally secure (G5) and occurs in much of western North America.
<i>Potentilla rubricaulis</i>	Watch	Taxonomic uncertainty; the Alaska collections assigned to <i>Potentilla rubricaulis</i> need further study.
<i>Salix reticulata</i> ssp. <i>glabelllicarpa</i>	Watch	<i>Salix reticulata</i> ssp. <i>glabelllicarpa</i> is no longer considered distinct from <i>S. reticulata</i> .
<i>Salix setchelliana</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Smelowskia porsildii</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.

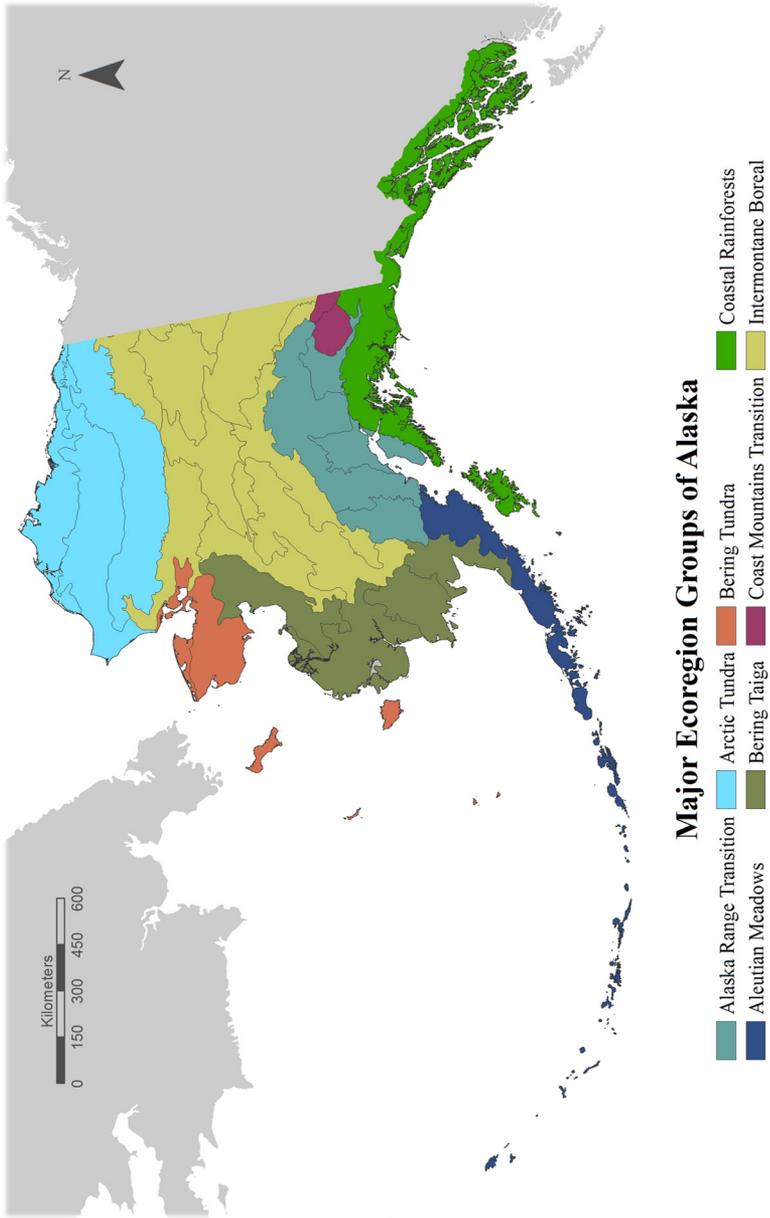
Taxon	BLM List	Justification
<i>Stellaria alaskana</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Stellaria dicranoides</i>	Watch	Currently ranked S4 and no longer on the Alaska Rare Plant List. Accepted name is <i>Cherleria dicranoides</i> .
<i>Symphyotrichum falcatum</i> var. <i>falcatum</i>	Watch	Taxon is globally apparently secure to secure (G5T4T5) and occurs in much of western North America.
<i>Taraxacum carneocoloratum</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
<i>Thlaspi arcticum</i>	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List. Accepted name is <i>Noccaea arctica</i> .

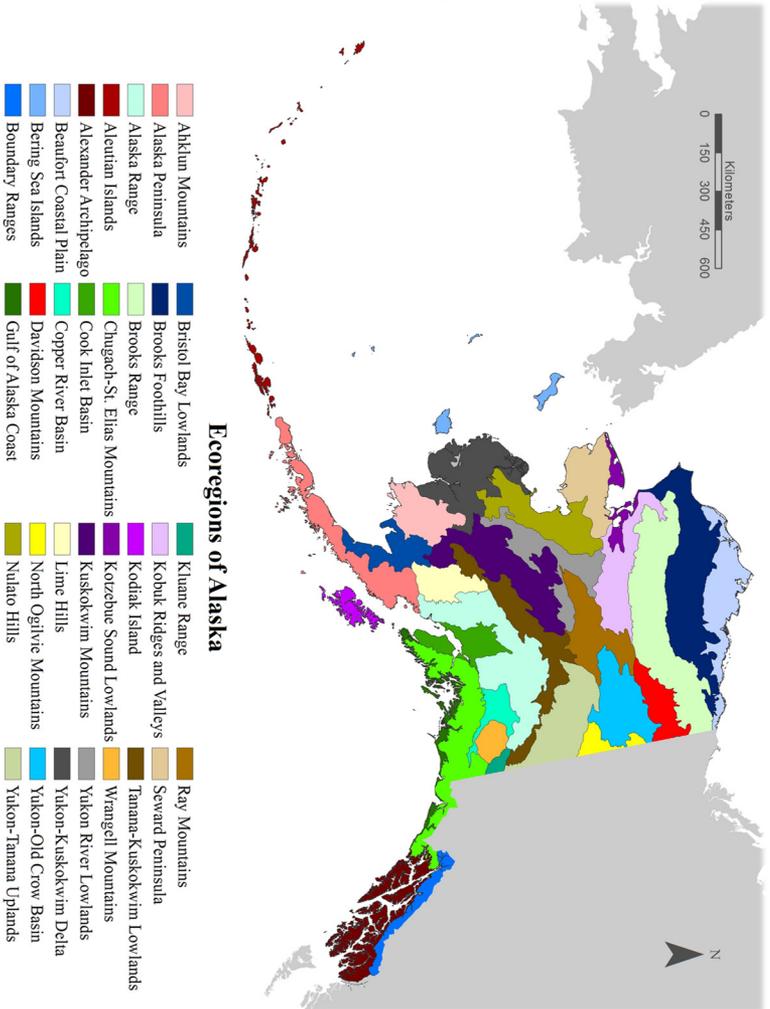
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Ecogeographic Regions of Alaska

Alaska is a region of diverse geologic, climatic, and ecologic conditions, all of which affect the distribution of suitable habitat for plant species. These conditions can be broadly grouped into eight major ecoregion groups and then more narrowly delineated into 32 ecoregions.²³

Each species account contains a Global Distribution, an Alaska Distribution, and an Ecoregions Occupied section. The Alaskan Distribution is based on the eight major ecoregion groups highlighted in the map on page xxiv. The Ecoregions Occupied section lists the smaller delineated ecoregions where the species has been found with more specific information in parentheses as necessary. A map of the ecoregions of Alaska is included on page xxv. For specific descriptions of the habitat, climate, soil, general vegetation communities, and geology of the ecoregions, please refer to Nowacki *et al.* 2001.





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Species Accounts

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