Alaska Rare Plant Field Guide



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Alaska Natural Heritage Program

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In cooperation with:

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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.

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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

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

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).

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

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

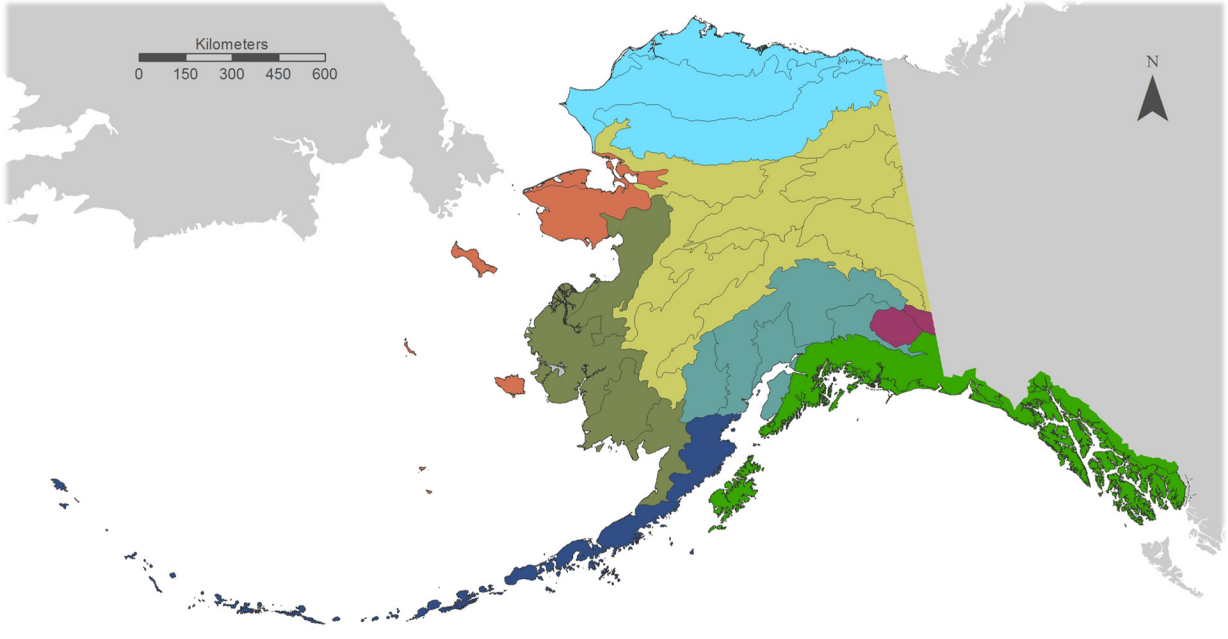
Taxon	BLM List	Justification
Stellaria alaskana	Watch	Currently ranked S4 and removed from the Alaska Rare Plant List.
Stellaria dicranoides	Watch	Currently ranked S4 and no longer on the Alaska Rare Plant List. Accepted name is *Cherleria dicranoides*.
Symphyotrichum falcatum* var. *falcatum	Watch	Taxon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

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Ecogeographic Regions of Alaska

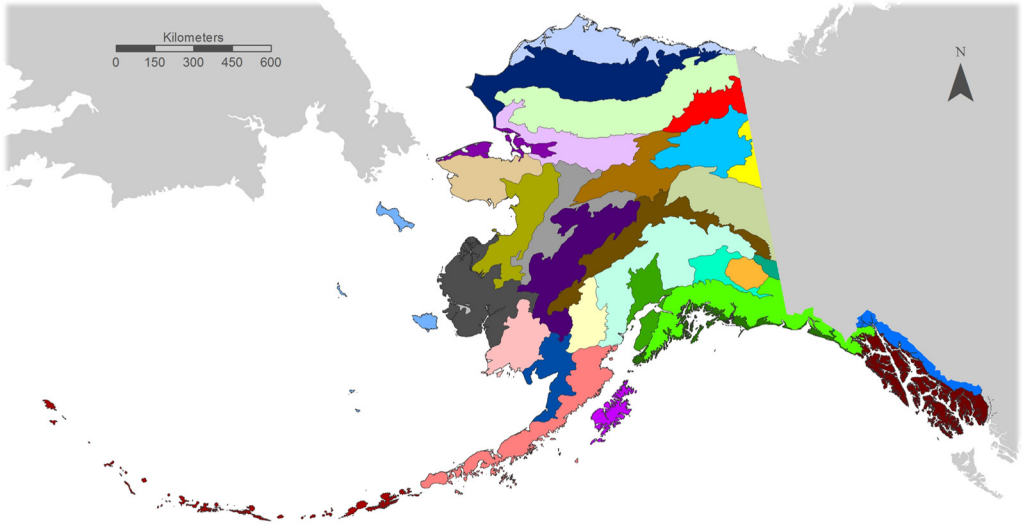
Alaska is a region of diverse geologic, climatic, and ecologic conditions, all of which affect the distribution of suitable habitat for plant species. These conditions can be broadly grouped into eight major ecoregion groups and then more narrowly delineated into 32 ecoregions.[23]

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.



Major Ecoregion Groups of Alaska

Alaska Range Transition
Aleutian Meadows
Arctic Tundra
Bering Taiga
Bering Tundra
Coast Mountains Transition
Coastal Rainforests
Intermontane Boreal



Ecoregions of Alaska

Ahklun Mountains	Bristol Bay Lowlands	Kluane Range	Ray Mountains
Alaska Peninsula	Brooks Foothills	Kobuk Ridges and Valleys	Seward Peninsula
Alaska Range	Brooks Range	Kodiak Island	Tanana-Kuskokwim Lowlands
Aleutian Islands	Chugach-St. Elias Mountains	Kotzebue Sound Lowlands	Wrangell Mountains
Alexander Archipelago	Cook Inlet Basin	Kuskokwim Mountains	Yukon River Lowlands
Beaufort Coastal Plain	Copper River Basin	Lime Hills	Yukon-Kuskokwim Delta
Bering Sea Islands	Davidson Mountains	North Ogilvie Mountains	Yukon-Old Crow Basin
Boundary Ranges	Gulf of Alaska Coast	Nulato Hills	Yukon-Tanana Uplands

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Species Accounts

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Alyssum obovatum (C.A. Mey.) Turcz. **Brassicaceae**

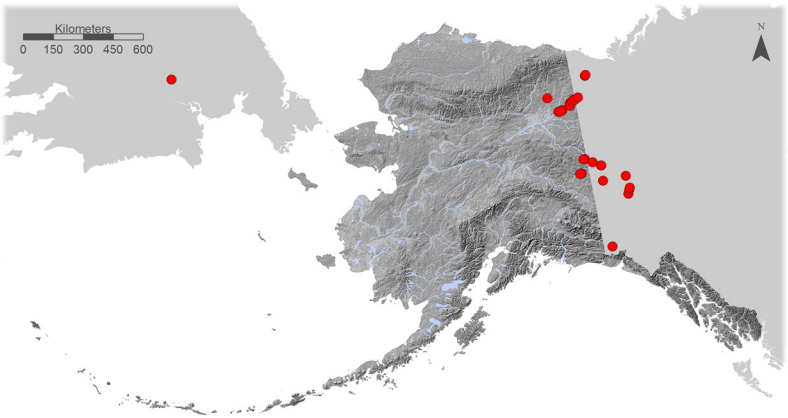
Synonyms: *Alyssum americanum*

Global Distribution: Alaska, Yukon; central and East Asia, including arctic Russia from the Polar Ural Mountains to west Chukotka Peninsula.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Davidson Mountains, Yukon-Old Crow Basin, Yukon-Tanana Uplands.

Conservation Status: S2S3 G5.



Description[24, 25, 26, 27]

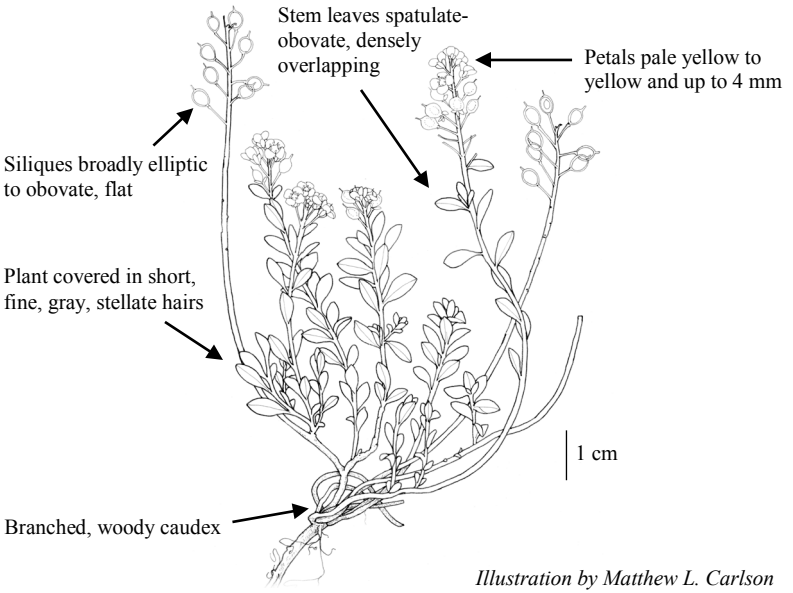


Illustration by Matthew L. Carlson

General: Perennial herb with branched, woody caudex, both fertile and sterile stems often present; covered in short, fine, gray, stellate hairs throughout; stems 5 to 30 cm, ascending or erect; long, stout taproot.

Leaves: Stem leaves subsessile, alternate, densely overlapping, spatulate-obovate, 6 to 14 mm long, 2 to 6 mm wide.

Flowers: Inflorescence terminal corymb or raceme; petals pale yellow to yellow, 2.5 to 4 mm long, longer than sepals.

Fruits: Fruits broadly elliptic to obovate siliques, flat, valves inflated at middle or on one side, densely pubescent, 1- or 2-seeded, 3 to 5 mm long; styles slender, 1.5 to 2 mm long.



Ecology

Elevation: Known from 150 to 800 m in Alaska; known from up to 1,740 m in central Russia.

Landform: Bluff slopes above rivers, river terraces, river benches, barren slopes, steppe slopes.

Soil Type: Sand, silt, loam, gravel, scree; associated with calcareous substrates; associated with ultramafic substrates in northern Asia;[28] accumulates high levels of magnesium and nickel within tissue.[29]

Moisture regime: Dry.

Slope: Slopes to at least 45º.

Aspect: Predominantly southeast to south to southwest; less commonly found on east aspects.

Vegetation type: Usually sparsely vegetated; also in grassy steppe.[30]

Associated species: *Arnica angustifolia*, *Androsace septentrionalis*, *Artemisia frigida*, *Braya humilis*, *Carex supina*, *Douglasia arctica*, *Draba cana*, *Dryas integrifolia*, *Erigeron caespitosus*, *Festuca brachyphylla*, *Hedysarum alpinum*, *Micranthes reflexa*, *Minuartia yukonensis*, *Poa glauca*, *Potentilla arenosa*, *Saxifraga bronchialis*.

Longevity: Long-lived perennial, as shown by extensive caudex.

Phenology: Flowering May through July; begins fruiting late June, probably sooner.

Population estimate: There are twelve known occurrences in Alaska; this species has been reported as a codominant component of vegetation along several Porcupine River bluffs.[31]

Similar Species[24, 25, 26, 27]

Alyssum obovatum can be distinguished from superficially similar Brassicaceae that grow on south-facing river bluffs on calcareous substrates in interior Alaska by the morphological features listed in the table below. *Alyssum alyssoides* also occurs in Alaska, but it is not native and is not likely to be confused with *Alyssum obovatum*.

Species	Leaves	Flowers	Fruits
Alyssum obovatum	Basal leaves absent, stem leaves spatulate-obovate	Pale yellow, petals 2.5 to 4 mm long	Broadly elliptic to obovate, 1- or 2-seeded
Draba aurea	Basal leaves oblanceolate, stem leaves lanceolate	Yellow, petals 4-6 mm long	Oblong, many-seeded
Physaria arctica	Basal leaves oblanceolate to spatulate, stem leaves oblanceolate	Yellow, petals 4-7 mm long	Globose to obovate, many-seeded





ALA 138889





ALA 18403

Antennaria densifolia A.E. Porsild — **Asteraceae**

Synonyms: *Antennaria ellyae*

Global Distribution: Rocky Mountain cordillera in Alaska, Yukon, Northwest Territories; disjunct in British Columbia and Montana.[32]

Alaska Distribution: Intermontane Boreal.

Ecoregion Occupied: North Ogilvie Mountains.

Conservation Status: S2 G3; BLM Sensitive.



Description[24, 26, 33]

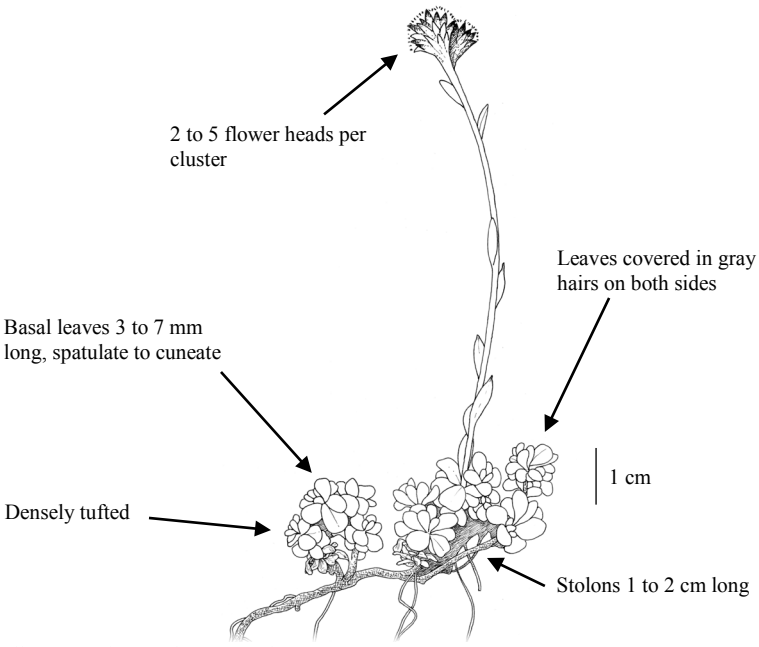


Illustration by Matthew L. Carlson

General: Plants 3.5 to 16 cm tall, densely tufted with stolons 1 to 2 cm long.

Leaves: Basal leaves densely congested, 1-nerved, spatulate to cuneate, 3 to 7 mm long, 2 to 5 mm wide, gray-hairy on both sides; stem leaves linear, 2 to 13 mm long, upper ones flagged.

Flowers: Flower heads arranged in cymose clusters of 2 to 5; involucres woolly at the base, 4.5 to 7.5 mm tall on pistillate plants, 3 to 6.5 mm tall on staminate plants; involucral bracts lanceolate, brown to black near the tips, arranged in 2 or 3 series; florets 2.5 to 4.5 mm long on pistillate plants, 2 to 3.5 mm long on staminate plants.

Fruits: Achenes 0.8 to 1.5 mm long, glabrous with hairy bristles 2.5 to 3.5 mm long.



Ecology

Elevation: Found from 600 to 1,580 m in Alaska and Yukon.

Landform: Subalpine slopes, alpine slopes, alpine ridges, rock outcrops.

Soil Type: Medium-sized talus, scree, gravel, rocky soil, mineral soil; associated with calcareous substrates.[34]

Moisture regime: Mesic to dry.

Slope: Moderate to steep slopes; usually 20° to 30° slope.

Aspect: Predominantly west to south to southeast; less commonly northeast or northwest.

Vegetation type: Sparsely vegetated, dwarf shrub tundra, open spruce woodlands, grasslands; usually in barren microsites.

Associated species: *Arctous rubra*, *Cassiope tetragona*, *Dryas integrifolia*, *Festuca altaica*, *Pedicularis capitata*, *Pedicularis lanata*, *Picea glauca*, *Salix reticulata*, *Silene acaulis.*

Longevity: Perennial, longevity unknown.

Phenology: In flower early June, probably earlier.

Population estimate: There are nine known occurrences in Alaska; populations range from few individuals to locally common.

Reproductive biology: Dioecious, the majority of populations include staminate plants and are located in previously unglaciated regions; only 3 populations that include staminate plants occur in previously glaciated regions.[35]

Similar Species[24, 33]

Antennaria densifolia can be distinguished from superficially similar *Antennaria* taxa by the differences in morphology and habitat shown in the table below.

Species	Basal Leaves	Stolons	Habitat
Antennaria densifolia	Spatulate to cuneate, 3 to 7 mm long, 2 to 5 mm wide	1 to 2 cm long	Calcareous talus and scree, tundra
Antennaria alpina	Narrowly spatulate to oblanceolate, 6 to 25 mm long, 2 to 7 mm wide	1 to 7 cm long	Alpine and arctic tundra
Antennaria friesiana* ssp. *friesiana	Narrowly spatulate to oblanceolate, 10 to 30 mm long, 2 to 4 mm wide	0.5 to 1.0 cm long	Dry slopes, gravelly frost boils



ALA 129882

Arnica lonchophylla ssp. *lonchophylla* Greene **Asteraceae**

Synonyms: *Arnica angustifolia* ssp. *lonchophylla*

Global Distribution: Occurs throughout Canada; Alaska, South Dakota, Wyoming.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Ray Mountains, Yukon-Tanana Uplands.

Conservation Status: S1S2 G5T4; BLM Sensitive.



Description[24, 25, 26, 36]

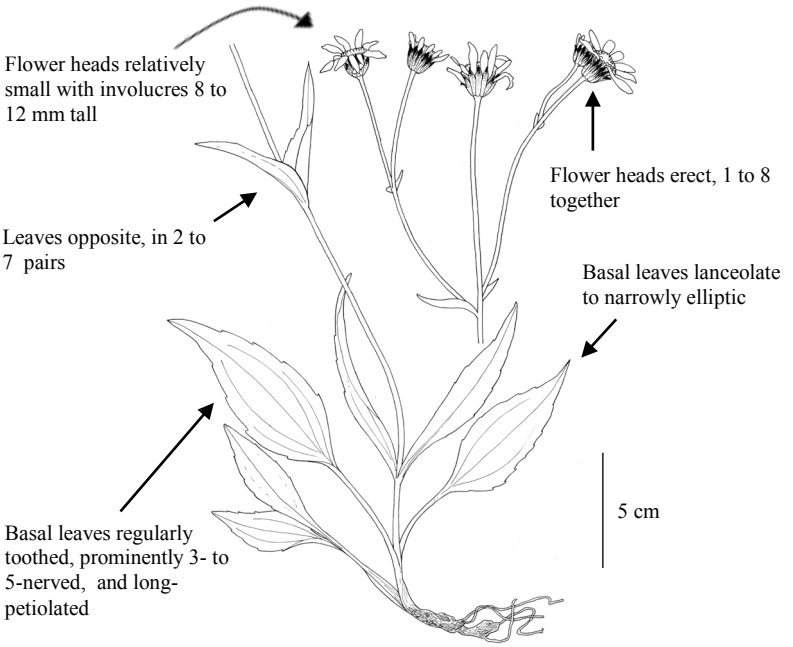


Illustration by Matthew L. Carlson

General: Perennial herb from slender, branched rhizome; stems 12 to 50 cm tall, erect to ascending, mostly solitary, usually simple but occasionally branched; entire plant sparsely to densely puberulent and sometimes glandular at least in the upper portion.

Leaves: Basal leaves lanceolate to narrowly elliptic-ovate, prominently 3- to 5-veined, puberulent and glandular to nearly glabrous, long-petiolated with regularly toothed margins; stem leaves opposite, in 2 to 7 pairs, 3.5 to 14 cm long, 0.5 to 3.7 cm wide, becoming reduced, sessile, and entire-margined near the top.

Flowers: Flower heads erect, arranged in clusters of 1 to 8; involucres densely white-hairy, 8 to 18 mm tall; involucral bracts 6 to 14, lanceolate, puberulent, usually glandular; ray florets 6 to 17, yellow, toothed at apexes; disk florets yellow.

Fruits: Achenes 3 to 8 mm long, uniformly densely hairy and sometimes glandular with white, finely barbed pappi.



Ecology

Elevation: Known from 120 to 620 m in Alaska; 0 to 1,500 m elsewhere in North America.[36]

Landform: River bars, river banks, mountain slopes, rock ledges

Soil Type: Rocky soil, gravel, sand; occasionally associated with calcareous substrates.

Moisture regime: Dry.

Vegetation type: Open woodlands, sparsely vegetated.

Associated species: *Aquilegia brevistyla*, *Castilleja caudata*, *Chamaepericlymenum canadense* (*Cornus canadensis*), *Salix alaxensis.*

Longevity: Perennial, longevity unknown.

Phenology: Flowering June to August.

Population estimate: There are three known occurrences in Alaska; usually occurs in small populations of scattered individuals throughout its known range in North America.[37]

Reproductive biology: Spreads vegetatively by rhizomes in addition to reproducing by seeds; floral visitors include muscid or calliphorid flies.



Similar Species[24, 25, 36]

Arnica lonchophylla ssp. *lonchophylla* can be distinguished from other *Arnica* taxa with relatively narrow leaves and erect, typically multiple heads that occur in Alaska by the morphological features and habitats shown in the table below.

Species	Leaves	Involucre	Pappus	Habitat
Arnica lonchophylla* ssp. *lonchophylla	Regularly toothed, elliptic to narrowly lanceolate, basal leaves long-petiolated	8 to 12 mm tall	White	Open woodlands, stream gravels
Arnica angustifolia	Basal leaves entire to remotely toothed, broadly lanceolate to linear, short-petiolated	10 to 14 mm tall	White	Alpine slopes, tundra
Arnica chamissonis	Regularly to coarsely toothed, cordate to ovate, basal leaves short-petiolated to sessile	8 to 12 mm tall	Tan	Moist meadows, conifer forests
Arnica mollis	Entire or irregularly toothed, elliptic to lanceolate, basal leaves long-petiolated	12 mm tall	Tan	Alpine to subalpine meadows, conifer forests
Arnica ovata	Coarsely toothed, broadly deltate to ovate	10 to 15 mm tall	Tan	Alpine to subalpine meadows, conifer forests

Global Distribution: Endemic to western Aleutian Islands.

Alaska Distribution: Aleutian Meadows.

Ecoregion Occupied: Aleutian Islands (Kiska Island and Rat Island).

Conservation Status: S1 G1.



Description[25, 38]

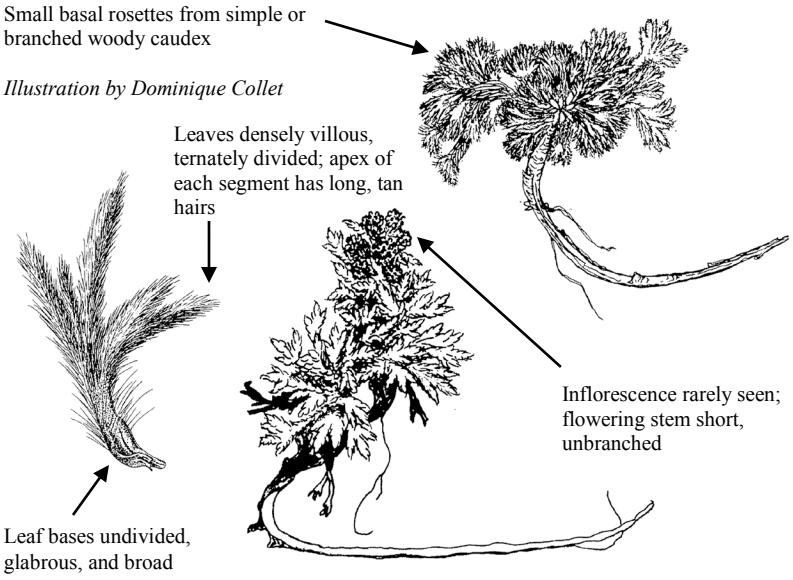


Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

General: Perennial herb, densely tufted, villous, 5 to 10 cm tall; caudices simple or branched, woody.

Leaves: Leaves mostly basal, short-petiolated, gray-green, 1.5 to 5 cm long, ternate to pinnate with linear to ovate-linear lobes.

Flowers: Peduncles 0 to 15 mm long; involucres hemispheric to globose, 5 to 7 mm tall; flower heads few in spike-like arrangements, 5 mm in diameter; florets purple-red, 1.5 to 2 mm long.

Fruits: Achenes glabrous, oblong, 1 mm long, longitudinally ribbed.



Ecology

Elevation: Known from 40 to 700 m.

Landform: Mountain slopes, tundra; disturbed areas.

Soil Type: Gravel, scree.

Moisture regime: Dry.

Slope: Gentle to moderate slopes.

Aspect: Southwest to south to east.

Vegetation type: Alpine cushion vegetation, sparsely vegetated; on barren patches between heath vegetation.

Associated species: *Achillea millefolium*, *Chrysosplenium wrightii*, *Diapensia lapponica*, *Lupinus nootkatensis*, *Luzula* sp., *Saxifraga oppositifolia*, *Sibbaldia procumbens.*

Longevity: Moderately long-lived perennial, as indicated by extensive caudices and rosettes.

Phenology: Flowering early June.

Reproductive biology: Rosettes often sterile; sexual reproduction is low, plants only rarely seen in flower;[39] many *Artemisia* species are primarily wind-pollinated although insect pollination is also likely.[40]

Population estimate: There are six known occurrences in Alaska; populations occur as scattered rosettes; there are likely fewer than 3,000 individual plants in Alaska.[39]

Similar Species[25, 38]

No other species that occur in the Aleutian Islands can be easily confused with *Artemisia aleutica*.



ALA 88770


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Artemisia globularia var. *lutea* Hultén

Asteraceae

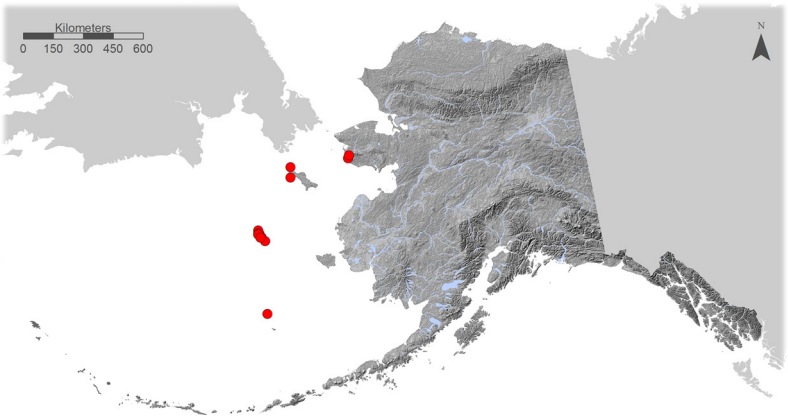
Synonyms: *Artemisia globularia* ssp. *lutea*

Global Distribution: Endemic to Bering Sea Islands and Seward Peninsula.

Alaska Distribution: Bering Tundra.

Ecoregions Occupied: Bering Sea Islands, Seward Peninsula.

Conservation Status: S2 G4TNR; BLM Sensitive.



Description[25, 38]

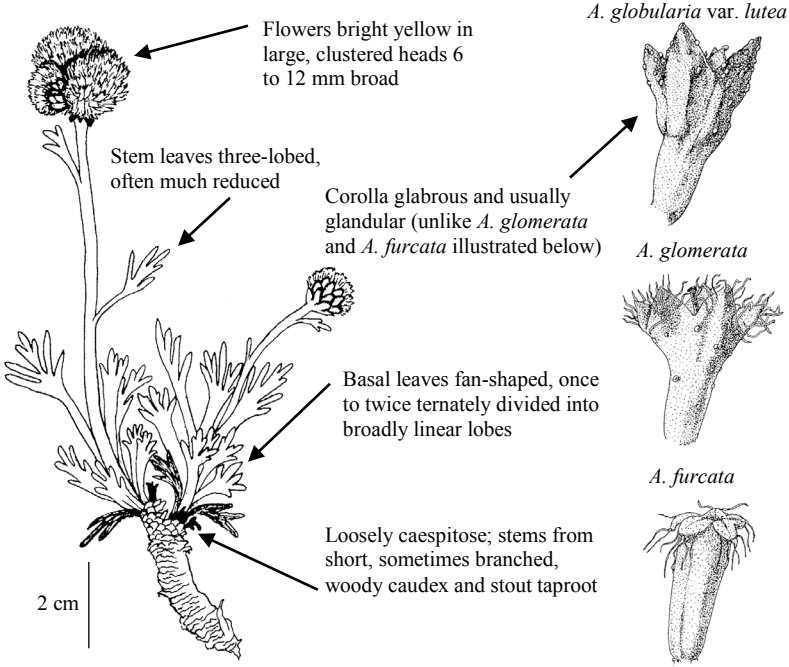


Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

General: Perennial herb, tufted, faintly aromatic, 5 to 9 cm tall from stout taproots; caudexes simple or branched, proximal branches with persistent leaf bases; stems 1 to 5, erect, white-gray, densely tomentose.

Leaves: Leaves mostly basal, white-green, sparsely hairy, once to twice ternately divided into broadly linear lobes, 1 to 4.5 cm long, 6 to 15 mm wide; stem leaves few, three-lobed.

Flowers: Flower heads arranged in capitate arrays of 2 to 20, 6 to 30 mm in diameter; peduncles 0 to 25 mm long; involucres hemispheric, 3.5 to 6 mm tall; involucral bracts lanceolate, pilose with brown margins; florets yellow, 2 to 3 mm long with orange-translucent glands.

Fruits: Achenes oblong, glabrous, 1.5 to 2 mm long with relatively broad ribs.



Ecology

Elevation: Known from 10 to 340 m.

Landform: Mountain slopes, summits, ridges, stream banks, and floodplains.

Soil Type: Sand, gravel, scree; granite, schist; sometimes associated with acidic substrates.

Moisture regime: Dry.

Slope: Gentle to steep slopes.

Aspect: No particular aspect.

Vegetation type: Alpine cushion vegetation.

Associated species: *Salix arctica*, *Salix reticulata*, *Tofieldia coccinea*, *Tofieldia pusilla.*

Longevity: Moderately long-lived perennial, as indicated by stout, woody caudices.

Phenology: Flowering late June and July.

Population estimate: There are twelve known occurrences in Alaska; common on St. Mathew Island, infrequent on surrounding islands and Seward Peninsula;[38] population at Crete Creek on Seward Peninsula estimated at a few hundred plants.[41]

Reproductive biology: Many *Artemisia* species are primarily wind-pollinated although insect pollination is also likely.[40]

Similar Species[25, 38]

Artemisia globularia var. *lutea* can be distinguished from superficially similar yellow-flowered *Artemisia* taxa that occur on the Seward Peninsula and Bering Sea Islands by the morphological features and habitats described in the table below. We accept it at the rank of variety because it occurs entirely within the range of *Artemisia globularia* s. str.[42]

Species	Habit	Flower Heads	Involucres	Florets	Habitat
Artemisia globularia* var. *lutea	Tufted	Capitate arrays	6 to 11 mm wide; phyllaries with brown margins	Yellow, glandular	Scree slopes, acidic tundra
Artemisia senjavinensis	Densely tufted	Corymb arrays	3 to 5 mm wide	Yellow or tan, glandular	Calcareous, dry scree slopes and outcrops
Artemisia furcata	Not tufted	Racemiform arrays	4.5 to 8 mm wide; phyllaries with dark brown margins	Yellow, sometimes red-tinged, glabrous	Talus slopes or tundra
Artemisia glomerata	Densely tufted	Subcapitate to corymb arrays	3.5 to 5 mm wide; phyllaries with white margins	Yellow, glabrous or pilose	Tundra and sandy slopes


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Artemisia senjavinensis Bess. **Asteraceae**

Synonyms: *Artemisia androsacea*

Global Distribution: Amphi-Beringian; endemic to Seward Peninsula and Chukotka Peninsula.

Alaska Distribution: Bering Tundra.

Ecoregions Occupied: Seward Peninsula.

Conservation Status: S3 G3; BLM Sensitive.



Description[25, 38]

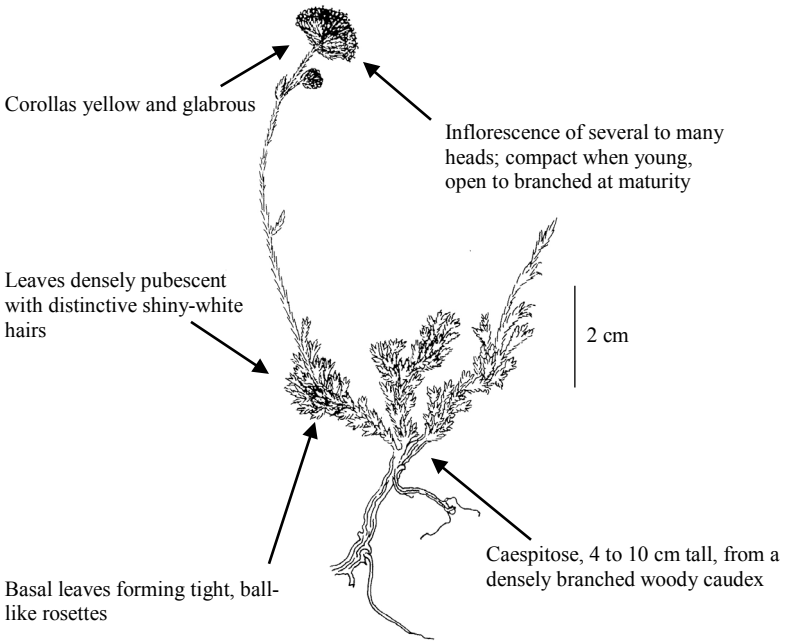


Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

General: Perennial herb, mildly aromatic, densely tufted, 4 to 10 cm tall from branched, woody caudex; stems 1 to 9, erect.

Leaves: Basal leaves arranged in rosettes, broadly oblanceolate, densely tomentose with shiny-white hairs, 5 to 8 mm long, 5 to 7 mm wide, deeply lobed with 3 to 5 lobes; stem leaves few, densely tomentose with shiny-white hairs, 5 to 10 mm long, entire or pinnately lobed with 3 to 5 lobes.

Flowers: Flower heads arranged in corymbiform arrays, compact when young, open to branched at maturity; involucres 3 to 4 mm tall, 3 to 5 mm wide; involucral bracts lanceolate to ovate, densely hairy; florets yellow, glandular.

Fruits: Achenes glabrous, 2 mm long.



Ecology

Elevation: Known from 10 to 960 m in Alaska.

Landform: Mountain slopes, ridges, rock outcrops, beach slopes above high tide.

Soil Type: Scree, gravel, sand; associated with calcareous substrates.

Moisture regime: Dry to mesic; common on early-melting, windswept slopes and ridges with minimal winter snow cover.[43]

Slope: Flat to steep slopes, roughly 0° to 30°.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, open dwarf shrub – herbaceous barrens and meadows, dwarf shrub – herbaceous tundra, *Dryas* tundra.

Associated species: *Carex nardina*, *Carex glacialis*, *Dryas ajanensis, Dryas integrifolia, Festuca altaica*, *Minuartia obtusiloba*, *Oxytropis borealis*, *Oxytropis bryophila, Phlox alaskensis*, *Potentilla hyparctica*, *Potentilla uniflora*, *Salix reticulata*, *Saxifraga oppositifolia*, *Smelowskia porsildii*.

Longevity: Long-lived perennial, as indicated by well-developed, woody caudices with many years of old leaf bases.

Phenology: Flowering June and July.

Population estimate: There are 51 known occurrences in Alaska; one population near Josie Creek consisted of approximately 300 plants in a 150 m by 30 m area, another near Upper Francisco Creek consisted of approximately 50 plants in a 30 m by 40 m area;[41] state population is probably at least several thousand individuals.[44]

Reproductive biology: Many *Artemisia* species are primarily wind-pollinated although insect pollination is also likely;[40] at one population near Josie Creek, roughly 70% of individuals were vegetative with few seedlings but many small plants present, suggesting that reproduction may be episodic.[41]

Similar Species[25, 38]

Artemisia senjavinensis is distinct from other yellow-flowered *Artemisia* taxa that occur on the Seward Peninsula. The table below describes differences in morphology and habitat between superficially similar yellow-flowered *Artemisia* taxa.

Species	Habit	Flower Heads	Involucres	Corolla	Habitat
Artemisia senjavinensis	Densely tufted	Corymbiform arrays	3 to 5 mm wide	Yellow or tan, glandular	Calcareous, dry scree slopes and outcrops
Artemisia glomerata	Densely tufted	Subcapitate to corymbiform arrays	3.5 to 5 mm wide	Yellow, glabrous or pilose	Tundra and sandy slopes
Artemisia globularia* var. *lutea	Tufted	Capitate arrays	6 to 11 mm wide	Yellow, glandular	Scree slopes, acidic tundra
Artemisia furcata	Not tufted	Racemiform arrays	4.5 to 8 mm wide	Yellow, sometimes red-tinged, glabrous	Talus slopes or tundra


2 cm
ALA 130227

Artemisia tanacetifolia L. **Asteraceae**

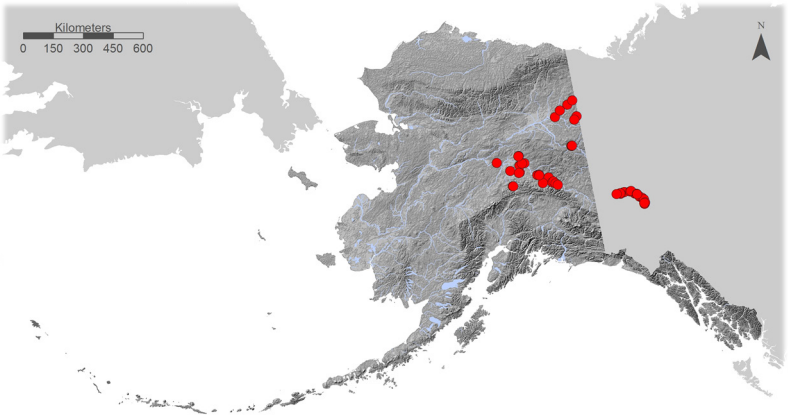
Synonyms: *Artemisia laciniata* auct. non Willd., *Artemisia laciniatiformis* auct. non Kom.

Global Distribution: Eurasia; Alaska, Yukon.

Alaska Distribution: Intermontane Boreal, Alaska Range Transition.

Ecoregions Occupied: Yukon-Old Crow Basin, North Ogilvie Mountains, Yukon-Tanana Uplands, Tanana-Kuskokwim Lowlands, Alaska Range.

Conservation Status: S3 G4?; BLM Sensitive.



Description[24, 25, 38]

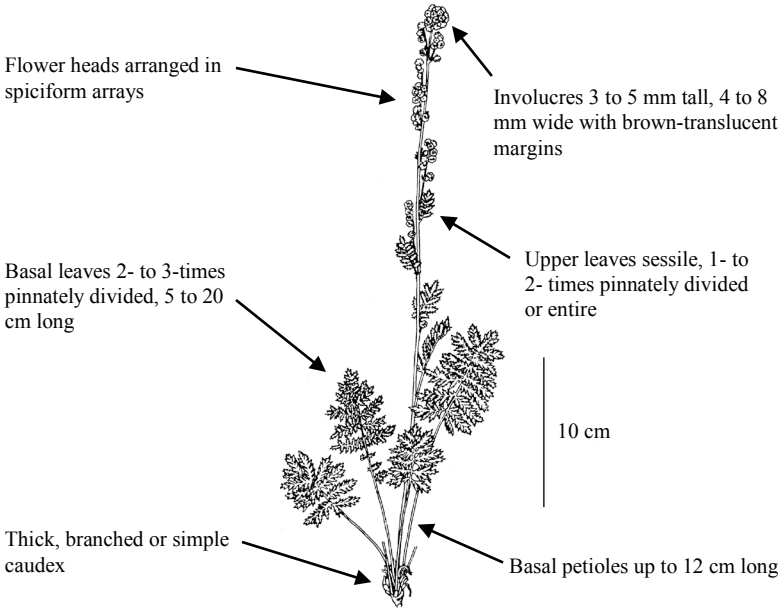


Illustration by Dagny Tande-Lid, courtesy of Stanford University Press

General: Perennial, mildly aromatic herb from a thick, branched or simple caudex and taproot; stems 1 to 3, 20 to 60 cm tall, erect, red-brown, simple, pubescent to sparsely hairy.

Leaves: Basal leaves arranged in rosettes, greenish, pubescent at least below, 5 to 20 cm long, 1 to 2 cm wide, 2- to 3-times pinnately divided, deeply lobed with petioles up to 12 cm long; stem leaves smaller, sessile, 1- to 2-times pinnately divided to entire.

Flowers: Flower heads spreading to nodding, arranged in spiciform arrays 8 to 18 cm long; peduncles 0 to 10 mm long; involucres globose, 3 to 5 mm tall, 4 to 8 mm wide; involucral bracts elliptic, glabrous to sparsely hairy with brown-translucent margins; florets yellow, hairy.

Fruits: Achenes oblong, 0.5 to 1 mm long, glabrous.



Ecology

Elevation: Known from 80 to 840 m in Alaska; 100 to 1,500 m elsewhere in its range.[38]

Landform: Predominantly bluff slopes above rivers; also mountain slopes, mountain summits, lake shores.

Soil Type: Silt, loam, loess, gravel, rocky soil; sometimes associated with acidic substrates or shale.

Moisture regime: Dry.

Slope: Flat to slopes of up to 45º.

Aspect: Predominantly south; also southeast and southwest.

Vegetation type: Grass shrub steppes, grass forb steppes, aspen woodland, dwarf shrub tundra.

Associated species: *Artemisia frigida*, *Calamagrostis purpurascens*, *Cnidium cnidiifolium*, *Populus tremuloides.*

Longevity: Long-lived perennial, as evidenced by thick caudex.

Phenology: Flowering May through August.

Population estimate: There are 26 known occurrences in Alaska; population sizes range from scattered individuals to locally common.

Reproductive biology: Many *Artemisia* species are primarily wind-pollinated although insect pollination is also likely.[40]

Similar Species[24, 38]

Artemisia tanacetifolia can be distinguished from other tall *Artemisia* species with pinnately divided leaves that grow in interior Alaska by the morphological features and habitats shown in the table below.

Species	Basal Leaves	Involucres	Involucral Bracts	Habitat
Artemisia tanacetifolia	2- to 3-times pinnately divided, 5 to 20 cm long	3 to 5 mm tall	Margins brown-translucent	Dry bluff slopes and mountain slopes
Artemisia alaskana	1- to 2-times ternately divided, 1.5 to 5 cm long	3.5 to 5 mm tall	Margins brown-translucent	Gravel banks, scree slopes, tundra
Artemisia arctica	1- to 3-times pinnately divided, 5 to 8 cm long	5 to 8 mm tall	Margins dark brown to black	Subalpine to alpine meadows, forests

Tanacetum bipinnatum and *Tanacetum huronense*, both of which occur in Interior Alaska, also look similar to *Artemisia tanacetifolia* when in a vegetative state. *Tanacetum* species can be distinguished from *Artemisia tanacetifolia* by the presence of flower heads arranged in corymbiform arrays or singly rather than in spiciform arrays and involucres 8 to 22 mm wide rather than 4 to 8 mm wide.[45]


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Boechera lemmonii (S. Watson) W.A. Weber **Brassicaceae**

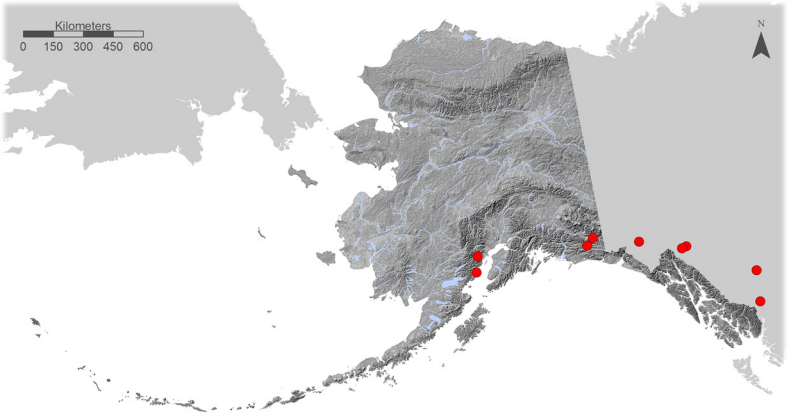
Synonyms: *Arabis codyi*, *Arabis lemmonii*

Global Distribution: Mountains in western North America from Alaska south to California and east to Colorado.

Alaska Distribution: Alaska Range Transition, Coastal Rainforests.

Ecoregions Occupied: Alaska Range, Chugach-St. Elias Mountains.

Conservation Status: S1S2 G5; BLM Watch.



Description[46, 47]

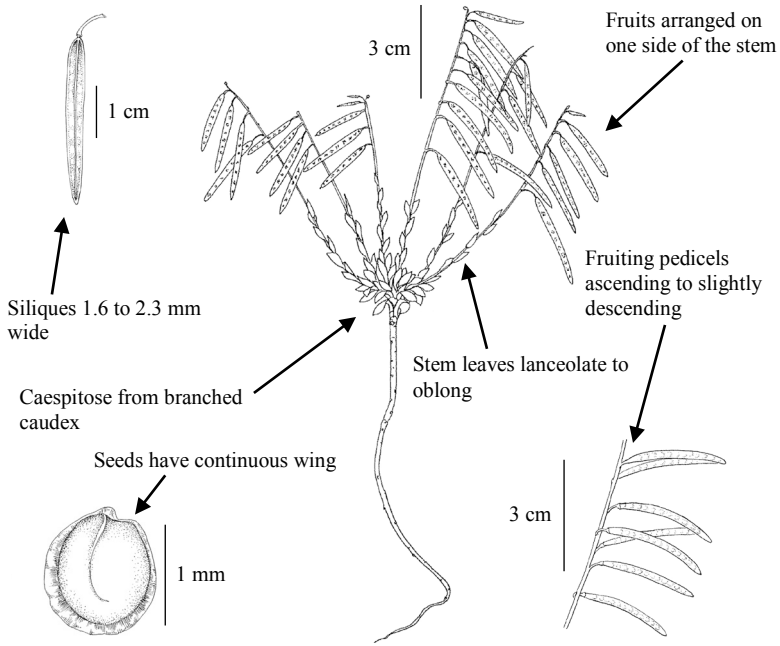


Illustration by Yevonn Wilson-Ramsey, courtesy of Flora of North America Association

General: Caespitose, perennial herb with branched, woody caudex; stems usually one per caudex branch, 5 to 25 cm tall, glabrous or sparsely pubescent near the base with short-stalked, 2- to 6-rayed hairs.

Leaves: Basal leaves arranged in rosettes, ciliate along petiole, oblanceolate to obovate, 1.5 to 5 mm wide, usually entire but sometimes slightly toothed, both surfaces densely to sparsely pubescent with short-stalked, 3- to 9-rayed hairs; stem leaves 2 to 8, not concealing stem, lanceolate to oblong, uppermost leaves glabrous or sparsely pubescent, sessile, auricles absent or 0.1 to 0.5 mm long.

Flowers: Inflorescences unbranched racemes of 3 to 12 flowers; sepals glabrous or sparsely pubescent, purple; petals purple to lavender, spatulate, 3.5 to 6 mm long, 1 to 1.5 mm wide.

Fruits: Fruiting pedicels ascending to slightly descending, usually slightly recurved but sometimes straight, 2 to 6 mm long, glabrous or sparsely pubescent; fruits linear, 2 to 4.4 cm long, 1.6 to 2.3 mm wide with style 0.1 to 0.2 mm long.



Ecology

Elevation: Known from 700 to 1,800 m in Alaska; up to 4,400 m elsewhere in North America.[46]

Landform: Mountain slopes, alpine saddles, crumbling alpine cliffs, glacial moraines.[48]

Soil Type: Gravel, unstable scree, glacial till, bedrock;[48, 49] sometimes associated with calcareous substrates.

Moisture regime: Mesic to dry; sometimes associated with areas of late-melting snow drifts.

Slope:	10° to 30°.
Aspect:	No particular aspect.
Vegetation type:	Alpine barrens, sparsely vegetated, shrub birch-ericaceous scrub.
Associated species:	*Arnica ovata*, *Artemisia frigida*, *Carex phaecocephala*, *Festuca altaica*, *Festuca brachyphylla*, *Hedysarum boreale*, *Juniperus horizontalis*, *Luzula spicata*, *Noccaea arctica*, *Papaver alboroseum*, *Potentilla uniflora*.
Longevity:	Long-lived perennial, as evidenced by extensive, woody caudexes.
Phenology:	Flowering July, probably sooner, through August; fruiting late July, probably sooner, through August.
Population estimate:	There are four known occurrences in Alaska; populations are usually small and scattered, population at Saddle Mountain consisted of 100 individuals and population at Double Glacier Nunatak consisted of 40 individuals.[50]
Reproductive biology:	Can form apomictic hybrids with other *Boechera* species, e.g. *Boechera drepanoloba* is an apomictic species that likely formed through the hybridization of *B. lemmonii* with *B. stricta*;[47] *B. lemmonii* likely forms autopolyploids, such as *Arabis codyi* (included within *B. lemmonii* as a synonym).[47]



Similar Species[46, 47]

Boechera lemmonii can be distinguished from similar *Boechera* species that grow on gravel or scree on alpine slopes and ridges in the mountains of southern Alaska by the morphological features given in the table below. Identification of *Boechera* species is sometimes complicated by the formation of apomictic hybrids.

Species	Lower Stem Hairs	Basal Leaf Hairs	Petals	Fruiting Pedicels	Fruits
Boechera lemmonii	Branched hairs only	Short-stalked, 3- to 9-rayed	3.5 to 6 mm long	Ascending to slightly descending; secund	1.6 to 2.3 mm wide
Boechera drepanoloba	Branched hairs only	Subsessile, 2- to 6-rayed	6 to 8 mm long	Horizontal to ascending; secund	2.5 to 3.5 mm wide
Boechera stricta	Usually branched hairs only	Sessile, 2-rayed	7 to 11 mm long	Erect, appressed to rachis; not secund	1.5 to 3.5 mm wide
Boechera calderi	Glabrous	Sessile, 3- to 4-rayed	6 to 9 mm long	Erect, appressed to rachis; not secund	1.8 to 2.5 mm wide
Boechera grahamii	Simple and branched hairs	Sessile or subsessile, 2- to 4-rayed	5.5 to 8 mm long	Ascending to descending; not secund	1 to 1.8 mm wide

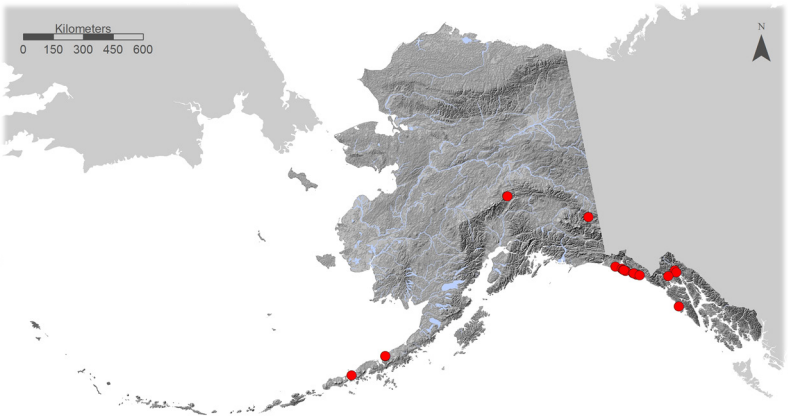


Global Distribution: Found throughout western North America; present in northeastern North America with large gaps.[51]

Alaska Distribution: Aleutian Meadows, Alaska Range Transition, Coast Mountains Transition, Coastal Rainforests.

Ecoregions Occupied: Alaska Peninsula, Alaska Range, Kluane Ranges, Gulf of Alaska Coast, Alexander Archipelago.

Conservation Status: S2S3 G3; BLM Sensitive.



Description[51, 52, 53, 54]

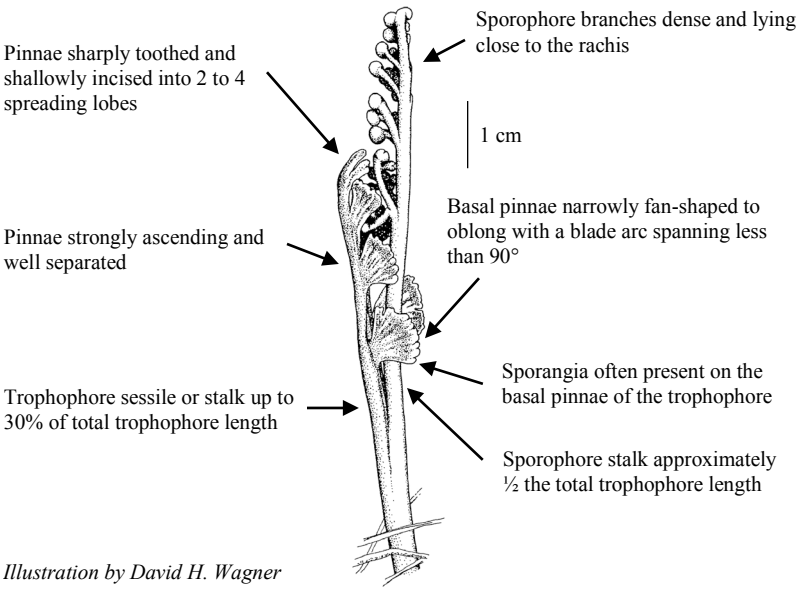


Illustration by David H. Wagner

General: Frond divided into dissimilar vegetative blade (trophophore) and spore-bearing segment (sporophore); perennial, 5 to 13 cm tall.

Trophophore: Sessile or stalk up to 30% of total trophophore length; blade yellow-green, up to 6 cm long and 2 cm wide, once pinnately divided; pinnae in up to 6 pairs, strongly ascending, well separated, fan-shaped, margins sharply toothed and often shallowly incised into 2 to 5 lobes, prominently veined; 1st (lowest) and 2nd pinnae pairs approximately equal in size and shape; distance between 1st and 2nd pairs up to slightly more than distance between 2nd and 3rd pairs; extra sporangia often present on the 1st pair.

Sporophore: Sporophore stalk approximately ½ the total length of the trophophore; twice pinnately-divided at base of sporangial cluster, branches dense and lying close to the rachis.







Ecology

Elevation: In Alaska, predominantly known from near sea level to 50 m but also from up to 1,440 m in mountains;[49] up to 3,200 m elsewhere in western North America.[51]

Landform: Beaches, beach ridges, spits, beach meadows, coastal dunes, riparian meadows, mountain slopes.

Soil Type: Sand, gravel, scree;[49] *Botrychium* gametophytes require mycorrhizae to grow beyond a 2- to 3-cell stage and reproduce, and sporophytes require mycorrhizae to develop enough to produce above ground leaves.[55]

Moisture regime: Moist to mesic.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, forb-graminoid meadow, alder thicket, willow thicket, alpine willow scrub.

Associated species: *Achillea millefolium*, *Alnus viridis* ssp. *sinuata*, *Castilleja unalaschcensis*, *Fragaria chiloensis*, *Leymus mollis*, *Salix pulchra*, *Salix richardsonii.*

Longevity: Long-lived perennial with a persistent rhizome that produces one leaf per year;[55] when collecting, remove only the above-ground portion with a knife.[55]

Phenology: Leaves appear late spring to mid-summer;[52] rhizomes of *Botrychium* species can remain dormant and produce no above ground growth for one to three years.[55]

Population estimate: There are seventeen known occurrences in Alaska; above ground populations of *Botrychium* species are often small and scattered;[55] below ground population of gametophytes and juvenile sporophytes at various developmental stages can occur at significantly higher densities.[55]

Reproductive biology: Spores of *Botrychium* species filter into soil and germinate in darkness;[55] self-fertilization is dominant, gametophyte density below ground often exceeds juvenile sporophyte density;[55] mortality rate of juvenile sporophytes is high;[55] sporophytes grow for several years below ground before the apex of the rhizome produces a leaf that emerges above ground;[55] sporophytes of *Botrychium ascendens* also reproduce vegetatively by gemmae.[51]

Herbivory: Above ground leaves of *Botrychium* species often regrow from rhizomes one to several years after disturbances such as herbivory or fire with no decrease in plant vigor.[55]

Similar Species[51, 52, 53, 54]

Several other *Botrychium* species that occur in Alaska can be easily confused with *Botrychium ascendens*, and distinguishing characteristics are often difficult to recognize. The table below shows morphological traits that distinguish *Botrychium* species that occur in Alaska with basal pinnae that span less than 120º.

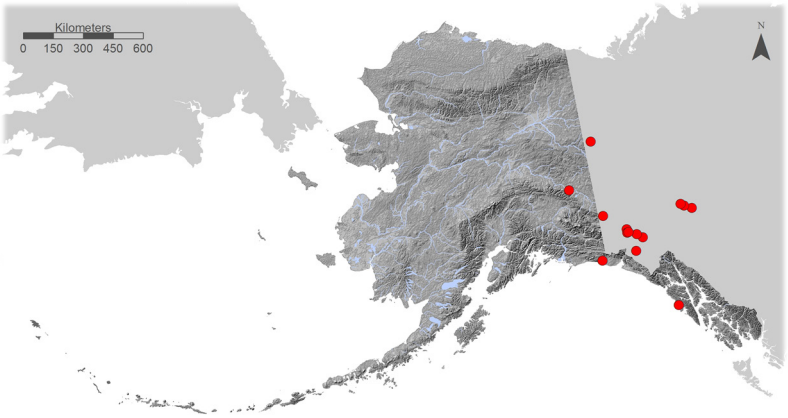
Species	Trophophore	Basal Pinnae	Pinnae Margins	Sporophore
Botrychium ascendens	Sessile or stalk up to 30% of total trophophore length, yellow-green	Fan-shaped, blade spanning arc less than 90°	Coarsely toothed, if divided into segments then symmetrically cleft into 2 to 4 spreading lobes; junction of lower margin with outer margin sharp-angled	Sporophore stalk approximately ½ total trophophore length
Botrychium spathulatum	Sessile, shiny yellow-green	Spatulate to fan-shaped, blade spanning arc less than 90°	Entire or irregularly and shallowly cleft into rounded and non-spreading lobes; junction of lower margin with outer margin rounded	Sporophore stalk approximately ½ total trophophore length
Botrychium minganense	Stalk usually up to 20% of total trophophore length, rarely sessile; dull green	Narrowly fan-shaped to oblong, blade spanning arc less than 120°	Entire to symmetrically and shallowly 3- to 5-lobed	Sporophore stalk ½ or more the total trophophore length
Botrychium campestre* var. *lineare	Sessile or stalk up to 1 cm long; pale green	Linear, blade spanning arc less than 45°	Commonly bifid with spreading and linear lobes	Sporophore stalk $^1/_3$ or less the total length of the trophophore
Botrychium montanum	Stalk 0.3 to 1.5 cm long; dull green, glaucous	Pinnae poorly developed, often confluent	Trophophore blade often appearing to have 2 to 4 angular lobes at tip	Not branched below the upper $^2/_3$

Global Distribution: Northwestern and northeastern North America with large gap between the two ranges.[51]

Alaska Distribution: Coastal Rainforests, Intermontane Boreal.

Ecoregions Occupied: Gulf of Alaska Coast, Alexander Archipelago, Tanana-Kuskokwim Lowlands.

Conservation Status: S1 G3; USFS Sensitive.



Description[51, 52, 53, 54, 56]

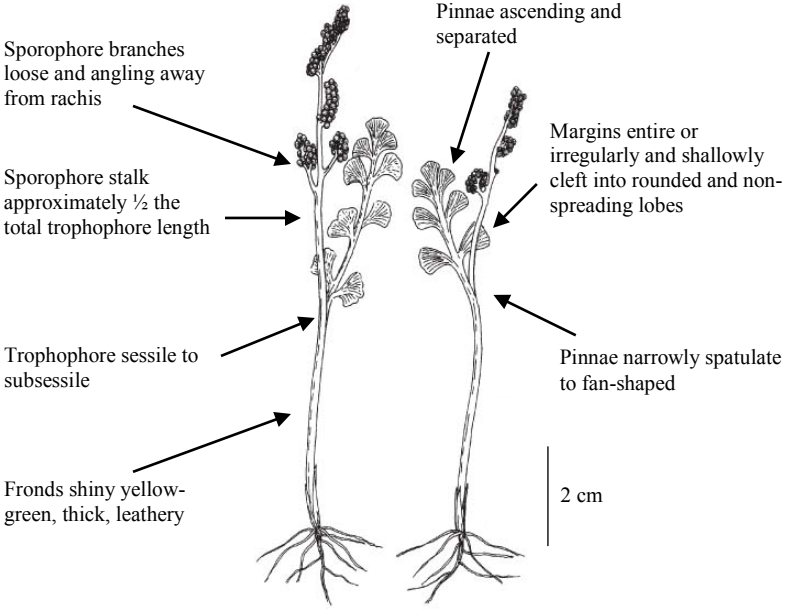


Illustration by Jane Lee Ling, courtesy of Province of British Columbia

General: Frond divided into dissimilar vegetative blade (trophophore) and spore-bearing segment (sporophore); perennial, 1 to 10 cm tall; some atypical forms with irregularly cleft pinnae occur in Alaska, such as the plants from Kruzof Island in the Alexander Archipelago.[57]

Trophophore: Stalk 0 to 1 mm long; blade shiny yellow-green, thick, leathery, up to 8 cm long and 2.5 cm wide, once pinnately divided; pinnae in up to 8 pairs, ascending, separated, spatulate to fan-shaped, rounded, margins entire or irregularly and shallowly cleft into rounded and non-spreading lobes, prominently veined; 1st (lowest) and 2nd pinnae pairs approximately equal in size and shape; distance between 1st and 2nd pairs up to slightly more than distance between 2nd and 3rd pairs.

Sporophore: Sporophore stalk approximately ½ the total length of the trophophore; once or twice pinnately-divided, branches loose and angling away from rachis.







Ecology

Elevation: Known from near sea level to approximately 480 m in Alaska; 0 to 2,000 m elsewhere in North America.[56]

Landform: Coasts, stabilized coastal dunes, upper beaches, riparian forests.

Soil Type: Sand, gravel; *Botrychium* gametophytes require mycorrhizae to grow beyond a 2- to 3-cell stage and reproduce, and sporophytes require mycorrhizae to develop enough to produce above ground leaves.[55]

Moisture regime: Mesic.

Slope: Flat to gentle.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, early seral, boreal forest.

Associated species: *Botrychium* spp., *Conioselinum pacificum*, *Dodecatheon pulchellum*, *Festuca rubra*, *Leymus mollis.*

Longevity: Long-lived perennial with a persistent rhizome that produces one leaf per year;[55] when collecting, remove only the above-ground portion with a knife.[55]

Phenology: Leaves appear late spring through summer;[52] rhizomes of *Botrychium* species can remain dormant and produce no above ground growth for one to three years.[55]

Population estimate: There are three known occurrences in Alaska; above ground populations of *Botrychium* species are usually small and scattered;[55] below ground populations of gametophytes and juvenile sporophytes at various developmental stages can occur at higher densities.[55]

Reproductive biology: Spores of *Botrychium* species filter into soil and germinate in darkness;[55] self-fertilization is dominant, gametophyte density below ground often exceeds juvenile sporophyte density;[55] mortality rate of juvenile sporophytes is high;[55] sporophytes grow for several years below ground before the apex of the rhizome produces a leaf that emerges above ground;[55] sporophytes of *Botrychium spathulatum* possibly reproduce vegetatively by gemmae.[55]

Herbivory: Above ground leaves of *Botrychium* species often regrow from rhizomes one to several years after disturbances such as herbivory or fire with no decrease in plant vigor.[55]

Similar Species[51, 52, 53, 54]

Several other *Botrychium* species that occur in Alaska can be easily confused with *Botrychium spathulatum*, and distinguishing characteristics are often difficult to recognize. The table below shows morphological traits that distinguish *Botrychium* species that occur in Alaska with basal pinnae that span less than 120º.

Species	Trophophore	Basal Pinnae	Pinnae Margins	Sporophore
Botrychium spathulatum	Sessile, shiny yellow-green	Spatulate to fan-shaped, blade spanning arc less than 90°	Entire or irregularly and shallowly cleft into rounded and non-spreading lobes; junction of lower margin with outer margin rounded	Sporophore stalk approximately ½ total trophophore length
Botrychium ascendens	Sessile or stalk up to 30% of total trophophore length, yellow-green	Fan-shaped, blade spanning arc less than 90°	Coarsely toothed, if divided into segments then symmetrically cleft into 2 to 4 spreading lobes; junction of lower margin with outer margin sharp-angled	Sporophore stalk approximately ½ total trophophore length
Botrychium minganense	Stalk usually up to 20% of total trophophore length, rarely sessile; dull green	Narrowly fan-shaped to oblong, blade spanning arc less than 120°	Entire to symmetrically and shallowly 3- to 5-lobed	Sporophore stalk ½ or more the total trophophore length
Botrychium campestre* var. *lineare	Sessile or stalk up to 1 cm long; pale green	Linear, blade spanning arc less than 45°	Commonly bifid with spreading and linear lobes	Sporophore stalk $^1/_3$ or less the total length of the trophophore
Botrychium montanum	Stalk 0.3 to 1.5 cm long; dull green, glaucous	Pinnae poorly developed, often confluent	Trophophore blade often appearing to have 2 to 4 angular lobes at tip	Not branched below the upper $^2/_3$

Global Distribution: Patchy throughout western North America.[51]

Alaska Distribution: Coastal Mountains Transition, Coastal Rainforests.

Ecoregions Occupied: Kluane Ranges, Gulf of Alaska Coast, Alexander Archipelago.

Conservation Status: S2 G3?; USFS Sensitive.



Description[51, 57, 58]

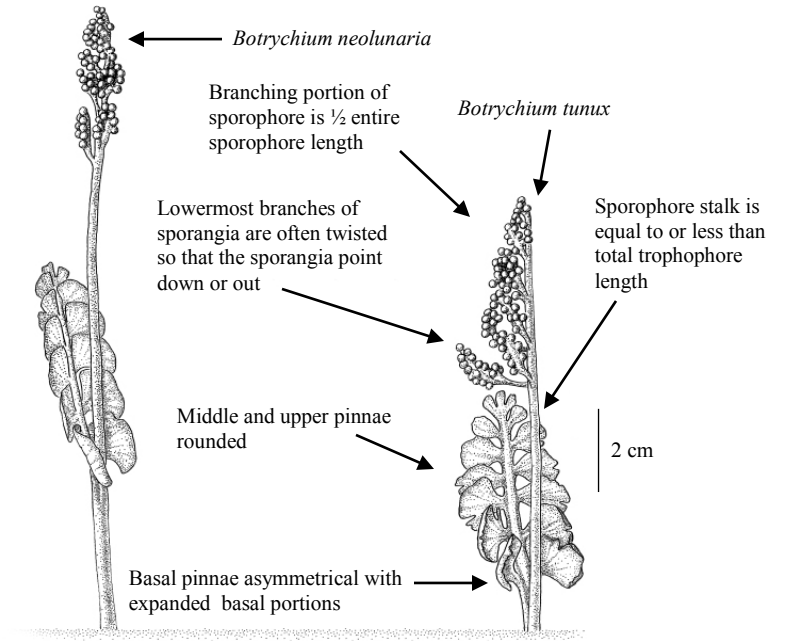


Illustration by Mary Stensvold, courtesy of American Fern Society

General: Frond divided into dissimilar vegetative blade (trophophore) and spore-bearing segment (sporophore); perennial, 6 to 12 cm tall with a common stalk 0 to 3 cm long.

Trophophore: Stalk 0 to 1 cm long; blade yellow-green, leathery, 2.5 to 7 cm long, 2 to 4 cm wide, once pinnately divided; pinnae in 4 to 6 pairs, perpendicular to rachis, separated to slightly overlapping, not overlapping rachis; basal pinnae 7 to 20 mm long, 7 to 18 mm wide, sessile, fan-shaped spanning an arc of 120° to 180°, asymmetrical with expanded basal portions, margins entire or occasionally incised.

Sporophore: Stalk 2.5 to 5 cm long, shorter than or equal to the total trophophore length; 1- to 2-times pinnately-divided at base of sporangial cluster; branching portion of sporophore is ½ the entire sporophore length, branches ascending to spreading; sporangia partially embedded in the branches.





Ecology

Elevation: Known from near sea level to 1,020 m in Alaska; up to 3,600 m elsewhere in western North America.[51]

Landform: Upper beaches, beach meadows, coastal dunes, riparian forests, stream terraces, river bars, alpine slopes in Alexander Archipelago.

Soil Type: Sand, silt, rocky soil, unstable scree;[48] *Botrychium* gametophytes require mycorrhizae to grow beyond a 2- to 3-cell stage and reproduce, and sporophytes require mycorrhizae to develop enough to produce above ground leaves.[55]

Moisture regime: Mesic.

Slope: Flat to gentle.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, forb-graminoid meadows.

Associated species: *Achillea millefolium*, *Botrychium minganense*, *B. neolunaria*, *B. yaaxudakeit*, *Castilleja unalaschcensis*, *Equisetum variegatum*, *Festuca rubra*, *Fragaria chiloensis*, *Gentianella amarelle*, *Leymus mollis*, *Lupinus nootkatensis*, *Moehringia lateriflora*, *Oxytropis campestris*, *Rhinanthus minor* ssp. *minor*.

Longevity: Long-lived perennial with a persistent rhizome that produces one leaf per year;[55] when collecting, remove only the above-ground portion with a knife.[55]

Phenology: Rhizomes of *Botrychium* species can remain dormant and produce no above ground growth for one to three years.[55]

Population estimate: There are 11 known occurrences in Alaska; above ground populations range from small to approximately 100 individuals;[59] populations in alpine habitats consist of few scattered individuals;[60] below ground population of gametophytes and juvenile sporophytes at various developmental stages can occur at significantly higher densities.[55]

Reproductive biology: Spores of *Botrychium* species filter into soil and germinate in darkness;[55] self-fertilization is dominant, gametophyte density below ground often exceeds juvenile sporophyte density;[55] mortality rate of juvenile sporophytes is high;[55] sporophytes grow for several years below ground before the apex of the rhizome produces a leaf that emerges above ground;[55] sporophytes of *Botrychium tunux* do not reproduce vegetatively by gemmae.[58]

Herbivory: Above ground leaves of *Botrychium* species often regrow from rhizomes one to several years after disturbances such as herbivory or fire with no decrease in plant vigor.[55]

Similar Species[51, 57, 58]

Several other *Botrychium* species that occur in Alaska can be easily confused with *Botrychium tunux*, and distinguishing characteristics are often difficult to recognize. The table below shows morphological traits that distinguish *Botrychium* species that occur in Alaska with basal pinnae that span at least 120º.

Species	Pinnae	Basal Pinnae	Sporophore Stalk	Sporophore
Botrychium tunux	Nearly overlapping to overlapping, not overlapping rachis	Broadly fan-shaped, asymmetrical, blade spanning arc of 120° to 180°	Equal to or less than total trophophore length	Branching portion of sporophore is ½ entire sporophore length
Botrychium neolunaria	Nearly overlapping to overlapping, not overlapping rachis	Broadly fan-shaped, blade spanning arc of 150° to 180°	Greater than total trophophore length	Branching portion of sporophore is ¼ to $^1/_3$ entire sporophore length
Botrychium yaaxudakeit	Strongly overlapping each other and the rachis	Broadly fan-shaped, blade spanning arc greater than 180°	Much greater than total trophophore length	Branching portion of sporophore is ¼ to $^1/_3$ entire sporophore length
Botrychium lunaria* var. *lunaria	Spreading, well separated	Broadly fan-shaped, blade spanning arc of more than 150°	Approximately equal to total trophophore length	Branching portion of sporophore is ½ entire sporophore length
Botrychium minganense	Spreading to ascending, well separated	Narrowly fan-shaped to oblong, blade spanning arc less than 120°	½ or more the total trophophore length	Branching portion of sporophore is ½ entire sporophore length

Botrychium yaaxudakeit Stensvold & Farrar

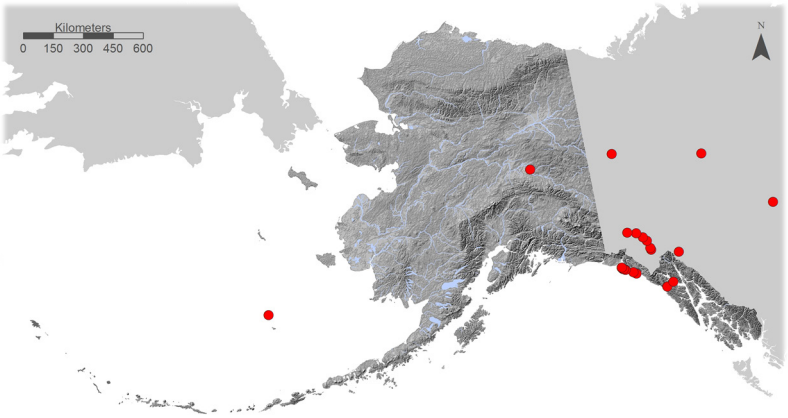
Ophioglossaceae

Global Distribution: Patchy throughout western North America.[51]

Alaska Distribution: Coastal Rainforests, Intermontane Boreal, Bering Tundra.

Ecoregions Occupied: Gulf of Alaska Coast, Alexander Archipelago, Tanana-Kuskokwim Lowlands, Bering Sea Islands.

Conservation Status: S2 G3G4; USFS Sensitive.



Description[51, 57, 58]

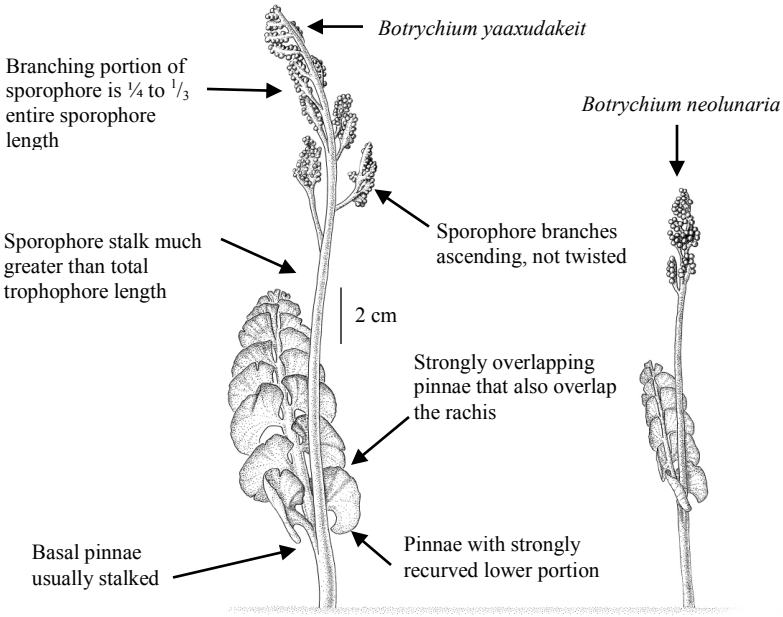


Illustration by Mary Stensvold, courtesy of American Fern Society

General: Frond divided into dissimilar vegetative blade (trophophore) and spore-bearing segment (sporophore); perennial, 8 to 25 cm tall with a common stalk 1 to 5 cm long.

Trophophore: Stalk 0 to 5 mm long; blade green, leathery, oblong to ovate, 1.5 to 11 cm long, 1.25 to 6 cm wide at the base, once pinnately divided; pinnae in 4 to 7 pairs, angled up, strongly overlapping one another with the top overlapping the rachis, bottom strongly recurved; basal pinnae 7 to 30 mm long, 9 to 32 mm wide, short-stalked, fan-shaped spanning an arc of 180° to 250°, usually symmetrical, margins entire to undulate or occasionally slightly toothed or shallowly cleft.

Sporophore: Stalk 5 to 9 cm long, much longer at maturity than total trophophore length; 1- to 2-times pinnately-divided at base of sporangial cluster; branching portion of sporophore is ¼ to $^1/_3$ entire sporophore length, branches ascending, not twisted.





Ecology

Elevation: Known from near sea level to 140 m in Alaska; up to 3,200 m elsewhere in western North America.[51]

Landform: Upper beaches, beach dunes, coastal outwash plains; abandoned fields, roadsides.

Soil Type: Sand; *Botrychium* gametophytes require mycorrhizae to grow beyond a 2- to 3-cell stage and reproduce, and sporophytes require mycorrhizae to develop enough to produce above ground leaves.[55]

Moisture regime: Mesic.

Slope: Flat to gentle.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, moss.

Associated species: *Achillea millefolium*, *Androsace chamaejasme*, *Astragalus alpinus*, *Carex gmelinii*, *Chamaepericlymenum canadense*, *Festuca rubra*, *Fragaria chiloensis*, *Honckenya peploides*, *Leymus mollis*, *Linnaea borealis*, *Lupinus nootkatensis*, *Moehringia lateriflora*, *Oxytropis campestris*, *Polemonium boreale*, *Rhinanthus minor* ssp. *minor*, *Rubus arcticus*, *Shepherdia canadensis*, *Taraxacum ceratophorum.*

Longevity: Long-lived perennial with a persistent rhizome that produces one leaf per year;[55] when collecting, remove only the above-ground portion with a knife.[55]

Phenology: Rhizomes of *Botrychium* species can remain dormant and produce no above ground growth for one to three years.[55]

Population estimate: There are 12 known occurrences in Alaska; several populations are abundant or locally common; below ground population of gametophytes and juvenile sporophytes at various developmental stages can occur at significantly higher densities.[55]

Reproductive biology: Spores of *Botrychium* species filter into soil and germinate in darkness;[55] self-fertilization is dominant, gametophyte density below ground often exceeds juvenile sporophyte density;[55] mortality rate of juvenile sporophytes is high;[55] sporophytes grow for several years below ground before the apex of the rhizome produces a leaf that emerges above ground;[55] sporophytes of *Botrychium tunux* do not reproduce vegetatively by gemmae.[58]

Herbivory: Above ground leaves of *Botrychium* species often regrow from rhizomes one to several years after

disturbances such as herbivory or fire with no decrease in plant vigor.[55]

Similar Species[51, 57, 58]

Several other *Botrychium* species that occur in Alaska can be easily confused with *Botrychium yaaxudakeit*, and distinguishing characteristics are often difficult to recognize. The table below shows morphological traits that distinguish *Botrychium* species that occur in Alaska with basal pinnae that span at least 120º.

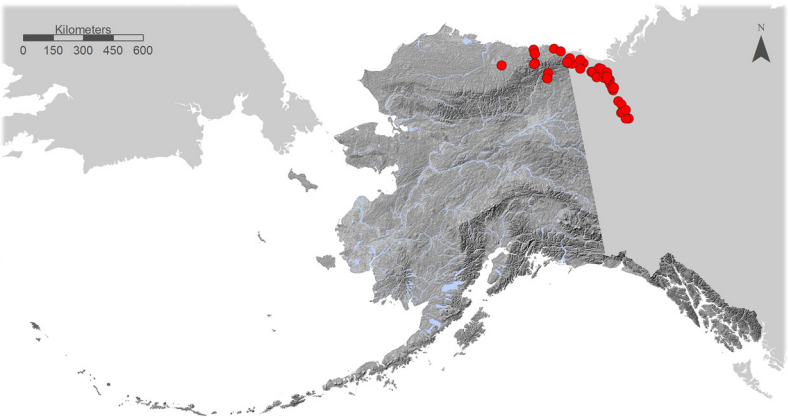
Species	Pinnae	Basal Pinnae	Sporophore Stalk	Sporophore
Botrychium tunux	Nearly overlapping to overlapping, not overlapping rachis	Broadly fan-shaped, asymmetrical, blade spanning arc of 120° to 180°	Equal to or less than total trophophore length	Branching portion of sporophore is ½ entire sporophore length
Botrychium neolunaria	Nearly overlapping to overlapping, not overlapping rachis	Broadly fan-shaped, blade spanning arc of 150° to 180°	Greater than total trophophore length	Branching portion of sporophore is ¼ to $^1/_3$ entire sporophore length
Botrychium yaaxudakeit	Strongly overlapping each other and the rachis	Broadly fan-shaped, blade spanning arc greater than 180°	Much greater than total trophophore length	Branching portion of sporophore is ¼ to $^1/_3$ entire sporophore length
Botrychium lunaria* var. *lunaria	Spreading, well separated	Broadly fan-shaped, blade spanning arc of more than 150°	Approximately equal to total trophophore length	Branching portion of sporophore is ½ entire sporophore length
Botrychium minganense	Spreading to ascending, well separated	Narrowly fan-shaped to oblong, blade spanning arc less than 120°	½ or more the total trophophore length	Branching portion of sporophore is ½ entire sporophore length

Global Distribution: Siberia, Russian Far East, and ca. 1,500 km disjunct in northwestern North America.[61]

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Foothills, Brooks Range (not known from Northwest Alaska).

Conservation Status: S2 G3G4; BLM Watch.



Description[62]

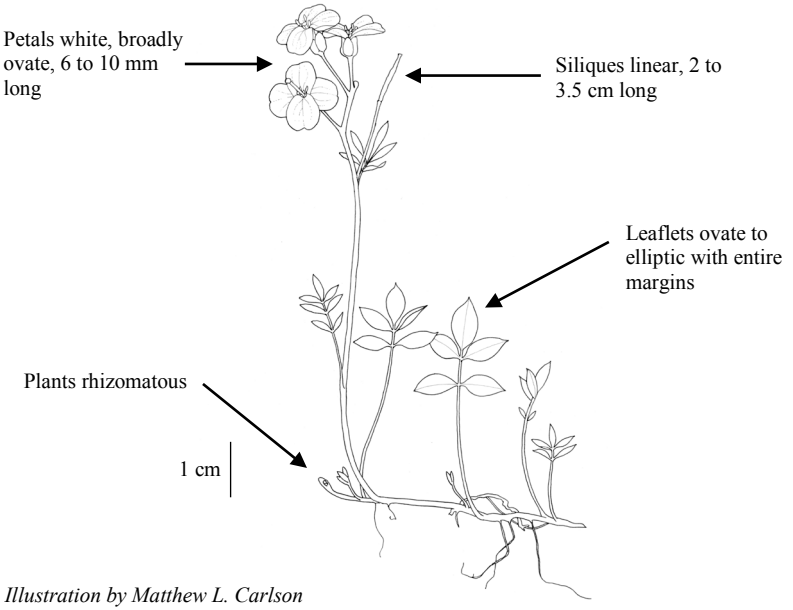


Illustration by Matthew L. Carlson

General: Perennial herb, usually glabrous, sometimes sparsely hairy, 3 to 15 cm tall; rhizomes cylindrical, slender, 0.7 to 1.5 mm in diameter; stems erect or ascending, unbranched.

Leaves: Rhizomal leaves pinnately divided into 5 or 7 lobes, not fleshy, 2.5 to 6.5 cm long with petioles 1.5 to 5.5 cm long; leaflets entire, ovate to elliptic, 4 to 12 mm long, 2.5 to 6 mm wide with petiolules 1.5 to 7 mm long; stem leaves entire or pinnately divided into 3 to 7 lobes, with petioles 2 to 15 mm long; leaflets entire, ovate to elliptic, 6 to 13 mm long, 1 to 7 mm wide, subsessile or with petiolules to 2 mm long.

Flowers: Flowers arranged in terminal racemes of 5 to 20, elongating in fruit; pedicels erect to ascending, 5 to 25 mm long; sepals green or purple-tinted, ovate to oblong, 3 to 4 mm tall; petals usually white, rarely lavender, broadly ovate, 6 to 10 mm long.

Fruits: Siliques linear, 2 to 3.5 cm long, 1.2 to 1.7 mm wide; seeds brown, oblong, roughly 1.5 mm by 1 mm.



ALA 136743

Ecology

Elevation: Known from near sea level to 1,440 m in Alaska.

Landform: Floodplains, stream banks, river bars, river terraces, bog shores, alpine slopes.

Soil Type: Cobble, gravel, sand, silt, clay, peat; sometimes associated with calcareous substrates.

Moisture regime: Moist to wet.

Slope: Mostly on gentle slopes, also on steep slopes.

Aspect: Predominantly northwest to north to northeast; less commonly found on east aspects.

Vegetation type: *Dryas* heath, moss, tussock tundra, dwarf shrub – herbaceous tundra.

Associated species: *Cerastium beeringianum, Petasites frigidus*, *Ranunculus sulphureus*, *Stellaria humifusa*; mosses.

Longevity: Perennial but likely short-lived, as indicated by weak, herbaceous caudex.[63]

Phenology: Flowering late June, probably sooner, through early August; fruiting early July.

Population estimate: Nine known occurrences in Alaska; at least one population is locally common.

Reproductive biology: Probably pollinated by bees and flies;[63] reproduces vegetatively from rhizomes.[62]

Similar Species[61, 62]

Three similar, white-flowered *Cardamine* species with leaves divided into 3 to 7 lobes occur in northern Alaska. These species can be distinguished from each other according to the morphological features and geographic ranges listed in the table below. *Cardamine blaisdellii*, which occurs in the Russian Far East and northeast Alaska, was until recently treated variously as a subspecies or variety of *Cardamine microphylla* or within *Cardamine hyperborea*, a questionable taxon of the Russian Far East.[61]

Species	Leaflet Shape	Leaflet Margin	Leaflet Length	Range
Cardamine microphylla	Ovate to elliptic	Entire	4 to 13 mm long	Northeast Alaska
Cardamine digitata	Linear	Entire	10 to 25 mm long	Across northern Alaska
Cardamine blaisdellii	Broadly obovate	3- to 5-toothed	4 to 15 mm long	Northwest Alaska



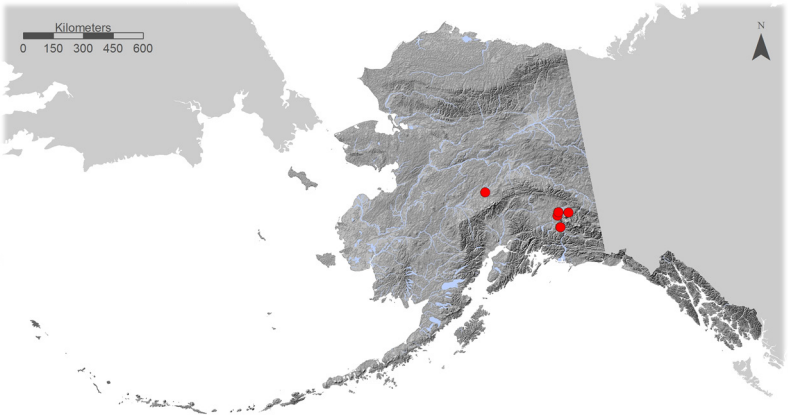
ALA 137490

Global Distribution: Circumboreal.

Alaska Distribution: Intermontane Boreal, Alaska Range Transition, Coastal Mountains Transition.

Ecoregions Occupied: Tanana-Kuskokwim Lowlands, Copper River Basin, Wrangell Mountains.

Conservation Status: S1S2 G4; BLM Sensitive.



Description[25, 64]

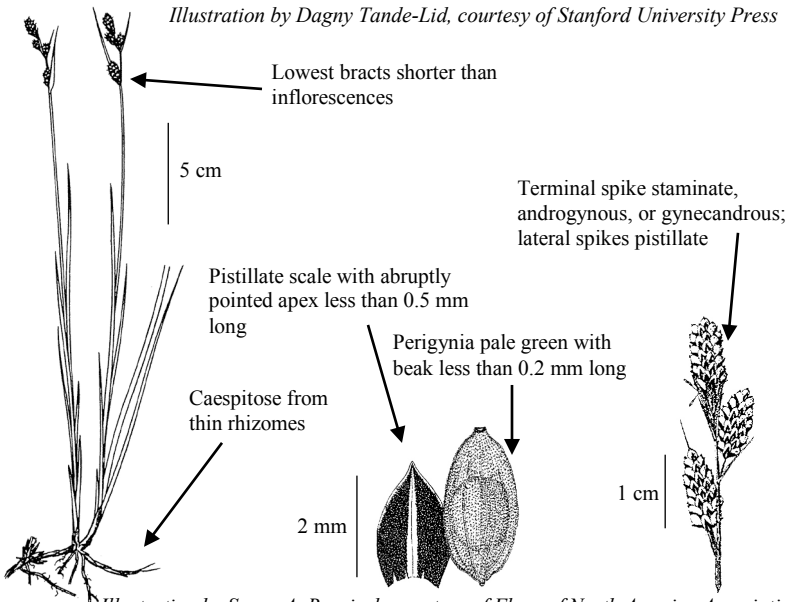


Illustration by Dagny Tande-Lid, courtesy of Stanford University Press

Illustration by Susan A. Reznicek, courtesy of Flora of North America Association

General: Caespitose, perennial sedge from thin rhizomes; purplish, bladeless sheaths at base; 20 to 35 cm tall, scabrous near the top.

Leaves: Blades 2 to 3 mm wide, shorter than culm.

Spikes: Peduncles short; spikes erect, oblong, 10 to 15 mm tall, 5 to 8 mm wide; lateral 2 to 3 spikes pistillate, of similar length; terminal spike staminate, androgynous, or gynecandrous.

Pistillate Scales: Dark brown, lanceolate, usually shorter than perigynia but sometimes longer than perigynia without long-pointed apex, as broad as perigynia; midveins light-colored; apexes abruptly pointed, point less than 0.5 mm long.

Perigynia: Ascending, pale green, papillose, elliptic, 2.5 to 3 mm long, 1.25 to 1.75 mm wide; beak up to 0.2 mm long, two-parted; achenes nearly filling body of perigynia.



Ecology

Elevation: Known from 250 to 920 m in Alaska.[49]

Landform: Subarctic lowland wet meadows, collapse scar bogs.[48]

Soil Type: Likely occurring in organic soil or mud.

Moisture regime: Wet to mesic.

Slope: Flat to gentle.

Aspect: No particular aspect.

Vegetation type: Sedge meadow, cottongrass sedge meadow, graminoid herbaceous meadow.[49]

Associated species: *Andromeda polifolia*, *Betula nana*, *Carex aquatilis*, *C. gynocrates*, *C. limosa*, *C. rotundata*, *C. saxatilis*, *C. utricularia*, *Myrica gale*, *Parnassia palustris*, *Pinguicula vulgaris*, *Rhododendron groenlandicum.*

Longevity: Perennial; most *Carex* species are long-lived.[65]

Phenology: Fruiting August, possibly sooner, through September.

Population estimate: There are five known occurrences in Alaska; populations are scattered to locally common.[48]

Reproductive biology: Most *Carex* species are wind-pollinated and self-compatible;[66] *Carex adelostoma* reproduces vegetatively from rhizomes in addition to sexually; inflorescences are prone to infection by smut (*Anthracoidea* species).[67]

Herbivory: *Carex* species provide preferred food source for many waterfowl and mammals.[68]

Similar Species[25, 64]

Several *Carex* species known to occur in South Central and Interior Alaska have multiple erect spikes and look similar to *Carex adelostoma* until the spikes are examined closely. These species can be distinguished from each other according to the morphological features listed in the table below.

Species	Pistillate Scales	Perigynia	Perigynia Beak	Habitat
Carex adelostoma	Usually shorter than and as broad as perigynia with abrupt point at apex less than 0.5 mm long	Perigynia not serrulate; pale green	Beak less than 0.2 mm long	Wet meadows, bogs
Carex buxbaumii	Narrower and longer than perigynia with abrupt point at apex 0.5 to 3 mm long	Perigynia not serrulate; pale green	Beak absent or less than 0.2 mm long	Wet meadows, marshes, fens
Carex parryana	As long and as broad as perigynia; apex rounded or pointed	Conspicuously serrulate along the margins toward the apex; green-yellow or brown	Beak less than 0.2 mm long	Alkaline meadows, lake shores
Carex holostoma	Shorter than or equaling perigynia and as broad as perigynia	Perigynia not serrulate; brown	Beak absent or less than 0.2 mm long	Lake shores, meadows, fens, bogs
Carex gmelinii	Slightly shorter than or exceeding perigynia and as broad as perigynia with abrupt, long point at apex	Perigynia not serrulate; brown	Beak longer than 0.2 mm	Coasts, beach meadows; not found inland
Carex stylosa	Shorter and narrower than perigynia; apex not abruptly pointed	Perigynia not serrulate; green to tan	Beak longer than 0.2 mm	Meadows, bogs, lake shores

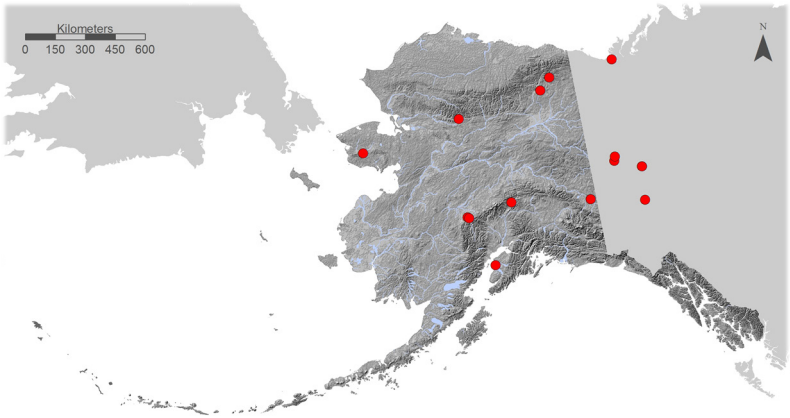

5 cm
ALA 97484

Global Distribution: Northern North America and Eurasia with large gaps.

Alaska Distribution: Arctic Tundra, Bering Tundra, Intermontane Boreal, Alaska Range Transition.

Ecoregion Occupied: Brooks Range, Seward Peninsula, Davidson Mountains, Kobuk Ridges and Valleys, Tanana-Kuskokwim Lowlands, Alaska Range, Cook Inlet Basin.

Conservation Status: S3 G4; BLM Watch.



Description[24, 25, 69, 70]

Illustration by Susan A. Reznicek, courtesy of Flora of North America Association

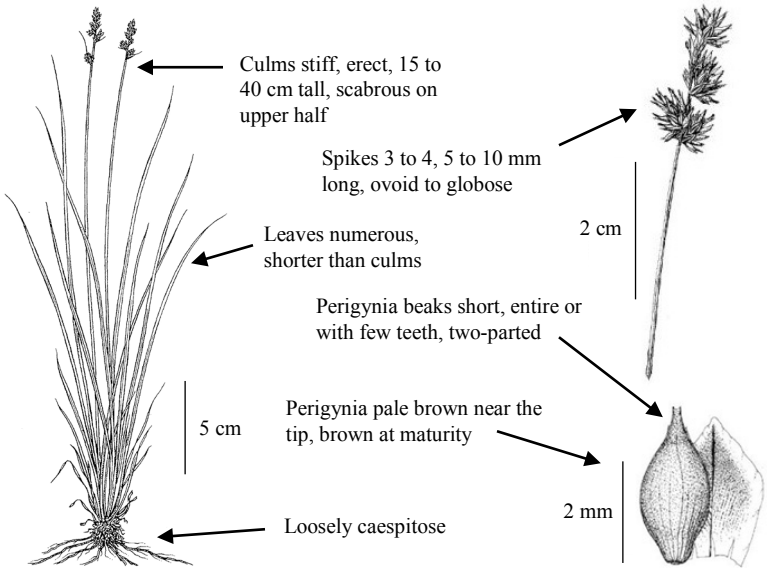


Illustration by R. A. With, courtesy of University of Washington Press

General: Loosely caespitose, perennial sedge from short, ascending rhizome; culms solitary or few, erect, slender, 15 to 40 cm tall, scabrous and sharp angles on upper half.

Leaves: Sheaths pale brown; ligules wider than long; blades numerous, pale green to gray-green, flat or slightly rolled inward, 5 to 15 cm long, 1 to 2 mm wide, shorter than culms.

Spikes: Bracts scale-like or occasionally bristle-like, shorter than spikes; spikes 3 to 4 or rarely to 6, sessile, ovoid to globose, containing 5 to 10 perigynia, 5 to 10 mm long, 4 to 7 mm wide, lateral spikes gynecandrous, lower spikes slightly separated.

Pistillate Scales: Red-brown with lighter center and broad, white, translucent margins, oblong to ovate, not exceeding perigynia; margins rough; apexes obtuse.

Perigynia: Appressed to ascending, green-white towards the base, pale brown towards the tip, brown when mature, elliptic to obovate, 2.5 to 3.5 mm long, 1.2 to 1.5 mm wide, widest near middle; beaks short, entire or with few teeth, two-parted.



Ecology

Elevation: Known from near sea level to 760 m in Alaska; sea level to 1,500 m elsewhere in North America.[70]

Landform: Bogs, wet meadows, muskegs, sloughs, lake edges; burned areas, roadsides.

Soil Type: Peat, sand, glacial till; oligotrophic soils, minerotrophic soils,[63] sometimes associated with calcareous substrates.

Moisture regime: Saturated to wet.

Slope: Flat to gentle.

Aspect: No particular aspect.

Vegetation type: Black Spruce muskeg, bulrush – sedge wet meadow, *Dryas* – moss, moss.

Associated species: *Carex limosa*, *Carex livida*, *Dryas* spp., *Eriophorum* spp., *Kobresia simpliciuscula, Trichophorum cespitosum.*

Longevity: Perennial; most *Carex* species are long-lived.[65]

Phenology: Flowering late June through early July; fruiting late July through August.

Population estimate: Nine known occurrences in Alaska; population sizes unknown.

Reproductive biology: Most *Carex* species are wind-pollinated and self-compatible;[66] *Carex heleonastes* occasionally forms sterile hybrids with other members of *Carex* sect. *Glareosa*;[71] also reproduces vegetatively from short rhizomes.[71]

Herbivory: *Carex* species provide preferred food source for many waterfowl and mammals.[68]

Similar Species[25, 70]

Carex heleonastes can be confused with other *Carex* species that have sessile spikes clustered towards the top of culms and brownish perigynia with short or indistinct beaks. The table below shows morphological features that distinguish *Carex heleonastes* from similar species.

Species	Culms	Spikes	Perigynia	Habitat
Carex heleonastes	15 to 40 cm tall; stiff, erect, scabrous on the upper half	3 to 4; 5 to 10 mm long, ovoid to globose	Pale brown near the tip; brown at maturity; beaks distinct	Bogs, wet meadows, lake shores
Carex marina	10 to 15 cm tall; erect, scabrous on the upper half	2 to 3; 3 to 6 mm long, oblong to clavate	Pale brown near the tip; brown at maturity; beaks indistinct	Wet tundra, gravelly shores
Carex glareosa* ssp. *glareosa	10 to 25 cm tall; weak, arching, smooth	2 to 4; 2 to 4 mm long, oblong-linear	Light to pale brown; gray-brown at maturity	Saline marshes, gravelly sea shores
Carex lachenalii	10 to 40 cm tall; erect, smooth or nearly smooth below the spikes	2 to 5; 2 to 3 mm long, short-oblong to suborbicular	Brown-yellow; brown at maturity	Arctic and alpine meadows, peatlands
Carex ursina	2 to 10 cm tall, leaves exceeding culms	1; 4 to 7 mm long, obovoid to suborbicular	Gray-brown to brown	Seashores in sand or gravel

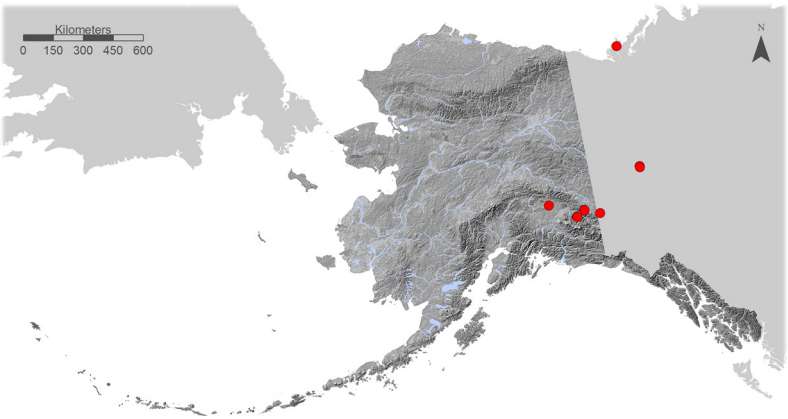

5 cm
ALA 85924

Global Distribution: Eurasia, Alaska, Yukon, Northwest Territories.

Alaska Distribution: Intermontane Boreal, Alaska Range Transition, Coastal Mountains Transition.

Ecoregions Occupied: Tanana-Kuskokwim Lowlands, Alaska Range, Wrangell Mountains.

Conservation Status: S1S2 G5?; BLM Watch.



Description[24, 25, 72]

Illustration by Susan A. Reznicek, courtesy of Flora of North America Association

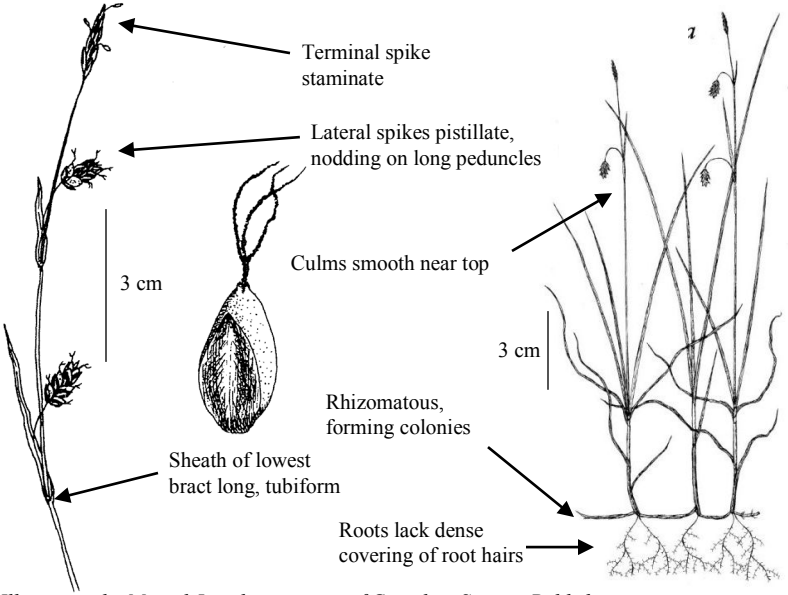


Illustration by Marcel Jomphe, courtesy of Canadian Science Publishing

General: Perennial sedge from long rhizomes, forming colonies; culms 15 to 40 cm tall, slender, smooth near the top, leafy near base.

Leaves: Lower sheaths green to pale brown; ligules 1.4 to 3.5 mm tall, taller than wide; blades green, flat, 2 to 25 cm long, 1 to 2.5 mm wide.

Spikes: Lowermost bract leaf-like, shorter than inflorescence, 0.9 to 5 cm long with tubiform sheaths 9 to 22 mm long; terminal spike staminate with long peduncle; lateral spikes 1 to 2, pistillate, short-cylindric, 6 to 15 mm long, 4 to 6 mm wide, nodding on long, flexible peduncles.

Pistillate Scales: Red-brown, ovate, broadly acute or obtuse, brown with a yellow-green midvein, as long as or longer than perigynia.

Perigynia: 5 to 18, dense, glaucous-green to tan, 2.8 to 4 mm long, 1.2 to 1.5 mm wide, papillose, beak absent or poorly defined up to 0.3 mm.



Ecology

Elevation: Known from 580 to 1,080 m in Alaska.[49]

Landform: Marshes, fens, pond margins, lake shores.

Soil Type: Likely organic soil and mud; many species of *Carex* sect. *Paniceae* are often associated with calcareous substrates.[72]

Moisture regime: Saturated to wet.

Slope: Flat to gentle.

Aspect: No particular aspect.

Vegetation type: Graminoid meadow, graminoid-forb marsh, wet tundra.

Associated species: *Carex buxbaumii, Carex leptalea, Carex limosa, Carex paupercula, Carex tenuiflora, Equisetum fluviatile, Eriophorum angustifolium, Eriophorum russeolum, Trichophorum caespitosum.*

Longevity: Perennial; most *Carex* species are long-lived.[65]

Phenology: Fruiting early to mid-summer.[72]

Population estimate: Three known occurrences in Alaska; one population in the Tanana River Basin consists of scattered individuals.[48]

Reproductive biology: Most *Carex* species are wind-pollinated and self-compatible;[66] *Carex laxa* reproduces vegetatively from rhizomes in addition to sexually;[72] the inflorescences are prone to infection by smut (*Anthracoidea* species).[73]

Herbivory: *Carex* species provide preferred food source for many waterfowl and mammals.[68]

Similar Species[24, 25, 72, 74]

Carex laxa has likely been overlooked in the field because it can be easily mistaken for *Carex limosa* and other species of *Carex* sect. *Limosae*, which grow in similar habitats.[72] The table below lists morphological features that distinguish these species.

Species	Habit	Roots	Lowest bract	Lowest bract sheath
Carex laxa	Rhizomatous	Lacking dense covering of root hairs	Shorter than inflorescence	Long tubiform sheath
Carex limosa	Stoloniferous	Densely covered with yellow-orange root hairs	Shorter than inflorescence	Short sheath
Carex paupercula	Rhizomatous	Densely covered with yellow-orange root hairs	Equaling or exceeding inflorescence	Bract slightly sheathing at base
Carex pluriflora	Rhizomatous	Densely covered with yellow-orange root hairs	Shorter than inflorescence	Short sheath
Carex rariflora	Stoloniferous	Densely covered with yellow-orange root hairs	Much shorter than inflorescence	Short, dark sheath



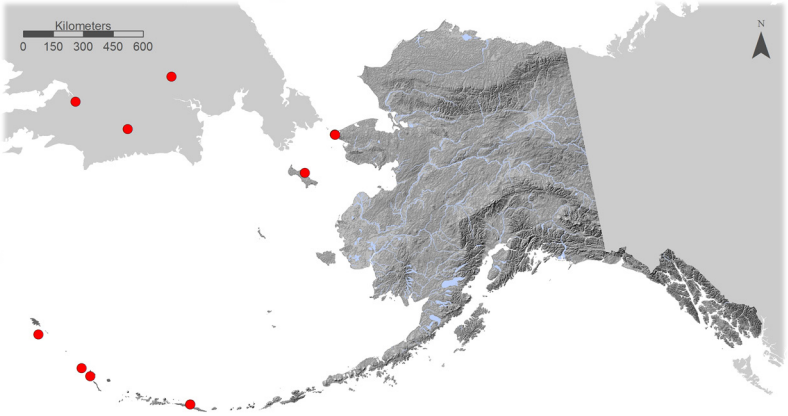
ALA 99970

Global Distribution: Siberia, Russian Far East, Alaska.

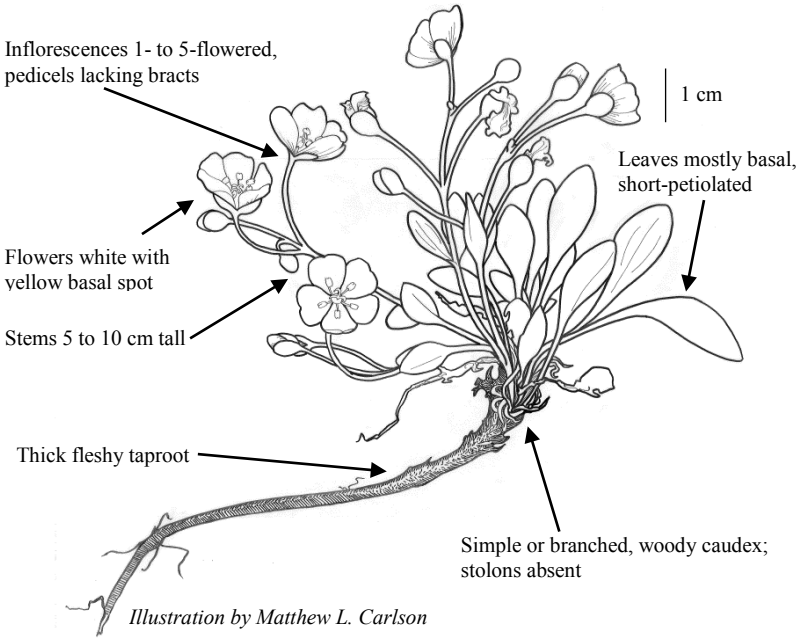
Alaska Distribution: Bering Tundra, Aleutian Meadows.

Ecoregions Occupied: Seward Peninsula, Bering Sea Islands (but not known from Pribilof Islands), Aleutian Islands.

Conservation Status: S1S2 G3; BLM Sensitive.



Description[25, 75]



General: Perennial herb from woody caudex; taproots thick, fleshy; stems several, 1 to 10 cm tall.

Leaves: Basal leaves several, petiolated, thick, spatulate to elliptic, 2 to 15 cm long, 0.5 to 1 cm wide; stem leaves sessile, opposite, single pair per stem, elliptic to ovate, 0.5 to 2 cm long, 0.5 to 1 cm wide.

Flowers: Inflorescences 1- to 5- flowered, lacking bracts; flowers 12 to 20 mm in diameter; sepals 6 to 8 mm long; petals yellow or white with yellow base, 10 to 12 mm long.

Fruits: Seeds 2 to 3 mm in diameter, shiny.



Ecology

Elevation: Known from 60 to 640 m in Alaska; 0 to 2,000 m in Russia.[75]

Landform: Slopes, alpine tundra, snow beds; riverbeds on Wrangel Island.[76]

Soil Type: Scree, rock, gravel; sand on Wrangel Island;[76] associated with calcareous substrates.

Moisture regime: Dry.

Slope: Sloping.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated.

Associated species: *Cardamine bellidifolia*, *Douglasia ochotensis*, *Hierochloe alpina*, *Luzula multiflora*, *Minuartia arctica*, *Potentilla elegans*, *Rhodiola integrifolia*, *Saxifraga bronchialis*; fruticose lichens.

Longevity: Moderate to long-lived perennials as indicated by the extensive caudices present on some specimens.

Phenology: Flowering June through July.[75]

Population estimate: Six known occurrences in Alaska; populations range from occasional individuals to locally common.

Similar Species[25, 75]

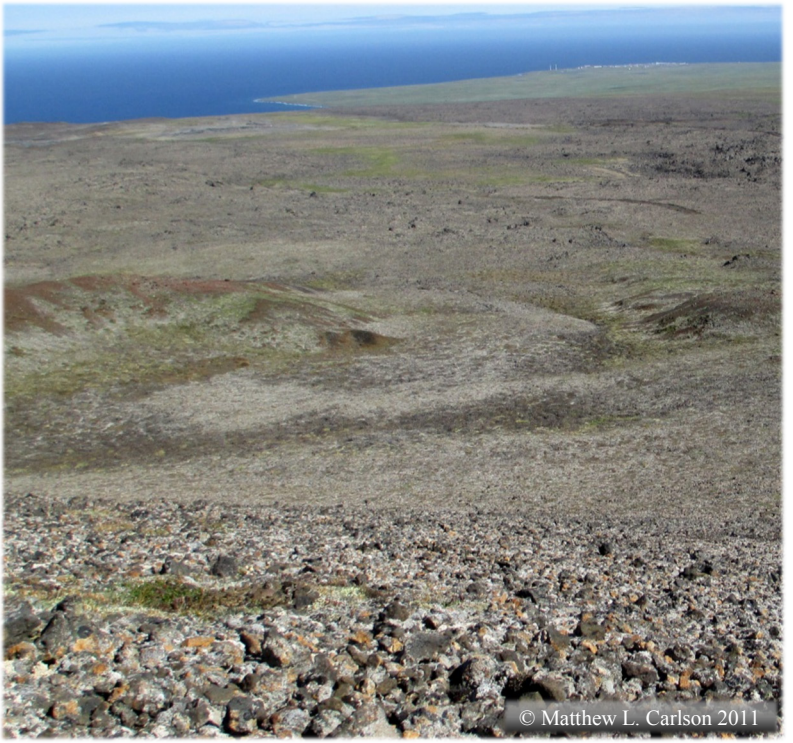
Several *Claytonia* species that can appear with white flowers are known from the Seward Peninsula, Bering Sea Islands, and Aleutian Islands. The table below describes differences in morphology and habitat between similar *Claytonia* species. *Claytonia acutifolia* is not included here because its occurrence in Alaska is disputed.

Species	Root	Stolons / Rhizomes	Bracts	Habitat
Claytonia arctica	Thick, fleshy	Stolons absent; rhizomes absent	Bracts absent	Scree and talus slopes, rocky tundra
Claytonia sarmentosa	Filiform	Stolons present, bud-bearing; rhizomes present	Bracts absent	Rocky slopes, snow beds in mountains
Claytonia scammaniana	Filiform	Stolons absent; rhizomes present	Bracts absent	Scree slopes
Claytonia tuberosa	Tubers globose, 1 to 3 cm in diameter	Stolons absent; rhizomes rarely present	Bracts present	Wet to moist stony tundra slopes
Claytonia sibirica	Slender	Stolons present; rhizomes present	Bracts present	Moist, shady places; common along coasts





ALA 63708



Global Distribution: Endemic to Ogilvie Mountains of Yukon.

Alaska Distribution: Intermontane Boreal

Ecoregions Occupied: North Ogilvie Mountains.

Conservation Status: SP G2G3.



Description[24, 75, 77]

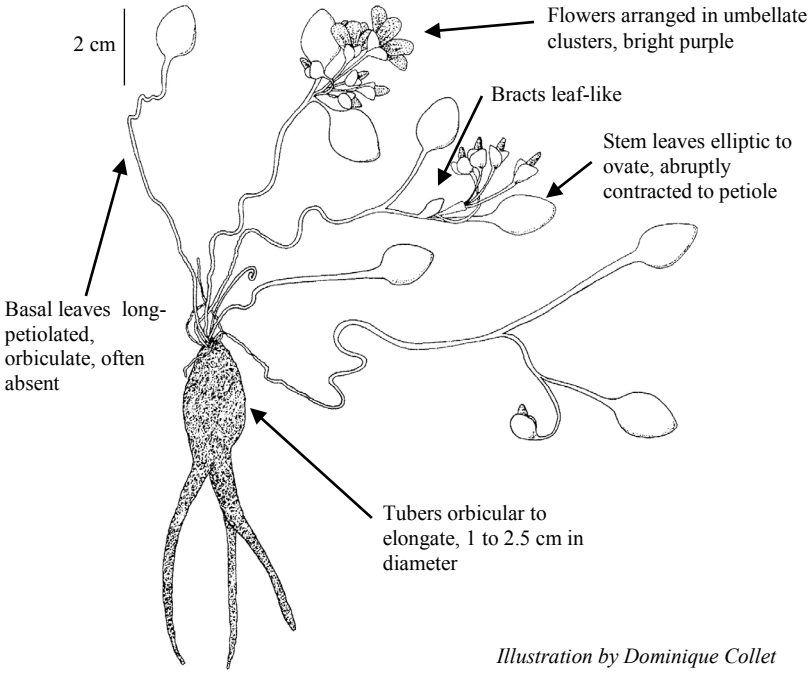


Illustration by Dominique Collet

General: Perennial herb; tubers orbicular to elongate, 1 to 8 cm long, 1 to 2.5 cm in diameter; mature plants rhizomatous; stems 4 to 8 cm long.

Leaves: Basal leaves often absent, long-petiolated, orbiculate, as long as wide, 0.6 to 1 cm long; stem leaves subtending the inflorescence in a pair, abruptly contracted to petiole, elliptic to ovate, 1 to 2.5 cm long, 5 to 18 mm wide.

Flowers: Flowers arranged in umbellate clusters; bracts multiple, leaf-like; flowers 10 to 16 mm in diameter; sepals 5 to 7 mm long; petals bright purple, 8 to 14 mm long.

Fruits: Seeds 2.4 to 2.5 mm in diameter.



Ecology

Elevation: Known from 1,200 to 1,860 m in Yukon.

Landform: Open mountain slopes, alpine ridges.

Soil Type: Scree; associated with calcareous substrates.

Moisture regime: Dry.

Slope: Moderate to steep.

Aspect: Often, but not limited to, south to southeast.

Vegetation type: Sparsely vegetated.

Associated species: No information available.

Longevity: Perennial, likely long-lived as tubers are large and well-developed on some specimens.

Phenology: Flowering in June.

Population estimate: Nine known occurrences in Yukon; population sizes unknown.

Similar Species[24, 75, 77]

Claytonia scammaniana, with its purple flowers, and *Claytonia sarmentosa*, with its rose-colored flowers, could be confused with *Claytonia ogilviensis. Claytonia tuberosa* has white petals with yellow bases but looks superficially similar to *Claytonia ogilviensis* when not in flower. The table below describes differences in morphology and habitat between these species.

Species	Roots	Stolons	Stem Leaves	Bracts	Habitat
Claytonia ogilviensis	Tubers orbicular to elongate, 1 to 2.5 cm in diameter	Stolons absent, rhizomes present in mature plants	Orbiculate; abruptly contracted to petiole	All bracts leaf-like	Calcareous scree slopes
Claytonia tuberosa	Tuber globose, 1 to 3 cm in diameter	Stolons absent; rhizomes present rarely	Narrowly elliptic to oblanceolate; tapering to base, sessile	Lower bracts leaf-like, upper bracts reduced to scales	Wet to moist stony tundra slopes
Claytonia scammaniana	Filiform	Stolons absent; rhizomes present	Narrowly lanceolate to ovate; sessile	Lacking bracts	Scree slopes
Claytonia sarmentosa	Filiform	Stolons present, bud-bearing; rhizomes present	Ovate to ovate-lanceolate; sessile	Lacking bracts	Rocky slopes, snow beds in mountains


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Cochlearia sessilifolia Rollins — **Brassicaceae**

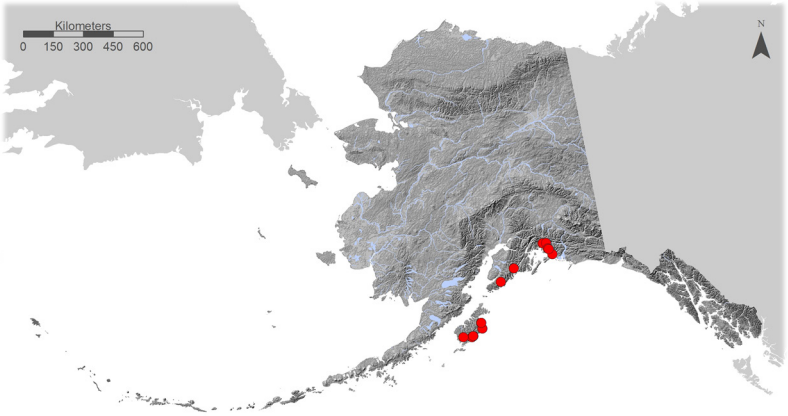
Synonyms: *Cochlearia officinalis* var. *sessilifolia*

Global Distribution: Endemic to Alaska.

Alaska Distribution: Coastal Rainforests.

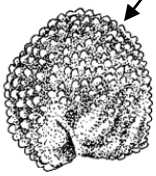
Ecoregions Occupied: Chugach-St. Elias Mountains (Prince William Sound), Gulf of Alaska Coast (Kenai Peninsula), Kodiak Island.

Conservation Status: S2Q G1G2Q; BLM Watch, USFS Sensitive.



Description[78, 79, 80]

Seeds densely and evenly covered with white, waxy scale-like bumps



C. sessilifolia



C. groenlandica



Flowers white, 4 to 7 mm long; fruit erect, broadly oblong to elliptical, 8 to 12 mm long when mature

Leaves entire or shallowly and bluntly toothed, sessile, oblong to spatulate

Stems slender, simple or branched, leafy

Annual herb lacking a basal rosette of leaves

Illustration by Dominique Collet

General: Annual herbs, 1 to 12 cm tall; stems erect or with decumbent lower branches, simple or branched from the base, mid-stem, or top.

Leaves: Basal leaves absent or occasionally present in a single pair (never a rosette), broadly lanceolate, entire, 8 to 16 mm long, 3 to 5 mm wide, usually withering or yellowing by time of flowering with cuneate bases or tapering bases that are nearly petioles 2 to 6 mm long; stem leaves broadly lanceolate to ovate, entire or shallowly and bluntly toothed, 5 to 17 mm long, 3 to 5 mm wide, sessile with cuneate bases or tapering bases that are nearly petioles.

Flowers: Flowers are arranged in terminal racemes of 3 to 15 flowers, almost capitate in fruit; sepals oblong, 1.8 to 2.2 mm long; petals white, spatulate, 4 to 6 mm long.

Fruits: Fruiting pedicels erect, 3.5 to 8 mm long; fruits long-elliptic, 8 to 12 mm long, 3.5 to 4.5 mm wide; seeds light brown, covered over entire surface with polar-oriented rows of rough or scaly-tipped papillae that give seeds a waxy appearance.



Ecology

Elevation: Sea level.

Landform: Shallow flats below high-tide line on sheltered coasts, estuaries.

Soil Type: Fine gravel, mud, sand.

Moisture regime: Entirely inundated twice daily by tides and often located near freshwater streams or seeps at low tide.[80]

Slope: Flat to gentle slopes.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated intertidal, intertidal halophytic graminoid-forb meadows.

Associated species: *Atriplex gmelinii, Carex lyngbyei, Cochlearia groenlandica*, *Honckenya peploides, Montia fontana*, *Plagiobothrys orientalis*, *Plantago maritima*, *Potentilla anserina* ssp. *groenlandica*, *Puccinellia nutkaensis, Spergularia canadensis*, *Spergularia rubra*, *Stellaria humifusa*.

Longevity: Annual.

Phenology: Flowering July through August.[78]

Population estimate: There are 12 known occurrences in Alaska; multiple populations on Sitkalidak Island consist of several hundred to a few thousand plants.[80]

Reproductive biology: Dispersal among populations is limited, and populations are relatively isolated.[60]

Similar Species[78, 79, 80]

Cochlearia sessilifolia can be difficult to separate from *Cochlearia groenlandica*, with which it can co-occur. Both species are variable and *Cochlearia sessilifolia* may prove to be the same species as *Cochlearia groenlandica*, although several traits including annual growth habit suggest otherwise.[80] The table below describes differences in morphology between these two species and is adapted from Parker 2011.

Species	Basal Rosette	Leaf Bases	Fruits	Seeds
Cochlearia sessilifolia	No true basal rosette of several broadly ovate to reniform leaves	All leaves have cuneate bases and are sessile (or have tapering bases that are nearly petioles)	Long-elliptic, much longer than broad; up to 12 mm long; erect when open; almost capitate arrangement	Light brown, polar-oriented rows of rough or scaly-tipped papillae over entire surface, giving them a waxy look
Cochlearia groenlandica	Basal rosettes consisting of broadly ovate to reniform leaves	Rosette leaves have long, distinct petioles that are 1 to 7 cm long; stem leaves are sessile or subsessile	Fruits ovate, broadly elliptic, or orbicular, at most 1.5 times longer than broad; up to 6 mm long; erect or spreading in slightly elongated racemes	Brown, polar-oriented rows of tall, blunt, smooth-tipped papillae over entire surface



Corispermum ochotense Ignatov — **Amaranthaceae**

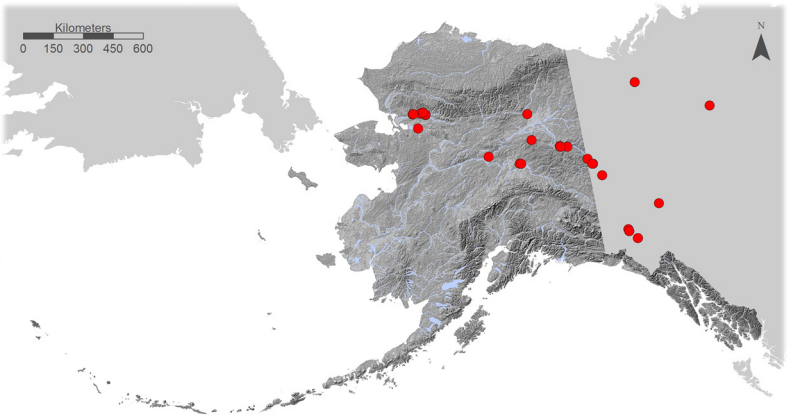
Synonyms: *Corispermum hyssopifolium* auct. non L., *Corispermum ochotense* var. a*laskanum*

Global Distribution: Russian Far East; Alaska, Yukon, Northwest Territories.

Alaska Distribution: Bering Tundra, Intermontane Boreal.

Ecoregions Occupied: Kotzebue Sound Lowlands, Kobuk Ridges and Valleys, Yukon-Old Crow Basin, Ray Mountains, Yukon-Tanana Uplands, North Ogilvie Mountains.

Conservation Status: S3 G3G4; BLM Watch.



Description[81, 82]

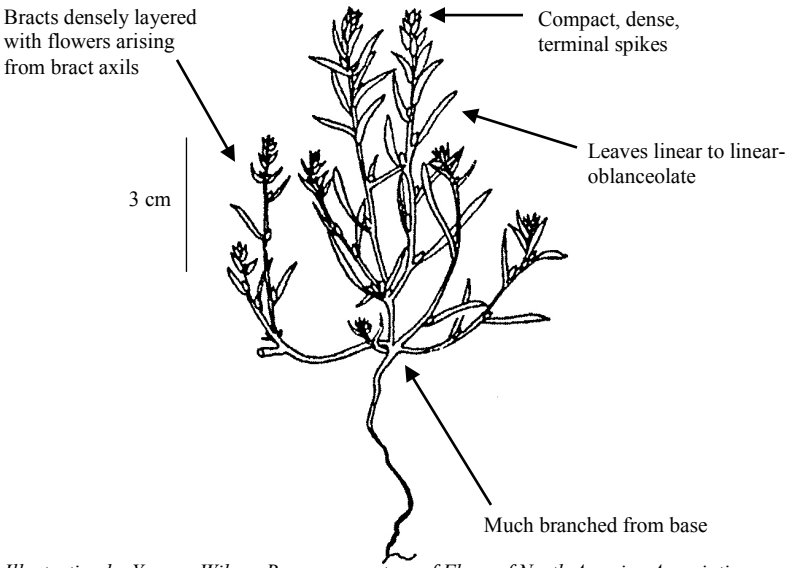


Illustration by Yevonn Wilson-Ramsey, courtesy of Flora of North America Association

General: Annual herb, branched from the base; stems 5 to 30 cm long, sparsely covered in dendroid or stellate hairs when young, becoming nearly glabrous at maturity; plants gray-green, often red at maturity.

Leaves: Stem leaves linear to linear-oblanceolate, often widest in the top third, 1 to 5 cm long and 1 to 3 mm wide, abruptly contracted to apex.

Flowers: Lower bracts usually linear, leaf-like, 4 to 7 times the length of the fruit; upper bracts lanceolate, flowers small, in axils of bracts, arranged in compact, dense, terminal spikes.

Fruits: Fruits red-brown, dark brown, olive green, or deep red, obovate-elliptic, widest near the middle, 2.8 to 4 mm long, 1.8 to 2.7 mm wide; wings thick, 0.2 to 0.3 mm wide, entire.



Ecology

Elevation: Known from 0 to 260 m in Alaska.

Landform: River bars, river banks, dunes.

Soil Type: Predominantly sand, also silt and gravel; not found in saline soils.

Moisture regime: Dry.

Slope: Flat to gently sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated; often growing in frequently disturbed area between river edge and tall shrub thicket.

Associated species: *Achillea millefolium*, *Alnus viridis*, *Calamagrostis canadensis*, *Chamerion latifolium*, *Equisetum* spp., *Galium boreale*, *Hierochloe odorata*, *Leymus innovatus*, *Lupinus arcticus*, *Potentilla anserina*, *Ribes triste*, *Salix* spp., *Symphyotrichum falcatum* ssp. *falcatum*, *Tanacetum bipinnatum.*

Longevity: Annual.

Phenology: Plants are usually identifiable beginning in late July;[82] flowering late summer to early autumn.[81]

Population estimate: There are 14 known occurrences in Alaska; populations range from scattered individuals to locally abundant.

Reproductive biology: Grows well in frequently disturbed areas with low competition.

Similar Species[81, 82]

No other *Corispermum* species occur in Alaska. The table below shows the morphological features and habitats that distinguish *Corispermum ochotense* from two superficially similar species in the Amaranthaceae family that occur in Alaska.

Species	Leaves	Flowers	Fruits	Habitat
Corispermum ochotense	Not fleshy	Perfect; arranged in terminal spikes	Fruits not enclosed by calyx lobes	Sandy river bars and sand dunes
Atriplex gmelini	Not fleshy	Monoecious; arranged in terminal and axillary clusters	Fruits not enclosed by calyx lobes	Seashores, salt marshes
Suaeda calceoliformis	Fleshy	Perfect; crowded in leaf and stem axils	Fruit enclosed by persisting calyx	Saline or alkaline wetland soils





ALA 147517



ALA 12539

Cryptantha shackletteana L.C. Higgins — **Boraginaceae**

Synonyms: *Oreocarya shackletteana*

Global Distribution: Endemic to eastern Interior Alaska.

Alaska Distribution: Intermontane Boreal, Alaska Range Transition.

Ecoregions Occupied: North Ogilvie Mountains (Eagle Bluff and Calico Bluff), Alaska Range (Mentasta Mountains).

Conservation Status: S1 G1Q; BLM Sensitive.



Description[24, 83]

Illustration by Dominique Collet

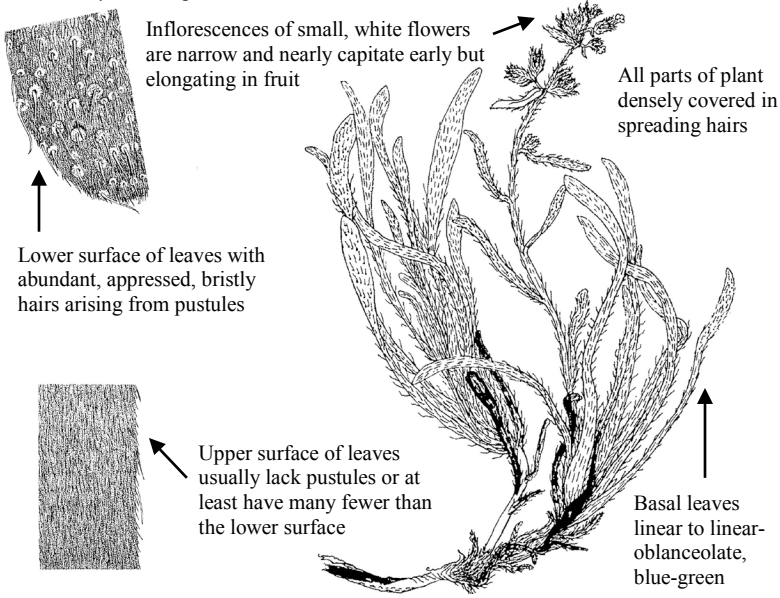


Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

General: Tufted perennial herb from branched, woody caudex and stout taproot; stems 7 to 18 cm tall, slender, weak, one to several; entire plant densely covered in spreading hairs.

Leaves: Leaves linear, 2 to 13 cm long, 1 to 5 mm wide, covered in spreading hairs with pustulate hairs on the lower surfaces and rarely few pustulate hairs on the upper surfaces.

Flowers: Inflorescences narrow and nearly capitate early but elongating in fruit; calyxes 3 to 5 mm long early elongating to 7 to 10 mm long in fruit with linear to narrowly lanceolate segments; corollas tubular, 5 to 6 mm long, white.

Fruits: Nutlets roughly 3.5 mm long, rough, ridged.



Ecology

Elevation: Known from 250 to 1,500 m.[48, 49]

Landform: River bluffs, rock outcrops, alpine ridges, alpine slopes.

Soil Type: Scree, gravel, unstable rubble, rock faces; associated with calcareous substrates.[48, 49]

Moisture regime: Dry.

Slope: Gentle to steep (up to at least 40°).

Aspect: Predominantly southeast to south to southwest; less commonly east.

Vegetation type: Sparsely vegetated; not present in adjacent graminoid steppe slopes.[84, 85]

Associated species: *Androsace chamaejasme, Anemone drummondii*, *Artemisia alaskana*, *Artemisia frigida*, *Braya humilis*, *Calamagrostis purpurascens*, *Cnidium cnidiifolium*, *Delphinium glaucum*, *Eriogonum flavum* var. *aquilinum*, *Erysimum angustatum*, *Galium boreale*, *Oxytropis borealis*, *Oxytropis splendens*, *Pascopyrum smithii*, *Phacelia sericea*, *Potentilla nivea*, *Rosa acicularis*, *Packera ogotorukensis*, *Solidago multiradiata, Zygadenus elegans.*[30, 85]

Longevity: Perennial; some plants have thick taproots and caudexes and may be long-lived.

Phenology: Flowering late May to mid-July.[84]

Population estimate: Four known occurrences in Alaska; populations at Eagle and Calico Bluffs on the Yukon River are abundant with several thousand plants estimated at both areas;[84] populations at the Mentasta Mountain localities are scattered and typically consist of 30 to 100 individuals.[85]

Reproductive biology: The Calico Bluff population includes a high number of small, immature individuals, indicating that this species has good recruitment ability at the bluff sites.[84] South-facing bluffs have rich diversity in solitary bee species and *Cryptantha shackletteana* is visited for nectar;[86] solitary bees are likely important pollinators.

Similar Species[24, 83]

No other *Cryptantha* species are native to Alaska. *Cryptantha shackletteana* is similar to *Cryptantha spiculifera* of the Great Basin region over 2,000 km to the south. *Cryptantha shackletteana* is weakly differentiated from *Cryptantha spiculifera* in having pustules primarily on the lower leaf surfaces instead of pustules on both leaf surfaces.[85]

Physaria arctica also grows on south-facing river bluffs in Interior Alaska and may look superficially similar to *Cryptantha shackletteana* when not in flower. The table below lists morphological traits that distinguish these two species.

Species	Hairs	Leaves	Flowers
Cryptantha shackletteana	Densely covered in spreading hairs with pustules on lower leaf surfaces	Linear	White
Physaria arctica	Densely pubescent with sessile or short-stalked, stellate hairs	Elliptic to oblanceolate	Yellow



ALA 81234



Cypripedium parviflorum var. *exiliens* Sheviak **Orchidaceae**

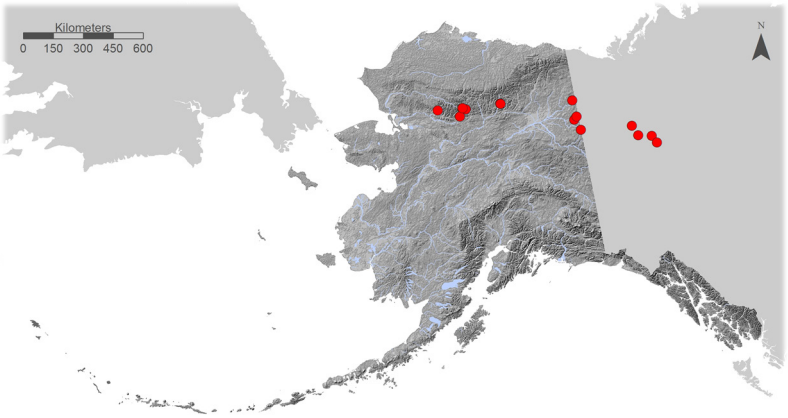
Synonyms: *Cypripedium parviflorum* var. *makasin* auct. non (Farwell) Sheviak

Global Distribution: Alaska and northwestern Canada south through the Canadian Rocky Mountains; disjunct in South Dakota.[87]

Alaska Distribution: Arctic Tundra, Intermontane Boreal.

Ecoregions Occupied: Brooks Range, Yukon-Old Crow Basin, North Ogilvie Mountains.

Conservation Status: S2S3 G5TNR.



Description[87]

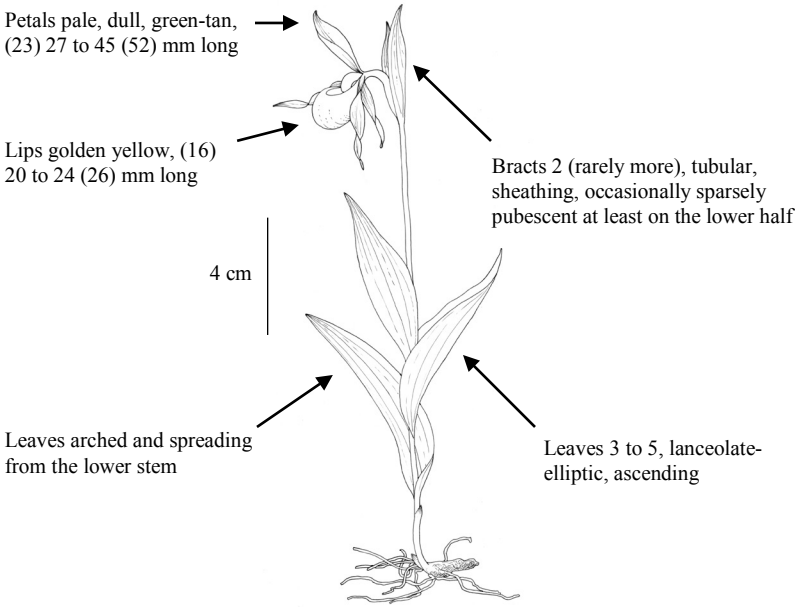


Illustration by Matthew L. Carlson

General: Perennial herb from slender rhizomes and coarse, fibrous roots; plants small, slender.

Leaves: Lanceolate-elliptic, ribbed, ascending, arched and spreading from the lower stem with sheathing base.

Flowers: Bracts 2 (rarely more), sheathing, tubular; uppermost bract glabrous to sparsely pubescent if not leaf-like, pubescent in the lower-half if leaf-like; flowers 1 (rarely 2), intensely sweet-scented when young, becoming rose-scented at maturity; lip (16) 20 to 24 (26) mm long, golden yellow; sepals and petals pale, dull, green-tan, finely marked with clusters of red-brown spots; petals (23) 27 to 45 (52) mm long.

Fruits: Capsules erect, ellipsoid, ribbed.



Ecology

Elevation: Known from 260 to 920 m in Alaska.

Landform: Slopes, rock outcrops, river bluffs.

Soil Type: Scree, rock, rocky soil, loam; often associated with calcareous substrates but also documented from one location on acidic substrate; seeds of *Cypripedium*

species lack carbohydrate reserves and require mycorrhizae to successfully germinate and produce above-ground growth.[88]

Moisture regime: Usually dry, occasionally moist.

Slope: Flat to steeply sloped.

Aspect: Not limited to any aspects, but often appearing on southern aspects.

Vegetation type: Open spruce forest, aspen woodland.

Associated species: *Arctous alpina*, *Dryas octopetala*, *Rhododendron tomentosum* ssp. *decumbens*.

Longevity: *Cypripedium* species are long-lived perennials that develop very slowly and may require several years to develop above-ground growth.[88]

Phenology: Flowering early June, possibly sooner, through mid-July; fruiting mid-July through August.

Population estimate: Nine known occurrences in Alaska; a population in an open spruce forest on calcareous substrate consisted of 100 individuals.

Reproductive biology: *Cypripedium parviflorum* var. *exiliens* may be of hybrid origin;[87] *C. parviflorum* and *C. montanum* can hybridize to form *C.* × *columbianum* where the ranges of the two species overlap when growing in mixed or adjacent stands;[87] *Cypripedium* species are pollinated by bees.[88]

Herbivory: *Cypripedium* species are grazed by deer in parts of North America[88] and may be grazed by other herbivores in Alaska.

Similar Species[87]

Cypripedium parviflorum var. *exiliens* is the only variety of *C. parviflorum* in northern Alaska and northwestern Canada. *C. parviflorum* var. *pubescens* (S1) occurs in Southeast Alaska. Previously, material from northern Alaska and northwestern Canada has often been referred to *C. parviflorum* var. *makasin*.[89] The morphology of these three varieties is compared in the table below; however, their ranges do not overlap in Alaska.

Species	Bracts	Lip	Petals
Cypripedium parviflorum* var. *exiliens	Glabrous to sparsely pubescent or pubescent in the lower half when young	Generally smaller: (16) 20 to 24 (26) mm long	Generally smaller: (23) 27 to 45 (53) mm long, green-tan with red-brown spots
Cypripedium parviflorum* var. *pubescens	Densely and conspicuously silvery-pubescent when young	Generally larger: up to 54 mm long	Generally larger, green-tan with red-brown spots
Cypripedium parviflorum* var. *makasin	Sparsely and inconspicuously pubescent to glabrous when young	Generally larger: (18) 22 to 28 (31) mm long	Generally larger: (30) 35 to 55 (62) mm, entirely dark brown



ALA 137865

ALA 92413

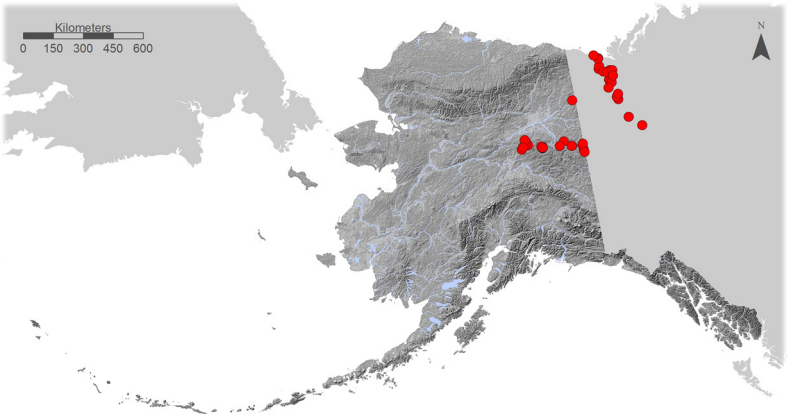


Global Distribution: Endemic to northwestern North America from Alaska to Northwest Territories.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Yukon-Old Crow Basin, Ray Mountains, Yukon-Tanana Uplands, North Ogilvie Mountains.

Conservation Status: S3 G3; BLM Sensitive.



Description[24, 25, 90]

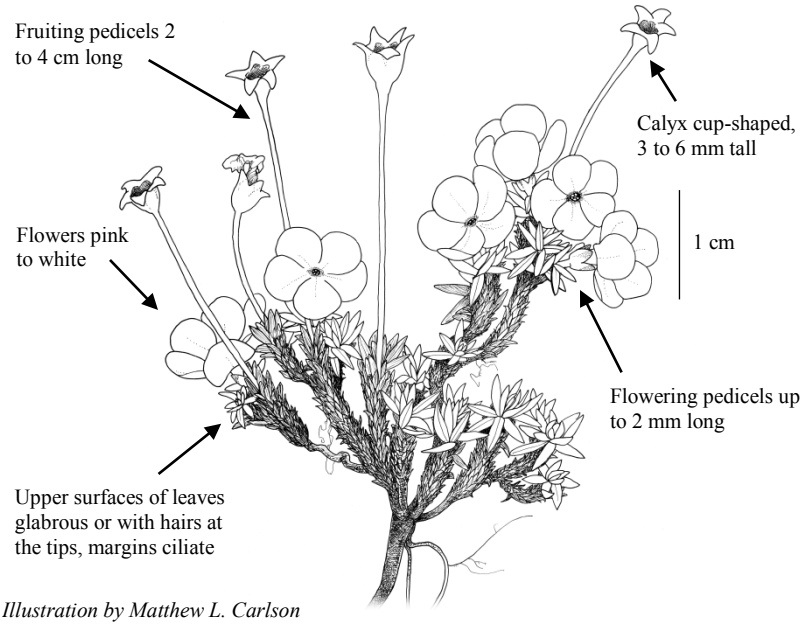


Illustration by Matthew L. Carlson

General: Perennial herb from branched caudex, forming loose cushions up to 20 cm wide; stems prostrate to ascending, covered in withered, persistent, densely overlapping, red leaves, terminating in green leaf rosettes.

Leaves: Leaves erect, thin, linear to narrowly lanceolate, 3 to 10 mm long, 0.5 to 2 mm wide with entire, ciliate margins; upper surfaces glabrous or with hairs at the tips.

Flowers: Pedicels up to 2 mm long in early anthesis and 2 to 4 cm long in fruit, minutely glandular and hairy with branched hairs; bracts solitary or less commonly 2, ovate-lanceolate, glabrous, 1 to 2 mm long; flowers solitary or less commonly 2 together; calyxes glabrous, 3 to 6 mm tall, 3 to 4 mm wide; corollas pink to white with entire or slightly toothed margins.



Ecology

Elevation: Known from 180 to 1,350 m in Alaska.

Landform: Alpine slopes, alpine ridges, subalpine slopes, rock outcrops, bluffs, cliffs.

Soil Type: Scree, loam; associated with calcareous substrates.

Moisture regime: Usually dry; reported from a single location described as moist.

Slope: Usually steep.

Aspect: Predominantly southeast to south to southwest; less commonly other aspects including north.

Vegetation type: Sparsely vegetated, aspen and spruce woodland, low birch scrub, graminoid steppe, *Dryas* heath.

Associated species: *Dryas* spp., *Picea glauca*, *Populus tremuloides.*

Longevity: Perennial, longevity unknown.

Phenology: Flowering early summer.[90]

Population estimate: There are 17 occurrences known from Alaska; populations usually consist of scattered individuals.

Similar Species[24, 25, 90]

Douglasia arctica can be confused with two other pink-flowered, cushion-forming *Douglasia* species that occur in Interior Alaska. *Silene acaulis* also looks superficially similar to *Douglasia arctica* because it is pink-flowered and cushion-forming. These species can be distinguished from each other according to the morphological features listed in the table below.

Species	Hairs	Flowering Pedicels	Bract
Douglasia arctica	Leaf surfaces glabrous, or with hairs at the tips, margins ciliate	Up to 2 mm long in early anthesis, 2 to 4 cm long in fruit	1 to 2 mm long
Douglasia gormanii	Leaf surfaces densely hairy with forked and branched hairs, margins ciliate	1 to 3 mm long in early anthesis, up to 2 cm long in fruit	1 to 2 mm long
Douglasia ochotensis	Upper leaf surfaces hairy with mostly simple hairs, margins hairy	5 to 10 mm long in early anthesis, elongating little in fruit	0.5 to 1 mm long
Silene acaulis	Leaf surfaces glabrous, margins ciliate	Flowers on leafy stems, 3 to 6 cm long	Absent





ALA 158733

Douglasia beringensis S. Kelso, Jurtz., & D.F. Murray **Primulaceae**

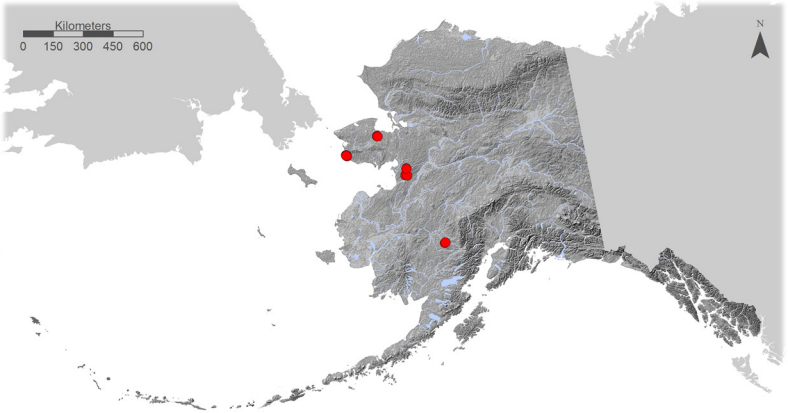
Synonyms: *Androsace beringensis*

Global Distribution: Endemic to Alaska.

Alaska Distribution: Bering Tundra, Bering Taiga, and Alaska Range Transition.

Ecoregions Occupied: Seward Peninsula, Nulato Hills, and Lime Hills.

Conservation Status: S2 G2; BLM Sensitive.



Description[90, 91]

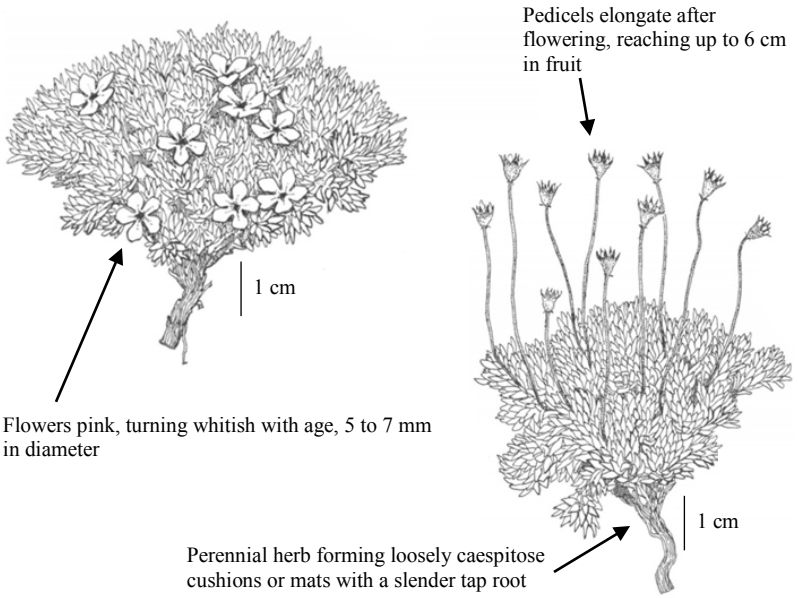


Illustration by Carolyn L. Crawford, courtesy of Missouri Botanical Garden

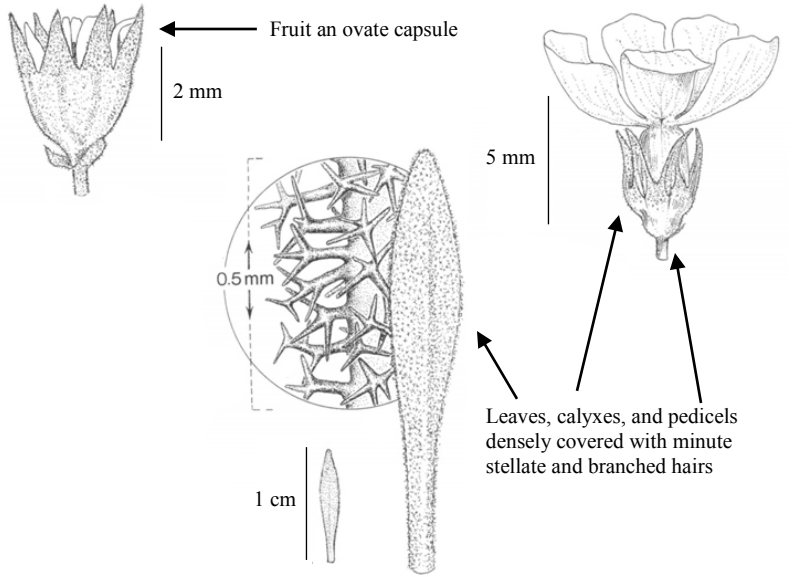


Illustration by Carolyn L. Crawford, courtesy of Missouri Botanical Garden



General: Perennial herb from branched caudex, forming loosely caespitose cushions or mats; taproots slender; stems prostrate to ascending with imbricate, red-tinted leaves underneath terminal, green leaf rosettes.

Leaves: Leaves prominently ascending, thin, linear to oblong, 3 to 10 mm long, 1 to 1.5 mm wide, densely covered with branched and stellate hairs on both surfaces, entire or toothed.

Flowers: **S**capes densely covered with branched and stellate hairs, 1 to 10 mm long in early anthesis, elongating to 6 cm long in fruit; inflorescences 1- to 2-flowered, usually with 1 bract, sometimes lacking bracts; calyx densely covered with branched and stellate hairs, 3 to 5 mm long; corolla pink, turning white with age, 5 to 7 mm in diameter.

Fruits: Capsules ovate with 1 to 4 seeds.



Ecology

Elevation: Known from 10 to 1,040 m.

Landform: Rock outcrops, rock ledges, and slopes in Seward Peninsula; alpine slopes and ridges in Nulato Hills; rock outcrops and slopes in Lime Hills.

Soil Type: Rock, scree, gravel; occurs on calcite marble in Seward Peninsula, non-calcareous substrates including shale and slate in Nulato Hills, and limestone in Lime Hills.[92]

Moisture regime: Usually moist, occasionally mesic or well-drained.

Slope: Steep.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated; scattered forbs, *Dryas* heath, moss.

Associated species: *Carex rupestris*, *Draba palanderiana*, *Dryas* spp., *Micranthes reflexa*, *Minuartia arctica*, *Minuartia obtusiloba*, *Oxytropis bryophila*, *Poa arctica*, *Poa glauca*, *Potentilla uniflora*, *Saxifraga cespitosa*, *Saxifraga oppositifolia*, *Smelowskia porsildii*; fruticose lichens, pleurocarpous moss.

Longevity: Perennial, longevity unknown.

Phenology: Flowering mid- to late June.

Population estimate: There are 11 known occurrences in Alaska; populations are scattered to abundant but are usually small; at least two populations each consist of several thousand ramets and total state population is likely around 10,000 individuals.[92]

Similar Species[90, 91]

Douglasia beringensis can be confused with two other pink-flowered, cushion-forming *Douglasia* species that occur in western Alaska. *Silene acaulis* also looks superficially similar to *Douglasia beringensis* because it is pink-flowered and cushion-forming. These species can be distinguished from each other according to the morphological features listed in the table below.

Species	Hairs	Flowering Pedicels	Bract	Petals
Douglasia beringensis	Pervasive, stellate hairs cover all vegetative parts	1 to 10 mm long in early anthesis, up to 6 cm long in fruit	2 to 3 mm long	5 to 7 mm long
Douglasia gormanii	Sparse forked hairs on leaves and peduncles only, calyxes glabrous	1 to 3 mm long in early anthesis, up to 2 cm long in fruit	1 to 2 mm long	5 to 8 mm long
Douglasia ochotensis	Upper leaf surfaces hairy with mostly simple hairs, margins hairy	5 to 10 mm long, elongating little in fruit	0.5 to 1 mm long	4 to 12 mm long
Silene acaulis	Leaf surfaces glabrous, margins ciliate; calyxes glabrous	Flowers on leafy stems, 3 to 6 cm long	Absent	2.5 to 3.5 mm long

Draba aleutica Ekman

Brassicaceae

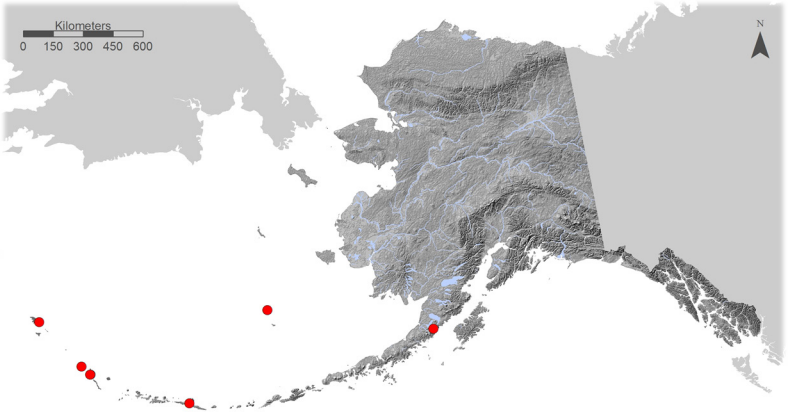
Synonyms: *Draba behringii*

Global Distribution: Endemic to northeastern Russia and Alaska.

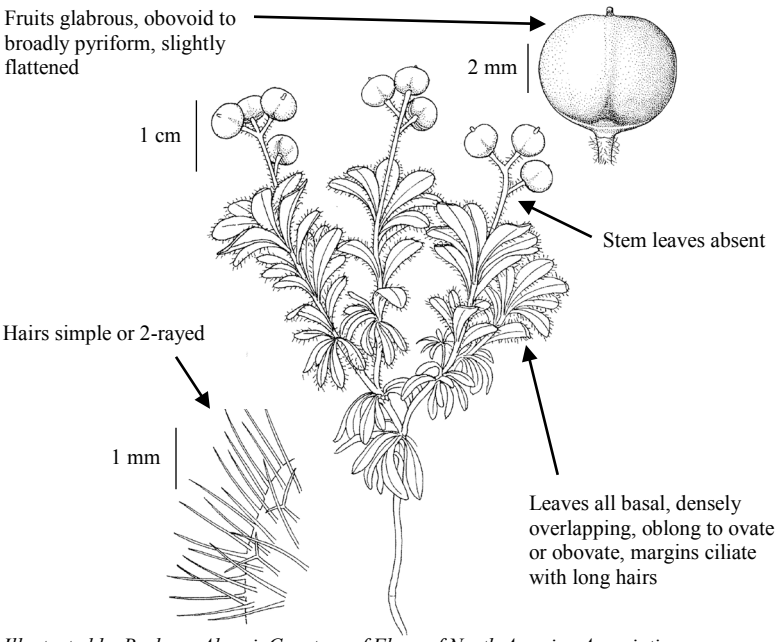
Alaska Distribution: Aleutian Meadows, Bering Tundra.

Ecoregions Occupied: Aleutian Islands, Alaska Peninsula, and Bering Sea Islands (St. Paul Island).

Conservation Status: S2 G2.



Description[25, 93]



Illustrated by Barbara Alongi, Courtesy of Flora of North America Association

General: Perennial herb, densely tufted, cushion forming, from branched caudex with persistent leaf remains, some branches terminating in sterile rosettes.

Leaves: Basal leaves arranged in rosettes, densely overlapping, petiolated, oblanceolate to spatulate, 4 to 8 mm long, 2 to 4 mm wide, sparsely to densely pilose with ciliate margins; stem leaves absent.

Flowers: Scapes pubescent, very short; flowers arranged in racemes of 2 to 5; sepals oblong, glabrous or sparsely pubescent, 2 to 3 mm long; petals yellow-green to pale yellow, linear-oblanceolate, 3 to 4 mm long, less than 1 mm wide.

Fruits: Fruiting pedicels pubescent, straight, 1.5 to 4 mm long; fruits obovoid to broadly pyriform, slightly flattened, usually glabrous, 3 to 5 mm tall, 3 to 4.5 mm wide.



ALA 37949

Ecology

Elevation: Known from 100 to 420 m.

Landform: Mountain slopes, solifluction slopes.

Soil Type: Gravel.

Moisture regime: Wet, often located near melting snow banks.

Slope: Occurs on slopes of unknown gradient.

Aspect: No information available.

Vegetation type: Alpine cushion vegetation, sparsely vegetated.

Associated species: *Cardamine bellidifolia, Chrysosplenium wrightii, Eritrichium chamissonis*, *Minuartia macrocarpa*, *Oxygraphis glacialis*, *Saxifraga aleutica, Saxifraga oppositifolia.*

Longevity: Perennial, longevity unknown.

Phenology: Flowering May through July;[93] fruiting late July, probably sooner.

Population estimate: Six known occurrences in Alaska; population sizes unknown.

Similar Species[25, 93]

Although *Draba aleutica* is distinct because its stems do not exceed its leaves, it can be confused with several other tufted or cushion-forming *Draba* species that occur in the Aleutian Islands and on the Alaska Peninsula. The table below describes the differences in morphology that distinguish *Draba aleutica* from superficially similar species.

Species	Basal Leaves	Stem	Flowers	Fruits
Draba aleutica	Densely overlapping, sparsely to densely pilose with ciliate margins	0.4 to 4 cm tall; not exceeding leaves; stem leaves absent	Yellow-green to pale yellow	Obovoid to broadly pyriform, usually glabrous
Draba stenopetala	Densely overlapping, pubescent with pubescent margins	0.7 to 2 cm tall, exceeding leaves; stem leaves absent	Yellow or purple	Suborbicular, glabrous or puberulent
Draba lactea	Not densely overlapping, surfaces sometimes pubescent, usually with ciliate margins	2 to 11 cm tall; stem leaves usually absent, 1 present rarely	White	Oblong to ovate, glabrous
Draba nivalis	Not densely overlapping ciliate on both surfaces, margins not ciliate	2 to 8 cm tall; stem leaves present	White	Elliptic, usually glabrous

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Global Distribution: Western North America cordillera.

Alaska Distribution: Intermontane Boreal, Alaska Range Transition, Coastal Mountains Transition.

Ecoregions Occupied: Yukon-Tanana Uplands, Alaska Range, Kluane Ranges.

Conservation Status: S2S3Q G5; BLM Watch.



Description[24, 25, 93, 94]

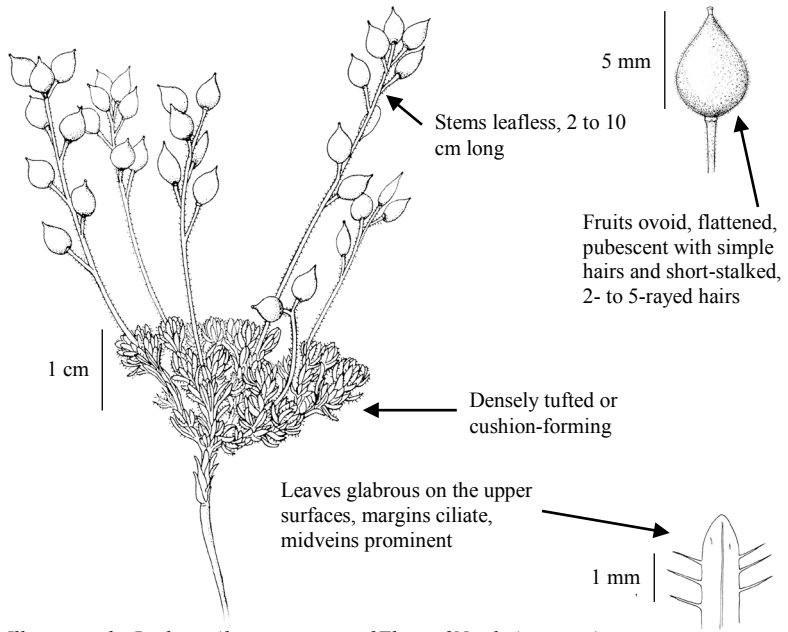


Illustration by Barbara Alongi, courtesy of Flora of North America Association

General: Perennial herb from branched caudex and taproot, forms dense tufts or cushions with persistent leaf remains and branches sometimes terminating in sterile rosettes; stems leafless, unbranched, 2 to 10 cm long, usually glabrous but sometimes pubescent with simple hairs and 2- to 4-rayed hairs.

Leaves: Basal leaves arranged in rosettes, sessile, linear to oblong, 3 to 9 mm long, 0.5 to 1.5 mm wide; upper leaf surfaces glabrous or sparsely pubescent; lower leaf surfaces pubescent with short-stalked, 2- to 4-rayed hairs; margins entire, ciliate.

Flowers: Pedicels leafless, ascending, straight, 1.5 to 10 mm long, usually glabrous; racemes 2 to 10 flowered, lacking bracts, not much elongated in fruit; sepals ovate, 2 to 3 mm long, usually sparsely pubescent with simple hairs and short-stalked, 2- to 4-rayed hairs; petals pale yellow, oblanceolate to obovate, 2 to 5 mm long, 1 to 1.7 mm wide.

Fruits: Fruits ovoid, flattened, 3 to 6 mm long, 2 to 3 mm wide, pubescent with simple hairs and short-stalked, 2- to 5-rayed hairs; styles 0.3 to 0.6 mm long.



Ecology

Elevation: 620 m to 1,980 m in Alaska;[49] up to 3,700 m elsewhere in North America.[93]

Landform: Alpine slopes, alpine ridges, alpines saddles, frost scars.

Soil Type: Sand, gravel, scree, rubble, boulders; usually associated with granite substrates.[48]

Moisture regime: Usually dry; occasionally present at moister sites.

Slope: Gentle to steep.

Aspect: Often southeast to south; also other aspects including north.

Vegetation type: Sparsely vegetated, alpine cushion vegetation, *Dryas* tundra.

Associated species: *Draba palanderiana, Dryas* spp., *Festuca brachyphylla, Minuartia macrocarpa.*

Longevity: Perennial, likely long-lived as evidenced by the extensive cushions from thick, many-branched caudexes.

Phenology: Flowering late May through early July; fruiting early July through August.

Population estimate: 14 known occurrences in Alaska; populations usually consist of scattered individuals.

Reproductive biology: *Draba densifolia* is apomictic.[93]

Similar Species[24, 25, 93, 94]

Draba densifolia can be distinguished from other cushion-forming or tufted *Draba* species that occur in Interior Alaska by the morphological features given in the table below.

Species	Habit	Leaf Hairs	Petals	Siliques
Draba densifolia	Densely tufted or cushion-forming	Upper leaf surfaces glabrous, margins ciliate	1 to 1.7 mm wide	Pubescent with simple hairs and short-stalked, 2- to 5-rayed hairs
Draba oligosperma	Densely tufted or cushion-forming	Pubescent with sessile, comb-like hairs, upper surfaces sometime glabrous	1.5 to 3 mm wide	Puberulent with simple hairs and sessile, 2-rayed hairs
Draba stenopetala	Cushion-forming	Pubescent with simple hairs and 2- to 5-rayed hairs, sometimes hairs present on margins only	0.3 to 0.7 mm wide	Glabrous or puberulent with simple hairs
Draba corymbosa	Tufted	Pubescent with simple hairs and 2- to 6-rayed hairs	3 to 5 mm wide	Pubescent or puberulent with simple hairs
Draba ruaxes	Tufted	Pubescent with simple hairs or 2- to 10-rayed hairs	2 to 3.5 mm wide	Puberulent with simple hairs and fewer 2-rayed hairs


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Draba micropetala Hook. **Brassicaceae**

Synonyms: *Draba pauciflora* var. *micropetala*

Global Distribution: Circumpolar high arctic.

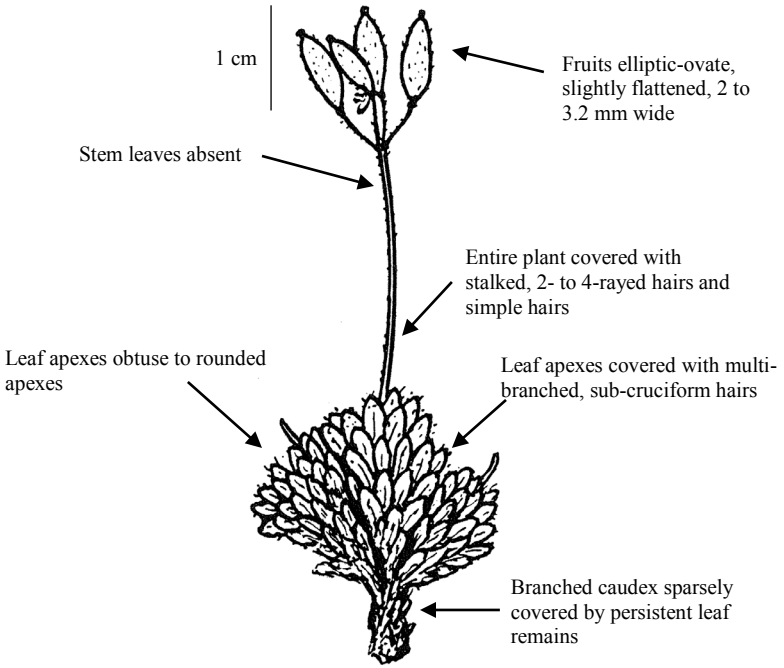
Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain.

Conservation Status: S1S2 GNR; BLM Sensitive.



Description[25, 93, 95, 96]



Illustrated by Dagny Tande-Lid, courtesy of Stanford University Press

General: Caespitose perennial herb from branched caudex sparsely covered by persistent leaf remains; entire plant pubescent with stalked, 2- to 4-rayed hairs and simple hairs, pubescence sometimes sparse towards the top; stems unbranched, lacking leaves.

Leaves: Basal leaves arranged in rosettes, petiolated, broadly oblanceolate to broadly obovate, 6 to 20 mm long, 4 to 12 mm wide with ciliate, entire margins and rounded or obtuse apexes; stem leaves absent.

Flowers: Flowers arranged in racemes of 2 to 7, bracts absent; sepals oblong, 1.8 to 2.5 mm long; petals pale yellow, narrowly spatulate to oblanceolate, 2 to 3 mm long, 1 to 1.5 mm wide.

Fruits: Fruiting racemes elongated; fruiting pedicels spreading to ascending, straight, 1 to 3 mm long; fruits elliptic-ovate, slightly flattened, 5 to 10 mm tall, 2 to 3.2 mm wide; valves often densely pubescent with simple and spurred hairs.



Ecology

Elevation: Near sea level to less than 10 m.

Landform: Beach ridges, beach fronts, stream banks, frost scars.

Soil Type: Sand, gravel; occurs on both acidic and basic substrates in Svalbard.[96]

Moisture regime: Moist to dry.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Graminoid-herbaceous meadows, sedge meadows.

Associated species: *Alopecurus borealis*, *Arctagrostis latifolia*, *Cochlearia groenlandica*, *Draba lactea*, *Draba pauciflora*, *Dupontia fisheri*, *Hierochloë pauciflora*, *Poa arctica*, *Papaver hultenii*, *Salix rotundifolia*, *Saxifraga oppositifolia*, *Silene uralensis* ssp. *uralensis*, *Stellaria humifusa*; moss.

Longevity: Perennial, short-lived in comparison to many other *Draba* species;[96] most plants have only one or a few rosettes (some have more than this).

Phenology: In flower in June (and probably earlier); in fruit by early to mid-July.

Population estimate: There are six known occurrences in Alaska; at least one population is locally common.

Reproductive biology: Nearly obligately self-pollinating,[97] reproduces by seed; in Svalbard, flowering and seed set is regular and abundant during most years, and mature seeds are regularly observed.[96]

Similar Species[25, 93, 95, 96]

Draba micropetala is easily confused with the closely related *Draba pauciflora,* especially because both species have pale yellow flowers of similar size.[98] The two species can be distinguished by the morphological features listed in the table below.

Species	Leaf Apexes	Leaf Apex Hairs	Fruiting Racemes	Fruits	Seeds
Draba micropetala	Obtuse to rounded apexes	Multi-branched, sub-cruciform hairs	Elongated	2 to 3.2 mm wide, elliptic-ovate to oblong	18 to 28 per fruit
Draba pauciflora	Subacute to acute apexes	Mainly simple hairs, also 2-rayed hairs	Congested	3.5 to 5 mm wide, obovate	8 to 16 per fruit



ALA 38804



Draba mulliganii Al-Shehbaz **Brassicaceae**

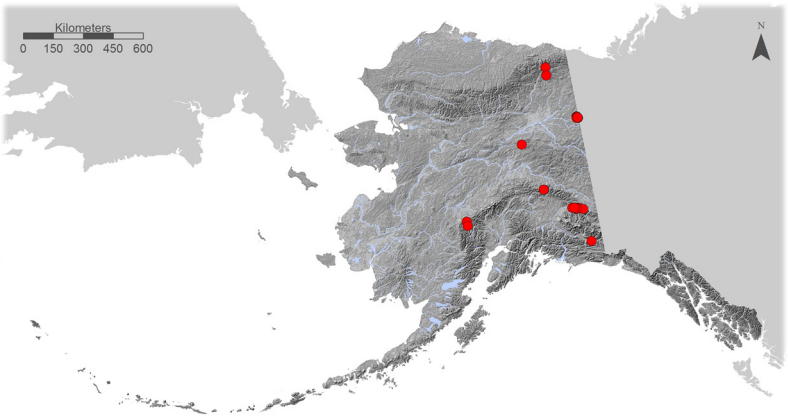
Synonyms: *Draba porsildii* auct. non G.A. Mulligan

Global Distribution: Endemic to mountains of Alaska.

Alaska Distribution: Arctic Tundra, Intermontane Boreal, Alaska Range Transition, Coastal Mountains Transition, Coastal Rainforests.

Ecoregions Occupied: Brooks Range, North Ogilvie Mountains, Ray Mountains, Alaska Range, Kluane Ranges, Chugach-St. Elias Mountains.

Conservation Status: S3 GNR; BLM Watch.



Description[93, 99]

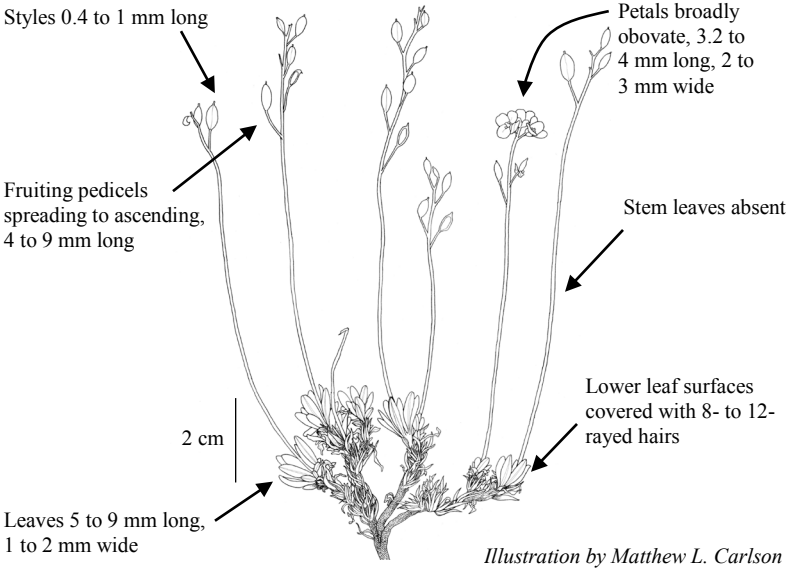


Illustration by Matthew L. Carlson

General: Perennial herb from many-branched caudex with persistent leaf remains; tufted; stems 3 to 12 cm tall, unbranched, leafless, glabrous or sparsely pubescent in the lower half with short-stalked, 4- to 10-rayed hairs.

Leaves: Basal leaves arranged in rosettes, subsessile or short-petiolated, oblanceolate to lanceolate, 5 to 9 mm long, 1 to 2 mm wide, margins entire; lower leaf surfaces pubescent with short-stalked, 8- to 12-rayed hairs; upper leaf surfaces with similar stellate hairs and some simple hairs; petiole bases and lower margin ciliate with stiff, simple hairs; stem leaves absent.

Flowers: Racemes of 3 to 11 flowers, lacking bracts, elongating in fruit; rachis and pedicels glabrous; sepals ovate, 1.7 to 2.2 mm long, covered with simple and 2-rayed hairs; petals white, broadly obovate, 3.2 to 4 mm long, 2 to 3 mm wide.

Fruits: Fruits ovate-lanceolate to oblong, flattened, glabrous, 5 to 8 mm long, 2 to 2.5 mm wide with styles 0.4 to 1 mm long; 12 to 16 seeds per fruit.



ALA 71705

Ecology

Elevation: Known from 360 to 1,780 m.

Landform: Alpine slopes, alpine ridges, alpine bowls, glacial outwash, rock outcrops, river bluffs.

Soil Type: Scree, gravel, mineral soil; associated with calcareous, shale, and granite substrates.[48]

Moisture regime: Dry.

Slope: 5° to at least 35° slopes.

Aspect: No particular aspect except south-facing on river bluffs.

Vegetation type: Sparsely vegetated, late-melting snow beds.

Associated species: *Artemisia alaskana*, *Calamagrostis purpurascens*, *Carex glacialis*, *Carex microchaeta*, *Carex rupestris*, *Cassiope tetragona*, *Diapensia lapponica*, *Draba breweri*, *Dryas alaskensis, Dryopteris fragrans*, *Hierochloe alpina*, *Lloydia serotina*, *Potentilla uniflora*, *Salix arctica*, *Saxifraga tricuspidata*, *Senecio spp.*, *Taraxacum spp.*, *Vaccinium uliginosum.*

Longevity: Perennial, likely long-lived as some specimens show extensively branched caudex.

Phenology: Flowering early June, probably sooner, through late July; fruiting mid-June through July, probably later.

Population estimate: There are 17 known occurrences in Alaska; population sizes range from few individuals to locally common.

Similar Species[93, 99]

All material in Alaska previously assigned to *Draba porsildii* has been reassigned to *Draba mulliganii*.[99] However, *Draba porsildii* does occur near the Alaska-Yukon border in the St. Elias Mountains. The table below describes the differences in morphology between the two species.

Species	Hairs	Petals	Fruiting Pedicels	Fruits
Draba mulliganii	Lower leaf surfaces with 8- to 12-rayed hairs often without spurred rays	Broadly obovate, 3.2 to 4 mm long, 2 to 3 mm wide	Spreading to ascending, 4 to 9 mm long	Non-appressed; with styles 0.4 to 1 mm long
Draba porsildii	Lower leaf surfaces with 3- to 5-rayed hairs often with spurred rays	Spatulate, 1.5 to 2.2 mm long, 0.7 to 1.2 mm wide	Ascending, 0.5 to 4 mm long	Appressed; with styles 0.05 to 0.1 mm long

Similar white-flowered, tufted *Draba* species with leafless stems that grow in Alaska can be distinguished from *Draba mulliganii* by the morphological features listed in the table below.

Species	Leaves	Fruits	Styles
Draba mulliganii	Petiole and midvein of basal leaves not thickened, basal leaves 1 to 2 mm wide	Fruits ovate-lanceolate to oblong, 5 to 8 mm long	Styles 0.4 to 1 mm long
Draba lactea	Petiole and midvein of basal leaves thickened, basal leaves 2 to 6 mm wide	Fruits oblong to ovate, 4 to 8 mm long	Styles 0.1 to 0.4 mm long
Draba lonchocarpa	Petiole and midvein of basal leaves not thickened, 1 to 3 mm wide	Fruits linear to oblong, 6 to 15 mm long	Styles 0.1 to 0.25 mm long



ALA 12726

Global Distribution: Endemic to Alaska and Yukon along the upper Yukon River.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Yukon-Old Crow Basin, North Ogilvie Mountains, Yukon-Tanana Uplands.

Conservation Status: S2S3 G2; BLM Sensitive.



Description[24, 93, 100]

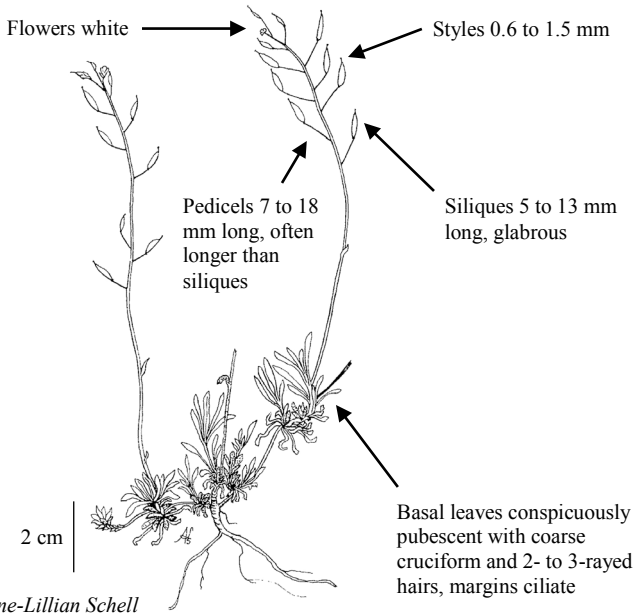


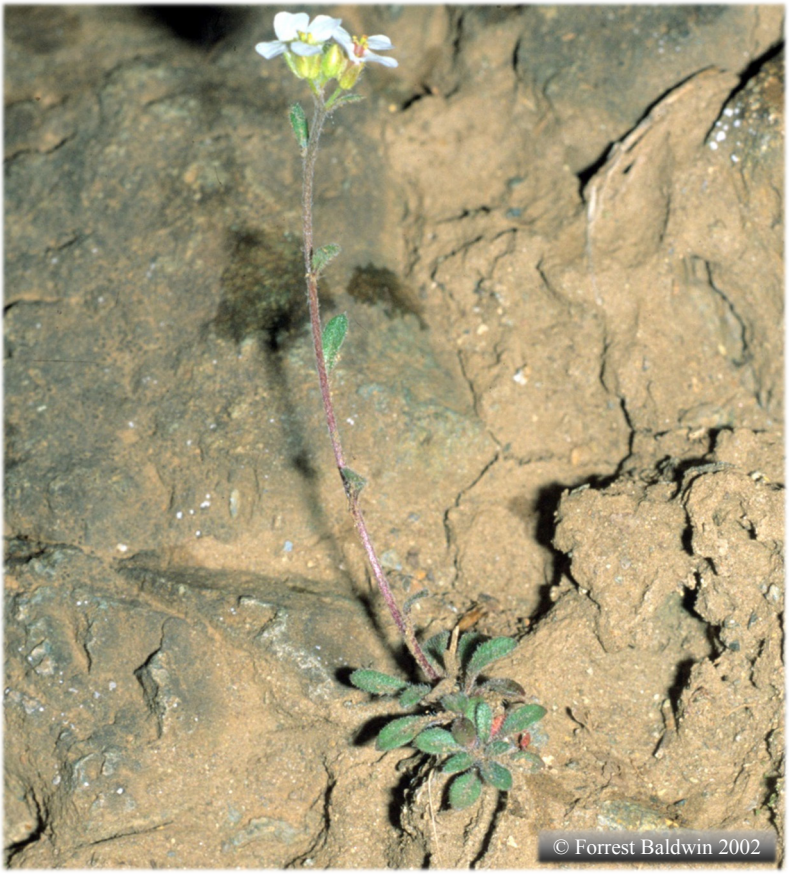
Illustration by Anne-Lillian Schell

General: Perennial herb from branched caudex, loosely caespitose; caudex branches covered with persistent leaf remains, sometimes terminating in sterile rosettes; stems unbranched, 9 to 27 cm tall, pubescent in the lower half with simple hairs and fewer 2- to 4-rayed hairs, glabrous in the upper half.

Leaves: Basal leaves arranged in rosettes, petiolate, oblanceolate to obovate, 6 to 21 mm long, 2.5 to 5 mm wide, pubescent with cruciform or 2- to 3-rayed hairs, margins ciliate and entire or sparsely toothed; stem leaves 1 to 6, sessile, ovate to lanceolate.

Flowers: Racemes of 7 to 25 flowers, lacking bracts, elongated in fruit; rachis glabrous; sepals ovate, 1.5 to 2.2 mm long, pubescent with simple hairs and 2-rayed hairs; petals white, obovate, 4 to 6 mm long, 1.5 to 2.5 mm wide.

Fruits: Fruiting pedicels 7 to 18 mm long, spreading to ascending, usually straight, glabrous; siliques linear-lanceolate to narrowly elliptic, flattened, 5 to 13 mm long, 1.5 to 2 mm wide, glabrous; styles 0.6 to 1.5 mm long.



Ecology

Elevation: Found from 180 to 1,120 m in Alaska.

Landform: Rock outcrops, subalpine slopes, river bluffs, cliffs, ridges; roadsides.

Soil Type: Rock, scree, loam; often associated with calcareous substrates.

Moisture regime: Usually dry, less commonly mesic; also rarely occurring on moist rock.

Slope: Slopes 5° to at least 40°, probably to nearly vertical; usually found on steeper slopes.

Aspect: Often southeast to south to southwest; less commonly west, east, and north.

Vegetation type: Establishes on bare microsites in early successional forests and open slopes;[84] large populations occur in the understory of immature or recently burned spruce woodland, aspen woodland, or open birch forest;[84] small populations occur on open slopes or in graminoid steppes;[84] grows in full sun but larger populations occur in partial shade.[84]

Associated species: *Adoxa moschtelliana*, *Anemone narcissiflora*, *Anemone patens*, *Anticlea elegans*, *Arctostaphylos uva-ursi*, *Artemisia frigida*, *Betula glandulosa*, *Bupleurum triradiatum*, *Calamagrostis purpurascens*, *Dasiphora fruticosa* ssp. *floribunda*, *Galium boreale*, *Juniperus communis*, *Lycopodium dendroideum*, *Phlox sibirica*, *Populus tremuloides*, *Rosa acicularis*, *Salix bebbiana*, *Saxifraga tricuspidata.*

Longevity: Perennial; rosette diameter is likely an unreliable indication of plant longevity for *Draba murrayi.*[84]

Phenology: Flowering May through late June; fruiting late May through July; seeds mostly dispersed by mid-August.[84]

Population estimate: There are 22 known occurrences in Alaska; populations are often widespread and scattered, with subpopulations consisting of several dozen to several hundred individuals;[84] one to several thousand individuals were found in multiple areas in immature forest understories along the upper Yukon drainage.[84]

Reproductive biology: In the Tatonduk River area, 70% to 90% of individuals bore flowering stems;[84] plants occurring in more exposed sites were generally smaller than partially shaded plants;[84] floral visitors include small bees and Bombyliidae flies.[84]

Herbivory: Dall sheep, or possibly other herbivores, eat flowering stems;[84] insect larva likely feed on maturing siliques.[84]

Similar Species[24, 93, 100]

Draba murrayi can be confused with several other white-flowered *Draba* species with leafy stems that occur on immature open forest slopes, graminoid steppe slopes, sparsely vegetated slopes, and rock outcrops along the upper Yukon River. The table below describes differences in morphology between similar species.

Species	Leaf Surfaces	Petals	Fruits	Styles
Draba murrayi	Pubescent with cruciform or 2- to 3-rayed hairs	4 to 6 mm long	Glabrous	0.6 to 1.5 mm long
Draba borealis	Pubescent with cruciform or 4- to 6-rayed hairs	4 to 6 mm long	Pubescent	0.2 to 0.6 mm long
Draba cana	Pubescent with 4- to 12-rayed hairs	2.3 to 3.7 mm long	Pubescent	0.1 to 0.6 mm long
Draba cinerea	Densely pubescent with 8- to 12-rayed hairs	3.5 to 4.5 mm long	Pubescent	0.2 to 1 mm long



ALA 12528

Global Distribution: Endemic to Alaska, Yukon, and Northwest Territories.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: North Ogilvie Mountains.

Conservation Status: S1 G3; BLM Sensitive.



Description[24, 25, 93, 101]

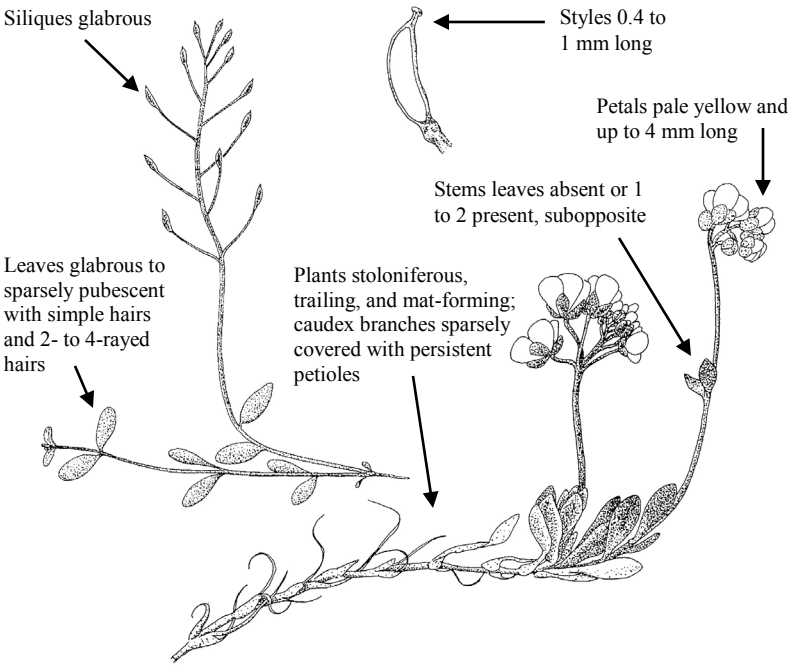


Illustration by Dominique Collet

General: Stoloniferous perennial herb; caudexes branched, sparsely covered with petiole remains; branches slender, creeping, loosely matted; stems unbranched, often leafless, glabrous or pubescent with simple hairs and 2- to 3-rayed hairs.

Leaves: Basal leaves not arranged in rosettes, petiolate, oblanceolate to lanceolate, 5 to 15 mm long, 1.5 to 5 mm wide, glabrous or sparsely pubescent with simple hairs and 2- to 4-rayed hairs, margins entire; stem leaves 1 or 2 when present, sessile, ovate to oblong, glabrous or sparsely pubescent as basal leaves.

Flowers: Racemes with 5 to 13 flowers, lacking bracts, elongated in fruit; sepals ovate, 2 to 3 mm long, glabrous or pubescent; petals golden yellow, obovate, 3.6 to 6 mm long, 2 to 3 mm wide.

Fruits: Fruits oblong, flattened, 6 to 9 mm long, 2 to 3 mm wide, glabrous; styles 0.4 to 1 mm long.



Ecology

Elevation: Known from 760 to 1,280 m in Alaska; up to 2,200 m in Yukon.

Landform:	Alpine slopes, alpine ridges, plateaus.
Soil Type:	Typically associated with calcareous substrates.
Moisture regime:	Wet to mesic.
Slope:	0° to 22° slopes.
Aspect:	No particular aspect.
Vegetation type:	Forb-moss meadows, graminoid-moss meadows, willow-dwarf shrub tundra, moss.
Associated species:	*Anemone narcissiflora*, *Artemisia arctica*, *Festuca altaica*, *Poa porsildii*, *Poa arctica*, *Salix arctica*, *Salix reticulata.*
Longevity:	Perennial, longevity unknown.
Phenology:	Flowering June, probably sooner, to August; fruiting mid-June to August.
Population estimate:	There are two known occurrences in Alaska; population sizes range from under 20 individuals to over 150 individuals.

Similar Species[24, 25, 93, 101]

Draba ogilviensis has been synonymized with *Draba sibirica* or *Draba juvenilis* in the past by some authors.[93, 101] *Draba sibirica* is no longer considered to occur in North America outside of Greenland. *Draba ogilviensis* and *Draba juvenilis* both occur near the Alaska – Yukon border in the North Ogilvie Mountains, potentially in similar habitats. The table below describes the differences in morphology between the two species.

Species	Leaf Surfaces	Stem Leaves	Flowers
Draba ogilviensis	Glabrous or sparsely pubescent with simple hairs and 2- to 4-rayed hairs	None, or 1 or 2 as a subopposite pair; margins entire	Golden yellow
Draba juvenilis	Pubescent with cruciform hairs, simple hairs, and 2-rayed hairs	None, or 1 to 3 alternate; margins frequently toothed	White, cream, or pale yellow





ALA 83317

Draba pauciflora R. Brown

Brassicaceae

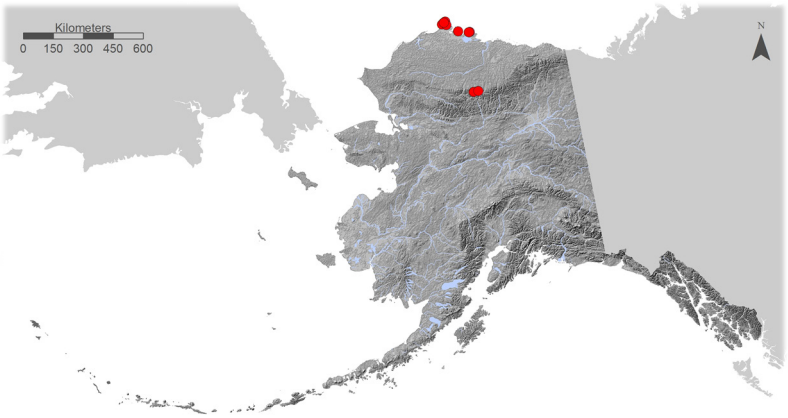
Synonyms: *Draba adamsii*

Global Distribution: Circumpolar high arctic.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Range.

Conservation Status: S2 G4; BLM Sensitive.



Description[93, 95, 96]

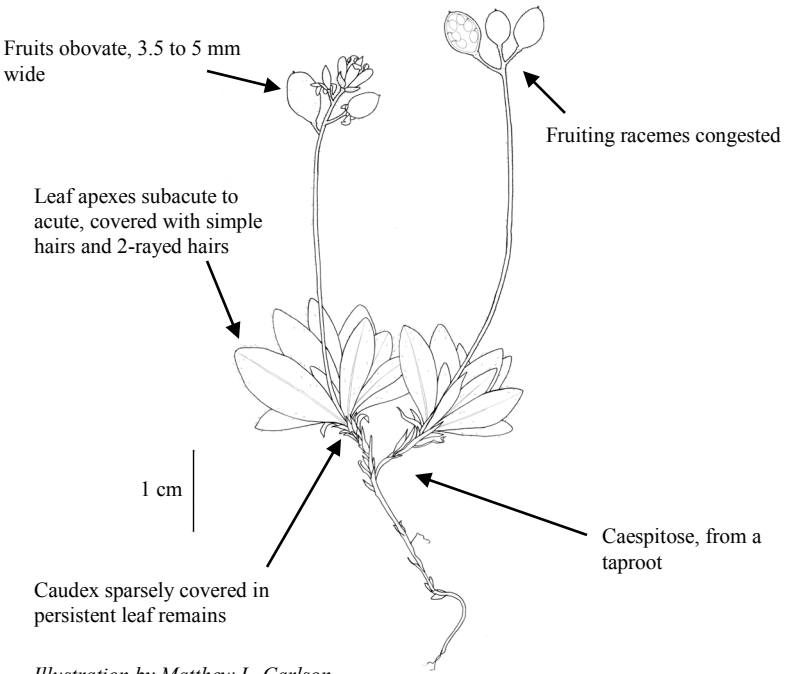


Illustration by Matthew L. Carlson

General: Perennial herb from branched or unbranched caudex sparsely covered by persistent leaf remains; stems unbranched, leafless, 1 to 8 cm tall, pubescent with simple hairs and 2- to 4-rayed hairs.

Leaves: Basal leaves arranged in rosettes usually up to 3 cm wide, petiolate, oblanceolate, 5 to 11 mm long, 1.5 to 4 mm wide with entire, ciliate margins; lower surfaces pubescent with simple hairs and 2- to 4-rayed hairs; upper surfaces pubescent with simple hairs or sometimes glabrous; stem leaves absent.

Flowers: Inflorescences with 2 to 8 flowers, lacking bracts, slightly elongated in fruit; sepals ovate, 1.8 to 2.3 mm long, pubescent; petals pale yellow, narrowly spatulate to oblanceolate, 2.5 to 3 mm long, 0.8 to 1.5 mm wide.

Fruits: Fruiting pedicels 1.5 to 4 mm long, spreading to ascending; fruits obovate, slightly flattened, 5 to 10 mm long, 3.5 to 5 mm wide, glabrous to sparsely pubescent.



Ecology

Elevation: Near sea level to 1,400 m in Alaska.

Landform: Beach ridges, polygon tundra, polygon troughs, alpine slopes.

Soil Type: Sand, clay, boulders; known to occur on acidic and carboniferous substrates in Alaska; occurs on both acidic and basic substrates in Svalbard.[96]

Moisture regime: Wet to moist.

Slope: No information available.

Aspect: No particular aspect.

Vegetation type: Graminoid-herbaceous meadow; ericaceous heath in open, mossy microsites; usually associated with moss.[96]

Associated species: *Anemone parviflora*, *Claytonia scammaniana*, *Dodecatheon frigidum*, *Draba corymbosa*, *Draba lactea*, *Dupontia fisheri*, *Eutrema edwardsii*, *Minuartia arctica*, *Parrya nudicaulis*, *Pedicularis langsdorffii*, *Poa arctica* ssp. *lanata*, *Poa paucispicula*, *Polemonium acutiflorum*, *Tephroseris frigida*, *Tephroseris kjellmanii.*

Longevity: Perennial, probably not very long-lived.[96]

Phenology: Flowering likely occurs from early June to late July; fruiting late June to mid-August.

Population estimate: Nine known occurrences in Alaska; population sizes unknown.

Reproductive biology: Nearly obligately self-pollinating,[97] reproduces by seed only; in Svalbard, flowering and seed-set is regular and abundant in most years, and mature seeds are regularly observed.[96]

Similar Species[93, 95, 96]

Draba pauciflora is easily confused with the closely related *Draba micropetala,* especially since both species have pale yellow flowers of similar size.[93] The two species can be distinguished by the morphological features listed in the table below.

Species	Leaf Apexes	Leaf Apex Hairs	Fruiting Racemes	Fruits	Seeds
Draba pauciflora	Subacute to acute apexes	Mainly simple hairs, also 2-rayed hairs	Congested	3.5 to 5 mm wide, obovate	8 to 16 per fruit
Draba micropetala	Obtuse to rounded apexes	Multi-branched, sub-cruciform hairs	Elongated	2 to 3.2 mm wide, elliptic-ovate to oblong	18 to 28 per fruit


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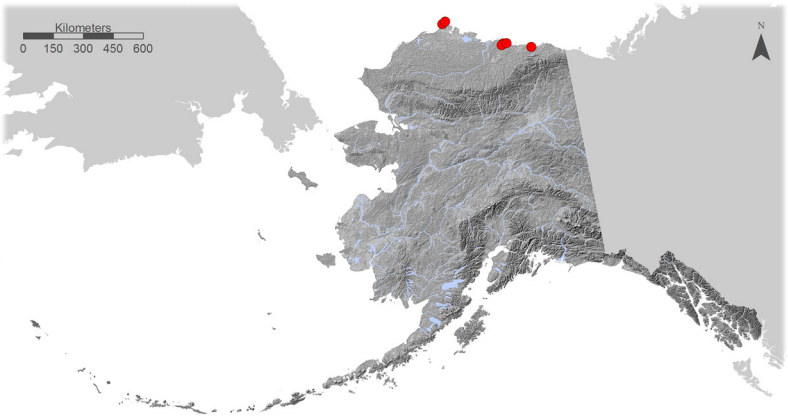

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Global Distribution: Circumpolar high arctic.

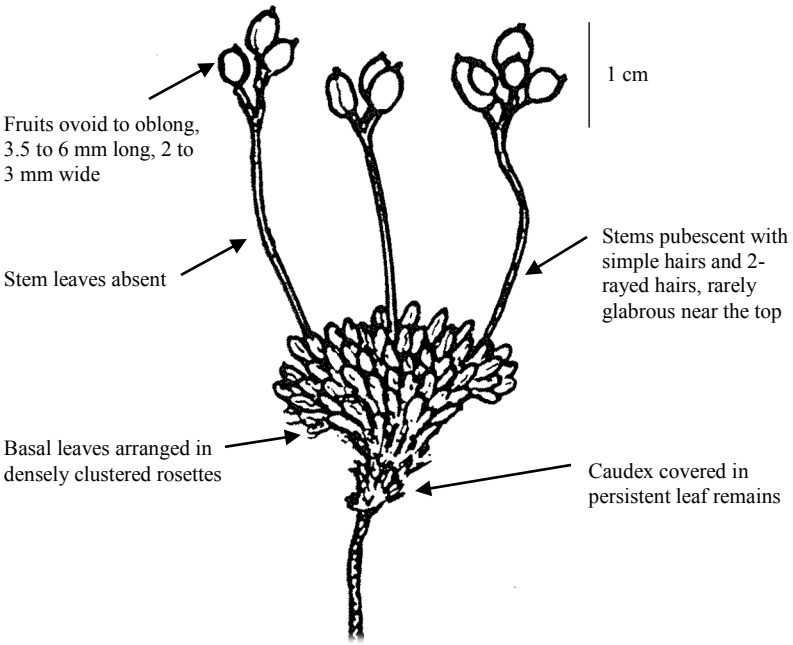
Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain.

Conservation Status: S1S2 G4; BLM Watch.



Description[25, 93, 95, 96]



Illustrated by Dagny Tande-Lid, courtesy of Stanford University Press

General: Perennial herb, caespitose or cushion-forming, from a branched caudex covered in persistent leaf remains, branches sometime terminating in sterile rosettes; stems unbranched, leafless, 0.7 to 5 cm tall, pubescent throughout or rarely glabrous at the top with simple hairs and 2-rayed hairs.

Leaves: Basal leaves arranged in densely clustered rosettes, densely overlapping, petiolate, narrowly elliptic to oblanceolate, 2 to 8 mm long, 1 to 3 mm wide, midveins prominent; margins entire, pubescent densely ciliate; lower surfaces pubescent with simple hairs and 2-rayed hairs; upper surfaces glabrous or with very sparse simple hairs; stem leaves absent.

Flowers: Inflorescences with 2 to 8 flowers, lacking bracts, slightly elongated in fruit; flowers half open; sepals oblong, 1.2 to 1.8 mm long, pubescent; petals white, spatulate, 1.5 to 2 mm long, 0.7 to 1 mm wide.

Fruits: Fruiting pedicels attached at 40° to 60° with the stem, curved upwards, usually less than 2 mm long; fruits ovoid to oblong, slightly flattened, 3.5 to 6 mm long, 2 to 3 mm wide, glabrous or rarely pubescent with simple hairs, styles 0.1 to 0.3 mm long.



Ecology

Elevation: Known from sea level to 20 m in Alaska.

Landform: Coastal bluffs, river bars, pingos, hummocks.

Soil Type: Sand, gravel; often associated with calcareous substrates but also found on acidic and carboniferous substrates.

Moisture regime: Moist to dry; occurring in both well-drained and poorly drained areas.[96]

Slope: Gentle.

Aspect: No particular aspect.

Vegetation type: Graminoid-herbaceous meadows, ericaceous heath, sparsely vegetated.

Associated species: *Artemisia comata*, *Cochlearia groenlandica*, *Noccaea arctica.*

Longevity: Perennial, likely very long-lived as extensive caudexes are present on many specimens.

Phenology: Flowering late June through late July; fruiting mid-July through late August.

Population estimate: There are six known occurrences in Alaska; population sizes unknown.

Reproductive biology: Nearly obligately self-pollinating,[97] reproduces by seed only; in Svalbard, flowering and seed-set is regular and abundant in most years, and mature seeds are regularly observed;[96] single plants can have many flowering stems and produce large numbers of seed.

Similar Species[25, 93, 95, 96]

When in flower, *Draba subcapitata* is distinct because of its small, narrow, white petals and leafless, pubescent stems.[96] Other white-flowered draba species that lack or sometimes lack stem leaves can be distinguished from *Draba subcapitata* by the morphological features described in the table below.

Species	Stems	Leaves	Flowers	Siliques
Draba subcapitata	Usually pubescent throughout with simple hairs and 2-rayed hairs	Stem leaves absent	Petals 1.5 to 2 mm long, 0.7 to 1 mm wide	Ovoid to oblong, 2 to 3 mm wide, 3.5 to 6 mm long
Draba fladnizensis	Glabrous	Stem leaves absent or 1 to 2 present	Petals 2 to 2.5 mm long, 0.8 to 1.5 mm wide	Elliptic lanceolate to ovate, 1.5 to 2 mm wide, 3 to 8 mm long
Draba lactea	Glabrous throughout or sparsely pubescent in the lower half with 2- to 8-rayed hairs	Stem leaves absent or rarely 1 present	Petals 3 to 5 mm long, 1.8 to 3 mm wide	Elliptic-lanceolate to broadly ovate, 2 to 3 mm wide, 4 to 8 mm long


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Erigeron muirii A. Gray — **Asteraceae**

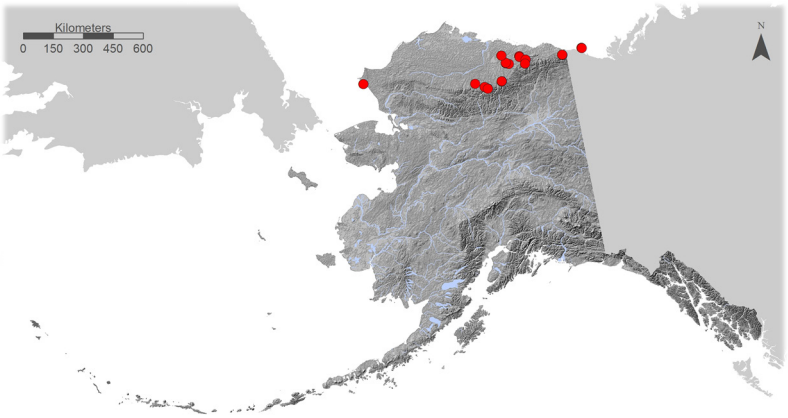
Synonyms: *Erigeron grandiflorus* ssp. *muirii*

Global Distribution: Endemic to arctic Alaska and Yukon.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Foothills, Brooks Range.

Conservation Status: S2S3 G2G3; BLM Sensitive.



Description[24, 25, 102, 103]

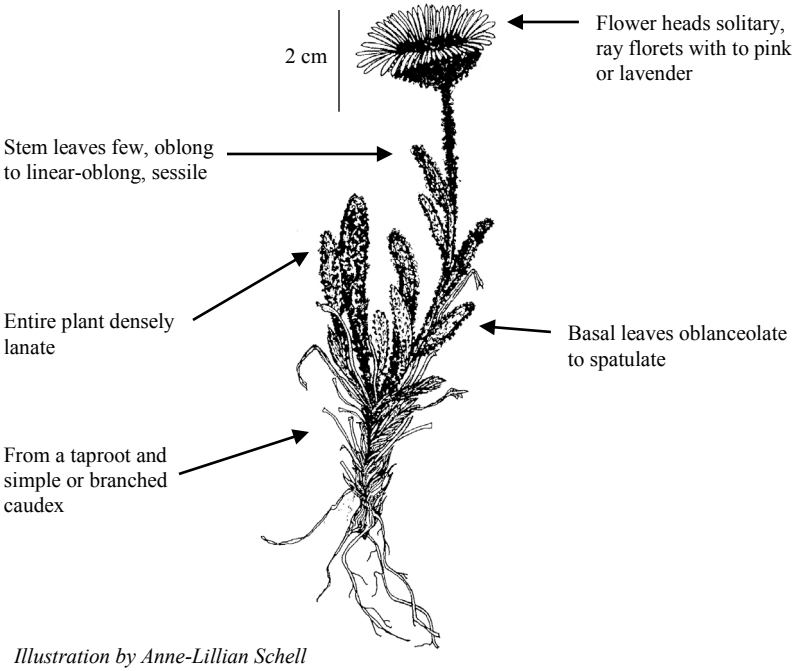


Illustration by Anne-Lillian Schell

General: Perennial herb from thick taproot and simple or branched caudex; stems erect, 3 to 10 cm tall; entire plant densely lanate, gray-green.

Leaves: Basal leaves oblanceolate to spatulate, 1 to 6 cm long, 2 to 10 mm wide with entire margins; stem leaves oblong to linear-oblong, reduced.

Flowers: Flower heads solitary; involucres 6 to 10 mm tall, 12 to 20 mm wide; involucral bracts arranged in two rows, hairs often somewhat yellow; ray florets 60 to 100, corollas white, pink, or lavender, 8 to 13 mm long; disc florets 3.5 to 5 mm long.

Fruits: Achenes 1.9 to 2.2 mm long, pappi white.



Ecology

Elevation: Found from 80 to 1,200 m.

Landform: Alpine slopes, alpine ridges, rock outcrops, river bluffs, river terraces, tundra slopes, pingos.

Soil Type: Scree, gravel, rock; sometimes associated with calcareous substrates.

Moisture regime: Dry; sometimes in areas of late-melting snow banks.

Slope: Gentle to steep.

Aspect: Predominantly southeast to south to southwest; has been found less frequently on east, west, and northwest aspects.

Vegetation type: Sparsely vegetated, *Dryas* tundra.

Associated species: *Anemone drummondii*, *Boykinia richardsonii*, *Cassiope tetragona*, *Castilleja hyperborea*, *Cetraria cuculata*, *Cetraria nivalis*, *Cornicularia divergens*, *Dryas octopetala*, *Eritrichium aretoides*, *Lupinus arcticus*, *Packera cymbalaria*, *Bistorta plumosa*, *Salix reticulata*, *Saxifraga bronchialis*, *Saxifraga tricuspidata*, *Silene acaulis*, *Thamnolia subuliformis*, *Vaccinium uliginosum.*

Longevity: Perennial, longevity unknown.

Phenology: Flowering early July, probably sooner, through early August.

Population estimate: There are 16 known occurrences in Alaska; at least two occurrences are locally common with 500 to 1,000 individuals.[104]

Reproductive biology: Likely pollinated by various insects including solitary bees, flies, and butterflies;[63] *Erigeron glabellus* in interior Alaska is known to be pollinated by one fritillary butterfly species and three halictid bee species.[105]

Similar Species[24, 25, 102, 103]

Erigeron muirii can be recognized by its tangled, wooly hairs. Several other *Erigeron* species have similar morphology and superficially similar pubescence and can be confused with *Erigeron muirii*. The table below shows morphological features for *Erigeron* species that occur in arctic Alaska and have broad, densely hairy leaves, solitary flower heads (at least sometimes), and ray florets longer than 6 mm. *Erigeron grandiflorus* is not considered here because Nesom and Murray (2004) restricted the name to a more southern cordilleran plant and included *Erigeron grandiflorus* ssp. *arcticus* as a synonym of *Erigeron porsildii*.[103]

Species	Leaf Hairs	Stems	Involucral Hairs	Ray Florets
Erigeron muirii	Densely lanate; hairs tangled and wooly	3 to 10 cm tall	Densely lanate; hairs often somewhat yellow	8 to 13 mm long
Erigeron porsildii	Densely pubescent with coarse, stiff hairs (not tangled, wooly)	10 to 30 cm tall	Densely pubescent with coarse, stiff, white hairs (not tangled, wooly)	13 to 17 mm long
Erigeron caespitosus	Pubescent with short, stiff hairs (not tangled, wooly)	5 to 25 cm tall	Pubescent with coarse, stiff, white hairs (not tangled, wooly)	5 to 15 mm long
Erigeron hyperboreus	Pubescent with coarse, stiff hairs (not tangled, wooly)	3 to 15 cm tall	Pubescent with coarse, stiff hairs with purple-black cross walls (not tangled, wooly)	7 to 15 mm long



ALA 22317

Erigeron ochroleucus Nuttall — Asteraceae

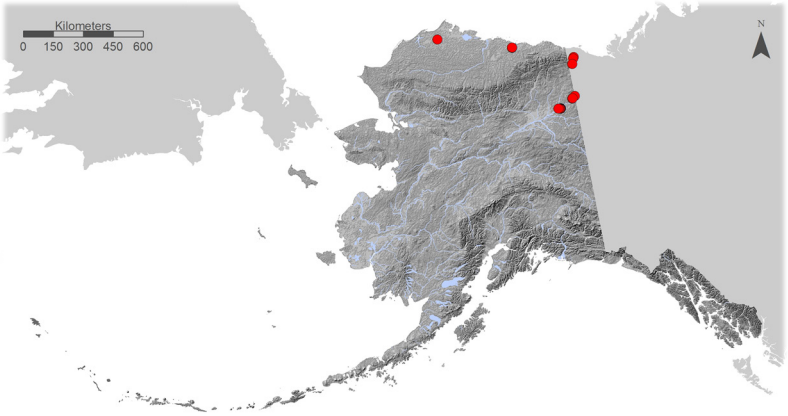
Synonyms: *Erigeron ochroleucus* var. *scribneri*

Global Distribution: Western North American cordillera and disjunct more than 2,800 km in American Beringia.[103]

Alaska Distribution: Arctic Tundra, Intermontane Boreal.

Ecoregions Occupied: Beaufort Coastal Plain, Yukon-Old Crow Basin.

Conservation Status: S1S2 G5; BLM Watch.



Description[102, 103, 106]

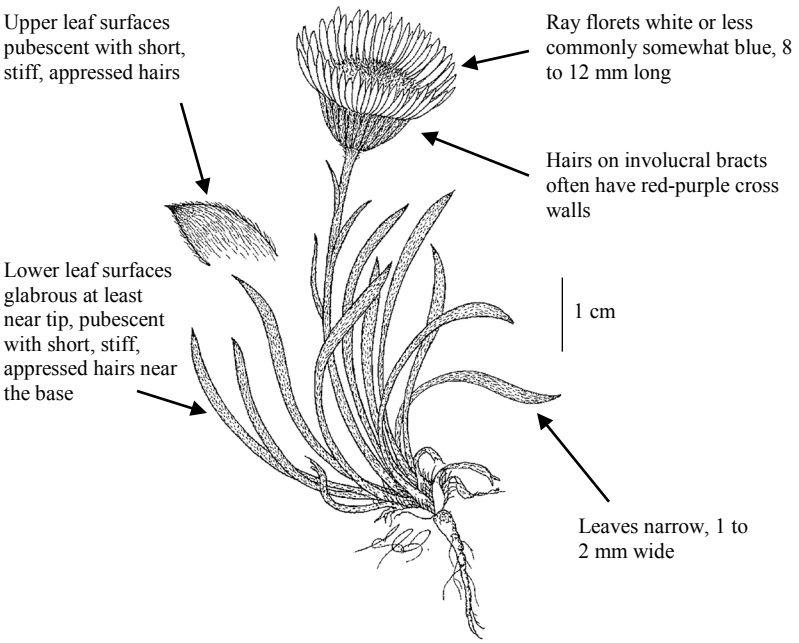


Illustration by Elizabeth Stephen, courtesy of Province of British Columbia

General: Perennial herb from a taproot and a thick, woody, usually simple caudex; stems 2 to 15 cm tall, ascending to erect, pubescent with short, stiff, appressed hairs; stem height, leaf length and width, and color of cross walls on hairs of the involucral bracts of Alaskan plants differ from plants of more southern cordillera.[103]

Leaves: Basal leaves linear to linear-oblanceolate, 2 to 7 cm long, 1 to 2 mm wide; stem leaves reduced near the top, margins entire; lower surfaces glabrous at least near the tip, pubescent with short, stiff, appressed hairs near the base; upper surfaces pubescent with short, stiff, appressed hairs.

Flowers: Flower heads usually solitary at the ends of stems; involucres 6 to 8 mm tall, 12 to 16 mm wide; involucral bracts arranged in three to four series, densely pubescent with stiff, long hairs that often have red-purple cross walls; ray florets 30 to 50, white or less commonly somewhat blue, 8 to 12 mm long; disc florets 3.5 to 4.5 mm long.

Fruits: Achenes 2 to 2.5 mm long, sparsely villous; pappi in two series.



Ecology

Elevation: Found from near sea level to 370 m in Alaska; up to 3,300 m elsewhere in North America.[102]

Landform: Pingos and river banks in Arctic Tundra; river bluffs and river terraces in Intermontane Boreal.

Soil Type: Gravel, sand.

Moisture regime: Dry.

Slope: Gentle to steep.

Aspect: South to southeast to east on river bluffs.

Vegetation type: Graminoid steppe, sparsely vegetated.

Associated species: *Artemisia frigida*, *Bupleurum americanum*, *Calamagrostis purpurascens*, *Carex rupestris*, *Dryas integrifolia*, *Erigeron caespitosus*, *Phlox hoodii*, *Potentilla uniflora*, *Pseudoroegneria spicata.*

Longevity: Perennial, moderately long-lived as evidenced by thick caudex on some specimens.

Phenology: In the arctic, in flower July, possibly sooner, through early August; flowering June through August in more southern cordillera.[102]

Population estimate: There are nine known occurrences in Alaska; locally common along the Porcupine River.[103]

Reproductive biology: Likely pollinated by various insects including solitary bees, flies, and butterflies; *Erigeron glabellus* in interior Alaska is known to be pollinated by one fritillary butterfly species and three halictid bee species.[105]

Similar Species[102, 103, 106]

The table below shows morphological features that distinguish *Erigeron ochroleucus* from similar *Erigeron* species that occur in arctic Alaska and have narrow basal leaves less than 5 mm wide (at least sometimes), solitary flower heads (at least sometimes), and ray florets longer than 8 mm.

Species	Leaf Hairs	Involucral Hairs	Ray Florets
Erigeron ochroleucus	Upper surfaces pubescent with short, stiff, appressed hairs; lower surfaces glabrous near tip	Pubescent with stiff, long hairs that often have red-purple cross walls	8 to 12 mm long
Erigeron purpuratus	Both surfaces sparsely pubescent or glabrous	Sparsely pubescent with long, soft hairs or glabrous	5 to 9 mm long
Erigeron hyperboreus	Both surfaces pubescent with stiff, coarse hairs	Pubescent with coarse, stiff hairs with purple-black cross walls	7 to 15 mm long
Erigeron muirii	Both surfaces densely lanate; hairs tangled and wooly	Densely lanate; hairs often somewhat yellow	8 to 13 mm long
Erigeron caespitosus	Both surfaces pubescent with short, stiff hairs	Pubescent with coarse, stiff, white hairs	5 to 15 mm long


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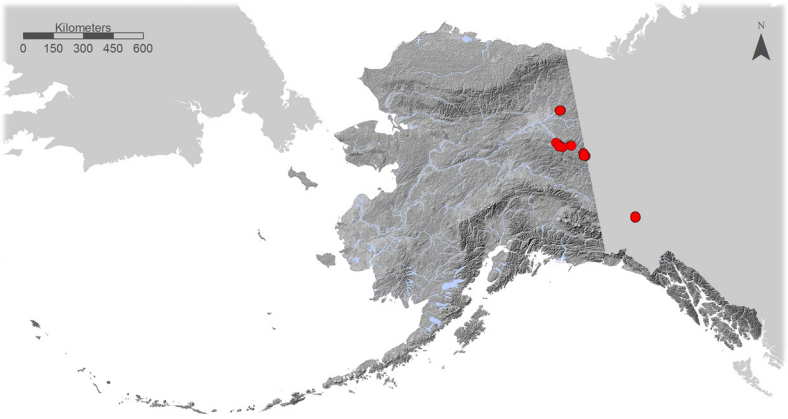

© Bruce Bennett 2008

Global Distribution: Endemic to Alaska and Yukon.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Yukon-Old Crow Basin, North Ogilvie Mountains.

Conservation Status: S2 G5T2; BLM Sensitive.



Description[24, 25, 107]

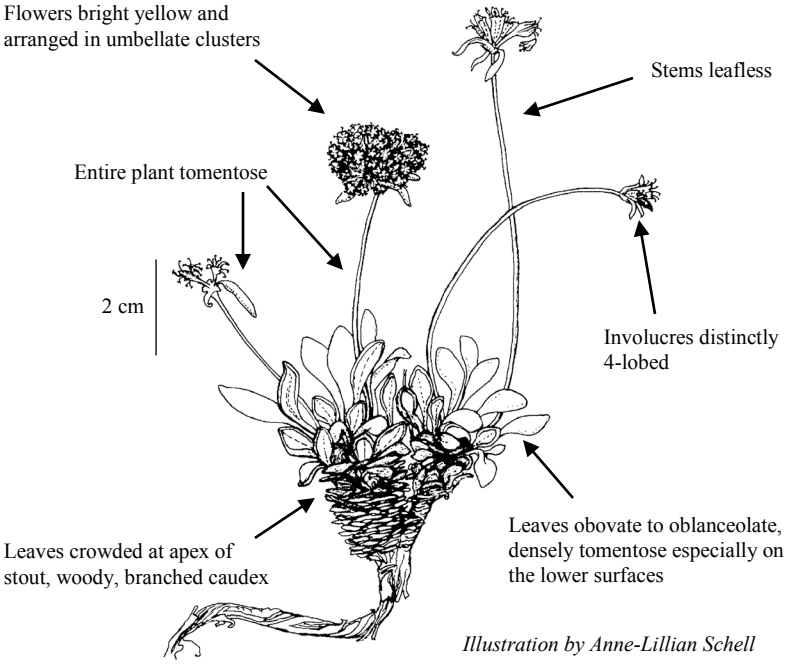


Illustration by Anne-Lillian Schell

General: Perennial herb from an orange taproot and stout, woody, branched caudex with persistent leaf bases, forming dense cushions sometimes over 35 cm in diameter;[84] stems leafless, slender, solid, usually erect, 2 to 15 cm tall; entire plant tomentose.

Leaves: Basal leaves crowded at apex of caudex, obovate to oblanceolate with entire margins, 8 to 35 mm long, 4 to 10 mm wide, densely tomentose especially on the lower surfaces; petioles 0.5 to 4 cm long.

Flowers: Flowers arranged in umbellate clusters subtended by 4 to 6 bracts; bracts 5 to 20 mm long, 2 to 5 mm wide; involucres campanulate, 5 to 7 mm long, deeply divided with 4 lobes; flowers yellow, deeply divided with 6 lobes, 3 to 5 mm long with stalk-like base 0.2 to 0.3 mm long, pubescent on the lower surfaces.

Fruits: Achenes three-angled, light brown to brown, 3 to 5 mm long, glabrous except sparsely pubescent at tip.



Ecology

Elevation: Found from 170 to 550 m in Alaska; up to 1,000 m in Yukon.

Landform: River bluffs, rock outcrops.

Soil Type: Rock, rubble, scree, gravel, silt, loam, sand;[30] sometimes associated with calcareous, mafic, or volcanic substrates.

Moisture regime: Dry

Slope: Usually associated with slopes 20° to 50° or cliffs.

Aspect: Predominantly southwest to south to southeast; rarely other aspects including north.

Vegetation type: Sparsely vegetated.

Associated species: *Artemisia frigida*, *Artemisia alaskana*, *Bupleurum americanum*, *Calamagrostis purpurascens*, *Cryptantha shackletteana*, *Eritrichium splendens*, *Erysimum asperum* var. *angustatum*, *Galium boreale*, *Pascopyrum smithii*, *Phlox hoodii*, *Physaria arctica*, *Poa glauca*, *Townsendia hookeri*, *Trisetum spicatum.*

Longevity: Perennial, likely long lived as some cushions are over 30 cm in diameter.[84]

Phenology: Flowering late May to mid-July.

Population estimate: There are 18 known occurrences in Alaska; several populations consist of 1,000 to 3,000 individuals, other populations consist of several hundred individuals.[84]

Reproductive biology: Limited vegetative reproduction by the down-slope spreading of caudex branches may occur;[84] seedlings appear to be uncommon, suggesting that this species reproduces slowly;[84] roughly half of individuals in a population produce flowering stems in a season, large plants can produce 25 to 35 flowering stems.[84]

Herbivory: Leaves have been observed with small holes, indicating likely herbivory by insects.[84]

Similar Species[24, 25]

Eriogonum flavum var. *aquilinum* is not likely to be confused with other species growing along the upper Yukon and Porcupine Rivers. No other *Eriogonum* species occur in Alaska.



ALA 81375



Erysimum angustatum Rydb. **Brassicaceae**

Synonyms: *Erysimum asperum* var. *angustatum*

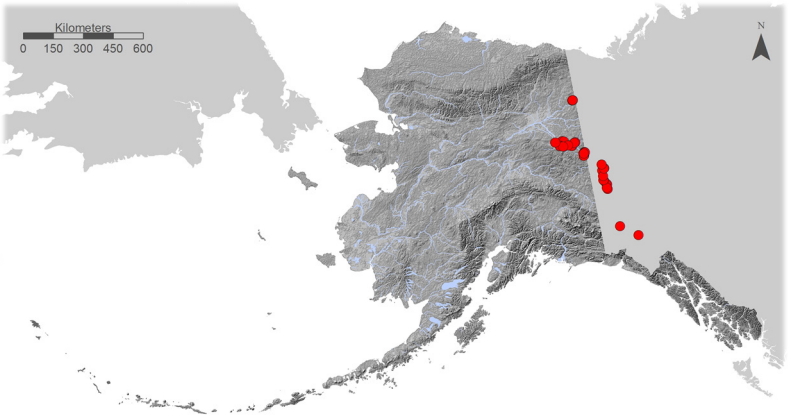
Notes: Al-Shehbaz (2010) included this taxon within *Erysimum capitatum* var. *purshii*.[108]

Global Distribution: Endemic to Alaska and Yukon.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Yukon-Old Crow Basin, North Ogilvie Mountains.

Conservation Status: S2 G5T2; BLM Sensitive.



Description[24, 25]

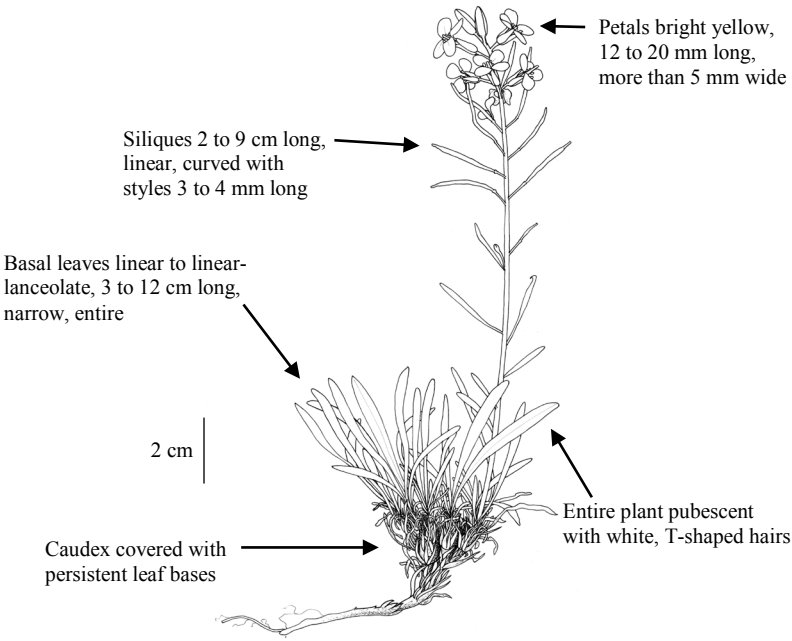


Illustration by Matthew L. Carlson

General: Perennial herb with many-headed caudex covered with persistent leaf bases that form a triangular pattern; long, thick root; stems several, 10 to 45 cm long; entire plant pubescent with white, T-shaped hairs.

Leaves: Basal leaves 3 to 12 cm long, linear to linear-lanceolate, narrow, entire (plants at Eagle Bluff with coarsely toothed basal leaves up to 10 mm wide were previously included within *Erysimum angustatum* but are apparently distinct and may belong within *Erysimum asperum*[109]); stem leaves reduced upwards.

Flowers: Flowers arranged in compact racemes, elongating in fruit; pedicels spreading to ascending; sepals oblong, half the length of petals; petals oblong-obovate, bright yellow, 12 to 20 mm long, more than 5 mm wide.

Fruits: Siliques 2 to 9 cm long, spreading to erect, linear, curved; styles 3 to 4 mm long.



Ecology

Elevation:	Known from 180 to 1,100 m in Alaska; up to 1,530 m in Yukon.
Landform:	River bluffs, rock outcrops, mountain slopes, cliffs.
Soil Type:	Rock, scree; associated variously with calcareous, acidic, volcanic, and shale substrates.
Moisture regime:	Dry, well-drained.
Slope:	Usually associated with steep slopes at least up to 40°.
Aspect:	Predominantly southwest to south to southeast; rarely other aspects including east and northeast.
Vegetation type:	Sparsely vegetated, open graminoid steppe, open sites in aspen or birch forest; usually occurs on sites with less than 40% total vegetative cover.[110]
Associated species:	*Artemisia frigida*, *Bupleurum triradiatum*, *Calamagrostis purpurascens*, *Campanula aurita*, *Cryptantha shackletteana*, *Eriogonum flavum* var. *aquilinum.*
Longevity:	Perennial, short-lived.[110]
Phenology:	Flowering late May, probably sooner, to late July; fruiting mid-June to August.
Population estimate:	There are 19 known occurrences in Alaska; population sizes range from scattered individuals to several thousand individuals.[111]
Herbivory:	Leaves on some specimens have small holes, indicating possible herbivory by insects.

Similar Species[24, 25, 108]

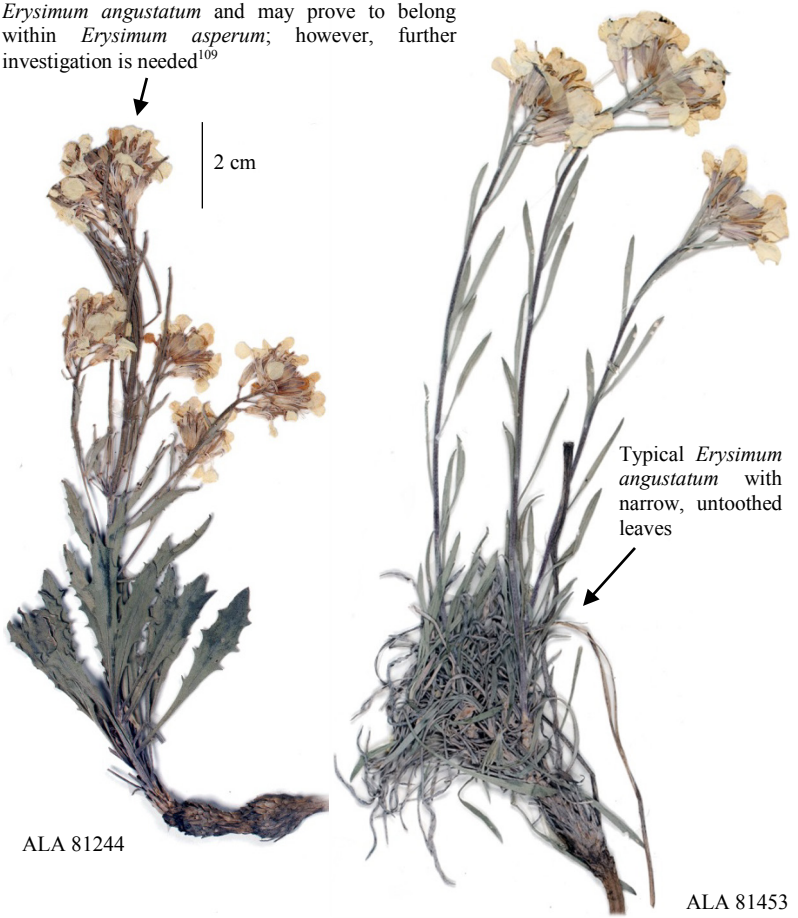
Plants similar to *Erysimum angustatum* but with coarsely-toothed, broad leaves occur at Eagle Bluff and are apparently distinct. Additional study is necessary, but the broad-leaved plants may belong within *Erysimum asperum.*[109]

In the past, *Erysimum angustatum* has been treated as a variety of *Erysimum asperum* because of the coarsely-toothed, broad-leaved material found at Eagle Bluff. Al-Shehbaz (2010) listed *Erysimum angustatum* in synonymy with *Erysimum capitatum* var. *purshii*, known from the western United States.[108] However, the narrow-leaved plants are uniform across their range and are maintained here as a distinct Alaska-Yukon endemic at the species level. The name should not be confused with *Erysimum capitatum* var. *angustatum*, a highly localized endemic of California.[108]

Erysimum angustatum can be distinguished from other yellow-flowered *Erysimum* species that grow on barren, steppe, or open-wooded slopes and rock outcrops in Interior Alaska by the morphological features described in the table below.

Species	Leaf Hairs	Petals	Siliques
Erysimum angustatum	T-shaped	12 to 20 mm long; more than 5 mm wide	3 to 8 cm long; styles 3 to 4 mm long
Erysimum coarctatum	T-shaped or 3-rayed hairs	10 to 15 mm long; 2.5 to 4 mm wide	2.5 to 5.8 cm long; styles 0.5 to 1.5 mm long
Erysimum inconspicuum	T-shaped or 3-rayed hairs	6 to 9 mm long; 1 to 2 mm wide	3 to 7 cm long; styles 0.7 to 3 mm long
Erysimum cheiranthoides	Predominantly 3- or 4-rayed hairs	3 to 5.5 mm long; 1.5 to 2 mm wide	1.2 to 2.7 cm long; styles 0.5 to 1.5 mm long

Material from Eagle Bluff with broad, coarsely-toothed leaves is apparently distinct from typical *Erysimum angustatum* and may prove to belong within *Erysimum asperum*; however, further investigation is needed[109]



Global Distribution: Circumpolar high arctic.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Brooks Range (Endicott Mountains).

Conservation Status: S1 G3G4; BLM Watch.



Description[95, 112, 113]

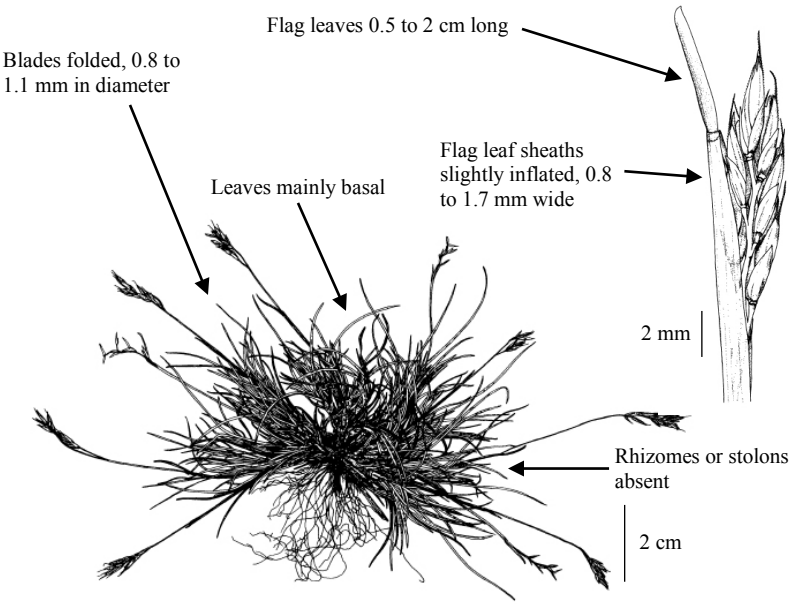


Illustration by Susan Laurie Bourque, courtesy of Canadian Museum of Nature

General: Perennial grass growing in dense tufts; branched below; culms 2.5 to 10 cm tall, glabrous, smooth, prostrate or angled when young, erect when flowering.

Leaves: Sheaths fused in the lower half; ligules 0.1 to 0.5 mm long; leaves yellow or green, folded, 0.8 to 1.1 mm in diameter, usually straight; persistent dead leaves present in tufts; flag leaf sheaths slightly inflated, 0.8 to 1.7 mm wide; flag leaves 0.5 to 2 cm long.

Inflorescences: Inflorescences usually unbranched, often remaining intact during the next flowering season, 1.5 to 3.5 cm long; branches erect.

Spikelets: Spikelets deep purple, 4.5 to 8.5 mm long; glumes ovate-lanceolate, exceeded by upper florets; lower glumes 1.8 to 3.5 mm long, 0.2 to 0.6 mm wide; upper glumes 2.9 to 4.3 mm long, 0.4 to 0.9 mm wide; lemmas 3.6 to 5.2 mm long with awns 1.1 to 2.9 mm long.



Ecology

Elevation: Known from 900 to 1,200 m in Alaska; known from near sea level in the Canadian Arctic Archipelago.

Landform: River bars, river terraces, frost boils.

Soil Type: Gravel, silt, sand; often associated with calcareous substrates[113] but also found on acidic substrate at one location in Nunavut.

Moisture regime: Moist to dry.[95]

Slope: Gentle.

Aspect: No particular aspect.

Vegetation type: Often sparsely vegetated, but also growing in herbaceous tundra.

Associated species: *Festuca brachyphylla*, *Festuca brevissima*, *Festuca rubra* ssp. *rubra*, *Koenigia islandica*, *Phippsia algida*, *Poa pratensis* ssp. *alpigena.*

Longevity: Perennial; probably long-lived, as some individuals are very densely tufted and have many old leaf remains.[63]

Population estimate: One known occurrence and one suspected but unconfirmed occurrence in Alaska; population sizes unknown.

Reproductive biology: Wind-pollinated, largely self-fertilized.[114]

Similar Species[95, 112, 113]

Festuca edlundiae is easily confused with other tufted *Festuca* species that occur in arctic Alaska. The morphological features that distinguish *Festuca edlundiae* from similar *Festuca* species are listed in the table below; however, these features often overlap somewhat between species. Specimens lose some of their distinctive characteristics, making *Festuca edlundiae* easier to identify in the field.[115] This species is difficult to distinguish from other similar *Festuca* species without isozyme analysis.[116]

Species	Culms	Leaves	Flag Leaf	Spikelets	Upper Glumes
Festuca edlundiae	Glabrous, culms up to twice as tall as tuft of basal leaves	Mostly straight	Sheaths inflated; blades 5 to 20 mm long	4.5 to 8.5 mm long	2.9 to 4.3 mm long
Festuca hyperborea	Glabrous, culms up to twice as tall as tuft of basal leaves	Mostly curved	0.5 to 5 mm long	4 to 5.5 mm long	2.2 to 3.2 mm long
Festuca brevissima	Glabrous, more than twice as tall as tuft of basal leaves	Mostly curved	Sheaths somewhat inflated; blades 2 to 10 mm long	5 to 7 mm long	3.2 to 4.8 mm long
Festuca brachyphylla* ssp. *brachyphylla	Glabrous, culms more than twice as tall as tuft of basal leaves	Stiff, bristle-like, sometimes curved	Sheaths not inflated; blades 10 to 30 mm long	4.4 to 7 mm long	2.6 to 4 mm long
Festuca baffinensis	Densely pubescent near the inflorescence	Sometimes curved	Sheaths loose; blades 5 to 40 mm long	5 to 7.5 mm long	3 to 5 mm long



ALA 33351



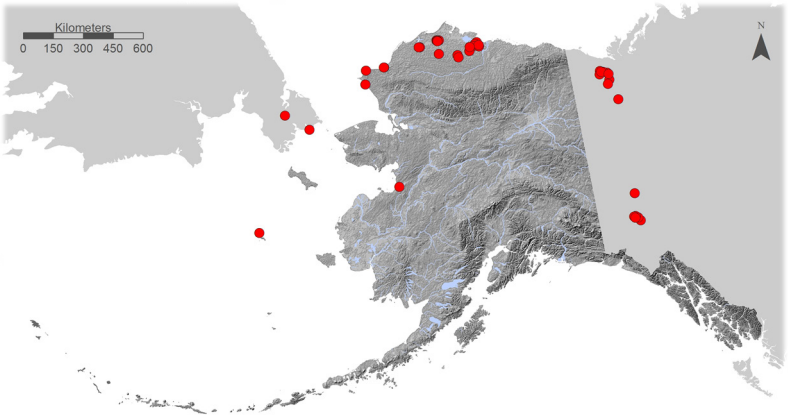


Global Distribution: North Asia from Ural Mountains through Chukotka Peninsula to Alaska and Yukon.

Alaska Distribution: Arctic Tundra, Bering Tundra, Bering Taiga.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Foothills, Bering Sea Islands, Nulato Hills.

Conservation Status: S3 G4; BLM Sensitive.



Description[24, 25, 117]

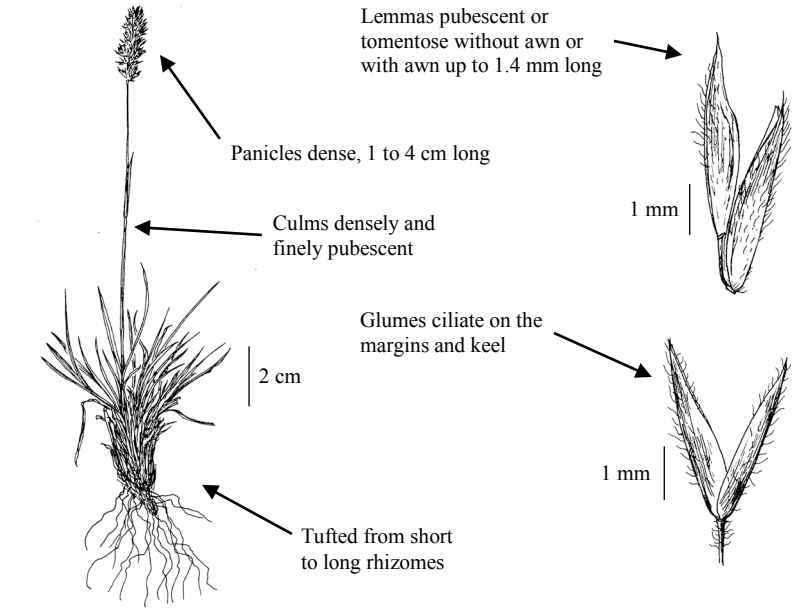


Illustration by Linda Ann Vorobik, courtesy of Intermountain Herbarium

General: Perennial grass, tufted from short to long rhizomes; culms 5 to 35 cm tall, densely and finely pubescent.

Leaves: Basal sheaths persistent; ligules 0.5 to 2.5 mm long; basal leaves 2 to 20 cm long, 1 to 3 mm wide with margins rolled inwards; upper surfaces pubescent; culm leaves short.

Inflorescences: Panicles dense, 1 to 4 cm long, 0.7 to 1.5 cm wide, sometimes interrupted at the base; branches villous.

Spikelets: Spikelets 4 to 6.5 mm long with 2 to 3 florets; glumes membranous, purple or tan, scabrous, ciliate on upper margins and keel; lower glumes 2.5 to 3.5 mm long; upper glumes 3 to 4.8 mm long; lemmas 4 to 5 mm long, pubescent or tomentose, purple to black, sometimes with awns up to 1.4 mm long; anthers 1.2 to 2.5 mm long.



Ecology

Elevation: Known from near sea level to 600 m in Alaska.

Landform: River terraces, river bluffs, river banks, river bars, sand dunes, tundra, alpine slopes, lake shores.

Soil Type: Sand, gravel, shale or sandstone scree; sometimes occurring on calcareous or ultramafic substrates.

Moisture regime: Usually dry, less commonly moist.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Tussock tundra, sparsely vegetated.[118]

Associated species: *Artemisia borealis*, *Potentilla uniflora*, *Eritrichium aretioides* var. *chamissonis*.

Longevity: Perennial; longevity difficult to estimate from specimens.[63]

Population estimate: There are 22 known occurrences in Alaska; populations range from scattered individuals to locally common.

Reproductive biology: Wind-pollinated.[63]

Herbivory: Musk ox and caribou graze *Koeleria asiatica*.[119]

Similar Species[24, 25, 117]

Koeleria asiatica is superficially similar to *Trisetum spicatum*, which occurs throughout the entire range of *Koeleria asiatica* in Alaska. The table below describes the differences in morphology that distinguish between the two species. *Koeleria macrantha* is also known in Alaska but only from the Tanana-Kuskokwim lowlands.

Species	Culms	Lemmas	Lemma Awns	Anthers
Koeleria asiatica	Densely and finely pubescent	Apexes acute, entire	Awns absent or arising from the apex, straight, up to 1.4 mm long	1.2 to 2.5 mm long
Trisetum spicatum	Sometimes glabrous, sometimes scabrous, sometimes villous	Apexes divided at the tip	Awns arising from upper third of lemma, curved or bent, 3 to 8 mm long	0.9 to 1.4 mm long



ALA 141242



Global Distribution: Endemic to coastal British Columbia and Southeast Alaska.

Alaska Distribution: Coastal Rainforests.

Ecoregions Occupied: Alexander Archipelago (Dall Island, southern Prince of Wales Island); not known from Kodiak Island.[120]

Conservation Status: S2 G3G4; USFS Sensitive.



Description[106, 121, 122, 123]

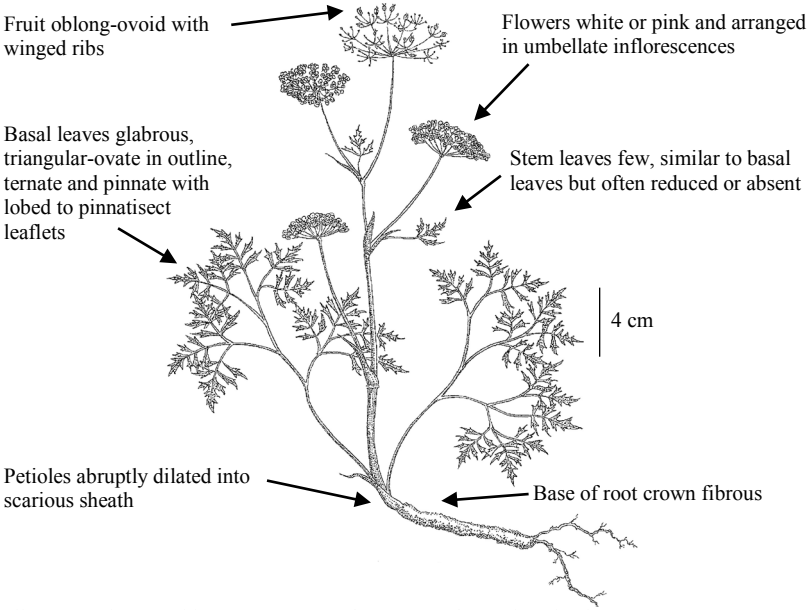


Illustration by Donald Gunn, courtesy of Province of British Columbia

General: Perennial herb from taproot; root crowns fibrous; stems 20 to 70 cm tall.

Leaves: Petioles 3 to 25 cm long, abruptly dilated into scarious sheaths, often purplish at base; leaves mostly basal, glabrous, triangular-ovate in outline, 5 to 20 cm long, ternate and once or twice pinnate; leaflets 1 to 4 cm long, pinnately lobed to pinnatisect with linear to lanceolate ultimate divisions; stem leaves few, reduced

Flowers: Terminal peduncle 5 to 30 cm long; lateral peduncles 1 to 3, smaller; umbels compound with 5 to 14 compact heads; umbel rays 1 to 4 cm long; pedicels 6 to 10 mm long; flowers white or pink with oval to oblanceolate petals.

Fruits: Fruits oblong to elliptic, 4 to 6 mm long, glabrous with narrowly winged ribs.



ALA 145640

Ecology

Elevation: Known from near sea level to 680 m in Alaska; near sea level to 1,000 m in British Columbia.

Landform: Alpine and subalpine slopes, cliffs.

Soil Type: Exposed rock, scree; often associated with calcareous substrates.[60]

Moisture regime: Wet to moist.

Slope: Gentle to steep slopes.

Aspect: No particular aspect.

Vegetation type: Open mixed conifer forest, herbaceous meadows, windswept plant communities, heath; also in bogs on Haida Gwaii (Queen Charlotte Islands).

Associated species: *Carex macrochaeta*, *Dryopteris expansa*, *Elliottia pyroliflora*, *Listera cordata*, *Lupinus nootkatensis*, *Diphasiastrum alpinum*, *Pedicularis lanata*, *Polystichum munitum*, *Polystichum setigerum*, *Senecio triangularis*, *Thelypteris quelpaertensis*, *Triantha occidentalis*, *Veratrum viride*.

Longevity: Moderately long-lived perennial, as indicated by the numerous fibrous remains of leaf sheaths at base.

Phenology: Flowering early July, probably sooner.

Population estimate: There are 15 known occurrences in Alaska; locally common on Haida Gwaii (Queen Charlotte Islands).

Similar Species[106, 121, 122, 123]

The table below describes the differences in morphology and habitat between *Conioselinum pacificum* and *Ligusticum calderi*, both of which occur in Southeast Alaska and are easily confused. The two species can occur in close proximity where their habitats overlap. *Ligusticum scoticum* also occurs in Southeast Alaska but is not likely to be confused with *Ligusticum calderi* because its leaves are twice ternately divided. Reports of *Ligusticum calderi* from Kodiak Island[122] are based on a misidentified specimen of *Conioselinum pacificum*.[120]

Species	Root Crown	Leaves	Inflorescences	Fruits	Habitat
Ligusticum calderi	Fibrous	Leaves ternate or pinnate with pinnatisect leaflets	Compound umbels with white flowers	Oblong to elliptic; 4 to 6 mm long	Alpine and subalpine slopes and cliffs
Conioselinum pacificum	Scale-like	2 to 4 times pinnately dissected with	1 or more compound umbels with white flowers	Oblong to oval; 5 to 8.5 mm long	Generally sea shores, low elevation slopes and cliffs

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Lupinus kuschei Eastw. **Fabaceae**

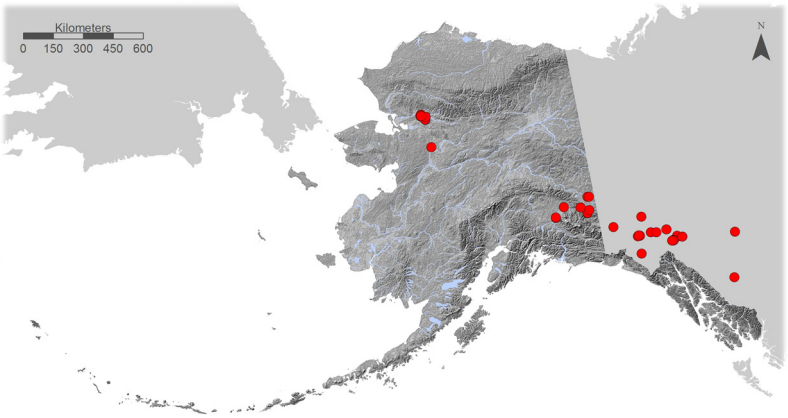
Synonyms: *Lupinus sericeus* var. *kuschei*

Global Distribution: Endemic to Alaska, Yukon, and northern British Columbia.

Alaska Distribution: Intermontane Boreal, Alaska Range Transition, Coastal Mountains Transition.

Ecoregions Occupied: Copper River Basin, Tanana-Kuskokwim Lowlands, Kluane Ranges, Yukon-Tanana Uplands; disjunct in Kobuk Ridges and Valleys, Yukon River Lowlands.

Conservation Status: S2 G3G4; BLM Watch.



Description[24, 25, 124]

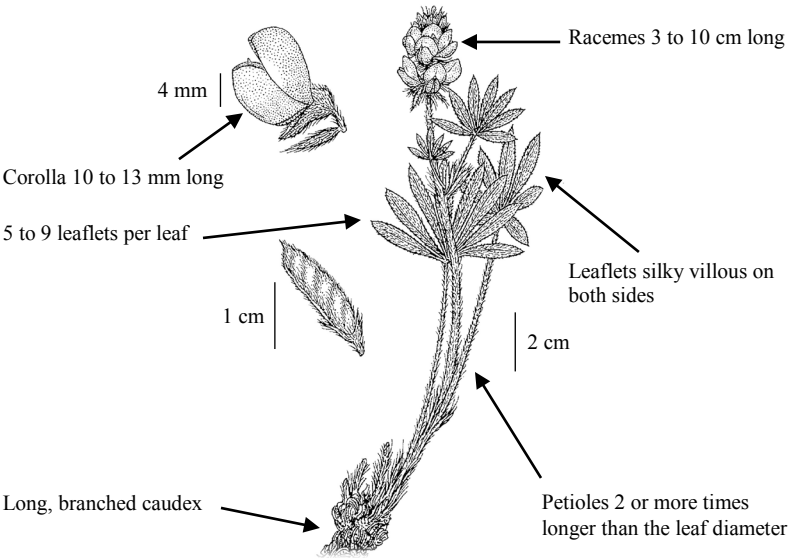


Illustration by Jeanne R. Janish, courtesy of University of Washington Press

General: Perennial herb from long, branched caudex; entire plant except corollas silky-villous; stems decumbent to erect, 15 to 50 cm tall.

Leaves: Petioles of basal leaves 4 to 15 cm long; leaves alternate, palmately compound with 5 to 9 leaflets per leaf; leaflets elliptic to oblanceolate, 1.5 to 5 cm long.

Flowers: Racemes dense, stalked, 3 to 10 cm long; calyxes two-lipped, upper lip 4 to 6 mm long, lower lip slender and 5 to 7 mm long; corollas blue to purple, 10 to 13 mm long.

Fruits: Pods 2 to 3 cm long; seeds 4 to 6.



Ecology

Elevation: Known from 60 to 880 m in Alaska.

Landform: Active sand areas including dunes, blowouts, sand sheets, and open sand; river terraces, river bars, floodplains; roadsides.[49]

Soil Type: Usually in sand; also in silt and cobbles.

Moisture regime: Moist to dry.

Slope: Flat to sloping.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, open poplar floodplains, scattered willow shrub.

Associated species: *Calamagrostis purpurascens*, *Dryas drummondii, Festuca rubra*, *Hedysarum mackenziei*, *Oxytropis campestris*, *Oxytropis deflexa, Populus balsamifera*, *Solidago simplex* var. *simplex.*

Longevity: Perennial, longevity unknown.

Phenology: Flowering early June, probably sooner; fruiting early July.

Population estimate: There are 15 known occurrences in Alaska; population sizes range from a few individuals to locally common.

Reproductive biology: Seed is long lived; *Lupinus kuschei* frequently colonizes new areas and often benefits from natural disturbance.[124]

Herbivory: In Yukon, plants have been found partially browsed, likely by horses, and are known to be consumed by Canada Geese.[125]

Similar Species[24, 25, 124]

Lupinus kuschei can be confused with *Lupinus nootkatensis* in the southern portion of its range in Alaska and with *Lupinus arcticus* throughout its range in Alaska. The table below describes the differences in morphology and habitat between these similar species.

Species	Habitat	Basal Petioles	Leaflets	Raceme	Corolla
Lupinus kuschei	Sandy areas including dunes, river terraces, floodplains	Petioles 2 or more times longer than the diameter of the leaf	Silky-villous on both surfaces	3 to 10 cm long	10 to 13 mm long
Lupinus arcticus	Gravel bars, meadows, open forests, alpine slopes, heath	Petioles longer than the diameter of the leaf	Glabrous above, pubescent below	5 to 15 cm long	14 to 20 mm long
Lupinus nootkatensis	Meadows, forest openings, alpine slopes, gravel bars	Petioles as long as the diameter of the leaf	Usually glabrous above, soft-hairy below	5 to 35 cm long	15 to 21 mm long


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Global Distribution: Endemic to arctic Alaska, Northwest Territories, and Nunavut (Victoria Island).

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain (Meade River and Kogosukruk River), barely extending into Brooks Foothills as well.

Conservation Status: S2 G2G3; BLM Sensitive.



Description[25, 95]

Illustration by Dominique Collet

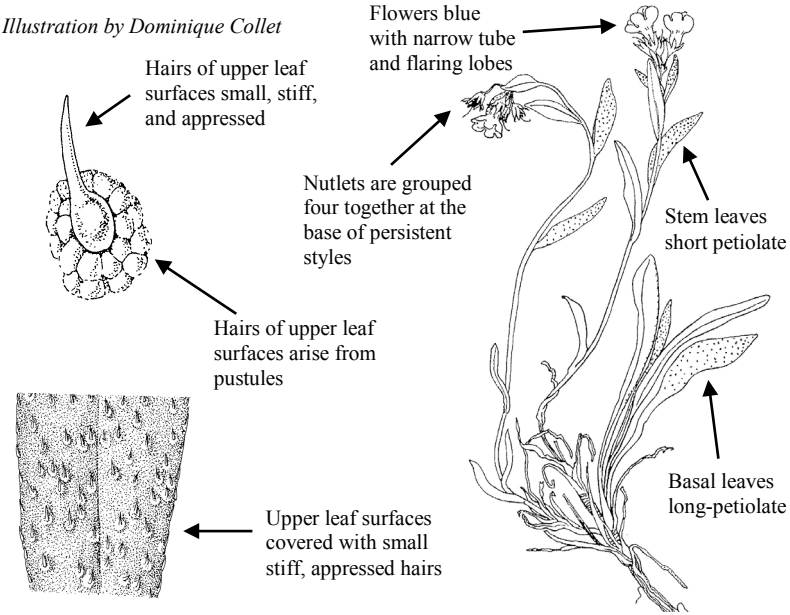


Illustration by Anne-Lillian Schell

General: Perennial herb from a slender taproot; caudex dark brown, simple or many-branched; plants 7 to 15 cm tall, sometimes forming clumps up to 50 cm wide; stems erect, ascending, or trailing.

Leaves: Basal leaves long-petiolate, 2 to 13 cm long, narrowly elliptic to oblanceolate; stem leaves short-petiolate, lanceolate to oblong upper surfaces covered with small, stiff, appressed hairs that arise from pustules.

Flowers: Flowers few to 20 arranged in corymbs; sepals fused at the base, 0.9 to 1.1 mm long, 3.5 to 6.0 mm wide; corollas 9 to 15 mm long, blue, fused in lower half forming narrow tube, five-lobed; styles 6 to 10 mm long.

Fruits: Nutlets grouped four together at base of persistent style within persistent calyx.



Ecology

Elevation: Known from near seal level to 100 m in Alaska.

Landform: Active sand areas near rivers (not sea shores or river banks), including blowouts and dunes.

Soil Type: Usually sand, less commonly gravel.

Moisture regime: Moist to dry.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated.

Associated species: *Bromopsis pumpelliana*, *Carex obtusata*, *Chamerion latifolium*, *Festuca rubra*, *Leymus mollis*, *Dryas integrifolia*, *Eritrichium aretioides* var. *chamissonis*, *Rumex aureostigmaticus*, *Salix niphoclada*.

Longevity: Perennial, longevity unknown.

Phenology: Flowering late June through late July;[63] mostly in fruit late July through August.[63]

Population estimate: There are 16 known occurrences in Alaska, all of which are clustered in two small areas along the Meade River and Kogosukruk River; defining individuals can be difficult, populations contain hundreds to thousands of ramets with possibly 10,000 total in the state.[126]

Reproductive biology: *Mertensia* species are primarily pollinated by bees, especially bumblebees (*Psithyrus* spp. and *Bombus* spp.).

Similar Species[25, 95]

Mertensia drummondii is not likely to be confused with any other species growing in northern Alaska. However, individuals without flowers can be confused with several species with superficially similar leaves that occur in arctic Alaska. The table below describes the differences in leaf morphology and habitat between *Mertensia drummondii* and similar species.

Species	Pustules	Leaf Hairs	Habitat
Mertensia drummondii	Present	Hairs small, stiff, appressed	Active sand areas near rivers
Mertensia maritima	Sometimes present	Hairs absent, leaves glaucous	Gravel and shingle sea shores
Rumex aureostigmaticus	Absent	Absent	Sand dunes and sandy river banks
Plantago canescens	Absent	Hairs simple, sparse, wooly	Scree slopes, river banks


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Micranthes porsildiana **Saxifragaceae**

(Calder & Savile) Elven & D.F. Murray

Synonyms: *Micranthes nelsoniana* ssp. *porsildiana*, *Saxifraga punctata* ssp. *porsildiana*

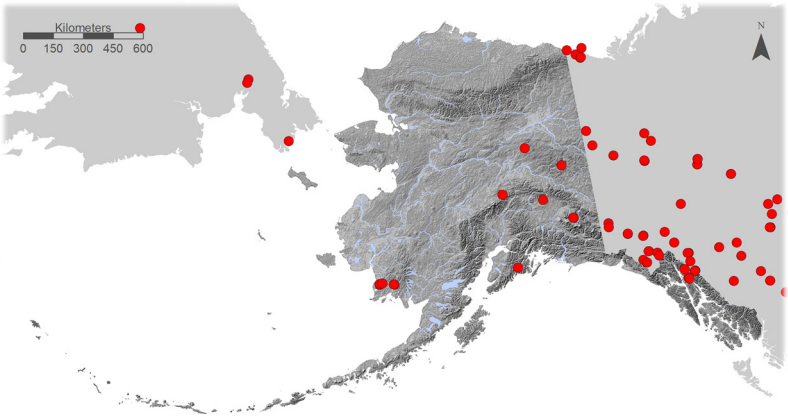
Notes: We consider *Micranthes pacifica* distinct from *Micranthes porsildiana*.

Global Distribution: Siberia and Russian Far East through northwestern North America to Nunavut.

Alaska Distribution: Bering Taiga, Intermontane-Boreal, Alaska Range Transition, Coastal Mountains Transition, Coastal Rainforests.

Ecoregions Occupied: Ahklun Mountains, Alaska Range, Yukon-Tanana Uplands, Wrangell Mountains, Chugach-St. Elias Mountains, Boundary Ranges.

Conservation Status: S3 G4; BLM Watch.



Description[24, 25, 53, 127]

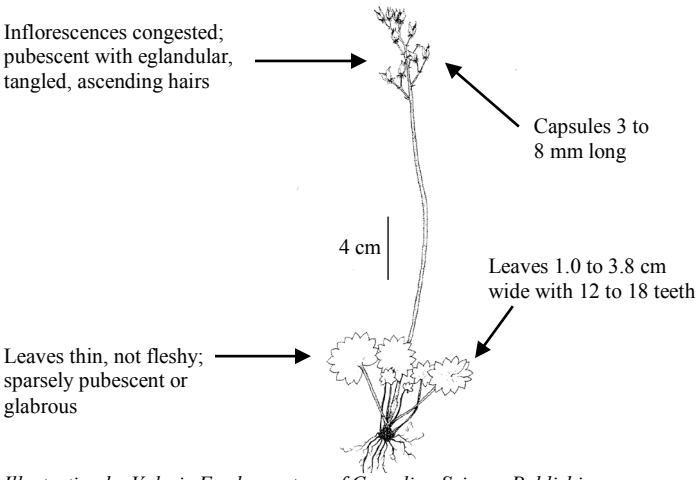


Illustration by Valerie Ford, courtesy of Canadian Science Publishing

General: Perennial herb from thin rhizome; scapes 5 to 35 cm tall, glabrous or sparsely pubescent at base or sparsely pubescent above with eglandular hairs.

Leaves: Petioles rounded, 3 to 30 cm long; basal leaves kidney-shaped to round, 1.0 to 3.8 cm wide, 12- to 18-toothed, thin (not fleshy), often sparsely pubescent, sometimes glabrous; stem leaves absent.

Flowers: Inflorescences congested, pubescent with tangled, ascending hairs; sepals reflexed, ovate, shorter than petals; petals white to pink, ovate to oblong, 2.5 to 4.5 mm long.

Fruits: Capsules green to purple, 3 to 8 mm long, tips spreading to bent.





ALA 146001

Ecology

Elevation:	Known from 40 to 2,050 m in Alaska; up to 2,500 m elsewhere in North America.[127]
Landform:	Rock outcrops, alpine slopes, alpine ridges, rocky seeps, stream banks; occurs obligately in late-melting snow areas in Chukotka Peninsula.[128]
Soil Type:	Mineral soil, scree, rock; known to occur on both ultramafic and acidic substrates.
Moisture regime:	Wet to moist.
Slope:	Slopes up to at least 40°.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, alpine tundra.

Associated species: *Cardamine purpurea*, *Chamerion latifolium*, *Cherleria dicranoides*, *Eritrichium aretioides* ssp. *chamissonis*, *Geum glaciale*, *Micranthes unalaschcensis*, *Minuartia arctica*, *Minuartia elegans*, *Saxifraga hirculus*, *Saxifraga serpyllifolia*, *Saxifraga setigera*, *Silene soczavana.*

Longevity: Perennial, longevity unknown.

Phenology: Fruiting early July through August.

Population estimate: There are 13 known occurrences in Alaska; at least one population is locally common.

Similar Species[24, 25, 53, 127]

Micranthes porsildiana has been treated as a subspecies or variety of *Micranthes nelsoniana* by some authors, and it is easily confused with all taxa in the *Micranthes nelsoniana* complex. Brouillet and Elvander (2009) synonymized *Micranthes nelsoniana* var. *pacifica* with *Micranthes nelsoniana* var. *porsildiana*;[127] however, they are treated here as two distinct species since the two taxa are distinguishable with no intermediates when occurring together.[42] The table below shows the differences in morphology that distinguish *Micranthes porsildiana* from similar species in the *Micranthes nelsoniana* complex that occur in Alaska.

Species	Leaf Hairs	Leaves	Inflorescence	Capsule
Micranthes porsildiana	Glabrous or sparsely pubescent	1.0 to 3.8 cm wide with 12 to 18 teeth; thin	Hairs ascending, eglandular	3 to 8 mm long; Cleft roughly $^{2}/_{5}$ to $^{3}/_{4}$ of length
Micranthes pacifica	Slightly ciliate margins and slightly stiff-pubescent near petioles	2.3 to 7.7 cm wide with 12 to 18 teeth; thin	Hairs ascending, eglandular	3 to 8 mm long; Cleft roughly $^{1}/_{4}$ to $^{3}/_{5}$ of length
Micranthes nelsoniana* ssp. *insularis	Leaves usually glabrous	12 to 18 teeth; thick, fleshy	Hairs ascending, eglandular	3 to 8 mm long
Micranthes nelsoniana* ssp. *nelsoniana	Pubescent on both sides	2.0 to 5.0 cm wide with 15 to 21 teeth; slightly fleshy	Purple- or brown-tipped glandular hairs	3 to 8 mm long
Micranthes charlottae	Leaves usually glabrous	6 to 12 teeth	Hairs ascending, eglandular	6 to 12 mm long

Montia vassilievii ssp. *vassilievii* (Kuzen.) McNeill **Montiaceae**

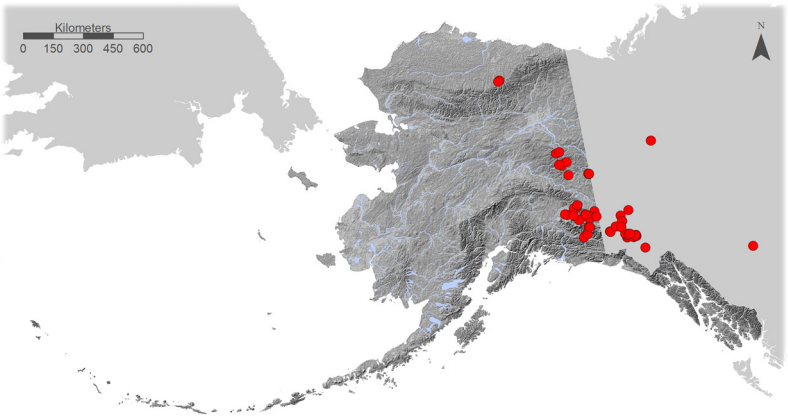
Synonyms: *Claytonia bostockii*, *Montia bostockii*

Global Distribution: Amphi-Beringian.

Alaska Distribution: Arctic Tundra, Intermontane Boreal, Alaska Range Transition, Coastal Mountains Transition, Coastal Rainforests.

Ecoregions Occupied: Brooks Foothills, Yukon-Tanana Uplands, Alaska Range, Wrangell Mountains, Kluane Ranges, Chugach-St. Elias Mountains.

Conservation Status: S3Q GNRTNR; BLM Sensitive.



Description[24, 25, 129]

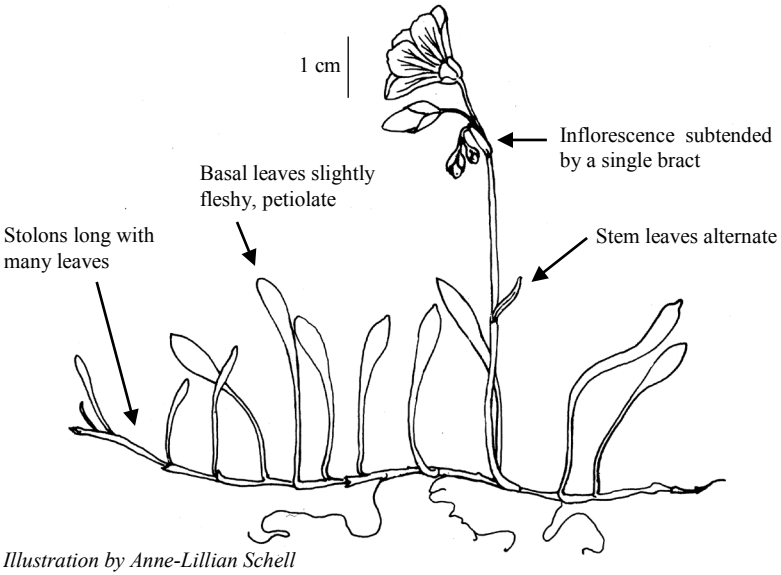


Illustration by Anne-Lillian Schell

General: Perennial herb from rhizomes or stolons, rooting at nodes; stems erect, 5 to 15 cm tall.

Leaves: Basal leaves 2 to 40 mm long, 0.5 to 2 mm wide, linear-oblanceolate, slightly fleshy, petiolate; stem leaves 1 to 3, linear to narrowly oblong, alternate, arising from one side of the stem.

Flowers: Flowers 1 to 12 subtended by a single bract; bracts linear to oblanceolate, 10 mm long, 2 mm wide; sepals 2, broadly ovate, rose-colored, 3.5 to 6 mm long; petals 5, 10 to 15 mm long, white or pink with pink veins, sometimes with yellow blotches at base.

Fruits: Seeds 0.8 to 1.5 mm wide, tuberculate.



Ecology

Elevation: Known from 700 m to 1,900 m in Alaska.[48, 49]

Landform: Alpine slopes, alpine benches, alpine ridges, lake shores, frost boils, rock outcrops, seepage slopes, stream banks.[48]

Soil Type: Organic soils.

Moisture regime: Usually wet to moist; less commonly mesic.

Slope: Flat to slopes of at least 10°.

Aspect: Often north to east to south; less commonly west-facing aspects.

Vegetation type: Sedge-shrub tundra, sedge-*Dryas* tundra, *Dryas* tundra, forb-dwarf willow tundra, graminoid-forb tundra, tussock tundra, sedge meadow, white spruce woodland, black spruce muskeg;[48, 49] often associated with mossy microsites.

Associated species: *Arctous alpina*, *Betula nana*, *Carex bigelowii*, *Dryas integrifolia*, *Equisetum arvense*, *Eriophorum* spp., *Salix* spp.

Longevity: Perennial, longevity unknown.

Phenology: Flowering early June through mid-August.

Population estimate: There are 29 known occurrences in Alaska; population sizes range from few scattered individuals to locally abundant.

Similar Species[24, 25, 129]

Material from North America has been previously referred to as *Claytonia bostockii* or *Montia bostockii* but belongs with *Montia vassilievii*, known from the Russian Far East. The North American plants may deserve treatment as a separate subspecies rather than within ssp. *vassilievii*.[42] The table below shows the morphological features that distinguish *Montia vassilievii* ssp. *vassilievii* from superficially similar *Claytonia* species that occur in eastern Alaska.

Species	Stolons	Stem Leaves	Inflorescence
Montia vassilievii* ssp. *vassilievii	Stolons long with many leaves	Alternate	Subtended by a single bract
Claytonia sarmentosa	Rhizomes only	Opposite	Subtended by a pair of opposite leaves
Claytonia scammaniana	Stolons present, less leafy	Opposite	Subtended by a pair of opposite leaves



ALA 135572

Oxygraphis glacialis (Fisch.) Bunge **Ranunculaceae**

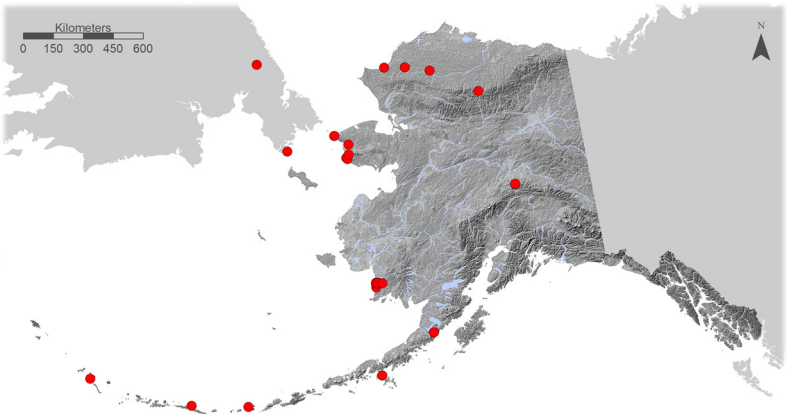
Synonyms: *Ranunculus kamtschaticus*

Global Distribution: Ural Mountains through Central Asia and East Asia to Alaska.

Alaska Distribution: Arctic Tundra, Bering Tundra, Alaska Range Transition, Bering Taiga, Aleutian Meadows.

Ecoregions Occupied: Brooks Foothills, Brooks Range, Seward Peninsula, Alaska Range, Ahklun Mountains, Alaska Peninsula, Aleutian Islands.

Conservation Status: S3 G4G5; BLM Watch.



Description[25, 130, 131]

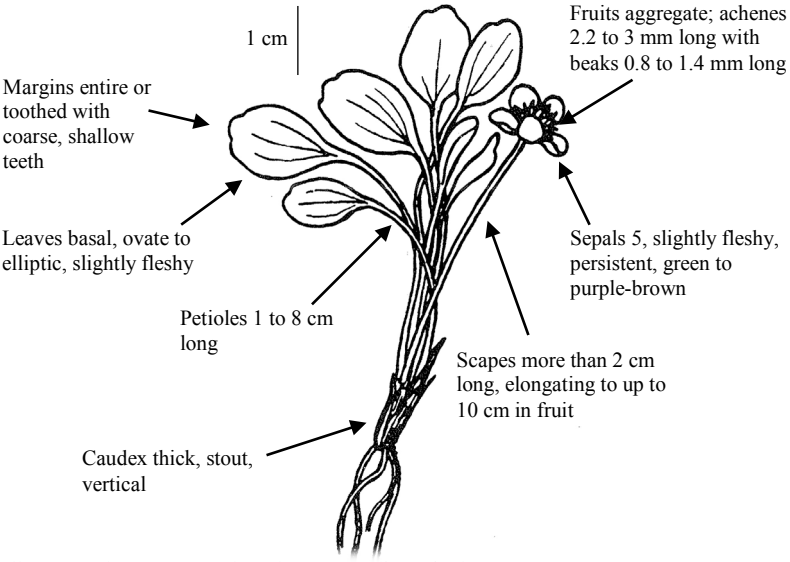


Illustration by Dagny Tande-Lid, courtesy of Stanford University Press

General: Perennial herb from thick, stout, vertical caudex; entire plant glabrous.

Leaves: Basal leaves 5 to 10, arranged in a rosette, slightly fleshy; petioles 1 to 8 cm long, narrowly folded at base; blades ovate to elliptic, 0.5 to 3 cm long, 0.5 to 3 cm wide, margins entire or toothed with coarse, shallow teeth.

Flowers: Scapes more than 2 cm long, elongating to up to 10 cm in fruit; flowers solitary, 1.5 to 3 cm in diameter; sepals 5, orbicular to ovate, slightly fleshy, persistent, green to purple-brown, 3 to 5 mm long, increasing in size after flowering to 10 to 18 mm long; petals 9 to 19, yellow, oblanceolate to oblong, 7 to 12 mm long, 1.5 to 3 mm wide.

Fruits: Fruits aggregate, subglobose, roughly 1 cm in diameter; achenes 2.2 to 3 mm long, 1.2 to 1.8 mm wide; beaks 0.8 to 1.4 mm long.



Ecology

Elevation:	Known from near sea level to 1,260 m in Alaska; up to 5,000 m in East Asia.[130]
Landform:	Rock outcrops, alpine slopes, alpine ridges, seepage slopes, frost boils, stream banks.
Soil Type:	Rock, scree, gravel; less commonly silt or clay; associated with calcareous substrates.
Moisture regime:	Usually wet to moist, sometimes dry.
Slope:	Gentle.
Aspect:	No particular aspect.
Vegetation type:	Sparsely vegetated, alpine cushion vegetation, *Dryas* heath, *Dryas* tundra, sedge meadow.
Associated species:	*Eritrichium aretioides* var. *chamissonis*, *Minuartia macrocarpa*, *Papaver walpolei*, *Saxifraga oppositifolia*.
Longevity:	Perennial, likely long-lived as the caudex on some specimens is very thick and robust.
Phenology:	Flowering mid-May, probably sooner, through late July; fruiting early June through at least August.
Population estimate:	There are 20 known occurrences in Alaska; no information available for population sizes.
Reproductive biology:	Likely pollinated by flies.[63]

Similar Species

No other *Oxygraphis* species are known to occur in Alaska. *Oxygraphis glacialis* has been accepted as *Ranunculus kamtschaticus* by some authors.[131] It is not easily mistaken for any other species in Alaska.





ALA 145078



Global Distribution: Endemic to Kobuk River Valley.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Kobuk Ridges and Valleys.

Conservation Status: S2 G2; BLM Sensitive.



Description[25, 132, 133]

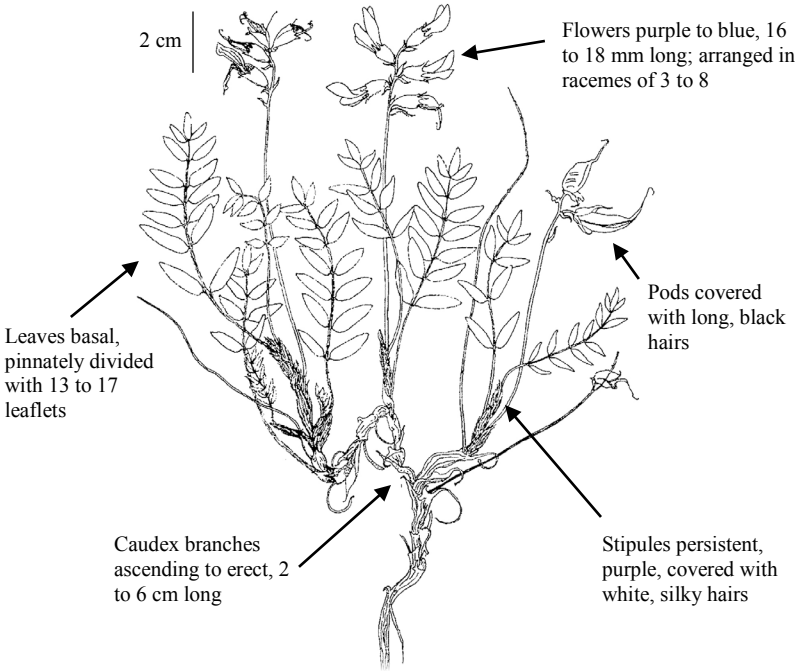


Illustration by Anne-Lillian Schell

General: Perennial herb, tufted, from branched caudex; caudex branches ascending to erect, 2 to 6 cm long; plants up to 30 cm tall, often forming clumps up to 60 cm in diameter.

Leaves: Leaves 3 to 10 cm long, pinnately divided into 13 to 17 leaflets; leaflets lanceolate to oblong, 6 to 16 mm long, 2 to 3.5 mm wide, margins rolled inwards; upper surfaces covered with white, silky hairs or nearly glabrous; lower surfaces covered with short to long, white hairs; stipules rigid, persistent, purple, covered with white, silky hairs.

Flowers: Racemes with 3 to 8 flowers; scapes 7 to 11 cm tall, covered with short, stiff, appressed and spreading hairs; flowers 16 to 18 mm long, purple to blue; calyxes fused into tubes 6 mm long, purple, toothed, covered with short, stiff, appressed hairs.

Fruits: Pods up to 17 mm long, covered with long, black hairs.



Ecology

Elevation:	Known from 10 to 100 m.
Landform:	Active sand areas including dunes and sand sheets; less commonly on stabilized dunes, old river bars (not actively flooded areas).[133]
Soil Type:	Usually sand, sometimes gravel.
Moisture regime:	Usually dry to mesic, less commonly moist.
Aspect:	No particular aspect.



Vegetation type: Usually sparsely vegetated; less commonly white spruce woodland or *Dryas* heath on stabilized sand bordering active dunes.[133]

Associated species: *Artemisia borealis*, *Calamagrostis purpurascens*, *Dryas* spp., *Eritrichium splendens*, *Festuca rubra*, *Populus balsamifera*.

Longevity: Perennial, likely long-lived; another arctic and boreal *Oxytropis* species, *Oxytropis viscida*, persists for 20 to 40 years.[134]

Phenology: Flowering mid-June through early-August; begins fruiting mid-July.

Population estimate: There are 13 known occurrences in Alaska; several populations are locally abundant, state population is likely between 500,000 and 1,000,000 individuals.[133]

Reproductive biology: Likely bee pollinated (*Bombus* spp. and *Psithrys* spp.); seeds sometimes remain in overwintering pods.

Herbivory: *Oxytropis* species are important forage for musk ox[134] and brown bears and may be consumed by other animals as well; grazing may result in a more clustered growth habit for at least the following year.[134]

Similar Species[24, 25, 95, 132, 133]

Oxytropis kobukensis is easily distinguished from all other *Oxytropis* species that occur in Alaska by its distinctive firm, purple stipules. The table below shows the additional morphological features that distinguish *Oxytropis kobukensis* from superficially similar *Oxytropis* species with generally upright habits, more than 5 and fewer than 17 (at least sometimes) leaflets per leaf, and purple flowers that occur in Northwest Alaska. *Oxytropis koyukukensis* is doubtfully distinct from *Oxytropis arctica* and is not included separately below.[42] The *Oxytropis arctica* group is in need of taxonomic study and revision.

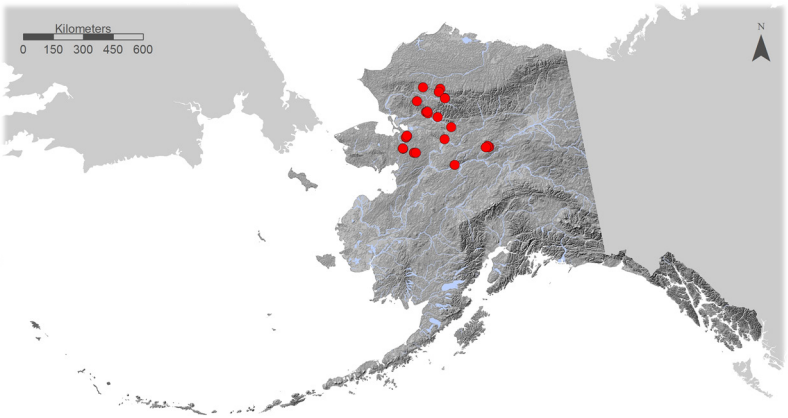
Species	Stipule Margins	Flowers	Calyx tubes
Oxytropis kobukensis	Club-shaped outgrowths present	16 to 18 mm long	Glands absent
Oxytropis arctica	Club-shaped outgrowths present	16 to 30 mm long	Glands absent
Oxytropis scammaniana	Club-shaped outgrowths absent	12 to 17 mm long	Glands absent
Oxytropis borealis	Club-shaped outgrowths absent	15 to 20 mm long	Glands present
Oxytropis viscida	Club-shaped outgrowths absent	11 to 21 mm long	Glands present

Global Distribution: Endemic to Northwest Alaska.

Alaska Distribution: Arctic Tundra, Bering Tundra, Bering Taiga, Intermontane Boreal.

Ecoregions Occupied: Brooks Foothills, Brooks Range, Seward Peninsula, Nulato Hills, Kobuk Ridges and Valleys, Ray Mountains.

Conservation Status: S3 G3; BLM Watch.



Description[25, 132]

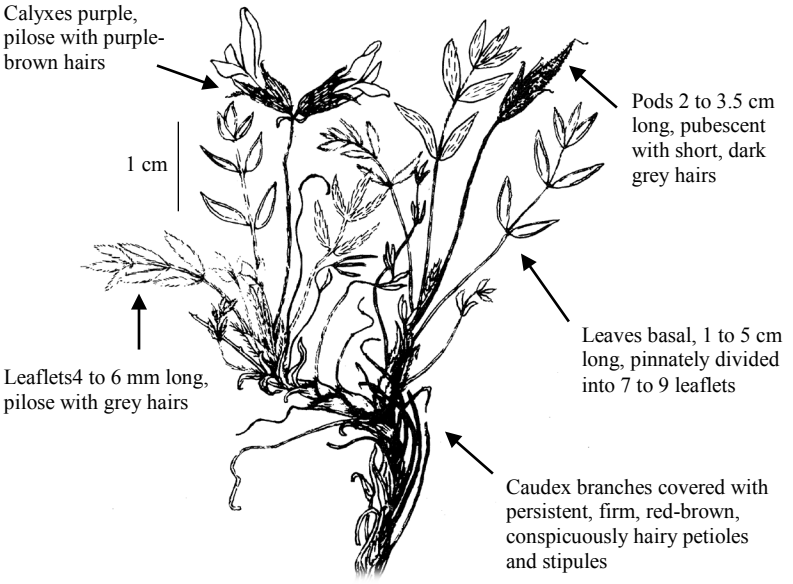


Illustration by Anne-Lillian Schell

General: Perennial herb, tufted, from branched caudex covered with persistent dark red-brown petioles and stipules.

Leaves: Leaves 1 to 5 cm long, pinnately divided into 7 to 9 leaflets; leaflets elliptic to lanceolate, 4 to 6 mm long, 1 to 2 mm wide, margins rolled downward or folded, pilose with gray hairs; stipules long-triangular.

Flowers: Inflorescences of 1 to 3 flowers; scapes not or slightly exceeding leaves; flowers 12 to 15 mm long; calyxes purple, fused at base into tube 4 to 4.5 mm long, toothed with teeth 2 to 2.5 mm long, pilose with purple-brown hairs; corollas purple to blue.

Fruits: Pods oblong, 2 to 3.5 cm long, pubescent with short, dark grey hairs.



Ecology

Elevation: Known from 200 to 1,380 m.

Landform: Alpine ridges, alpine valleys.

Soil Type: Scree, sand; found at one location on acidic substrate and another location on calcareous substrate but not typically associated with calcareous or ultramafic substrates.[135]

Moisture regime: Dry to moist.

Aspect: Often west to southwest to south; also other aspects including north and east.

Vegetation type: *Dryas* heath, sparsely vegetated.

Associated species: *Antennaria friesiana*, *Cardamine bellidifolia*, *Carex bigelowii*, *Dryas* spp., *Kobresia myosuroides*, *Lupinus arcticus*, *Luzula kjellmaniana*, *Luzula multiflora*, *Oxytropis maydelliana*, *Poa arctica*, *Poa glauca*, *Ranunculus sulphureus*, *Silene soczavana*, *Tephroseris frigida*.

Longevity: Perennial, likely long-lived; another arctic and boreal *Oxytropis* species, *Oxytropis viscida*, persists for 20 to 40 years.[134]

Phenology: Flowering early June to early August; fruiting late June through August.

Population estimate: There are 25 known occurrences in Alaska; population sizes unknown.

Reproductive biology: Likely bee pollinated (*Bombus* spp. and *Psithrys* spp.).

Herbivory: *Oxytropis* species are important forage for musk ox[134] and brown bears and may be consumed by other animals as well; grazing may result in a more clustered growth habit for at least the following year.[134]

Similar Species[25, 132]

The table below describes the morphological features that distinguish *Oxytropis kokrinensis* from other tufted *Oxytropis* species with purple or blue flowers and scapes not or only slightly exceeding leaves that occur in Northwest Alaska.

Species	Habit	Persistent Petioles and Stipules	Leaves	Calyxes
Oxytropis kokrinensis	Tufted	Firm, dark red-brown, conspicuously hairy	1 to 5 cm long; leaflets 7 to 9, 4 to 6 mm long	Purple, pilose with purple-brown hairs
Oxytropis bryophila	Densely tufted, leaves compact	Tan, not conspicuously hairy	0.5 to 5 cm long; leaflets 9 to 15, 2 to 10 mm long	Densely pilose with black hairs
Oxytropis gorodkovii	Densely tufted, leaves compact	Tan, not conspicuously hairy, persistent stipules present but petioles absent	0.5 to 5 cm long; leaflets 9 to 15, 2 to 10 mm long	Densely pilose with black hairs
Oxytropis scammaniana	Tufted, leaves loose	Papery, tan, sparsely hairy	2 to 9 cm long; leaflets 9 to 13, 4 to 13 mm long	Densely pilose with black hairs



ALA 92066

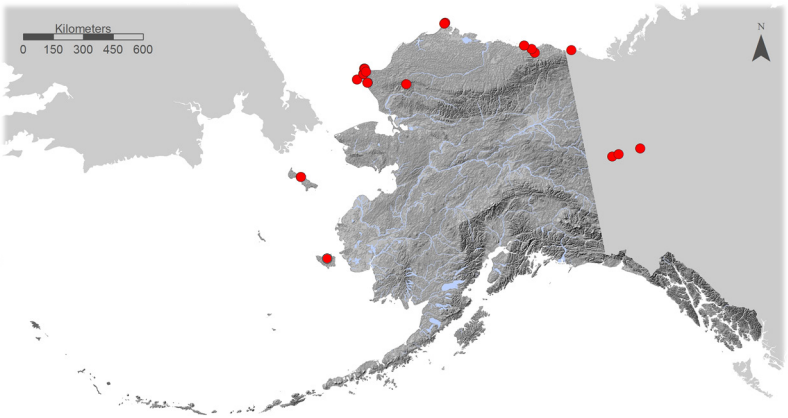


Global Distribution: Amphi-Beringian; also reported but not confirmed from Canadian Arctic Archipelago.

Alaska Distribution: Arctic Tundra, Bering Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Foothills, Brooks Range, Bering Sea Islands (reported but not confirmed from Seward Peninsula).[136]

Conservation Status: S2S3 G3; BLM Sensitive.



Description[42, 136]

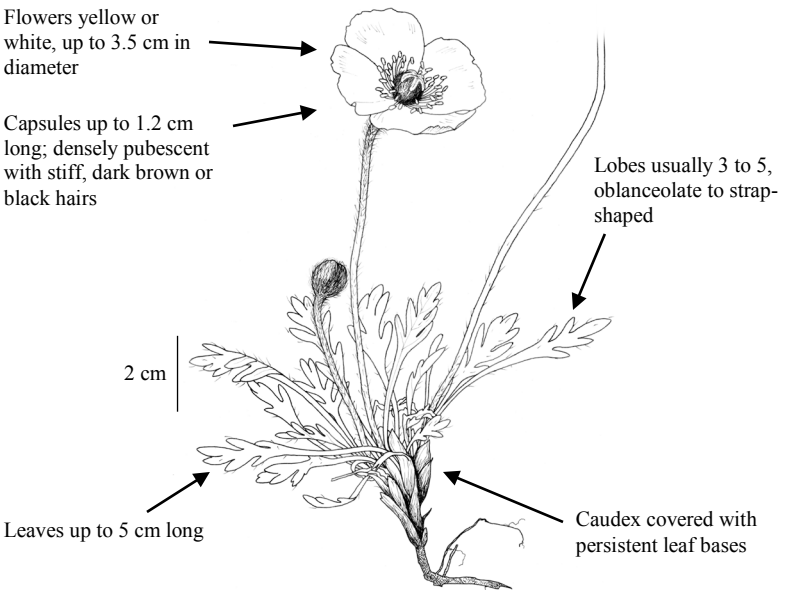


Illustration by Matthew L. Carlson

General: Perennial herb, tufted; caudex covered with persistent leaf bases.

Leaves: Petioles ½ to ¾ length of leaves; leaves basal, up to 5 cm long, lanceolate, pubescent with stiff hairs, lobed with one or two pairs of lateral lobes; lobes oblanceolate to strap-shaped; terminal lobes occasionally with small secondary lobes; lower surfaces light green; upper surfaces dark green.

Flowers: Scapes erect, sparsely to densely pubescent with stiff hairs; flowers solitary, up to 3.5 cm in diameter; petals yellow or white.

Fruits: Capsules subglobose to obconic, up to 1.2 cm long, 1 to 2.5 times longer than wide, densely pubescent with stiff, dark brown or black hairs.



Ecology

Elevation: Known from near sea level to 1,060 m in Alaska.

Landform: River floodplains, gravel bars, rock outcrops, polygon tundra.

Soil Type: Clay, sand, gravel, scree, rubble; sometimes associated with calcareous substrates.

Moisture regime: Mesic to moist.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated.

Associated species: *Cassiope tetragona* ssp. *tetragona*, *Chamerion latifolium*, *Corydalis arctica*, *Papaver hultenii*, *Poa arctica*, *Poa pratensis* var. *colpodea*, *Salix ovalifolia* var. *glacialis*, *Saxifraga rivularis* ssp. *arctolitoralis*, *Ranunculus nivalis*.

Longevity: Perennial, probably long-lived as many specimens have extensive caudexes with many persistent leaf bases.[63]

Phenology: Flowering early July, probably sooner, through mid-August; fruiting mid-July through at least mid-August.

Population estimate: There are 13 known occurrences in Alaska; populations are locally rare for several occurrences.

Reproductive biology: Pollinated by insects.[63]



Similar Species[42, 136]

Papaver species of arctic North America require further study; the taxonomy presented below is tentative. Kiger and Murray (1997) assigned much North American material to *Papaver lapponicum* and to subspecies of *Papaver radicatum*, both of which, in their concept, are similar to *Papaver gorodkovii*.[136] However, neither species is included here because *Papaver radicatum* is restricted to North Atlantic Europe and *Papaver lapponicum* does not occur in Alaska or any other part of Beringia.[42] Much of the northwestern North American material that has in the past been assigned *Papaver radicatum* and *Papaver lapponicum* likely belongs to *Papaver hultenii*.[42] *Papaver alaskanum* is not included here

because, although the species has been reported from Northwest Alaska, it is likely restricted to Southwest Alaska and is probably polyphyletic.[42] The table below describes the morphological features that distinguish *Papaver gorodkovii* from similar *Papaver* species that occur in arctic Alaska.

Species	Leaves	Primary leaf lobes	Flowers	Capsules
Papaver gorodkovii	Up to 5 cm long	Usually 3 to 5 lobes	Up to 3.5 cm in diameter	Up to 1.2 cm long; densely pubescent with stiff, dark brown or black hairs
Papaver walpolei	Up to 4 cm long	Usually 3 lobes	Up to 3 cm in diameter	Up to 1 cm long; sparsely to densely pubescent with stiff, light brown to black hairs
Papaver hultenii	Up to 12 cm long	Usually 5 to 9 lobes	Up to 5 cm in diameter	Up to 2 cm long; pubescent with short, stiff, appressed, light to dark brown hairs
Papaver keelei	Up to 12 cm long	Usually 5 to 7 lobes	Up to 5 cm in diameter	Up to 2.5 cm long; sparsely to densely pubescent with short, stiff, appressed hairs
Papaver macounii	Up to 10 cm long	Usually 7 to 9 lobes	Up to 6 cm in diameter	Up to 2 cm long; pubescent with short, stiff, appressed, light brown hairs
Papaver mcconnellii	Up to 10 cm long	Usually 7 lobes	Up to 6 cm in diameter	Up to 1.5 cm long; pubescent with short, stiff, appressed, dark brown or black hairs



ALA 138889

Parrya nauruaq **Brassicaceae**

Al-Shehbaz, J.R. Grant, R. Lipkin, D.F. Murray, & C.L. Parker

Global Distribution: Endemic to Seward Peninsula.

Alaska Distribution: Bering Tundra.

Ecoregions Occupied: Seward Peninsula.

Conservation Status: S1S2 G2; BLM Sensitive.



Description[137, 138]

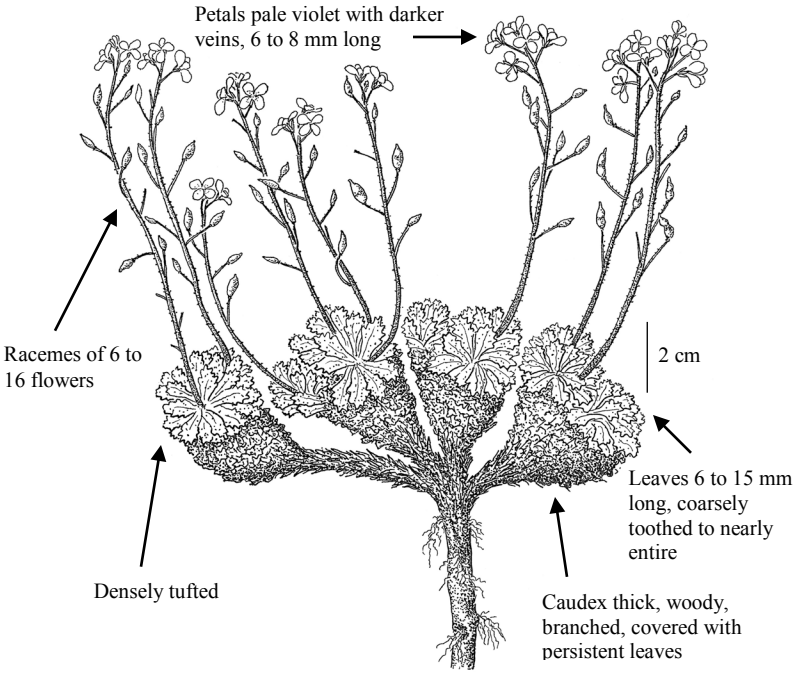


Illustration by Ihsan Al-Shehbaz, courtesy of Missouri Botanical Garden

General: Perennial herb, densely tufted, from branched caudex densely covered with persistent leaves; moderately to densely glandular on leaves and scapes, hairs absent; scapes 4 to 8 cm long.

Leaves: Leaves basal, arranged in rosettes; petioles 2 to 10 mm long, 2 to 4 mm wide at base; blades obovate to broadly spatulate, 6 to 15 mm long, 4 to 8 mm wide, coarsely toothed to nearly entire, apexes acute.

Flowers: Flowers arranged in racemes of 6 to 16 flowers; sepals ovate, 2.5 to 3.5 mm long, 1.2 to 1.7 mm wide, eglandular; petals pale violet with darker veins, broadly obovate, 6 to 8 mm long, 3 to 5 mm wide, apexes rounded.

Fruits: Siliques obovate to oblong, having 6 to 8 seeds, 8 to 14 mm long, 5 to 7 mm wide with prominent midveins; styles 0.2 to 1 mm long; seeds with broad wing 0.8 to 1.5 mm wide.



Ecology

Elevation: Known from near sea level to 180 m.

Landform: Floodplains, badlands slopes, rock outcrops, river bluffs.

Soil Type: Gravel, sand; associated with calcareous substrates, primarily marble but also limestone.

Moisture regime: Usually dry to mesic, less commonly moist.

Slope: Flat to gentle slopes.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, *Dryas* tundra.

Associated species: *Artemisia senjavinensis*, *Cherleria dicranoides*, *Erigeron hyperboreus*, *Eritrichium aretioides* var. *chamissonis*, *Micranthes calycina*, *Minuartia obtusiloba*, *Papaver walpolei*, *Parrya nudicaulis*, *Pyrola grandiflora*, *Rumex krausei*, *Saussurea angustifolia*.

Longevity: Perennial, likely long-lived as some specimens display extensive, many-branched caudexes with many persistent leaves.

Phenology: Flowering May through mid-June; fruiting early June through late August.

Population estimate: There are six known occurrences, broadly grouping into two populations, in Alaska; the total population of *Parrya nauruaq* is likely over 10,000 ramets, corresponding to fewer genetic individuals.[139]

Reproductive biology: The closely related *Parrya nudicaulis* is primarily pollinated by flies, mostly species within Syrphidae and Muscidae; it is self-compatible but produces a significantly reduced amount of seed in the absence of pollinators.[140]

Similar Species[137, 138]

Parrya nauruaq occurs in similar habitat to *Parrya nudicaulis* in the Moon Mountains of the Seward Peninsula. The two species infrequently grow together in mixed stands, although *Parrya nudicaulis* normally grows in slightly moister and more vegetated habitats.[138] *Parrya nauruaq* and *Parrya nudicaulis* can be easily distinguished from each other by the morphological features shown in the table below.

Species	Habit	Caudex	Leaves	Petals	Fruits
Parrya nauruaq	Densely tufted	Thick, woody; densely covered with persistent leaves	Petioles 2 to 10 mm long; leaves 6 to 15 mm long	6 to 8 mm long	8 to 14 mm long
Parrya nudicaulis	Often not tufted	Slender caudex; often not covered with persistent leaves	Petioles 15 to 70 mm long; leaves 17 to 70 mm long	14 to 22 mm long	30 to 40 mm long


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2 cm
ALA 145013

Global Distribution: Circumpolar.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain; not known from Seward Peninsula.[63]

Conservation Status: S1 G5?; BLM Sensitive.



Description[95, 96]

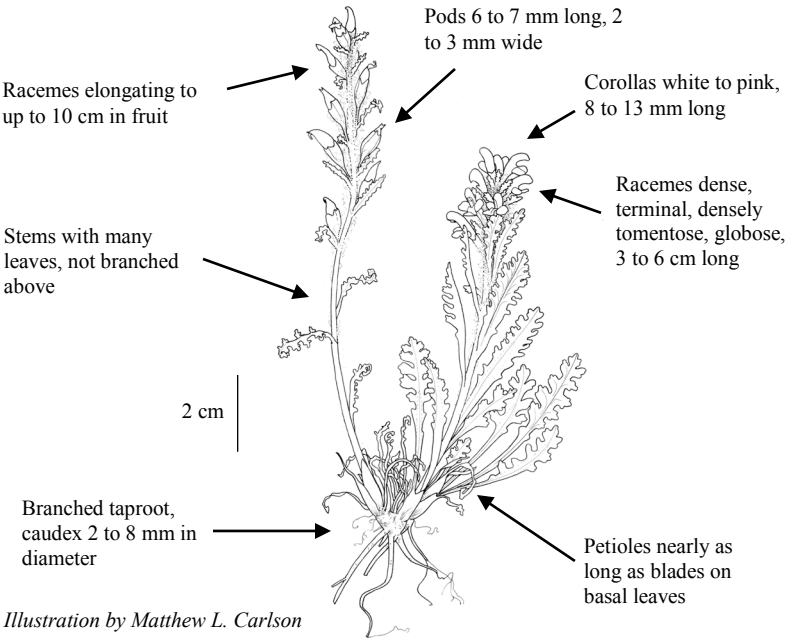


Illustration by Matthew L. Carlson

General: Perennial herb from a branched taproot; caudexes 2 to 8 mm in diameter; stems one to several, erect, 2 to 15 cm tall, densely tomentose with white, appressed or spreading hairs.

Leaves: Petioles tomentose, nearly as long as blades on basal leaves, short on stem leaves; basal leaves arranged in rosettes, marcescent, spreading, somewhat curled, linear to lanceolate, 15 to 25 mm long, 2 to 5 mm wide, pinnately divided with 10 to 24 oblanceolate divisions, sparsely tomentose to glabrous; stem leaves alternate, reduced.

Flowers: Racemes 5- to 10-flowered, dense, terminal, globose, 3 to 6 cm long, elongating to up to 10 cm in fruit, densely tomentose; bracts pinnately divided; lower bracts longer than flowers; upper bracts as long as flowers; calyxes 4 to 5 mm wide, tubular, 5-lobed, tomentose; corollas white and pink, 8 to 13 mm long.

Fruits: Calyxes persistent, enclosing base of capsules; capsules curved, many-seeded, 6 to 7 mm long, 2 to 3 mm wide.



Ecology

Elevation: Known from near sea level to 20 m in Alaska.

Landform: Beach terraces, tundra; also in late melting snow areas in Russia and Canada.

Soil Type: Likely organic soils; associated with basic substrates in mountains of Scandinavia but not associated with calcareous substrates in the arctic;[63] *Pedicularis* species are semi-parasitic and extract nutrients from other species through root connections.[96]

Moisture regime: Wet to moist.

Slope: Gentle.

Vegetation type: *Carex – Eriophorum* tundra, heath; not to be expected in sparsely vegetated areas.[114]

Associated species: *Carex concolor*, *Cassiope tetragona*, *Eriophorum triste*, *Pyrola grandiflora*, *Vaccinium uliginosum*; moss spp.

Longevity: Perennial, probably not long-lived.[96]

Phenology: Flowering late June to late August; fruiting late July through September.

Population estimate: There are three known occurrences in Alaska; population sizes unknown.

Reproductive biology: Pollinated by insects, especially bees (*Bombus* spp. and *Psithyrus* spp.)[114] and flies;[96] largely autogamous and able to set seed in absence of insect pollinators.[114]

Similar Species[24, 25, 95, 96]

The table below describes the differences in morphology between *Pedicularis* species with pink to purple petals, thick and hairy racemes, alternate stem leaves, and simple stems that occur in the Beaufort Coastal Plain. Reports of *Pedicularis hirsuta* from the Seward Peninsula are based on misidentified *Pedicularis langsdorfii*.[63]

Species	Stems	Upper Petals	Corollas	Pods
Pedicularis hirsuta	With many leaves	2 minute teeth at apex	8 to 13 mm long	6 to 7 mm long, 2 to 3 mm wide
Pedicularis langsdorfii	With many leaves	2 small teeth at apex	23 to 26 mm long	16 to 20 mm long, 5.5 to 6.5 mm wide
Pedicularis sudetica	Without leaves or with a single leaf	2 small teeth at apex	16 to 21 mm long	6 to 8 mm long, 3.5 to 4.5 mm wide
Pedicularis arctoeuropaea	Without leaves or with a single leaf	2 small teeth at apex	16 to 21 mm long	10 to 15 mm long
Pedicularis albolabiata	Without leaves or with a single leaf	2 small teeth at apex	16 to 20 mm long	11 to 18 mm long, 4 to 6 mm wide
Pedicularis lanata	With many leaves	Lacking 2 small teeth at apex	16 to 19 mm long	9 to 12 mm long, 4 to 5 mm wide



ALA 156726

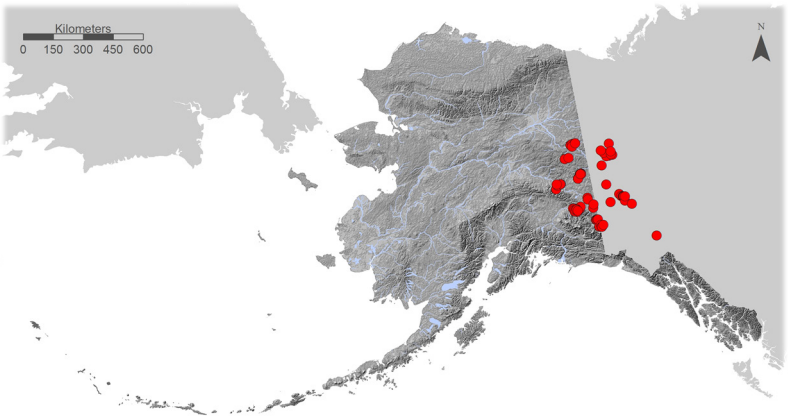


Global Distribution: Endemic to Interior Alaska and Yukon.

Alaska Distribution: Intermontane Boreal, Alaska Range Transition, Coastal Mountains Transition.

Ecoregions Occupied: North Ogilvie Mountains, Yukon-Tanana Uplands, Tanana-Kuskokwim Lowlands, Alaska Range, Kluane Ranges.

Conservation Status: S3 G3; BLM Sensitive.



Description[24, 25, 124]

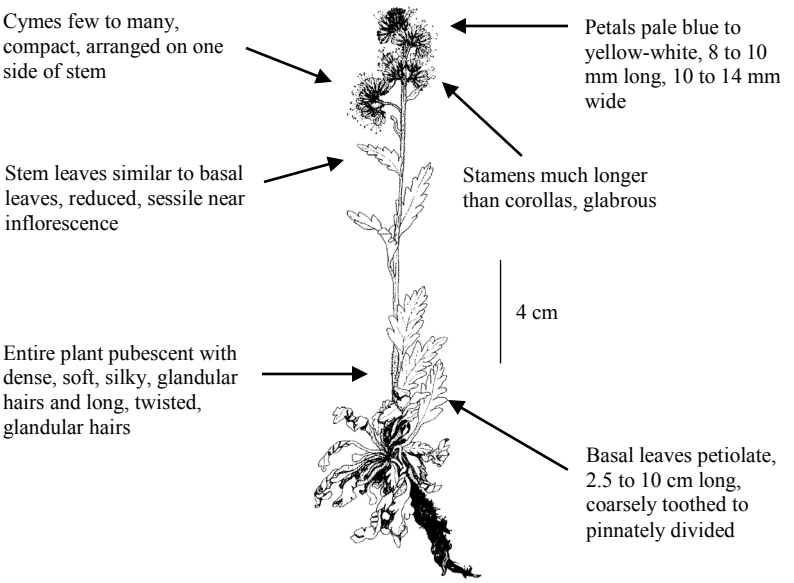


Illustration by Valerie Ford, courtesy of Canadian Science Publishing

General: Perennial herb from taproot; stems usually branched from base, 15 to 50 cm tall; entire plant pubescent with dense, soft, silky, glandular hairs and long, twisted, glandular hairs.

Leaves: Basal leaves petiolate, lanceolate, 2.5 to 10 cm long, coarsely toothed to pinnately divided with entire to shallowly cleft divisions; stem leaves similar, reduced, sessile near the inflorescence.

Flowers: Flowers arranged in cymes; cymes few to many, compact, arranged on one side of stem; calyx lobes linear; corollas pale blue or yellow-white, 8 to 10 mm long, 10 to 14 mm wide, with rounded lobes half as long as tubes; stamens much longer than corollas, glabrous.

Fruits: Capsules 5 to 7 mm long.



Ecology

Elevation: Known from 220 to 1,920 m in Alaska.

Landform: Alpine slopes, river bluffs, rock outcrops, river bars, lake shores; also on roadsides and cut banks along Alaska and Taylor Highways.[48, 49]

Soil Type: Mineral soil, sand, gravel, scree, rubble.[48, 49]

Moisture regime: Dry to wet.

Slope: Slopes up to at least 35º.

Aspect: Often, but not limited to, southwest to south to southeast on river bluffs; no particular aspect in other habitats.

Vegetation type: Open white spruce forest, aspen forest, graminoid steppe, dwarf shrub tundra, *Dryas* tundra; often in barren microsites.

Associated species: *Arctostaphylos uva-ursi*, *Arctous alpina*, *Betula nana*, *Cassiope tetragona*, *Dryas integrifolia*, *Elymus trachycaulus*, *Festuca saximontana*, *Saxifraga tricuspidata*, *Stellaria longipes*, *Vaccinium uliginosum*; moss spp.

Longevity: Perennial, longevity unknown.

Phenology: Likely flowering May[141] through July; flowering is induced by short days and low temperatures;[141] begins fruiting mid-July.

Population estimate: There are 37 known occurrences in Alaska; several populations are large or locally common but most consist of few or occasional individuals.[48]

Reproductive biology: South-facing bluffs have rich diversity in solitary bee species and *Phacelia mollis* is visited for nectar;[86] solitary bees are likely important pollinators.

Similar Species[124]

Phacelia mollis and *Phacelia sericea* are easily confused, and both occur on river bluffs and mountain slopes in Interior Alaska. The table below shows the morphological features that distinguish the two species.

Species	Hairs	Leaves	Corollas
Phacelia mollis	Dense, soft, silky, glandular hairs and long, twisted, glandular hairs	2.5 to 10 cm long	Pale blue or yellow-white; 8 to 10 mm long, 10 to 14 mm wide
Phacelia sericea	Spreading to appressed, long, eglandular hairs; giving plant a more silvery appearance	2 to 6.5 cm long	Dark blue or purple; 5 to 6 mm long and wide


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Physaria calderi **Brassicaceae**

(G.A. Mulligan & A.E. Porsild) O'Kane & Al-Shehbaz

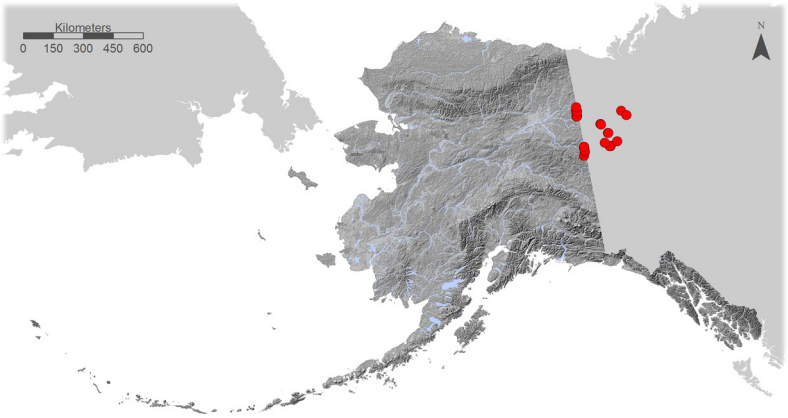
Synonyms: *Lesquerella calderi*

Global Distribution: Endemic to unglaciated region of Interior Alaska, Yukon, and Northwest Territories.

Alaska Distribution: Intermontane Boreal.

Ecoregion Occupied: North Ogilvie Mountains.

Conservation Status: S2 G3G4; BLM Sensitive.



Description[24, 142]

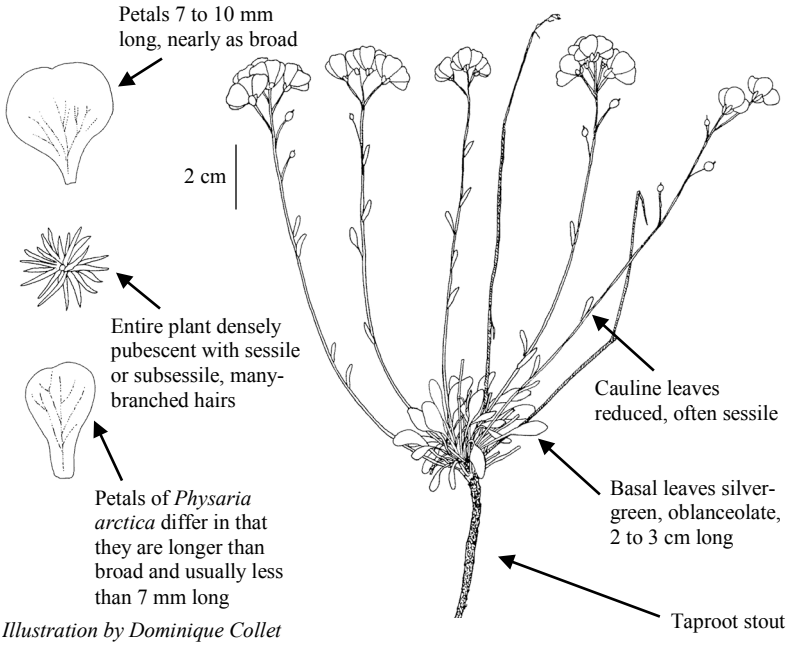


Illustration by Dominique Collet

General: Perennial herb from a simple or branched caudex and stout taproot; stems solitary to several, erect to spreading, rarely prostrate, 5 to 20 cm tall; entire plant densely pubescent with sessile or subsessile, many-branched hairs.

Leaves: Basal leaves silver-green, oblanceolate, 2 to 3 cm long, entire; stem leaves sessile or those in the lower half short-petiolate, narrowly oblanceolate, 5 to 15 mm long.

Flowers: Racemes loose; sepals ovate to elliptic, 4 to 5 mm long; petals obovate, 7 to 10 mm long, nearly as wide, yellow.

Fruits: Fruiting pedicels erect to ascending, 1 to 2 cm long; silicles globose to ellipsoid, compressed, up to 8 mm long; styles 1 to 2 mm long.



Ecology

Elevation: Known from 540 to 1,360 m in Alaska; occurs up to 1,500 m in Yukon and Northwest Territories.[142]

Landform: Mountain slopes, mountain ridges, rock outcrops.

Soil Type: Scree, rock; associated with calcareous substrates.

Moisture regime: Dry.

Slope: Gentle to steep.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, *Dryas* tundra, open spruce woodland.

Associated species: *Antennaria densifolia*, *Carex glacialis*, *Carex rupestris*, *Draba palanderiana*, *Dryas octopetatla*, *Eritrichium aretioides*, *Oxytropis varians*, *Papaver macounii*, *Pedicularis oederi*, *Phlox alaskensis*, *Potentilla subvahliana*, *Salix reticulata*.

Longevity: Perennial, longevity unknown.

Phenology: Flowering early June, probably sooner, through August;[142] fruiting late June through at least August.

Population estimate: There are 10 known occurrences in Alaska; several populations are locally common or abundant.

Reproductive biology: Possibly self-incompatible.[143]

Similar Species[24, 142]

Physaria calderi is very similar to the more widespread *Physaria arctica*, which occurs in similar habitat throughout the range of *Physaria calderi*. The table below describes the differences in morphology between the two species.

Species	Stem Hairs	Petals	Fruits
Physaria calderi	Many-branched, 0.2 to 0.3 mm in diameter	Obovate, blade abruptly narrowed, 7 to 10 mm long	Uncompressed
Physaria arctica	Many-branched, 0.35 to 0.5 mm in diameter	Spatulate, blade gradually narrowed, 5 to 6 mm long	Compressed



ALA 119569



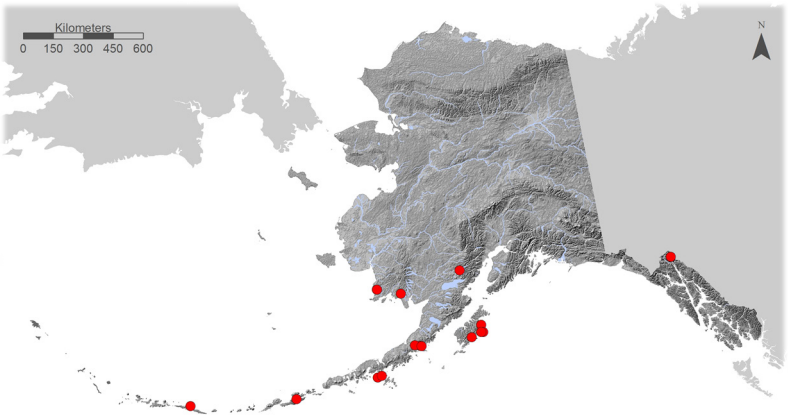
Plagiobothrys orientalis (L.) I.M. Johnst. **Boraginaceae**

Global Distribution: Amphi-Beringian from Russian Far East and Komandorski Islands to Aleutian Islands and Southwest Alaska, disjunct near Haines.

Alaska Distribution: Bering Taiga, Alaska Range Transition, Aleutian Meadows, Coastal Rainforests.

Ecoregions Occupied: Ahklun Mountains, Lime Hills, Alaska Peninsula, Kodiak Island; disjunct in Boundary Ranges.

Conservation Status: S3 G3G4; BLM Watch.



Description[25, 132]

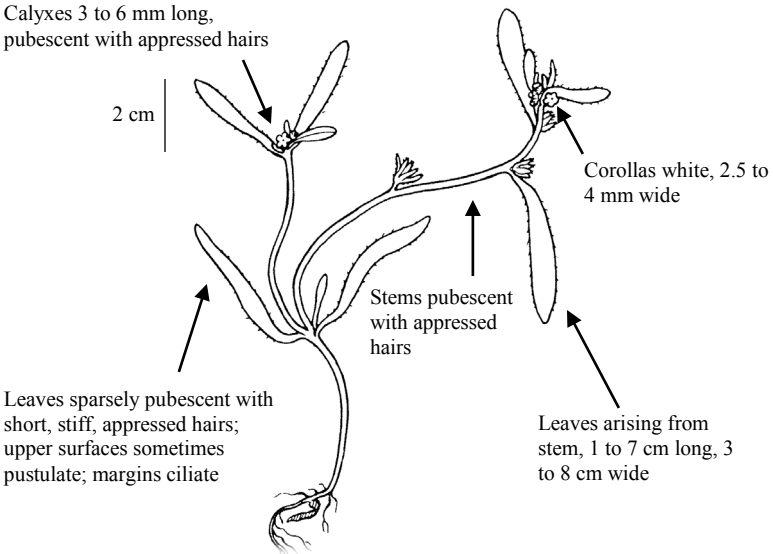


Illustration by Dagny Tande-Lid, courtesy of Stanford University Press

General: Annual herb from thin root; stems several, decumbent to ascending, 10 to 20 cm long, pubescent with appressed hairs.

Leaves: Stem leaves usually alternate, lower leaves sometimes opposite, oblong to linear, 1 to 7 cm long, 3 to 8 mm wide, sparsely pubescent with short, stiff, appressed hairs; upper surfaces sometimes pustulate; margins ciliate.

Flowers: Bracts numerous; flowers 3 to 4 mm in diameter; calyxes 3 to 6 mm long, pubescent with appressed hairs, lobed with lanceolate lobes; corollas white, 2.5 to 4 mm wide.

Fruits: Nutlets 2 to 2.5 mm long, ovoid, wrinkled.



Ecology

Elevation: Known from near sea level to 100 m in Alaska.

Landform: Estuaries and lagoons at or above tidal zone, lake shores, river bars; also in disturbed sites such as airstrips and ATV tracks.

Soil Type: Mud, silt, sand, gravel.

Moisture regime: Wet.

Slope: Flat to gentle.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated.

Associated species: *Carex lyngbyei*, *Cochlearia groenlandica*, *Deschampsia cespitosa*, *Hordeum brachyantherum*, *Equisetum arvense*, *Koenigia islandica*, *Leymus mollis*, *Spergularia canadensis*.

Longevity: Annual.

Population estimate: There are 15 known occurrences in Alaska; populations usually consist of occasional or scattered individuals.

Similar Species[25, 132]

Plagiobothrys scouleri occurs in Alaska primarily to the north and east of the range of *Plagiobothrys orientalis*; however, the two species may occur in similar habitat in Southwest Alaska as well. The table below shows the differences in morphological features between these two species. While Hultén (1968) reported *Plagiobothrys orientalis* to have pustulate upper leaf surfaces and *Plagiobothrys scouleri* to lack them,[25] Welsh (1973) reported both species to sometimes have pustulate upper leaf surfaces.[132] The presence of pustules is not considered a diagnostic figure in the table below.

Species	Leaves	Corollas	Calyxes
Plagiobothrys orientalis	Up to 7 cm long, 3 to 8 mm wide	2.5 to 4 mm wide	Hairs appressed; 3 to 6 mm long; sepals 2 to 3 times longer than nutlets
Plagiobothrys scouleri	Up to 5 cm long, 1 to 4 mm wide	1 to 3 mm wide	Hairs spreading-ascending; 2 to 3 mm long; sepals less than 2 times longer than nutlets



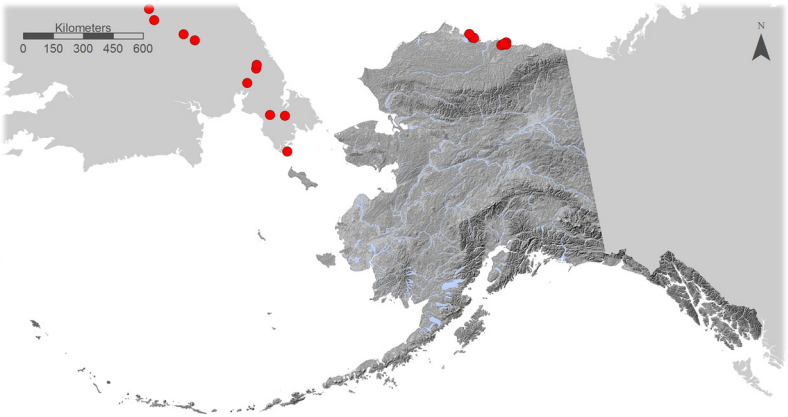

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Global Distribution: Circumpolar.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain; a questionable report from the Seward Peninsula is not included here.

Conservation Status: S1S2 G4G5; BLM Sensitive.



Description[25, 95, 144]

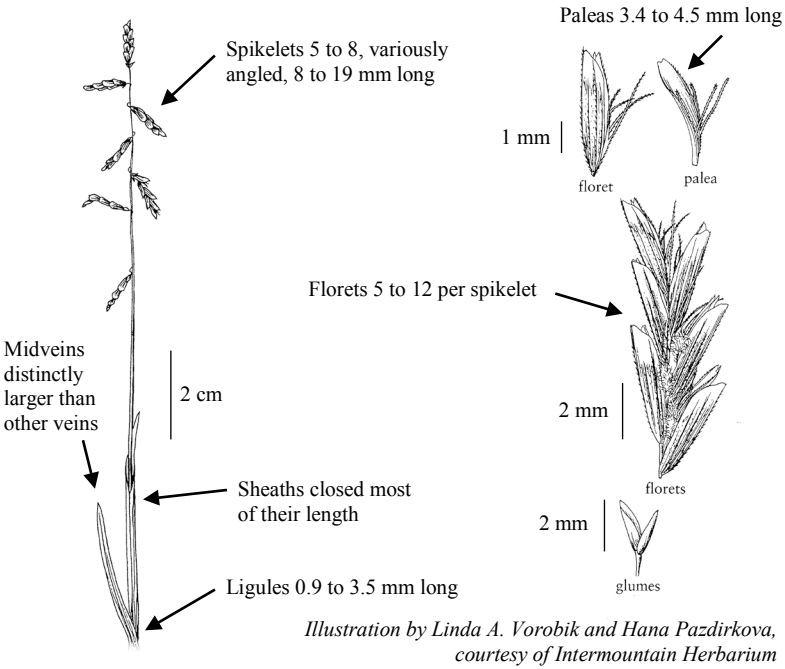


Illustration by Linda A. Vorobik and Hana Pazdirkova, courtesy of Intermountain Herbarium

General: Perennial grass from rhizomes, not tufted; culms 4 to 35 cm tall, 1 to 3 mm wide, erect to decumbent.

Leaves: Leaves alternate, distributed along stems, aerial leaves erect, submerged leaves often lax and floating; sheaths glabrous, closed most of their length; ligules 0.9 to 3.5 mm long; blades 2 to 35 cm long, 1.5 to 3 mm wide; midveins distinctly larger than other veins.

Inflorescences: Inflorescences 2.8 to 10 cm long with 5 to 8 spikelets; internodes 4 to 30 mm long; pedicels 1.5 to 3 mm long.

Spikelets: Spikelets 8 to 19 mm long with 5 to 12 florets; lower glumes 1 to 2.5 mm long; upper glumes 2 to 3.5 mm long; lemmas 3.5 to 5 mm long, 7-veined, slightly rough, unawned or with awns 0.2 to 1 mm long; paleas 3.4 to 4.5 mm long.



Ecology

Elevation: Known from near sea level in Alaska; known from up to 700 m on Ellesmere Island in the Canadian Arctic Archipelago.

Landform:	Lakeshores, stream banks, river banks, floodplains, marshes, mud flats; always found close to bodies of water.[109, 115]
Soil Type:	Mud, silt, clay, gravel.
Moisture regime:	Moist to saturated; occurs in areas where water accumulates for a majority of the growing season.[95]
Slope:	Flat to gently sloped.
Aspect:	No particular aspect.
Vegetation type:	Tundra.
Associated species:	*Arctophila fulva*, *Caltha palustris*; moss.
Longevity:	Perennial; longevity unknown.
Phenology:	Flowering July; fruiting late August to September.[109, 115]
Population estimate:	There are seven known occurrences in Alaska; population sizes unknown.
Reproductive biology:	Wind-pollinated,[114] forms clonal colonies from rhizomes.
Herbivory:	*Pleuropogon sabinei* is consumed by snow geese[145] and occasionally grazed by muskox.[146]

Similar Species[25, 144]

No other *Pleuropogon* species are known to grow in Alaska. The variously angled, widely separated spikelets are distinct and *Pleuropogon sabinei* is not likely to be confused with other species in Alaska.




© Geir Arnesen 2005

Poa hartzii ssp. *alaskana* Soreng

Poaceae

Synonyms: *Poa alaskana*

Global Distribution: Endemic to arctic Alaska.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Range.

Conservation Status: S1S2 G3G4T1T2; BLM Sensitive.



Description[147]

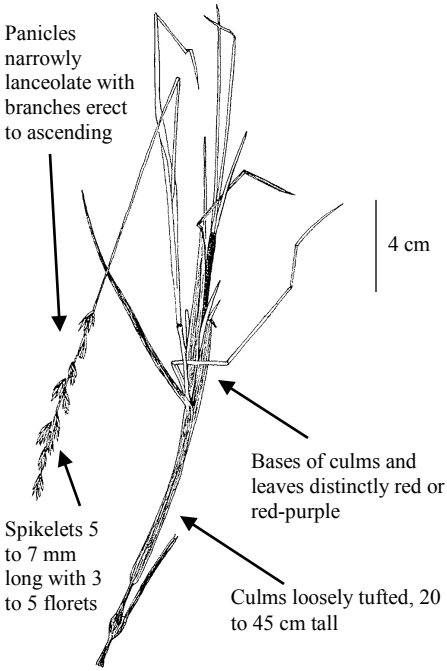
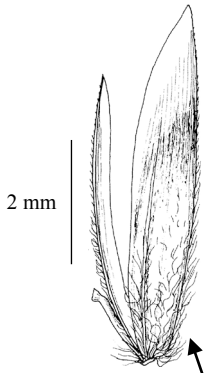


Illustration by Dominique Collet

Illustration by Sandy Long, courtesy of Intermountain Herbarium



Lemmas 5.5 to 7 mm long, loosely pubescent with soft hairs in the lower half and with hairs around the callus, sparsely villous on keel and marginal veins

General: Perennial grass, loosely tufted; culms 20 to 45 cm tall, usually decumbent; bases of leaves and culms distinctly red or red-purple.

Leaves: Sheaths closed for up to $^{1}/_{3}^{rd}$ of their length, bases of basal sheaths glabrous; ligules 5 to 7 mm long, smooth or slightly rough; blades 2 to 9 cm long, 1.5 to 3 mm wide, folded or with margins rolled inwards, apices narrowly prow-shaped.

Inflorescences: Panicles 7 to 12 cm long, erect, narrowly lanceolate with 7 to 40 spikelets; nodes usually with 2 branches; branches 1 to 3 cm, erect to ascending with 1 to 10 spikelets in the upper $^{2}/_{3}^{rds}$.

Spikelets: Spikelets 5 to 7 mm long, 3.5 to 4 times longer than wide, lanceolate; florets 3 to 5; upper glumes 5 to 6 mm long, often exceeding lowest lemmas; lemmas 5.5 to 7 mm long, loosely pubescent with soft hairs in the lower half and with hairs around the callus, margins membranous.



Ecology

Elevation: Usually occurs from near sea level to 20 m; known from up to 860 m in the eastern Brooks Range.

Landform: Rivers bars, floodplains, active sand dunes.

Soil Type: Sand, silt.

Moisture regime: Dry to moist.

Slope: Flat to gently sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated.

Associated species: *Artemisia borealis*, *Deschampsia brevifolia*, *Dupontia fisheri*, *Festuca rubra*, *Leymus mollis*, *Poa arctica* ssp. *lanata*, *Poa sublanata*, *Rumex aureostigmaticus*.

Longevity: Perennial; longevity unknown.

Phenology: Flowering July.

Population estimate: There are seven known occurrences in Alaska; the total state population is likely several thousand individuals.[148]

Reproductive biology: *Poa hartzii* ssp. *hartzii* is apomictic,[114] and it sets seed despite its poorly developed anthers and lack of pollen.[147] However, reproductive strategies between subspecies may differ: while *Poa hartzii* ssp. *hartzii* rarely forms anthers, the anthers of *Poa hartzii* ssp. *alaskana* are well-developed and shed pollen.[147]

Similar Species[147]

Deschampsia brevifolia and *Dupontia fisheri* can appear similar to *Poa hartzii* ssp. *alaskana* and can occur in the same or similar habitats. *Deschampsia brevifolia* is differentiated from *Poa hartzii* ssp. *alaskana* by the presence of awns on the lemmas. Both *Deschampsia brevifolia* and *Dupontia fisheri* are differentiated from *Poa hartzii* ssp. *alaskana* by lemmas that do not exceed the upper glumes. *Poa hartzii* ssp. *alaskana* can be confused with several other *Poa* species that grow in sandy riverbanks, dunes, and floodplains in arctic Alaska. These similar *Poa* species can be distinguished from each other according to the morphological features listed in the table below.

Species	Leaf and culm bases	Basal Branching	Spikelets	Anthers
Poa hartzii* ssp. *alaskana	Red or red-purple	Branches emerge from both the sides of sheaths and the tops of sheaths	Not viviparous	2.0 to 2.8 mm long
Poa hartzii* ssp. *vrangelica	Red or red-purple	Branches emerge from both the sides of sheaths and the tops of sheaths	Viviparous	Aborted, usually around 0.8 mm long
Poa glauca	Lacks red or red-purple bases	Branches emerge primarily from the sides of the sheaths	Not viviparous	1.8 to 2.5 mm long
Poa arctica	Lacks red or red-purple bases	Branches emerge primarily from the sides of the sheaths	Sometimes viviparous	1.2 to 2.5 mm long
Poa alpina	Lacks red or red-purple bases	Branches emerge from the tops of the sheaths	Uncommonly viviparous (in Alaska)	1.3 to 2.3 mm long


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Global Distribution: Endemic to Alaska, Yukon, and Northwest Territories.

Alaska Distribution: Arctic Tundra, Intermontane Boreal.

Ecoregions Occupied: Brooks Range, North Ogilvie Mountains, Yukon-Tanana Uplands.

Conservation Status: S2S3 G3; BLM Sensitive.



Description[24, 147]

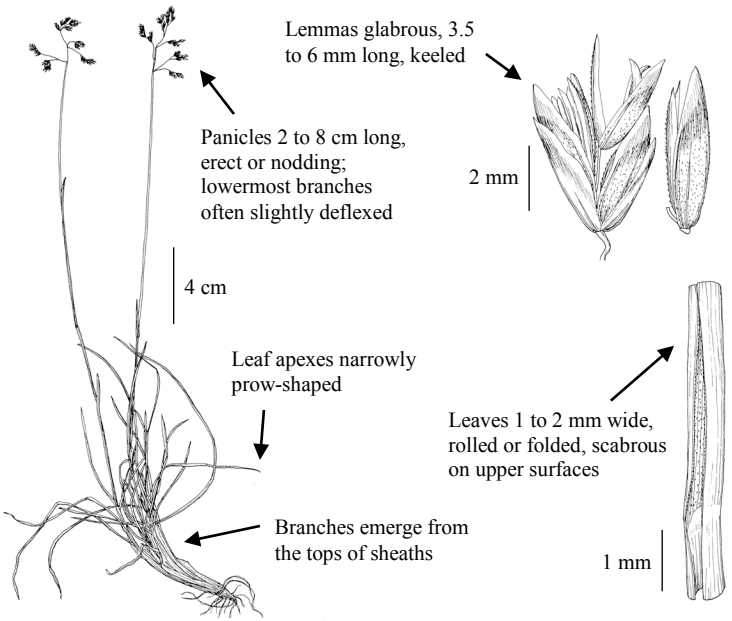


Illustration by Sandy Long, courtesy of Intermountain Herbarium

General: Perennial grass, dioecious, densely to loosely tufted, often forming large tussocks; branches emerge from the tops of sheaths; culms 17 to 40 cm tall, erect or with decumbent bases, 1 or 2 nodes.

Leaves: Sheaths closed for $^{1}/_{3}^{rd}$ to $^{2}/_{3}^{rds}$ of their length, bases of basal sheaths glabrous; ligules of stem leaves 1 to 2 mm long, smooth; ligules of basal leaves less than 0.5 mm long, scabrous; blades 1 to 3 mm wide, rolled or folded, apexes narrowly prow-shaped; upper surfaces scabrous.

Inflorescences: Panicles 2 to 8 cm long, erect or nodding, ovoid to pyramidal with less than 20 spikelets; nodes with 1 or 2 branches; branches 2 to 4 cm long, lowermost branches often slightly deflexed, spikelets 1 to 3 crowded near end of branches.

Spikelets: Spikelets 4 to 7.5 mm long, up to 3 times longer than width, broadly lanceolate or narrowly ovate, often purple-tinted; florets 3 to 5; glumes distinctly keeled, lower glumes shorter than lowest lemmas; lemmas 3.5 to 6 mm long, glabrous, distinctly keeled.



Ecology

Elevation:	Known from 900 to 1,480 m in Alaska; up to 1,680 m in Yukon.
Landform:	Alpine slopes, alpine ridges, subalpine slopes, seepage slopes, rock outcrops.
Soil Type:	Scree, gravel; usually associated with calcareous substrates.
Moisture regime:	Usually moist, less commonly mesic or dry.
Slope:	5° to at least 40°.
Aspect:	Often, but not limited to, southwest to south to southeast; also on all other aspects.
Vegetation type:	Graminoid-forb meadow, *Dryas* tundra, *Dryas*-willow tundra, dwarf shrub-sedge tundra, *Dryas* heath, herbaceous heath.
Associated species:	*Carex bigelowii*, *Corydalis pauciflora*, *Draba ogilviensis*, *Dryas alaskensis*, *Festuca altaica*, *Myosotis alpestris*, *Ranunculus turneri*, *Salix alaxensis*, *Salix reticulata*.
Longevity:	Perennial; longevity unknown.
Phenology:	Flowering begins in early June.
Population estimate:	There are 24 known occurrences in Alaska; populations range from scattered individuals to locally abundant.
Reproductive biology:	Dioecious;[147] some populations consist of female plants only.
Herbivory:	Likely grazed by Dall sheep.



Similar Species[24, 147]

The table below shows the morphological features that differentiate *Poa* species that lack distinctly webbed lemmas and occur in alpine and subalpine habitats of northeastern Alaska. The primary diagnostic feature in distinguishing *Poa porsildii* from the other species listed below is the glabrous lemma.

Species	Basal Branching	Leaves	Lemma	Floral Morphology
Poa porsildii	Branches emerge from the tops of the sheaths	Apexes narrowly prow-shaped	Glabrous	Dioecious
Poa glauca	Branches emerge primarily from the sides of the sheaths	Apexes narrowly prow-shaped	Pubescent with short hairs on the keel and marginal nerve, usually minutely pubescent between nerves	Monoecious
Poa alpina	Branches emerge from the tops of the sheaths	Apexes broadly prow-shaped	Long, wooly hairs between keel and marginal nerve	Monoecious
Poa arctica	Branches emerge primarily from the sides of the sheaths	Apexes broadly prow-shaped	Long, wooly hairs between keel and marginal nerve	Monoecious

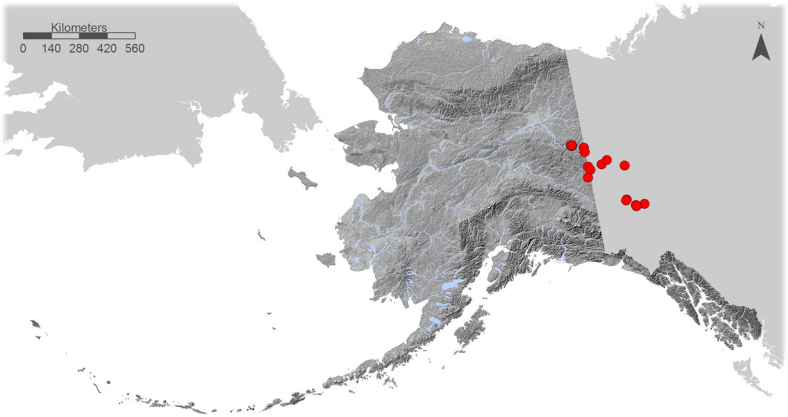


Global Distribution: Endemic to unglaciated portions of Yukon and eastern Alaska.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: North Ogilvie Mountains (Upper Yukon River Valley), Yukon-Tanana Uplands (Divide Mountain).

Conservation Status: S1S2 G2; BLM Watch.



Description[24, 25, 149]

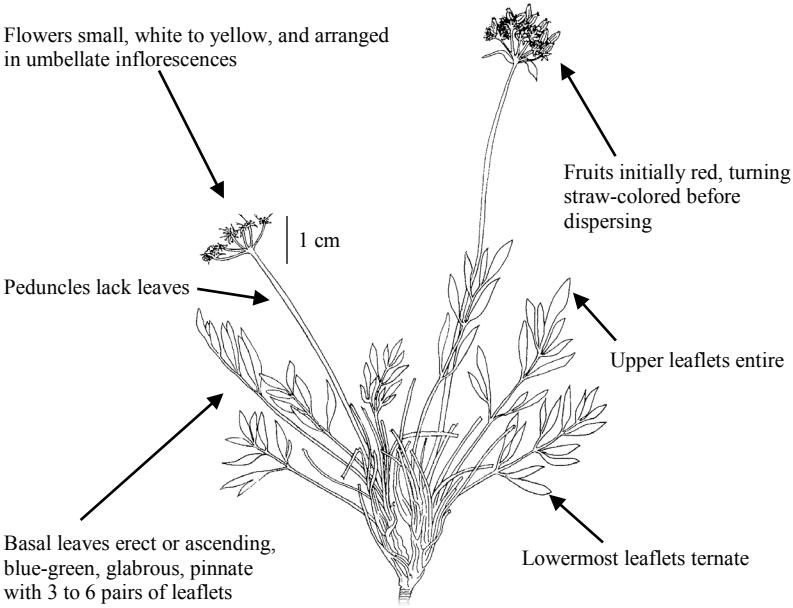


Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

General: Tufted perennial herb from branched caudex and stout, elongated taproot; stems absent.

Leaves: Petioles 3 to 6 cm long, sheathing at base; leaves 3 to 6 cm long, glabrous, pinnate, blue-green; leaflets arranged in 3 to 6 pairs, orbicular to lanceolate, 0.5 to 1.5 mm long, lowermost ternate, others entire.

Flowers: Peduncles 5 to 20 cm long; involucre of 1 to few linear bracts; umbels compound with 4 to 8 rays; rays 5 to 10 mm long; involucels of 5 linear bractlets, purple-tinted, 2 to 5 mm long; petals oblong-ovate, yellow-white.

Fruits: Fruits oval-oblong, red-tinted, turning straw colored before dispersal, 3 mm long with prominent ribs.



Ecology

Elevation: Known from 150 to 1,280 m in Alaska; up to 2,280 m in Yukon.[84]

Landform: Mountain slopes, river bluffs, rock outcrops.

Soil Type: Scree, rock; less abundant or absent where bedrock is deeply buried in scree;[84] associated with calcareous substrates or shale.

Moisture regime: Dry.

Slope: Steep slopes.

Aspect: Southeast to south to southwest.

Vegetation type: Sparsely vegetated; absent from adjacent graminoid steppes and open aspen forests.[84]

Associated species: *Artemisia frigida*, *Artemisia tanacetifolia*, *Bupleurum triradiatum*, *Calamagrostis purpurascens*, *Chamerion angustifolium*, *Douglasia arctica*, *Erigeron caespitosus*, *Erigeron compositus*, *Festuca lenensis*, *Galium boreale*, *Hierochloë alpina*, *Maianthemum stellatum*, *Minuartia arctica*, *Potentilla nivea*, *Rosa acicularis*, *Rubus idaeus*, *Saxifraga tricuspidata*, *Selaginella sibirica*.

Longevity: Perennial, moderately long-lived as indicated by persistent petiole bases and peduncles.

Phenology: Flowering early May; fruiting early June through July.[84]

Reproductive biology: Plants spread downslope, often in a linear fashion, through scree and talus from their elongating and branching caudices;[84] fruit development is likely staggered as umbels often bear both flowers and fruits simultaneously.[84]

Population estimate: There are six known occurrences in Alaska grouped in four areas: Kathul Mountain, headwaters of Pleasant Creek, Hillard Peak, and Divide Mountain. Populations range from locally rare to abundant; the population at Kathul Mountain was estimated at 1,000 to 3,000 genets, and the population at Hillard Peak was estimated at over 1,000 individuals.[84] However, seemingly separate individuals may be connected by the elongating caudex.[150]

Similar Species[24, 25]

Podistera yukonensis can be confused with the closely related and superficially similar *Podistera macounii*. Both species occur in similar habitats in eastern Alaska but can be differentiated by the morphological features listed in the table below.

Species	Leaflets	Umbels	Flowers	Fruits
Podistera yukonensis	Leaflets entire except lowermost pair	4 to 8 rays	Yellow-white	3 mm long
Podistera macounii	Leaflets lobed or incised	5 to 20 rays	Purple or white	4 to 5 mm long


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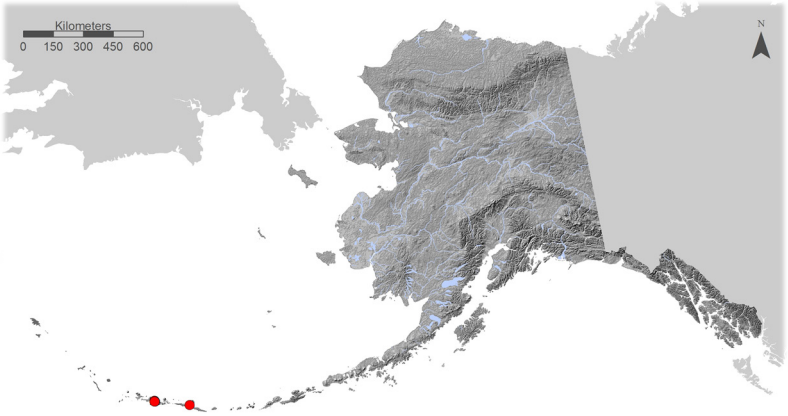

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Global Distribution: Endemic to Aleutian Islands.

Alaska Distribution: Aleutian Meadows.

Ecoregions Occupied: Aleutian Islands (Adak Island; a population discovered in 1932 on Atka Island has not been relocated).[151]

Conservation Status: S1 G1; Endangered.



Description[25, 152, 153]

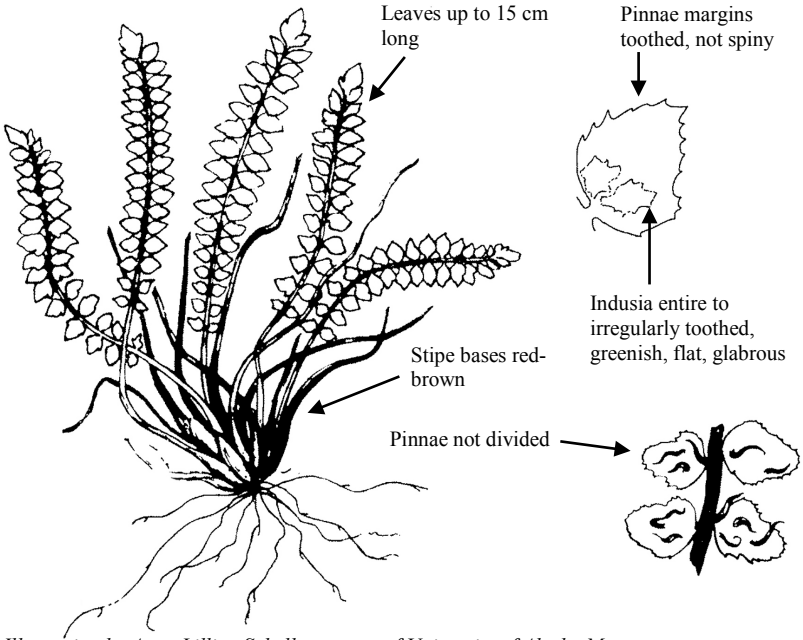


Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

General: Tufted fern from stout, dark brown rhizomes; stipes erect, stipe bases red-brown; scales tan, entire, up to 3 mm long, found on all parts of plant but falling off early (absent or sparse at maturity).

Leaves: Leaves 10 to 15 cm long, bulblets absent; stipes $^1/_6{}^{th}$ to $^1/_4{}^{th}$ length of leaves; blade linear-lanceolate, once pinnate, gradually tapered to base.

Pinnae: Pinnae arranged in 15 to 20 pairs per leaf, light to dark green, deltate to ovate, slightly overlapping, 3 to 8 mm long; bases abruptly tapering; margins toothed, not spiny; apexes rounded, lacking teeth.

Sori: Sori located on upper section of frond; indusia entire to irregularly toothed, greenish, flat, glabrous; spores brown.



Ecology

Elevation: Known from 340 m to 540 m.

Landform: Cliffs, rock outcrops; often in protected areas such as gullies or grottos.[154]

Soil Type: Rock; often rooting in fissures, crevices, and thinly soiled ledges; associated with volcanic substrates, when soils are present they are usually acidic.

Moisture regime: Usually moist.

Slope: Steep.

Aspect: East to northeast, these aspects are generally protected from the prevailing winds during the snow-free season.[151]

Vegetation type: Dwarf willow – sedge meadows, sedge – forb meadows.

Associated species: *Anemone narcissiflora*, *Arnica unalaschcensis*, *Carex macrochaeta*, *Salix rotundifolia*; moss spp.

Longevity: Perennial, long-lived.[154]

Phenology: Leaves appear soon after snow-melt; spores mature July, possibly sooner, through September; phenology likely varies much between years depending on the snow characteristics of specific sites.[154]

Population estimate: There are four known occurrences in Alaska, not including the occurrence reported from Atka Island, which has not been relocated since 1932;[151] total state population is slightly more than 100 individuals,[151] although seemingly independent plants may be connected by rhizomes.[154]

Reproductive biology: Reproduces asexually from rhizomes in addition to the sexual reproduction cycle typical of ferns (having haploid and diploid phases);[154] vegetative propagation by rhizomes may be the primary form of reproduction.[154]

Similar Species[25, 152, 153]

Polystichum aleuticum is most closely related to *Polystichum lachanense*, the nearest location of which is in northern Japan. The relationship between these two species is unclear and requires genetic study. They may belong within one species.[155]

In the Aleutian Islands, *Polystichum lonchitis* and *Cystopteris fragilis* can be mistaken for *Polystichum aleuticum*, especially when they are immature. *Woodsia alpina* also looks superficially similar but is not known to occur in the Aleutian Islands. The table below distinguishes *Polystichum aleuticum* from superficially similar species that occur in Alaska.

Species	Leaves	Stipes	Pinnae	Pinnae Margins
Polystichum aleuticum	Up to 15 cm long	Not jointed at base	Not divided	Toothed, not spiny
Polystichum lonchitis	Up to 60 cm long	Not jointed at base	Not divided	Spiny
Cystopteris fragilis	Up to 40 cm long	Not jointed at base	Pinnate or pinnatifid	Toothed, not spiny
Woodsia alpina	Up to 20 cm long	Jointed at base	Largest pinnae with 1 to 3 pairs of major divisions	Entire or round-toothed


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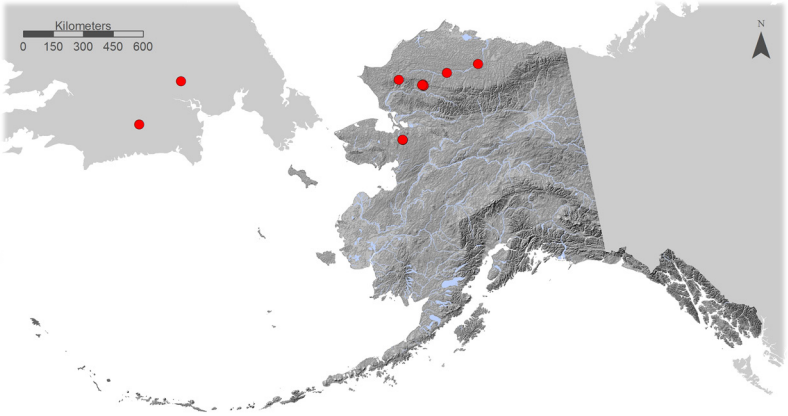

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Global Distribution: Northern Russia through Russian Far East to Alaska, disjunct in Greenland.

Alaska Distribution: Arctic Tundra, Bering Tundra.

Ecoregions Occupied: Brooks Foothills, Brooks Range, Seward Peninsula.

Conservation Status: S2 G5; BLM Sensitive.



Description[25, 132]

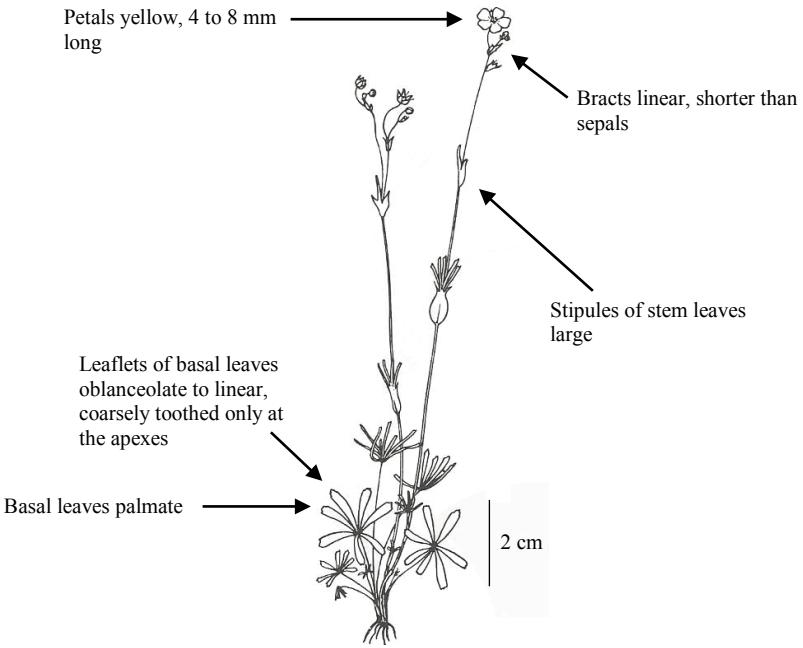


Illustration by Dagny Tande-Lid, courtesy of Stanford University Press

General: Perennial herb from thin caudex; stems usually 15 to 35 cm tall.

Leaves: Basal leaves 4 to 20 cm long, glabrous, palmate with 7 to 9 leaflets, stipules small, petioles long and slender; leaflets oblanceolate to linear, coarsely toothed only at the apexes, entire along the sides; largest leaflet 1 to 3.5 cm long, 2 to 8 mm wide; stem leaves gradually reduced; stipules of stem leaves very large, ovate to oblong.

Flowers: Flowers few to several per stem; bractlets linear, 3 to 5 mm long; sepals 4 to 7 mm long, triangular, ciliate; petals yellow, slightly longer than sepals, 4 to 8 mm long.

Fruits: Nutlets numerous, 1.5 mm long.



ALA 49893

Ecology

Elevation: Known from 10 to 700 m in Alaska.

Landform: Meadows, stream banks, river banks, river terraces, river bluffs, floodplains, lake shores.

Soil Type: Sand, silt, loam, mud, gravel, cobbles.

Moisture regime: Mesic to wet.

Slope: Gentle to moderate.

Aspect: Often, but not limited to, southeast to south to southwest.

Vegetation type: Graminoid meadow enclosed by tall willow and alder, graminoid-*Salix*-*Dryas* tundra, *Dryas*-heath hummock tundra, sedge tussock.

Associated species: *Alnus* spp., *Bromopsis pumpelliana*, *Potentilla hookeriana*, *Potentilla nivea*, *Salix* spp., *Saxifraga tricuspidata*, *Trisetum spicatum*.

Longevity: Perennial, moderately long-lived.[63]

Phenology: Mostly in flower through mid-July.[63]

Population estimate: There are eight known occurrences in five general areas in Alaska; population sizes unknown.

Similar Species[25, 132]

Potentilla stipularis is not easily confused with other *Potentilla* species that occur in Alaska because of the distinctive, large stipules of its stems leaves and the linear to oblanceolate, apically toothed leaflets of its basal leaves. The table below shows the morphological and habitat features that distinguish *Potentilla stipularis* from the superficially similar *Potentilla biflora*, which also occurs in northern Alaska.

Species	Habitat	Caudex	Stipules	Bractlets
Potentilla stipularis	Meadows, stream banks, bluffs, floodplains	Thin	Stipules of stem leaves large	Linear, shorter than the calyx lobes
Potentilla biflora	Rocky slopes, heaths	Thick, branched, covered in persistent, brown leaf bases	Stipules of stem leaves small	Ovate-laceolate, as long as the sepals


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Primula tschuktschorum Kjellman **Primulaceae**

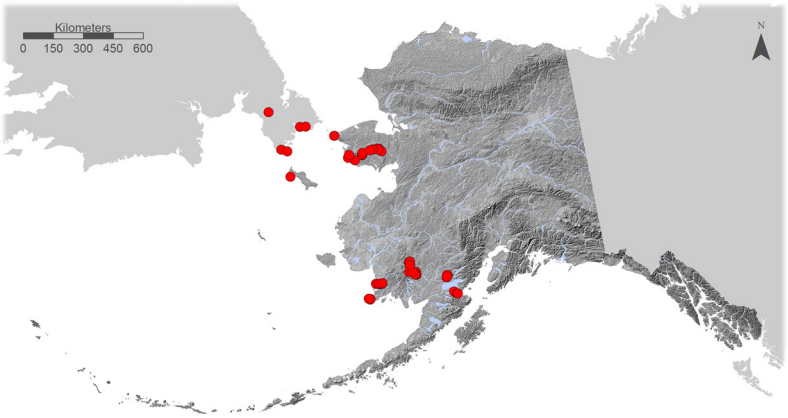
Notes: *Primula tschuktschorum* sensu Hultén is polyphyletic.

Global Distribution: Amphi-Beringian.

Alaska Distribution: Bering Tundra, Bering Taiga, Alaska Range Transition, Aleutian Meadows.

Ecoregions Occupied: Seward Peninsula, Bering Sea Islands, Ahklun Mountains, Lime Hills, Alaska Peninsula.

Conservation Status: S3 G2G3; BLM Sensitive.



Description[156, 157]

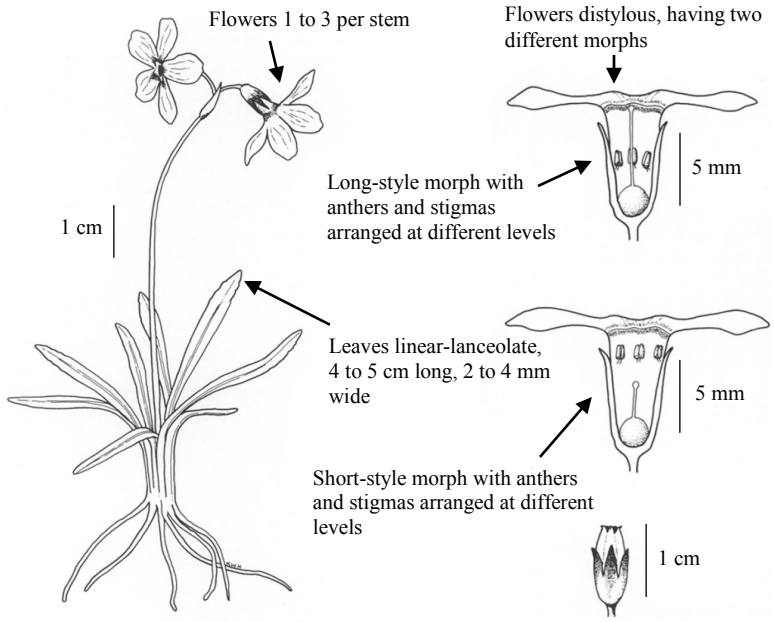


Illustration by Kay Holmes, courtesy of New York Botanical Garden

General: Perennial herb from stout rhizome; rosettes not clumped; stems leafless, 2 to 15 cm tall.

Leaves: Petioles indistinct, winged; leaves basal, linear-lanceolate, 4 to 5 cm long, 2 to 4 mm wide, glabrous, fleshy with entire or shallowly toothed margins.

Flowers: Flowers arranged in groups of 1 to 6; bracts equal to or shorter than length of pedicels; pedicels erect to slightly reflexed, 2 to 10 mm long, bent; calyxes green or green-black, campanulate, divided with narrow teeth, 5 to 7 mm long; corollas pink or rarely blue, tubes 5 to 7 mm long, lobes 5 to 10 mm long; flowers are distylous, with a long-style morph and a short-style morph, both of which have the anthers and stigmas arranged at different levels.

Fruits: Capsules broadly cylindrical, 2 times longer than calyxes.



Ecology

Elevation: Known from 40 to 950 m in Alaska.

Landform: Stream banks, subarctic lowlands, wet meadows, alpine slopes, solifluction slopes, frost boils, pond shores, lake shores.

Soil Type: Sand, mud, gravel, cobbles, scree, boulders; occurs on both calcareous and acidic substrates.

Moisture regime: Usually moist to wet throughout growing season, sometimes in shallow running water; sometimes associated with late-melting snow beds.

Slope: Flat to slopes of at least 30°.

Aspect: No particular aspect.

Vegetation type: Herbaceous meadows, graminoid herbaceous meadows, sedge meadow, low shrub-*Dryas* tundra; sometimes in open, rocky microsites.

Associated species: *Calamagrostis canadensis*, *Carex bigelowii*, *Carex podocarpa*, *Empetrum nigrum*, *Equisetum arvense*, *Festuca altaica*, *Juncus biglumis*, *Pedicularis pennellii*, *Sagina intermedia*, *Salix fuscescens*, *Salix ovalifolia*, *Salix pulchra*, *Sanguisorba sitchensis*, *Vaccinium uliginosum*; often associated with mosses.

Longevity: Perennial, longevity unknown.

Population estimate: There are 36 known occurrences in Alaska; populations often consist of roughly 50 of fewer individuals, and some populations are significantly decreasing, especially at Kuzitrin Lake where several thousand individuals were observed in 1995.[158]

Reproductive biology: *Primula tschuktschorum* is a primarily outcrossing species with two floral morphs (short-style and long-style);[156] crosses between long-style morphs do not result in seed production, but self-fertilization of both morphs and crosses between short-style morphs do produce seed;[158] reproduction is inefficient and seed set is low possibly because of the decreasing availability of necessary insect pollinators and competition from the self-compatible and autogamous *Primula pumila*;[158] forms hybrids with *Primula pumila* in locations where the two co-occur.[158]

Herbivory: Canada geese graze on *Primula tschuktschorum*, destroying the reproductive scapes.[158]



Similar Species[156, 157]

Primula pumila, a homostylous species recently diverged from *Primula tschuktschorum*, is widespread and common in western Alaska. The two species are closely related and occur in similar or the same habitats. The table below shows the morphological differences that distinguish the two species. Unlike most *Primula* species that occur in Alaska, which have divided corolla lobes, both *Primula tschuktschorum* and *Primula pumila* have undivided corolla lobes.

Species	Immature Plants	Leaves	Inflorescences	Flowers
Primula tschuktschorum	Lack white, powdery covering	Linear-lanceolate, 2 to 4 mm wide	Usually 1- to 6-flowered	Anthers and stigmas are arranged at different levels (distylous)
Primula pumila	White, powdery covering present	Elliptic to lanceolate, 7 to 30 mm wide	Usually 3- to 20-flowered	Anthers and stigmas are arranged at the same level (homostylous)



Puccinellia vahliana (Liebm.) Scribn. & Merr. **Poaceae**

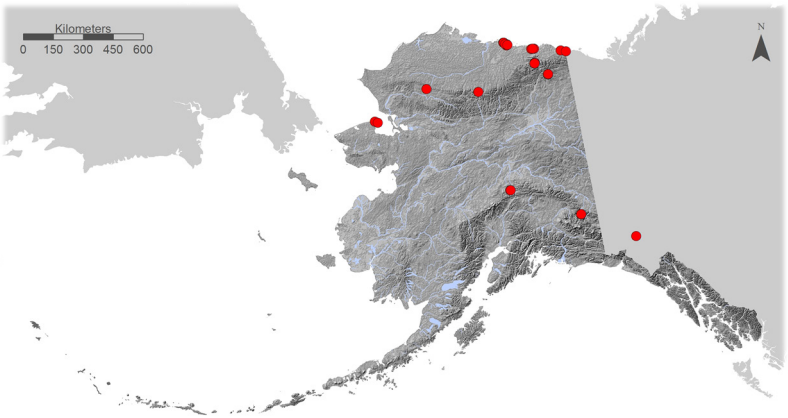
Synonyms: *Colpodium vahlianum*

Global Distribution: Alaska through northern Canada to Greenland, Svalbard, Franz Josef Land, and Novaya Zemlya.

Alaska Distribution: Arctic Tundra, Bering Tundra, Alaska Range Transition, Coastal Mountains Transition.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Range, Kotzebue Sound Lowlands, Alaska Range, Kluane Ranges.

Conservation Status: S3 G4; BLM Watch.



Description[24, 25, 159]

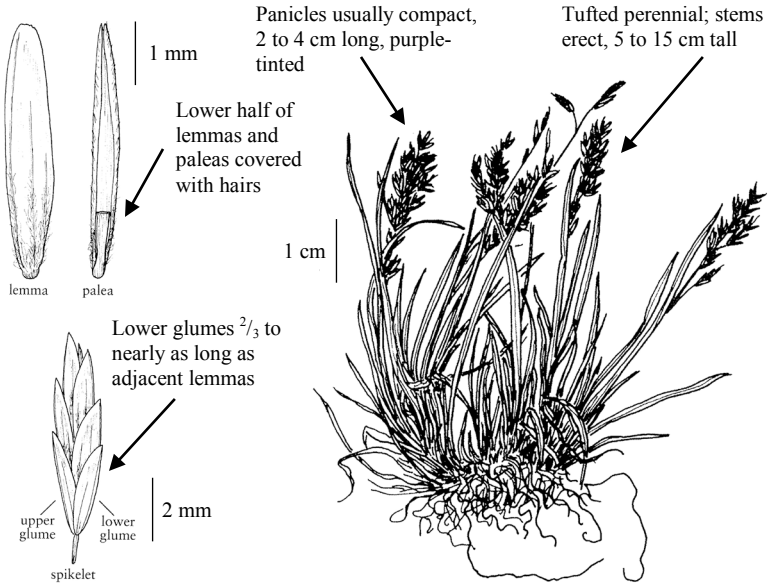


Illustration by Cindy Talbot Roché, courtesy of Intermountain Herbarium

General: Perennial, tufted grass, not mat-forming, from thick, curled roots; stems erect, 5 to 15 cm tall.

Leaves: Blades flat or folded, yellow-green, glabrous, 2 to 8 mm wide; ligules entire, 1 to 2.5 mm long; stem leaves 1 to 3.

Inflorescences: Panicles 2 to 4 cm long, usually compact, sometimes slightly spreading at maturity; lower branches of panicle long and short, erect to ascending with spikelets on the upper $^{2}/_{3}$rds.

Spikelets: Spikelets 3.8 to 6.5 mm long with 2 to 4 florets; glumes broadly ovate, enfolding the base of the lower lemmas, lower glumes 2 to 3.5 mm long and at least $^{2}/_{3}$ as long as adjacent lemmas, upper glumes 2.4 to 4 mm long; lemmas purple-tinted, 5-veined, hairy on the lower half, 3 to 5.2 mm long; palea veins covered with curly, intertwined hairs on the lower half.





Ecology

Elevation: Known from near sea level to 1,920 m in Alaska.

Landform: Alpine slopes, alpine ridges, frost-boils, high-center polygons, pingos, beaches, fens; pond edges and stream banks in dune areas.

Soil Type: Silt, sand, coarse mineral soil, gravel; often associated with calcareous substrates or shale.

Moisture regime: Moist to wet; sometimes in seepage areas.

Slope: Gentle to steep.

Aspect: No particular aspect.

Vegetation type: Open herbaceous meadows, wet meadows, *Dryas* tundra, sparsely vegetated.

Associated species: *Braya glabella* ssp. *purpurascens*, *Bromopsis pumpelliana*, *Cochlearia groenlandica*, *Deschampsia brevifolia*, *Deschampsia cespitosa*, *Elymus violaceus Festuca viviparoidea*, *Oxyria digyna*, *Poa alpigena*, *Poa arctica*, *Puccinellia andersonii*, *Salix arctica*, *Salix ovalifolia*.

Longevity: Perennial, longevity unknown.

Population estimate: There are 23 known occurrences in Alaska; several populations consist of scattered individuals or are locally rare and at least one population is locally common.

Reproductive biology: In arctic Atlantic regions, Canadian Arctic Archipelago, and Russian arctic islands, *Puccinellia vahliana* has hybridized with *Phippsia algida*, forming the triploid hybrid × *Pucciphippsia vacillans*.[42]

Similar Species[1, 2, 159]

Many *Puccinellia* species are known to occur in northern Alaska and all can potentially be confused with one another. The table below shows the morphological and habitat characteristics that distinguish the *Puccinellia* species of Northwest Alaska. (Table continues on next page).

Species	Panicles	Lower Glumes	Palea Veins	Habitat
Puccinellia vahliana	Compact, sometimes slightly diffuse at maturity, 2 to 4 cm long; panicle branches smooth	2 to 3.5 mm long, $^2/_3$ to nearly as long as the adjacent lemmas	Curly, intertwined hairs on lower half	Alpine slopes, ridges, stream banks, fens
Puccinellia wrightii* ssp. *wrightii	Spreading, 5 to 8 cm long; panicle branches smooth	1.7 to 3 mm long, less than $^2/_3$ as long as the adjacent lemmas	Curly, intertwined hairs on lower half	Alpine slopes, terraces, seepages, wet meadows

Species	Panicles	Lower Glumes	Palea Veins	Habitat
Puccinellia phryganodes	Usually not developed, diffuse if present, 1 to 7 cm long; panicle branches scabrous	1.5 to 2.2 mm long	Glabrous	Seashores at high tide line, wet saline meadows, salt marshes
Puccinellia tenella	Usually contracted, 1.6 to 5.5 cm long; panicle branches smooth	0.7 to 1.3 mm long	Glabrous	Seashores above high tide zone, salt marshes
Puccinellia pumila	Dense to diffuse at maturity, 3 to 20 cm long; panicle branches smooth or slightly scabrous	1.4 to 2 mm long	Glabrous	Protected intertidal areas
Puccinellia andersonii	Contracted to diffuse at maturity, 5 to 8 cm long; panicle branches smooth or scabrous	1 to 2 mm long	Glabrous	Seashores near high tide line
Puccinellia nutkaensis	Dense to diffuse at maturity, 5 to 30 cm long; panicle branches scabrous	1 to 1.6 mm long	Glabrous or with short hairs on the lower half	Protected intertidal areas
Puccinellia nuttalliana	Dense to diffuse at maturity, 5 to 30 cm long; panicle branches scabrous	0.5 to 1.5 mm long, usually less than ½ as long as the adjacent lemmas	Glabrous, short-ciliate, or with a few long hairs on the lower half	Alkaline soil on coast or in interior
Puccinellia vaginata	Contracted to diffuse at maturity, 6 to 12 cm long; panicle branches slightly scabrous	1.3 to 2.1 mm long	Glabrous	Coastal marine sediments, eroding raised marine sediments inland

Puccinellia wrightii ssp. w*rightii* (Scribn. & Merr.) Tzvelev **Poaceae**

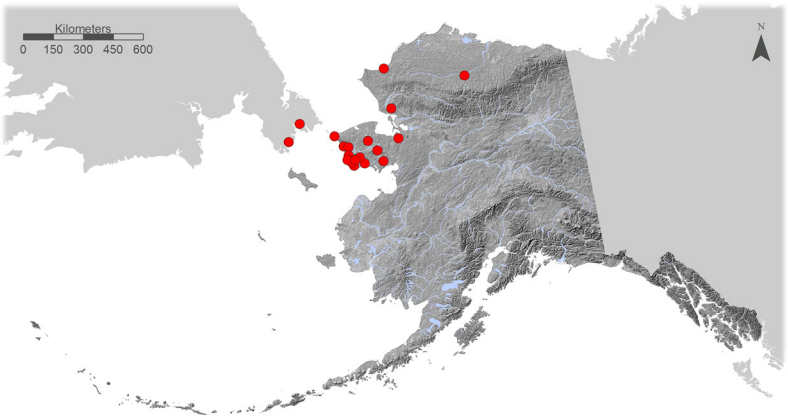
Synonyms: *Colpodium wrightii*

Global Distribution: Amphi-Beringian (ssp. *colpodioides* is known only from Wrangel Island).

Alaska Distribution: Arctic Tundra, Bering Tundra; a single occurrence in the Intermontane Boreal region as well.

Ecoregions Occupied: Seward Peninsula, Kotzebue Sound Lowlands, Kobuk Ridges and Valleys, Brooks Foothills.

Conservation Status: S3 G3G4TNR; BLM Sensitive.



Description[25, 159]

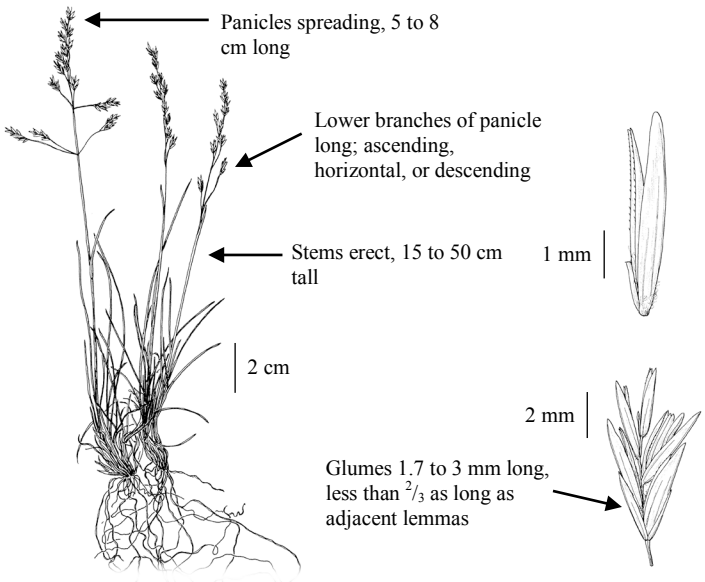


Illustration by Cindy Talbot Roché, courtesy of Intermountain Herbarium

General: Perennial, tufted grass from thick, curled roots; stems erect, 15 to 50 cm tall.

Leaves: Blades mostly basal, flat or folded, 2 to 8 mm wide; ligules entire, 1.5 to 3 mm long.

Inflorescences: Panicles 5 to 8 cm long, spreading, glabrous; lower branches of panicle long, ascending, horizontal, or descending.

Spikelets: Spikelets few at apices of branches, purple-tinted, 4 to 7 mm long with 3 to 5 florets; glumes narrow, not enfolding the base of the lower lemmas, lower glumes 1.7 to 3 mm long, upper glumes 2.5 to 4 mm long; lemmas lanceolate, 5-veined, hairy on the lower half, 4 to 5 mm long; palea scabrous towards the tips, hairy on the veins in the lower half.



Ecology

Elevation: Known from near sea level to 640 m in Alaska.

Landform: Alpine slopes, rock outcrops, seepages, wet meadows.

Soil Type: Associated with calcareous substrates.

Moisture regime: Mesic to wet.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Dwarf shrub and herbaceous graminoid meadows, *Dryas* heath, eutrophic tundra.

Associated species: *Acomastylis rossii*, *Armeria scabra*, *Claytonia sarmentosa*, *Dryas* spp., *Erigeron humilis*, *Gentianella propinqua*, *Juncus biglumis*, *Juncus castaneus*, *Kobresia sibirica*, *Micranthes calycina*, *Primula anvilensis*, *Primula pumila*.

Longevity: Perennial, longevity unknown.

Population estimate: There are 18 known occurrences in Alaska; population sizes unknown.

Similar Species[25, 159]

Many *Puccinellia* species are known to occur in Northwest Alaska and all can potentially be confused with one another. The table below shows the morphological and habitat characteristics that distinguish the *Puccinellia* species of Northwest Alaska. (Table continues on next page).

Species	Panicles	Lower Glumes	Palea Veins	Habitat
Puccinellia wrightii* ssp. *wrightii	Spreading, 5 to 8 cm long; panicle branches smooth	1.7 to 3 mm long, less than $^2/_3$ as long as the adjacent lemmas	Curly, intertwined hairs on lower half	Alpine slopes, terraces, seepages, wet meadows
Puccinellia vahliana	Compact, sometimes slightly diffuse at maturity, 2 to 4 cm long; panicle branches smooth	2 to 3.5 mm long, $^2/_3$ to nearly as long as the adjacent lemmas	Curly, intertwined hairs on lower half	Alpine slopes, ridges, stream banks, fens
Puccinellia phryganodes	Usually not developed, diffuse if present, 1 to 7 cm long; panicle branches scabrous	1.5 to 2.2 mm long	Glabrous	Seashores at high tide line, wet saline meadows, salt marshes
Puccinellia tenella	Usually contracted, 1.6 to 5.5 cm long; panicle branches smooth	0.7 to 1.3 mm long	Glabrous	Seashores above high tide zone, salt marshes

Species	Panicles	Lower Glumes	Palea Veins	Habitat
Puccinellia pumila	Dense to diffuse at maturity, 3 to 20 cm long; panicle branches smooth or slightly scabrous	1.4 to 2 mm long	Glabrous	Protected intertidal areas
Puccinellia andersonii	Contracted to diffuse at maturity, 5 to 8 cm long; panicle branches smooth or scabrous	1 to 2 mm long	Glabrous	Seashores near high tide line
Puccinellia nutkaensis	Dense to diffuse at maturity, 5 to 30 cm long; panicle branches scabrous	1 to 1.6 mm long	Glabrous or with short hairs on the lower half	Protected intertidal areas
Puccinellia nuttalliana	Dense to diffuse at maturity, 5 to 30 cm long; panicle branches scabrous	0.5 to 1.5 mm long, usually less than ½ as long as the adjacent lemmas	Glabrous, short-ciliate, or with a few long hairs on the lower half	Alkaline soil on coast or in interior
Puccinellia vaginata	Contracted to diffuse at maturity, 6 to 12 cm long; panicle branches slightly scabrous	1.3 to 2.1 mm long	Glabrous	Coastal marine sediments, eroding raised marine sediments inland

Ranunculus camissonis Schltdl. **Ranunculaceae**

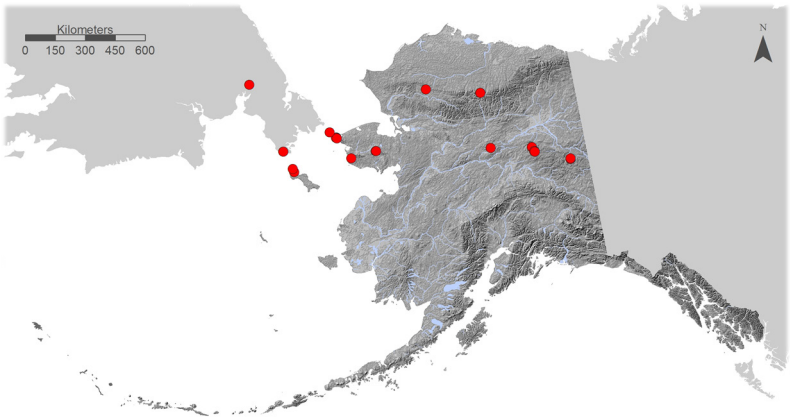
Synonyms: *Ranunculus glacialis* ssp. *chamissonis*

Global Distribution: Amphi-Beringian.

Alaska Distribution: Arctic Tundra, Bering Tundra, Intermontane Boreal.

Ecoregions Occupied: Brooks Range, Kotzebue Sound Lowlands, Seward Peninsula, Bering Sea Islands, Ray Mountains, Yukon-Tanana Uplands.

Conservation Status: S3 GNR; BLM Sensitive.



Description[25, 160, 161]

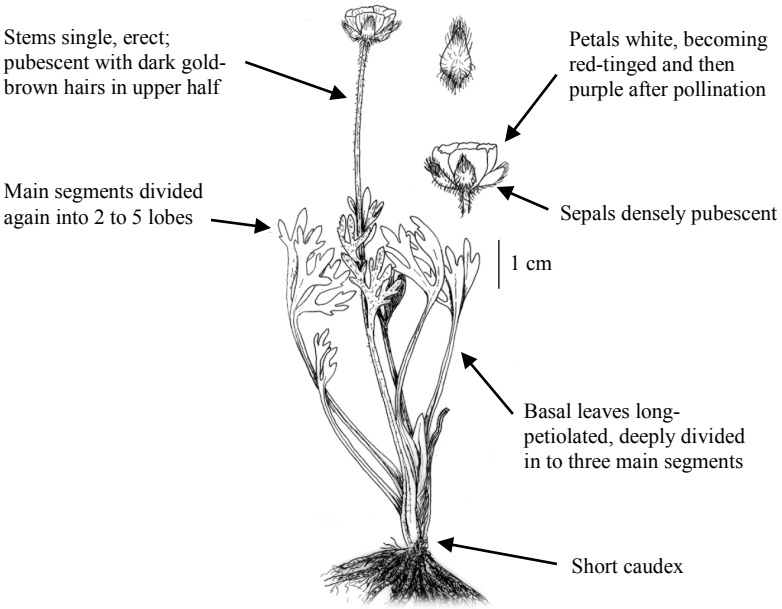


Illustration by Anne Elven, courtesy of Botanical Research Institute of Texas

General: Perennial herb from short caudex; plants glabrous in lower half, pubescent with dark gold-brown hairs in the upper half; stems single, erect.

Leaves: Basal leaves long-petiolated, wedge-shaped in outline, deeply divided into three main segments; main segments oblanceolate to linear, lateral ones often smaller than the central one, often divided again into 2 to 5 lobes; stem leaves 2 to 4, reduced above, sessile above.

Flowers: Flowers usually solitary; peduncles densely pubescent; sepals ovate, densely pubescent, 7 to 12 mm long, 4 to 9 mm wide; petals 5 to 8, broadly obovate, 9 to 15 mm long, 7 to 14 mm wide, white, becoming red-tinged and then purple after pollination.

Fruits: Fruiting heads hemispheric, 5 to 8 mm tall, 7 to 16 mm wide; achenes 2.6 to 3 mm long, glabrous; beaks persistent, lanceolate, 0.8 to 2.3 mm long.



Ecology

Elevation: Known from near sea level to 1,500 m in Alaska.

Landform: Alpine slopes, seepage slopes, rock outcrops, beach ridges, alluvial fans, wet meadows, frost boils.

Soil Type: Mud, gravel, rock; usually associated with calcareous substrates,[161] less commonly found on granite.

Moisture regime: Usually moist to wet, less commonly mesic.

Slope: Flat to slopes of 10°.

Aspect: No particular aspect.

Vegetation type: Sedge-graminoid meadows, *Dryas* tundra, dwarf shrub-forb tundra.

Associated species: *Artemisia tilesii*, *Carex bigelowii*, *Pedicularis oederi*, *Poa arctica*, *Salix arctica*, *Saxifraga nelsoniana*.

Longevity: Perennial, probably short-lived.[109, 115]

Phenology: Flowering mid-June, probably sooner, through early August; fruiting late July through August.

Population estimate: There are 16 known occurrences in Alaska; locally abundant in at least two localities, an occurrence on St. Lawrence Island consisted of approximately 40 individuals.

Herbivory: Evidence of small mammal herbivory has been observed on some plants.

Similar Species[160, 161]

Ranunculus camissonis has in the past been treated as a subspecies of *Ranunculus glacialis*. However, no intermediates have been observed between *Ranunculus camissonis* and *Ranunculus glacialis* ssp. *alaskensis* and, although their ranges overlap on the Seward Peninsula, they are not found within the same habitats. The table below shows the morphological and habitat differences that distinguish *Ranunculus camissonis* and *Ranunculus glacialis* ssp. *alaskensis*. Neither taxa is likely to be confused with other *Ranunculus* species that occur in northern Alaska.

Species	Stems	Basal Leaves	Main Segments	Habitat
Ranunculus camissonis	Single, erect	Deeply divided into three main segments; wedge-shaped in outline	Oblanceolate to linear; again divided into 2 to 5 lobes	Usually calcareous substrates; alpine slopes, seepages, wet meadows
Ranunculus glacialis* ssp. *alaskensis	Several, ascending	Ternately divided; kidney-shaped in outline	Divided into short lobes	Non-calcareous substrates; scree ridges and summits


1 cm
ALA 83771


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Ranunculus glacialis var. *alaskensis* Jurtzev **Ranunculaceae**

Synonyms: *Beckwithia glacialis* ssp. *alaskensis*

Global Distribution: Endemic to Alaska (ssp. *glacialis* is amphi-Atlantic and European).

Alaska Distribution: Bering Tundra.

Ecoregions Occupied: Seward Peninsula.

Conservation Status: S1S2 G4T2; BLM Sensitive.



Description[160, 161]

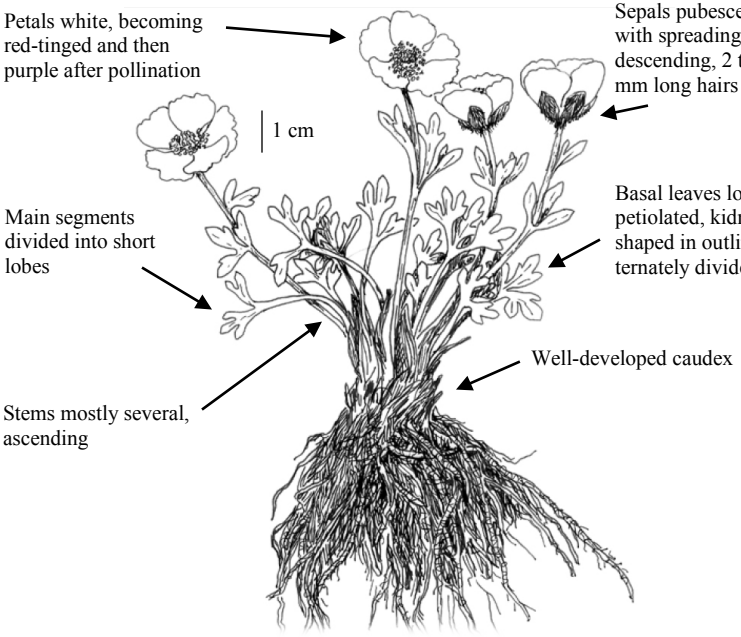


Illustration by Anne Elven, courtesy of Botanical Research Institute of Texas

General: Perennial herb from well-developed caudex; stems mostly several, ascending.

Leaves: Basal leaves long-petiolated, kidney-shaped in outline, ternately divided, glabrous; main segments subdivided into short, obtuse to rounded lobes, lateral main segments nearly the same size as the central one; stem leaves similar but reduced above, lower surfaces pubescent with long hairs.

Flowers: Flowers 1 to 3; peduncles densely pubescent with long hairs; sepals obovate, 7 to 12 mm long, 4 to 9 mm wide, pubescent with spreading to descending, 2 to 4 mm long hairs; petals 5 to 8, broadly obovate, 9 to 15 mm long, 7 to 14 mm wide, white, becoming red-tinged and then purple after pollination.

Fruits: Fruiting heads hemispheric, 5 to 8 mm tall, 7 to 16 mm wide; achenes 2.6 to 3 mm long, glabrous; beaks persistent, lanceolate, 0.8 to 2.3 mm long.



Ecology

Elevation: Known from 220 to 1,000 m.

Landform: Alpine slopes, alpine ridges.

Soil Type: Scree (often platey shale or schist), mineral soil; not associated with calcareous substrates.[161]

Moisture regime: Mesic.

Slope: Gentle to steep.

Aspect: Often, but not limited to, southeast to south; also on all other aspects.

Vegetation type: Sparsely vegetated.

Associated species: *Carex microchaeta*, *Draba lactea*, *Minuartia arctica*, *Oxytropis bryophila*, *Papaver mcconnellii*.

Longevity: Perennial; in Finland, the mean life expectancy of *Ranunculus glacialis* ssp. *glacialis* is 27 years.[162]

Phenology: Flowering late June and July.

Population estimate: There are seven known occurrences in Alaska; population sizes unknown.

Reproductive biology: Sometimes forms clumps of several individuals with intertwined roots.

Herbivory: *Ranunculus glacialis* ssp. *glacialis* is grazed by small mammals in northern and central Europe.[163]

Similar Species[160, 161]

Ranunculus camissonis has in the past also been treated as a subspecies of *Ranunculus glacialis*. However, no intermediates have been observed between *Ranunculus glacialis* ssp. *alaskensis* and *Ranunculus camissonis* and, although their ranges overlap on the Seward Peninsula, they are not found within the same habitats. The table below shows the morphological and habitat differences that distinguish *Ranunculus camissonis* and *Ranunculus glacialis* ssp. *alaskensis*. Neither taxa is likely to be confused with other *Ranunculus* species that occur in northern Alaska.

Species	Stems	Basal Leaves	Main Segments	Habitat
Ranunculus glacialis* ssp. *alaskensis	Several, ascending	Ternately divided; kidney-shaped in outline	Divided into short lobes	Non-calcareous substrates; scree ridges and summits
Ranunculus camissonis	Single, erect	Deeply divided into three main segments; wedge-shaped in outline	Oblanceolate to linear; again divided into 2 to 5 lobes	Usually calcareous substrates; alpine slopes, seepages, wet meadows


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Ranunculus ponojensis (Markl.) Ericsson **Ranunculaceae**

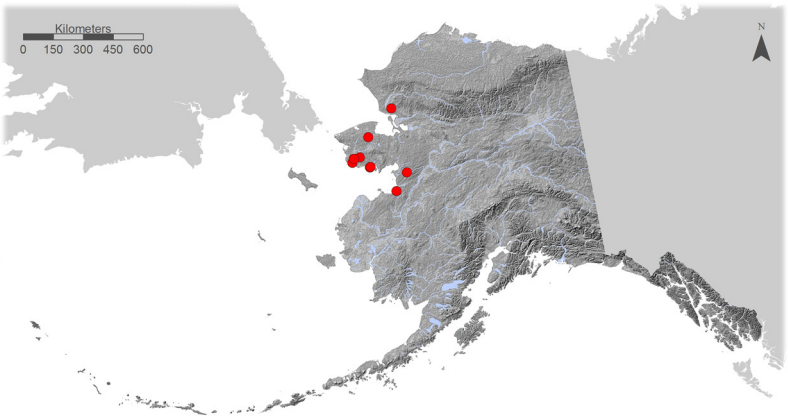
Synonyms: *Ranunculus auricomus* auct. non L. s. lat., *Ranunculus monophyllos* Oscz. s. lat. pro parte

Global Distribution: Northern Russia through Russian Far East to Western Alaska.

Alaska Distribution: Bering Tundra, Bering Taiga, Intermontane Boreal.

Ecoregions Occupied: Seward Peninsula, Nulato Hills, Kobuk Ridges and Valleys.

Conservation Status: S2 GNR; BLM Watch.



Description[164]

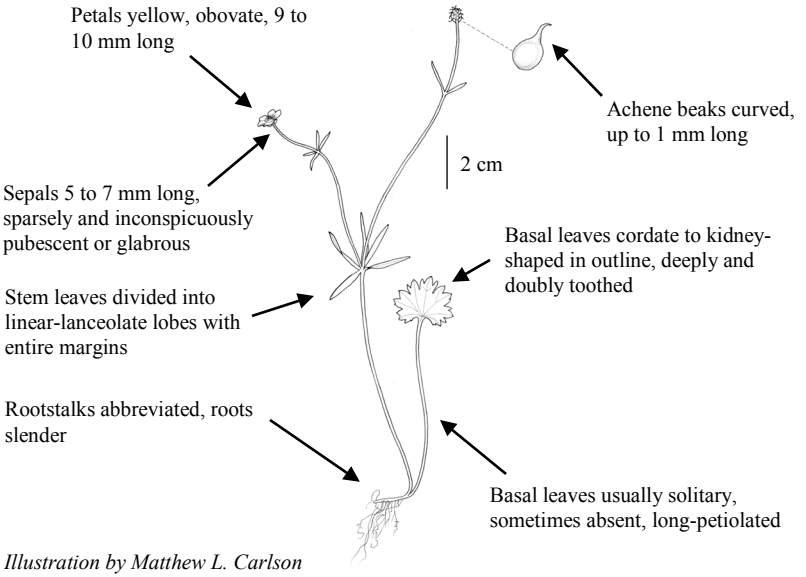


Illustration by Matthew L. Carlson

General: Perennial herb from an abbreviated root stalk and slender roots; stems solitary, erect or ascending, simple or with 2 to 3 branches in the upper portion, glabrous, grooved, 15 to 20 cm tall; leafless scales at base of stem 2 or more, upper scales considerably larger than lower scales.

Leaves: Basal leaf usually solitary, sometimes absent, long-petiolated, cordate to kidney-shaped in outline, deeply and often doubly toothed, glabrous on the lower surfaces, sparsely pubescent with appressed hairs on the veins of the upper surfaces; stem leaves sessile, divided into linear-lanceolate lobes with entire margins.

Flowers: Flowers usually 1 to 3, rarely 5 or 6; pedicels slightly pubescent; sepals curved, elliptic, 5 to 7 mm long, sparsely and inconspicuously pubescent or glabrous; petals yellow, obovate, 9 to 10 mm long.

Fruits: Fruiting heads globose to short-cylindrical; achenes 2.5 to 3 mm long, glabrous; beaks curved, up to 1 mm long.



ALA 28223

Ecology

Elevation: Known from 10 to 580 m in Alaska.

Landform: Alpine slopes, subalpine slopes, stream banks.

Soil Type: Organic soil; sometimes associated with limestone substrates.

Moisture regime: Moist to wet.

Slope: Gentle to at least 30°.

Aspect: Often, but not limited to, south to southeast.

Vegetation type: Graminoid-forb meadows, willow shrub, low shrub-forb tundra, tussock tundra; often associated with moss.

Associated species: *Arctous alpina*, *Dasiphora fruticosa* ssp. *floribunda*, *Dryas alaskensis*, *Festuca altaica*, *Salix alaxensis*, *Salix hastata*, *Solidago multiradiata*, *Viola biflora*.

Longevity: Perennial, likely short-lived as plants do not form extensive caudexes.

Phenology: Flowering late May, probably sooner, through early July; begins fruiting early June.

Population estimate: There are eight known occurrences in Alaska; populations are generally small.

Reproductive biology: *Ranunculus ponojensis* is pseudogamous: the seeds develop apomictically (without fertilization) but require pollination to stimulate endosperm development;[165] likely predominantly self-pollinating.[166, 167]

Similar Species[24, 25, 160, 164]

Material from western Alaska corresponding to the *Ranunculus auricomus* aggregate has been referred to *Ranunculus auricomus*. However, *Ranunculus auricomus* s. lat. is Amphi-Atlantic in distribution.[42]

Ranunculus monophyllos s. lat., which belongs within the *Ranunculus auricomus* aggregate, primarily occurs in northern Russia. The material from Alaska most likely falls within *Ranunculus ponojensis*, the most widespread agamospecies of *Ranunculus monophyllos* s. l. However, with future study, *Ranunculus ponojensis* will likely prove to consist of multiple agamospecies.[42]

Ranunculus arcticus also occurs in Northwest Alaska and is generally similar to *Ranunculus ponojensis* apart from the morphology of the basal leaves. The differences between the basal leaves of the two species are shown in the table below.

Species	Basal Leaves
Ranunculus ponojensis	Usually solitary, sometimes absent; deeply and often doubly toothed
Ranunculus arcticus	Usually multiple; cleft nearly to the center into 5 to 9 linear or again lobed segments

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Ranunculus sabinei R. Br. **Ranunculaceae**

Synonyms: *Ranunculus pygmaeus* ssp. *sabinei* (R. Br.) Hultén pro parte

Global Distribution: Northern Asia from Siberia through Russian Far East, Alaska, and Canadian Arctic to Greenland.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain (Point Barrow).

Conservation Status: S1 G4; BLM Watch.



Description[24, 25, 160]

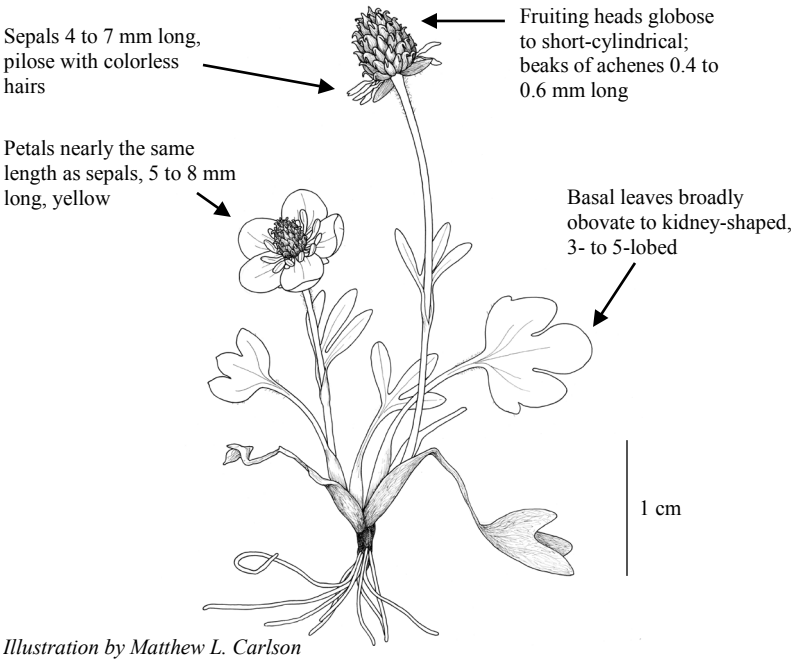


Illustration by Matthew L. Carlson

General: Perennial herb from simple, non-fibrous caudex and slender roots, tufted; stems erect or decumbent, 1 to 12 cm tall, sparsely pilose.

Leaves: Basal petioles 26 to 32 mm long; basal leaves somewhat fleshy, broadly obovate to kidney-shaped, 3- to 5-lobed, 9 to 30 mm long, 8 to 34 mm wide; segments undivided, entire with rounded or rounded-obtuse apexes; stem leaves 1 to 2, reduced, more deeply cleft.

Flowers: Flowers 1 to 3; pedicels pilose; sepals 4 to 7 mm long, 2 to 3 mm wide, purple-tinged, pilose with colorless hairs; petals 5 per flower, yellow, 5 to 8 mm long, 3 to 4 mm wide.

Fruits: Fruiting heads globose to short-cylindrical, 6 to 9 mm tall, 4 mm wide; achenes 1.2 to 1.4 mm long, glabrous; beaks straight or curved 0.4 to 0.6 mm long.



ALA 38479

Ecology

Elevation: Known from near sea level.

Landform: Tundra slopes, hummocks, estuary banks; all occurrences near coast.

Soil Type: Sand, gravel.

Moisture regime: Moist.

Slope: Flat to gently sloped.

Aspect: No particular aspect.

Vegetation type: Often associated with moss turf.[168]

Longevity: Perennial; short-lived.[63]

Phenology: Flowering June through mid-July; fruiting early July through August.

Population estimate: There are six known occurrences in Alaska, but it is unknown if all six are still extant; at least two populations are locally uncommon.

Reproductive biology: Probably fly-pollinated.[115]

Similar Species[24, 25, 160]

The table below shows the morphological features that distinguish *Ranunculus sabinei* from other low-growing *Ranunculus* species with lobed leaves that occur in arctic Alaska, often in similar habitats.

Species	Basal Leaves	Sepals	Petals	Achene Beaks
Ranunculus sabinei	3- to 5-lobed; lobes undivided, entire	Pilose with colorless hairs	Petals nearly same as sepals, 5 to 8 mm long	0.4 to 0.6 mm long
Ranunculus pygmaeus	Deeply palmately divided into 3- to 5-lobes	Sparsely pubescent with colorless hairs	Petals shorter than sepals, 1.2 to 3.5 mm long	0.3 to 0.7 mm long
Ranunculus eschscholtzii	3-lobed, lobes again once divided	Sparsely pubescent with pale yellow hairs	Petals longer than sepals, 6 to 12 mm long	0.6 to 1.8 mm long
Ranunculus nivalis	Deeply 3-lobed, lateral lobes cleft again halfway to base	Densely pubescent with stiff, brown hairs	Petals longer than sepals, 8 to 11 mm long	1 to 2 mm long
Ranunculus sulphureus	Round-toothed or shallowly 3-lobed with round-toothed lateral lobes	Densely pubescent with stiff, brown hairs	Petals longer than sepals, 8 to 12 mm long	0.8 to 1.4 mm long
Ranunculus grayi	3-lobed, lobes again 3-lobed	Glabrous or pubescent	Petals nearly same as sepals, 3 to 6 mm long	0.4 to 0.8 mm long


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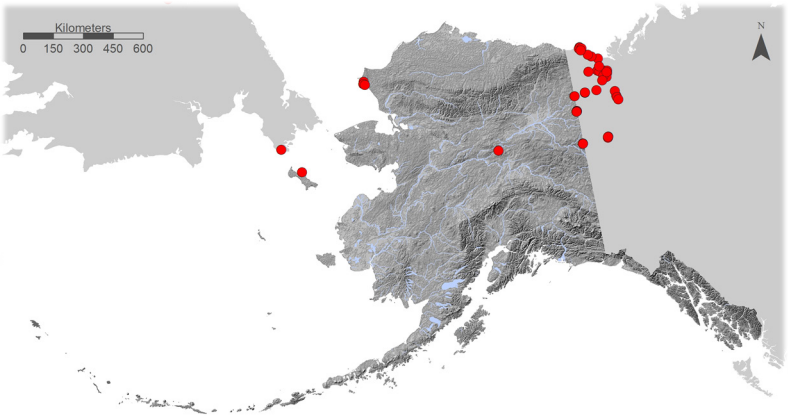

© Forrest Baldwin 1994

Global Distribution: Amphi-Beringian.

Alaska Distribution: Arctic Tundra, Bering Tundra, Intermontane Boreal.

Ecoregions Occupied: Brooks Foothills, Bering Sea Islands, Ray Mountains, North Ogilvie Mountains.

Conservation Status: S2 G3TNR; BLM Sensitive.



Description[24, 25, 160]

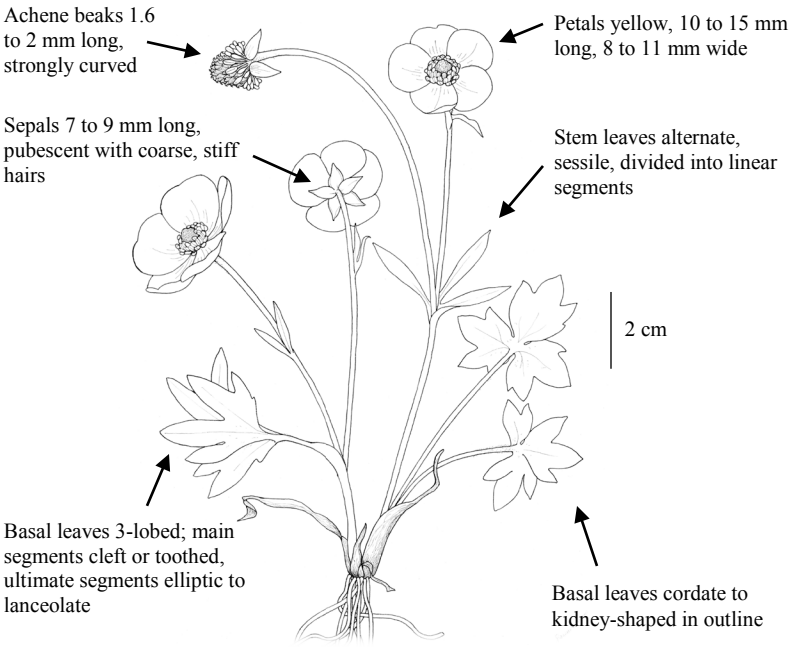


Illustration by Matthew L. Carlson

General: Perennial herb from branching fibrous roots; stems few to several, erect, never rooting at the nodes, 20 to 40 cm tall, pubescent with coarse, stiff hairs.

Leaves: Basal leaves long-petiolated, cordate to kidney-shaped in outline, 3-lobed, 1 to 3 cm long, 2 to 4 cm wide; main segments cleft or toothed, ultimate segments elliptic to lanceolate, apexes acute; stem leaves alternate, sessile, divided into linear segments.

Flowers: Sepals spreading, 7 to 9 mm long, 2 to 4 mm wide, pubescent with coarse, stiff hairs; petals 5 per flower, yellow, 10 to 15 mm long, 8 to 11 mm wide.

Fruits: Fruiting heads globose, 7 to 10 mm wide; achenes glabrous, 2.4 mm long with narrow rib along margin; beaks strongly curved, 1.6 to 2 mm long.



Ecology

Elevation: Known from near sea level to 1,400 m in Alaska; occurs at similar elevations in Yukon and Russian Far East.

Landform: Stream banks, stream terraces, subalpine slopes, seepage slopes, late-melting snowbeds.

Soil Type: Sand, gravel, cobbles; associated with calcareous or mafic (basalt) substrates.

Moisture regime: Mesic to moist.

Slope: Flat to gently sloped.

Aspect: Often, but not limited to, southwest to south; also on all other aspects.

Vegetation type: Tall willow shrub, low willow shrub, Cottonwood-willow riparian forest, herbaceous meadows, *Eriophorum* tussock meadow, graminoid meadow, forb-graminoid tundra, sparsely vegetated; sometimes associated with mossy microsites.

Associated species: *Artemisia tilesii*, *Arctagrostis latifolia*, *Cardamine blaisdellii*, *Carex nesophila*, *Festuca altaica*, *Polemonium acutifolium*, *Primula pumila*.

Longevity: Perennial, likely relatively short-lived, as specimens do not exhibit stout or extensive caudexes.

Phenology: Flowering early June through early August; fruiting mid-June through at least early August.

Population estimate: There are ten known occurrences in Alaska; two populations along rocky stream banks on St. Lawrence Island were estimated at 5,000 and 1,000 individuals.



Similar Species[24, 25, 160]

The table below shows the morphological features that distinguish *Ranunculus turneri* ssp. *turneri* from other *Ranunculus* taxa that occur in northern Alaska with erect stems, height over 6 cm, and lobed or cleft leaves. *Ranunculus acris*, included in the comparison below, is not non-native to Alaska. Currently, it is known primarily from southern Alaska; however, it has the potential to spread northward in the future.

Species	Basal Leaves	Sepals	Petals	Achene Beaks
Ranunculus turneri* ssp. *turneri	Cordate to kidney-shaped in outline	Sepals linear-lanceolate, 7 to 9 mm long	10 to 15 mm long	1.6 to 2 mm long, strongly curved
Ranunculus acris	Pentagonal in outline	Sepals 4 to 6 mm long	8 to 11 mm long	0.2 to 1 mm long, straight or curved
Ranunculus sceleratus* var. *multifidus	Kidney-shaped to semi-circular in outline	Sepals 2 to 5 mm long	2 to 5 mm long	0.1 mm long, usually straight
Ranunculus pedatifidus* var. *affinis	Cordate to kidney-shaped in outline	Sepals elliptic-oblong with conspicuous black tips; sepals 4 to 6 mm long	7 to 10 mm long	0.5 to 1 mm long, curved



Rumex aureostigmaticus Kom. **Polygonaceae**

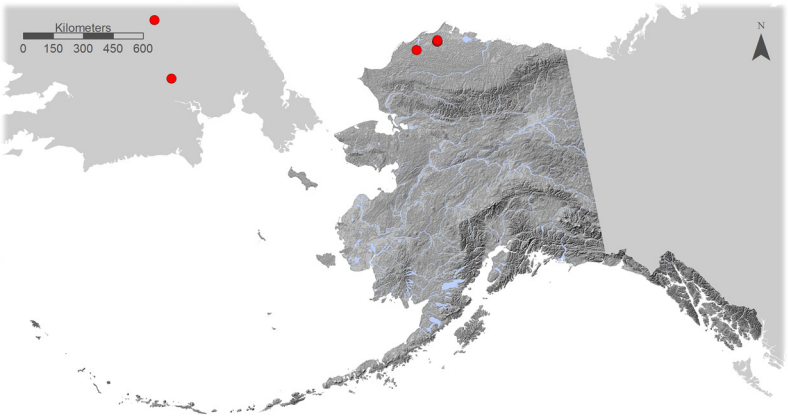
Synonyms: *Rumex graminifolius* auct. non Rudolph ex Lamb.

Global Distribution: Siberia through Russian Far East to Northwest Alaska.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Foothills.

Conservation Status: S1 GNR.



Description[169, 170]

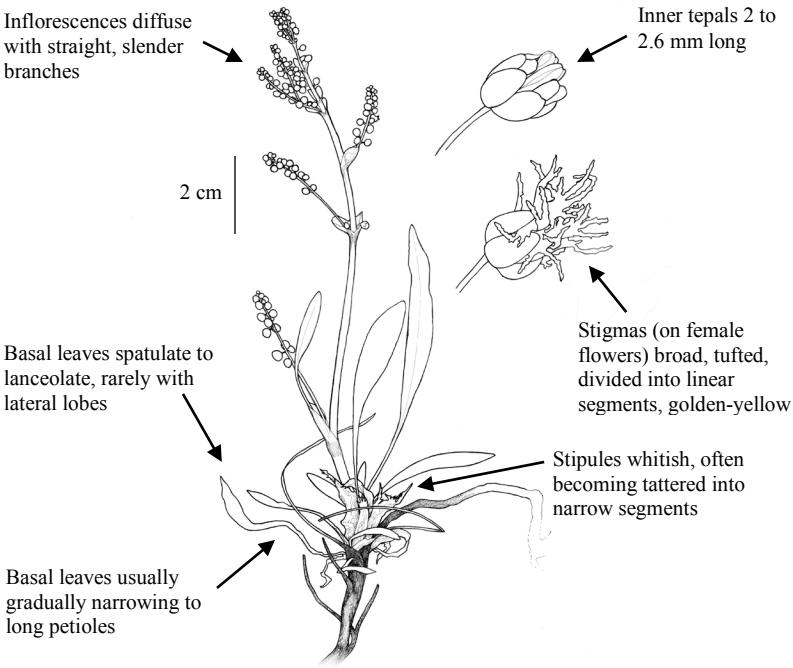


Illustration by Matthew L. Carlson

General: Perennial herb, dioecious; stems usually simple, less commonly with 1 or 2 branches, slender, grooved, glabrous, 10 to 20 cm tall.

Leaves: Basal leaves arranged in rosettes, spatulate to lanceolate, rarely with lateral lobes perpendicular to the main leaf axis at the leaf bases, bases usually gradually narrowing to long petioles; stipules fused to form sheaths, whitish, often becoming tattered into narrow segments; stem leaves linear.

Flowers: Inflorescences diffuse with straight, slender branches; pedicels slender, shorter than the flowers; flowers small; stigmas (on female plants) broad, tufted, divided into linear segments, golden-yellow.

Fruits: Fruits small, purple, obovoid.



ALA 134513

Ecology

Elevation:	Known from near sea level to 40 m in Alaska; occurs at least up to 120 m in Russian Far East.
Landform:	Sand areas along river banks, including sand dunes; also on slopes near timberline in arctic Russia.[169]
Soil Type:	Sand.
Slope:	Flat.
Aspect:	No particular aspect.
Vegetation type:	Sparsely vegetated; also sedge-graminoid coastal meadows in arctic Russia.[171]
Associated species:	*Chamerion latifolium, Mertensia drummondii*, *Polemonium boreale*, *Saxifraga flagellaris*.
Longevity:	Perennial; longevity unknown.
Phenology:	Flowering July, probably sooner.
Population estimate:	There are four known occurrences in Alaska; all populations are in need of revisits as the most recent past visit was in 1980; at least one population was abundant in 1960.
Reproductive Biology:	Dioecious plants are obligately outcrossing because they bear flowers of one sex; likely wind-pollinated.



ALA 142949

Similar Species[169, 170]

Material from Alaska corresponding to *Rumex aureostigmaticus, Rumex krausei*, and *Rumex beringensis* has in the past been assigned to *Rumex graminifolius*, which is known from northern Fennoscandia to southeastern Yakutia. *Rumex graminifolius* is not known from or likely to occur in Alaska. *Rumex aureostigmaticus, Rumex krausei,* and *Rumex beringensis* are similar and likely to be confused with one another, although they are somewhat separated geographically. All three species can occur in similar habitats.

The table below describes the differences in morphology and geographic range between the three aforementioned *Rumex* species and the non-native *Rumex acetosella*.

Species	Stipules	Inflorescence	Inner Tepals	Range
Rumex aureostigmaticus	Whitish, often becoming tattered into narrow segments	Inflorescences diffuse with straight, slender branches	2 to 2.6 mm long	Arctic Alaska
Rumex beringensis	Brown or red-brown, membranous	Inflorescences interrupted at base, dense near top, occupying more than the top half of stem, never globose	1.6 to 2.3 mm long	Southwest Alaska and Wrangell Mountains
Rumex krausei	Brown or red-brown, membranous	Inflorescences dense, sparsely branched or unbranched, occupying usually less than top half of stem, compact or globose when young	2.3 to 3 mm long	Northwest Alaska and St. Lawrence Island
Rumex acetosella	Brown at base, silver-tinted and lacerated in upper half	Inflorescences diffuse and interrupted throughout, branched	1.2 to 1.7 mm long	Anthropogenically disturbed areas throughout Alaska

Rumex beringensis Jurtzev & V.V. Petrovsky **Polygonaceae**

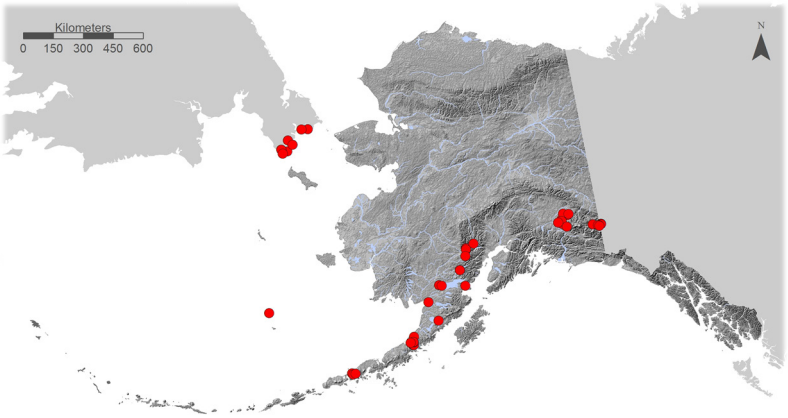
Synonyms: *Rumex graminifolius* auct. non Rudolph ex Lamb.

Global Distribution: Amphi-Beringian.

Alaska Distribution: Bering Tundra, Bering Taiga, Aleutian Meadows, Alaska Range Transition, Coast Mountains Transition.

Ecoregions Occupied: Bering Sea Islands, Bristol Bay Lowlands, Alaska Peninsula, Lime Hills, Alaska Range, Kluane Ranges.

Conservation Status: S3 G3.



Description

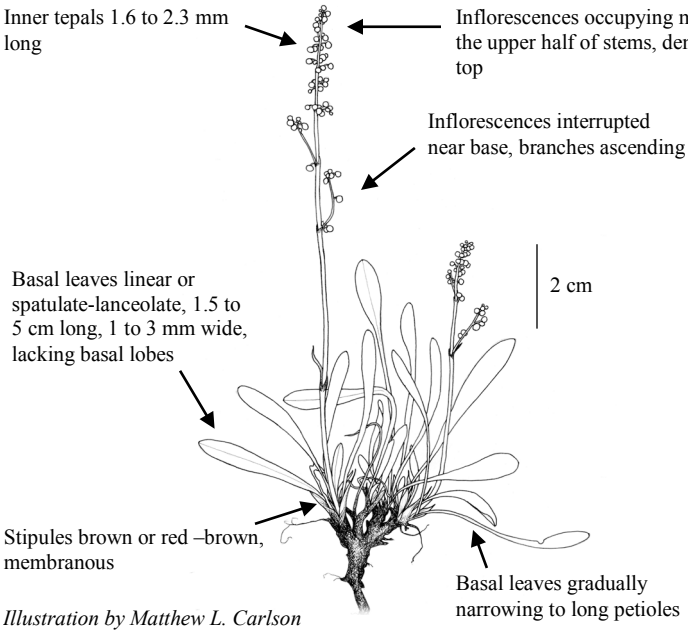


Illustration by Matthew L. Carlson

General: Perennial herb from thick, densely tufted underground stolons, dioecious; stems several, erects or rarely ascending, branched in the inflorescence, 5 to 15 cm tall; shoots usually densely crowded.

Leaves: Basal leaves arranged in rosettes, linear or spatulate-lanceolate, lacking basal lobes, 1.5 to 5 cm long, 1 to 3 mm wide, bases gradually narrowing to long petioles, entire; stipules fused to form sheaths, brown or red-brown, membranous; stem leaves few, reduced.

Flowers: Inflorescences terminal, occupying more than upper half of stems, dense towards top, usually interrupted near the base; branches ascending; pedicels 1 to 4 mm long; flowers 4 to 7 in whorls, usually unisexual; inner tepals distinctly enlarged, 1.6 to 2.3 mm long, 1.8 to 2.5 mm wide.

Fruits: Achenes brown or red-brown, 1 to 1.5 mm long, 0.8 to 1.2 mm wide.



Ecology

Elevation: Known from near sea level to 1,720 m in Alaska; occurrences over 1,000 m elevation are located in the western Alaska Range, Wrangell Mountains, and St. Elias Mountains.[48]

Landform: Alpine slopes, alpine ridges, recently de-glaciated areas, late melting snow beds, ephemeral ponds, lake shores, stream banks.[48]

Soil Type: Sand, volcanic ash, silt, gravel, alluvial deposits; often on volcanic substrates.[48]

Moisture regime: Moist to wet.

Slope: Flat to steeply sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, alpine cushion vegetation, graminoid-forb tundra, graminoid meadow, dwarf birch-ericaceous heath, dwarf shrub-ericaceous tundra, moss-lichen mats.

Associated species: *Achillea millefolium*, *Angelica lucida*, *Arabidopsis kamchatica*, *Arctous alpina*, *Armeria maritima*, *Calamagrostis canadensis*, *Chamerion latifolium*, *Festuca brachyphylla*, *Festuca rubra*, *Heuchera glabra*, *Leymus mollis*, *Lupinus nootkatensis*, *Oxyria digyna*, *Rhododendron lapponicum*, *Salix glauca*, *Trisetum spicatum*.

Longevity: Perennial, likely long-lived as some individuals form extensive, dense tufts.

Phenology: Flowering begins early June, probably sooner; fruiting through mid-September.

Population estimate: There are 33 known occurrences in Alaska; locally common at several locations, one of which consists of approximately 1,000 individuals; sometimes occurs in pure stands.

Reproductive Biology: Dioecious plants are obligately outcrossing because they bear flowers of one sex; likely wind-pollinated.

Similar Species

Material from Alaska corresponding to *Rumex aureostigmaticus, Rumex krausei*, and *Rumex beringensis* has in the past been assigned to *Rumex graminifolius*, which is known from northern Fennoscandia to southeastern Yakutia. *Rumex graminifolius* is not known from or likely to occur in Alaska. *Rumex aureostigmaticus, Rumex krausei,* and *Rumex beringensis* are similar and likely to be confused with one another, although they are somewhat separated geographically. All three species can occur in similar habitats.

The table below describes the differences in morphology and geographic range between the three aforementioned *Rumex* species and the non-native *Rumex acetosella*.

Species	Stipules	Inflorescences	Inner Tepals	Range
Rumex beringensis	Brown or red-brown, membranous	Inflorescences interrupted at base, dense near top, occupying more than the top half of stem, never globose	1.6 to 2.3 mm long	Southwest Alaska and Wrangell Mountains
Rumex aureostigmaticus	Whitish, often becoming tattered into narrow segments	Inflorescences diffuse with straight, slender branches	2 to 2.6 mm long	Arctic Alaska
Rumex krausei	Brown or red-brown, membranous	Inflorescences dense, sparsely branched or unbranched, occupying usually less than top half of stem, compact or globose when young	2.3 to 3 mm long	Northwest Alaska and St. Lawrence Island
Rumex acetosella	Brown at base, silver-tinted and lacerated in upper half	Inflorescences diffuse and interrupted throughout, branched	1.2 to 1.7 mm long	Anthropogenically disturbed areas throughout Alaska



ALA 142009

Rumex krausei Jurtzev & V.V. Petrovsky **Polygonaceae**

Synonyms: *Rumex graminifolius* auct. non Rudolph ex Lamb.

Global Distribution: Amphi-Beringian.

Alaska Distribution: Arctic Tundra, Bering Tundra, Intermontane Boreal.

Ecoregions Occupied: Brooks Foothills, Brooks Range, Seward Peninsula, Bering Sea Islands, Kobuk Ridges and Valleys.

Conservation Status: S2S3 G2; BLM Sensitive.



Description[170]

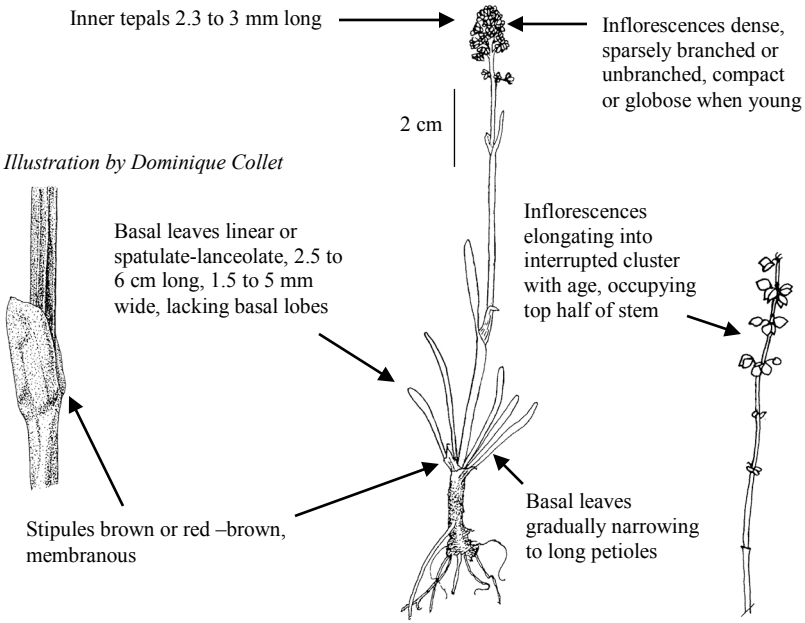


Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

General: Perennial herb from thick, densely tufted underground stolons, dioecious; stems erect, solitary or several, 8 to 25 cm tall; shoots usually densely crowded.

Leaves: Basal leaves arranged in rosettes, linear or spatulate-lanceolate, lacking basal lobes, 2.5 to 6 cm long, 1.5 to 5 mm wide, bases gradually narrowing to long petioles, entire; stipules fused to form sheaths, brown or red-brown, membranous; stem leaves few, reduced.

Flowers: Inflorescences terminal, occupying the upper half of stems, compact or globose when young, elongating later into interrupted clusters, usually unbranched or sparsely branched; pedicels 1 to 4 mm long; flowers 3 to 7 in whorls, unisexual, red or red-purple; inner tepals distinctly enlarged, 2.3 to 3 mm long, 1.8 to 3 mm wide.

Fruits: Achenes light brown, 1.5 to 2 mm long, 1.2 to 1.9 mm wide.



Ecology

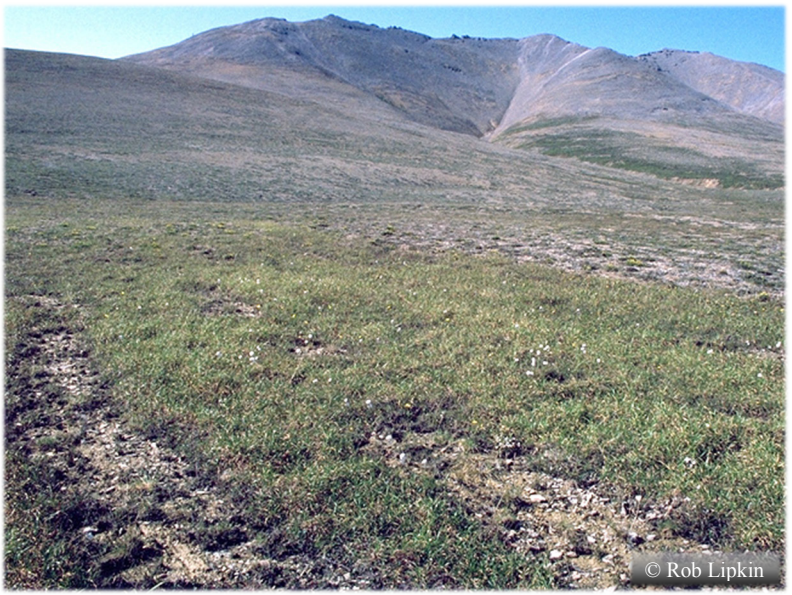
Elevation:	Known from near sea level to 360 m in Alaska.
Landform:	Alpine slopes, frost scars, river terraces.
Soil Type:	Clay, sand, mineral soil, gravel; often associated with calcareous substrates.
Moisture regime:	Moist to wet.
Slope:	Gentle.
Aspect:	No particular aspect.
Vegetation type:	Sparsely vegetated, *Dryas* tundra, *Dryas*-dwarf shrub tundra, graminoid meadow, forb meadow, sedge-forb meadow; growing in open microsites.
Associated species:	*Eriophorum callitrix*, *Eriophorum scheuchzeri*, *Eriophorum triste*, *Tephroseris frigida*, *Triglochin maritima*.
Longevity:	Perennial, likely long-lived as some individuals form extensive, dense tufts.
Phenology:	Flowering early June through late July.
Population estimate:	There are 11 known occurrences in Alaska; several populations consist of over 1,000 individuals[172] while other populations consist of 10 to 60 individuals.
Reproductive Biology:	Dioecious plants are obligately outcrossing because they bear flowers of one sex; likely wind-pollinated.

Similar Species[42, 169, 170]

Material from Alaska corresponding to *Rumex aureostigmaticus, Rumex krausei*, and *Rumex beringensis* has in the past been assigned to *Rumex graminifolius*, which is known from northern Fennoscandia to southeastern Yakutia. *Rumex graminifolius* is not known from or likely to occur in Alaska. *Rumex aureostigmaticus, Rumex krausei,* and *Rumex beringensis* are similar and likely to be confused with one another, although they are somewhat separated geographically. All three species can occur in similar habitats.

The table below describes the differences in morphology and geographic range between the three aforementioned *Rumex* species and the non-native *Rumex acetosella*.

Species	Stipules	Inflorescence	Inner Tepals	Range
Rumex krausei	Brown or red-brown, membranous	Inflorescences dense, sparsely branched or unbranched, occupying usually less than top half of stem, compact or globose when young	2.3 to 3 mm long	Northwest Alaska and St. Lawrence Island
Rumex beringensis	Brown or red-brown, membranous	Inflorescences interrupted at base, dense near top, occupying more than the top half of stem, never globose	1.6 to 2.3 mm long	Southwest Alaska and Wrangell Mountains
Rumex aureostigmaticus	Whitish, often becoming tattered into narrow segments	Inflorescences diffuse with straight, slender branches	2 to 2.6 mm long	Arctic Alaska
Rumex acetosella	Brown at base, silver-tinted and lacerated in upper half	Inflorescences diffuse and interrupted throughout, branched	1.2 to 1.7 mm long	Anthropogenically disturbed areas throughout Alaska



Global Distribution: East Asia, Russian Far East, Alaska.

Alaska Distribution: Intermontane Boreal.

Ecoregions Occupied: Kobuk Ridges and Valleys.

Conservation Status: S1 GNR; BLM Sensitive.



Description[173]

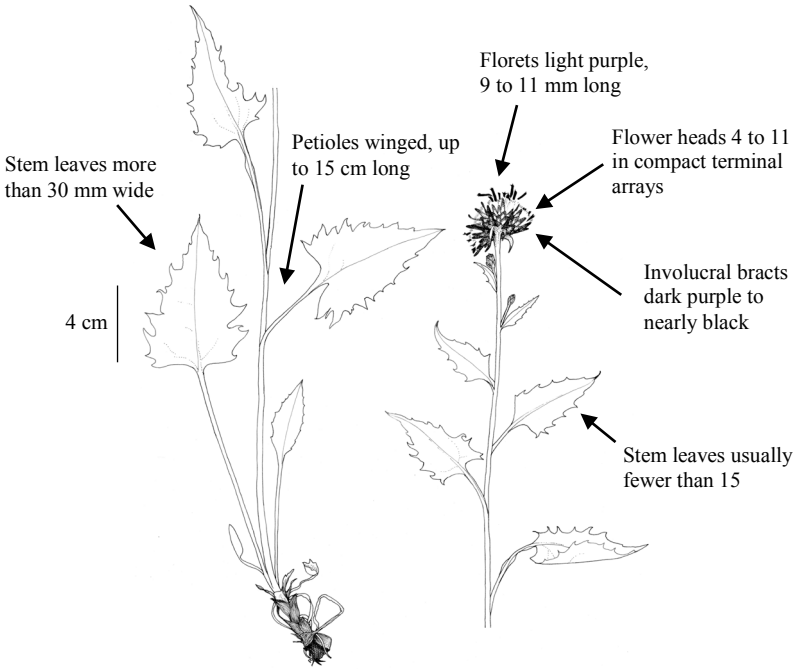


Illustration by Matthew L. Carlson

General: Perennial herb from rhizome; stems leafy, simple or with ascending branches, 30 to 70 cm tall.

Leaves: Lower and middle leaves with winged petioles up to 15 cm long; lower petioles ciliate; upper petioles tomentose when young, becoming nearly glabrous with age; leaves lanceolate to triangular, 6 to 13 cm long, bases tapered or lobed, margins coarsely and irregularly toothed; petioles and leaves reduced above; stem leaves usually 15 or fewer.

Flowers: Flower heads 4 to 11, mostly arranged in compact terminal arrays with solitary flower heads sometimes arising from upper leaf axils; involucres 10 to 12 mm tall; involucral bracts in 4 or 5 rows, appressed, dark purple to nearly black with slightly hairy margins; florets 10 to 17 per flower head, light purple, 9 to 11 mm long; anthers dark purple, 4 to 5 mm long.

Fruits: Achenes 3 mm long; pappi brown, inner bristles 8 to 9 mm long.



ALA 142650

Ecology

Elevation: Known from 300 to 420 m in Alaska.

Landform: Subalpine slopes, ridges.

Soil Type: Organic soil, cobble.

Moisture regime: Moist.

Slope: Gentle.

Aspect: No particular aspect.

Vegetation type: Forb-heath meadow, low shrub meadow, tall alder; grows in full or partial sun or shaded sites under alder canopies.

Associated species: *Corydalis pauciflora*, *Dodecatheon frigidum*, *Equisetum arvense*, *Mertensia paniculata*, *Polemonium acutiflorum*. *Stelleria edwardsii*.

Longevity: Perennial, longevity unknown.

Phenology: Flowering late June, probably sooner; fruiting August.

Population estimate: There is one known occurrence in Alaska; population size unknown.

Similar Species[173]

Saussurea americana, *Saussurea nuda*, and *Senecio triangularis* also have lanceolate to triangular leaves with coarsely toothed margins. The table below shows the differences in morphology and range between *Saussurea triangulata* and similar species that occur in Alaska. While other *Saussurea* species occur in Northwest Alaska, they lack coarsely toothed, broad, lanceolate to triangular leaves and are not likely to be mistaken for *Saussurea triangulata*.

Species	Stem Leaves	Involucral Bracts	Florets	Range
Saussurea triangulata	Usually fewer than 15; more than 30 mm wide	Dark purple to nearly black	Light Purple, 9 to 11 mm long	Northwest Alaska
Saussurea americana	Usually more than 20; more than 30 mm wide	Pale green on lower half, dark purple to nearly black towards tip	Light to dark purple, 11 to 13 mm long	Southeast Alaska
Saussurea nuda	Less than 25 mm wide, not triangular	Dark green and often tinged with dark purple	Purple, 8 to 11 mm long	Primarily Northwest Alaska
Senecio triangularis	20 to 60 mm wide	Tips usually green, rarely black	Yellow	South Central and Southeast Alaska

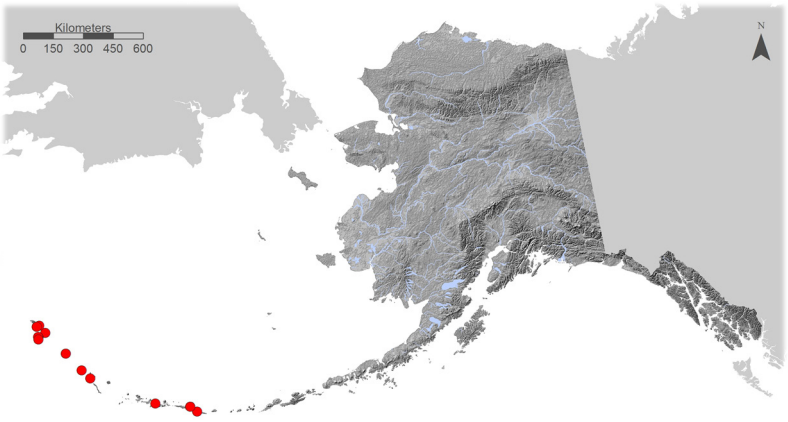
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Global Distribution: Endemic to Alaska.

Alaska Distribution: Aleutian Islands.

Ecoregion Occupied: Aleutian Meadows.

Conservation Status: S2S3, G2G3.



Description[25, 174]

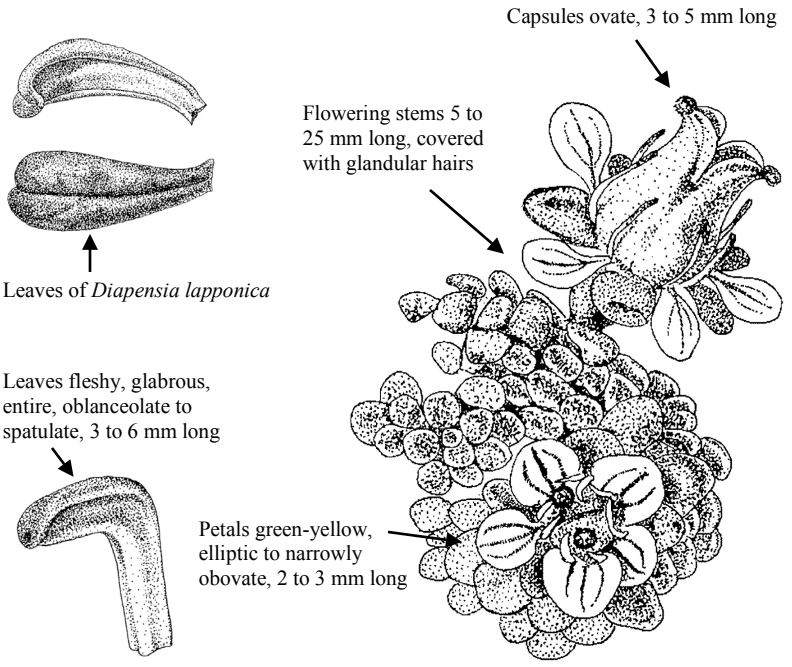


Illustration by Dominique Collet

General: Perennial herb from rhizomes, densely tufted or matted; flowering stems 5 to 25 mm long, barely exceeding leaves, covered with glandular hairs.

Leaves: Basal leaves crowded, sessile, fleshy, glabrous, oblanceolate to spatulate, 3 to 6 mm long with entire margins; stem leaves 1 to 2.

Flowers: Flowers solitary at ends of stems, barely rising above leaves; bracts sessile; sepals reflexed, oblong to ovate, surfaces glabrous, margins densely covered with pink- or purple-tipped glandular hairs; petals green-yellow, elliptic to narrowly obovate, 2 to 3 mm long.

Fruits: Capsules ovate, 3 to 5 mm long.



Ecology

Elevation: Known from 100 to 640 m.

Landform: Alpine ridges, alpine slopes, rock crevices; often occurring in exposed or wind-swept areas.

Soil Type: Gravel, scree, rubble, talus, rock.

Moisture regime: Dry.

Slope: Nearly flat to steep.

Aspect: No particular aspect.

Vegetation type: Prostrate shrub-herbaceous tundra, alpine cushion vegetation.

Associated species: *Cerastium aleuticum, Empetrum nigrum, Oxyria digyna, Salix reticulata, Silene acaulis*.

Longevity: Perennial, likely long-lived as some individuals are extensively matted.

Phenology: Flowering late May; fruiting at least through mid-September.

Population estimate: There are 13 known occurrences in Alaska; one population is locally common.

Similar Species[25, 174]

The closest relative of *Saxifraga aleutica* occurs in the Himalayas. *Saxifraga aleutica* is unlikely to be confused with any other *Saxifraga* species in the Aleutian Islands, but looks superficially similar to *Diapensia obovata*, especially when flowers or fruits are not present. *Saxifraga serpyllifolia* and *Saxifraga eschscholtzii* are also superficially similar to *Saxifraga aleutica* but are not known from the western Aleutian Islands. The table below describes the morphological differences between *Saxifraga aleutica* and similar species.

Species	Basal Leaves	Leaf Margins	Flowering Stems	Petals
Saxifraga aleutica	Glabrous, not ciliate in margin	Not reflexed or revolute	Barely exceeding leaves, 5 to 25 mm long	Green-yellow, 2 to 3 mm long
Saxifraga eschscholtzii	Ciliate in margin with stiff, bristly hairs	Not reflexed or revolute	Barely exceeding leaves, up to 10 mm long	Yellow, 1 to 2.5 mm long
Saxifraga serpyllifolia	Glabrous, not ciliate in margin	Reflexed	Flowers on elongated stems, 20 to 70 mm long	Pale yellow, 4 to 8 mm long
Diapensia obovata	Glabrous, not ciliate in margin	Revolute	Pedicels 5 to 20 mm long, elongating to 30 to 50 mm in fruit	White, 7 to 9 mm long



ALA 45532



Saxifraga rivularis ssp. *arctolitoralis* (Jurtzev & V.V. Petrovsky) M.H. Jørgensen & Elven

Saxifragaceae

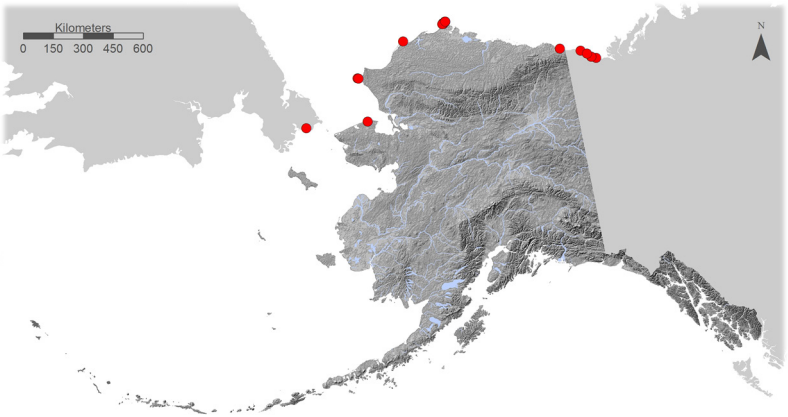
Synonyms: *Saxifraga arctolitoralis*

Global Distribution: Russian Far East through Alaska and northern Canada to Greenland (ssp. *rivularis* is amphi-Atlantic).

Alaska Distribution: Arctic Tundra, Bering Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Foothills, Kotzebue Sound Lowlands.

Conservation Status: S2 G5T2T3.



Description[96, 174, 175]

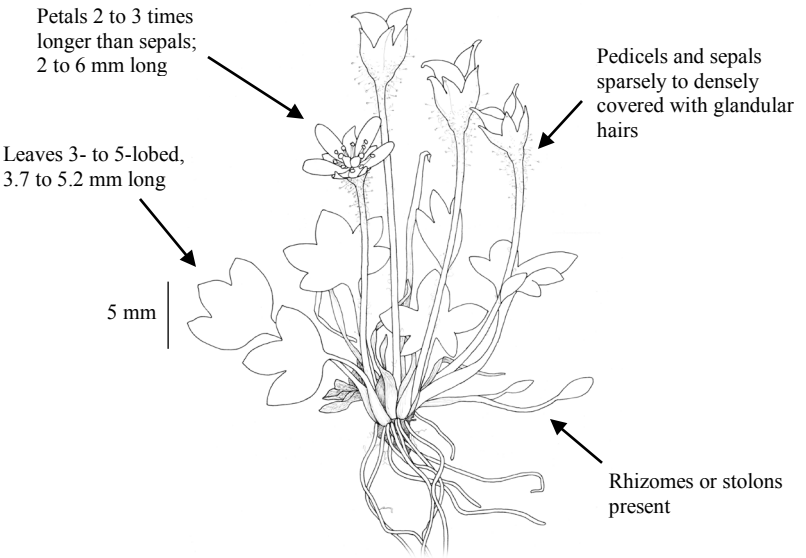


Illustration by Matthew Carlson

General: Perennial herb, mat-forming or loosely tufted, from thin rhizomes or stolons; stems one to several, usually erect, sometimes ascending, purple-tinted; bulbils present at stem bases.

Leaves: Basal leaves petiolate, sheathing, kidney-shaped, 3.7 to 5.2 mm long, slightly fleshy, glabrous to sparsely hairy, 3- to 5-lobed; lower stem leaves 1 or 2, short petiolate, sheathing, 3- to 5-lobed; upper stem leaves 1 or 2, sessile, not lobed.

Flowers: Inflorescences purple-tinted; flowers arranged in groups of 2 to 3, or less commonly solitary, at the ends of stems; pedicels and sepals sparsely to densely covered with glandular hairs 0.3 to 0.6 mm long; sepals erect, elliptic to ovate; petals white, sometimes pink-tinged, oblong to elliptic, 2 to 6 mm long, 2 to 3 times longer than the sepals.

Fruits: Capsules 2-beaked, containing numerous seeds.



Ecology

Elevation: Known from near sea level.

Landform: Arctic seashores, soil banks, disturbed tundra, polygon tundra, hummocks.

Soil Type: Silt, clay,[175] sand, mud, gravel; often a colonizer of bare soil.

Moisture regime: Dry to wet; usually in well-drained sites.

Slope: Flat ground to steep or collapsing banks.

Aspect: No particular aspect.

Vegetation type: Wet meadows, moss, sparsely vegetated.

Associated species: *Arctagrostis latifolia*, *Cochlearia groenlandica*, *Equisetum arvense*, *Puccinellia phryganodes*, *Ranunculus pygmaeus*, *Saxifraga foliolosa*, *Stellaria humifusa*, *Stellaria laeta*.

Longevity: Perennial, clonal colonies interconnected by thin rhizomes are possibly long-lived.[96]

Phenology: Flowering late June, probably earlier, through late July; fruiting mid-July through August.

Population estimate: There are 9 known occurrences in Alaska, 8 of which have not been relocated since 1980; at least one population was locally common in 1971.

Reproductive Biology: Plants regularly produce seed, largely through self-fertilization;[176] plants also reproduce vegetatively from runners.[176] In *Saxifraga rivularis* ssp. *rivularis* from Svalbard, 12.7% of seed germinated successfully after one year of storage.[177] The small seeds are well-suited to long distance wind dispersal across snow and ice. *Saxifraga rivularis* ssp. *arctolitoralis* has likely spread from Beringian regions to northeastern Canada and Greenland in several independent events.[178]

Similar Species[96, 174, 175]

Saxifraga rivularis ssp. *arctolitoralis* is the only subspecies of *Saxifraga rivularis* that occurs in Alaska and the other Beringian regions. However, it co-occurs with *Saxifraga rivularis* ssp. *rivularis* in eastern Canada. The two subspecies can be distinguished according to the morphological features listed in the table below.

Species	Plants	Hair Crosswalls	Inflorescences
Saxifraga rivularis* ssp. *arctolitoralis	Stems and inflorescences purple-tinted	Purple	1.7 to 3 cm long; sparsely to densely covered with glandular hairs
Saxifraga rivularis* ssp. *rivularis	Mostly green or purple-tinted only in inflorescence	Usually colorless, sometimes pale purple	2.7 to 7 cm long; glabrous or sparsely covered with glandular hairs

Saxifraga rivularis ssp. *arctolitoralis* is easily confused with *Saxifraga hyperborea,* which often grows in the same or adjacent habitat. Cody (1996) referred to *Saxifraga hyperborea* as *Saxifraga rivularis* s. l.[24] Hultén (1968) split *Saxifraga hyperborea* between his concepts of *Saxifraga rivularis* ssp. *flexuosa* and *Saxifraga rivularis* ssp. *rivularis* but did not include a taxon referable to *Saxifraga rivularis* ssp. *arctolitoralis*.[25] Reports of *Saxifraga rivularis* ssp. *arctolitoralis* from non-arctic regions are attributable to *Saxifraga hyperborea*. The table below shows the morphological features that distinguish these two taxa and additional superficially similar *Saxifraga* species.

Species	Habit	Rhizomes	Leaves	Petals
Saxifraga rivularis* ssp. *arctolitoralis	Mat-forming	Often present	3- to 5-lobed, 3.7 to 5.2 mm long	2 to 3 times longer than sepals; 2 to 6 mm long
Saxifraga hyperborea	Tufted, not mat-forming	Rhizomes and stolons absent	3- to 5-lobed, 3 to 6 mm long	1.5 times longer than sepals; 2 to 3.4 mm long
Saxifraga cernua	Solitary or in tufts	Weakly rhizomatous	3- to 7-lobed, 5 to 18 mm long	5 to 12 mm long
Saxifraga bracteata	Solitary or in tufts	Weakly rhizomatous	5- to 7-lobed, 7.4 to 11.2 mm long	Roughly equal to sepals; 2 to 5 mm long
Saxifraga radiata	Tufted	Weakly rhizomatous	5- to 7-lobed, 5 to 20 mm long	7 to 15 mm long

Global Distribution: Endemic to Pacific Northwest from Oregon to British Columbia, disjunct in Alaska.

Alaska Distribution: Coastal Rainforests.

Ecoregions Occupied: Alexander Archipelago (Chilkat Peninsula).

Conservation Status: S1, G3; USFS Sensitive.



Description[124, 179]

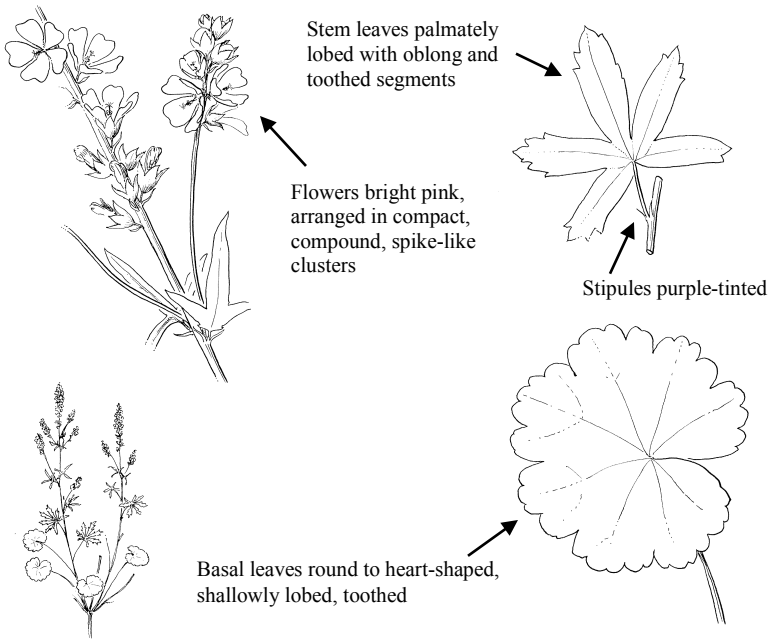


Illustration by Jeanne R. Jannish, courtesy of University of Washington Press

General: Perennial herb from stout taproot and short rhizomes; stems erect or decumbent, hollow, purple-tinted, glabrous or sparsely hairy, 50 to 150 cm tall.

Leaves: Basal leaves long-petiolated, round to heart-shaped, shallowly lobed, toothed; petioles reduced upwards; stem leaves alternate, palmately 5-lobed with oblong and toothed segments; stipules purple-tinted.

Flowers: Numerous flowers arranged in compact, compound, spike-like clusters; pedicels 1 to 3 mm long; calyxes glabrous on surface, ciliate in margin, purple-tinted, 9 to 15 mm long, 5-lobed; petals bright pink, 1.5 to 2 cm long; flowers on female plants smaller than flowers on hermaphroditic plants.

Fruits: 5 to 9 carpels arranged in head-like disks, sparsely hairy, 4 mm long; beaks 1 mm long.



Ecology

Elevation: Known from near sea level.

Landform: In Southeast Alaska, known from upper beaches; elsewhere in Pacific Northwest, known from wet meadows, estuaries, and tidal flats.[124]

Soil Type: No information available.

Moisture regime: Moist to wet; in British Columbia, often associated with areas that are tidally inundated.[180]

Slope: Gentle.

Aspect: No particular aspect.

Vegetation type: *Picea sitchensis* / *Alnus viridis* ssp. *sinuata* – beach meadow ecotone.[181]

Associated species: *Achillea millefolium*, *Angelica lucida*, *Calamagrostis canadensis*, *Castilleja unalaschcensis*, *Deschampsia cespitosa*, *Fritillaria camschatcensis*, *Geranium erianthum*, *Heracleum lanatum*, *Hordeum brachyantherum*, *Lathyrus palustris*, *Lupinus nootkatensis*, *Maianthemum dilatatum*, *Potentilla anserina* ssp. *pacifica*, *Rhinanthus minor*, *Rubus spectabilis*.

Longevity: Perennial, longevity unknown.

Phenology: In the Pacific Northwest, flowering occurs from June to August; plants with flowers have been observed in mid-August in Alaska.

Population estimate: There is one known occurrence in Alaska; the single known population consisted of three individuals and may have been recently extirpated.[120]

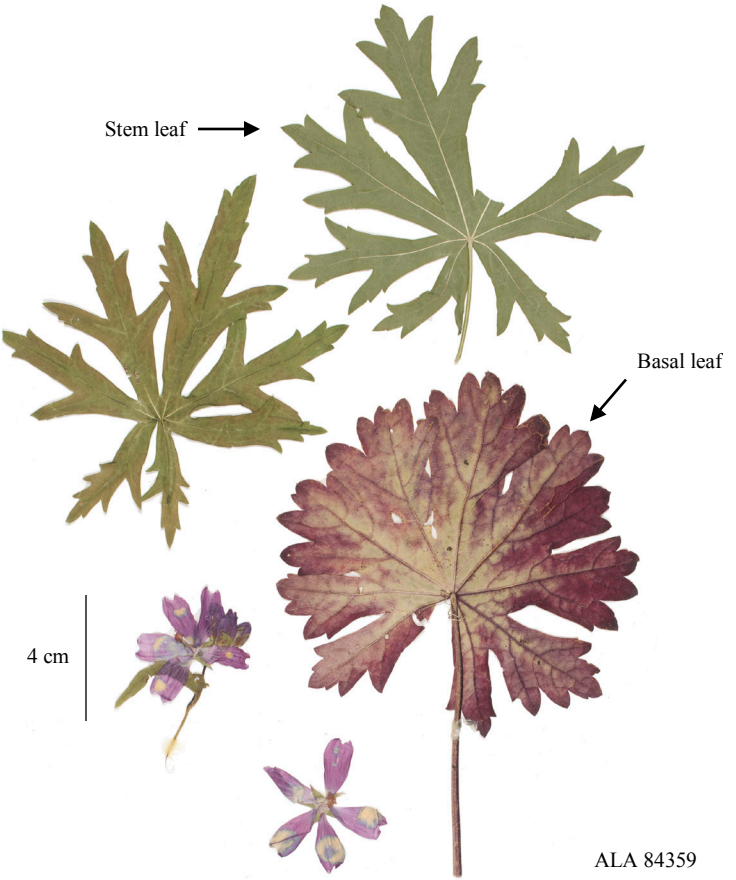
Reproductive Biology: Pollinated by bees (*Bombus* and *Apis* species) and butterflies (*Vanessa* species);[182] most populations are gynodioecious, with female plants and hermaphroditic plants coexisting. Self-fertilized plants show reduced reproductive success.[183] Plants can also reproduce vegetatively by rhizomes.[179]

Herbivory: Weevils consume seed of *Sidalcea hendersonii* in British Columbia;[183] however, it is unknown whether *Sidalcea hendersonii* seed is predated by any insects in Alaska.

Similar Species

Sidalcea hendersonii is the only *Sidalcea* species known from the state and is not likely to be confused with any other species that occur in Alaska.




Stem leaf
Basal leaf
4 cm
ALA 84359


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Silene uralensis ssp. *ogilviensis* (A.E. Porsild) D.F. Brunt

Caryophyllaceae

Global Distribution: Alaska and Yukon,[42] possibly also scattered throughout the Canadian arctic.[184]

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Brooks Range (Sheenjek River Valley).

Conservation Status: S1Q G4G5T2.



Description[24, 184, 185]

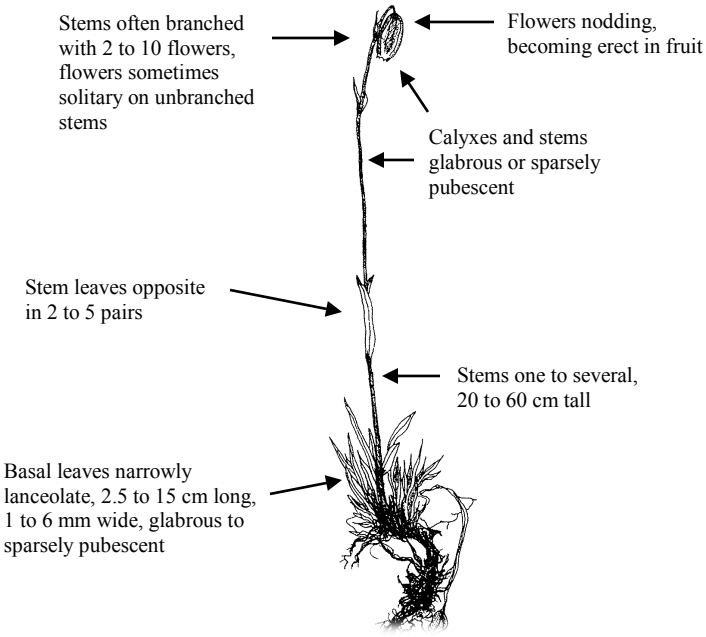


Illustration by Valerie Ford, courtesy of Canadian Science Publishing

General: Perennial herb from stout taproot; stems one to several, erect, simple or branched above, 20 to 60 cm tall, glabrous or sparsely pubescent.

Leaves: Basal leaves few, petiolate, narrowly lanceolate, 2.5 to 15 cm long, 1 to 6 mm wide, glabrous or sparsely pubescent, entire; stem leaves opposite in 2 to 5 pairs, linear to lanceolate, sessile, reduced above.

Flowers: Flowers solitary on stems or 2 to 10 at ends of branches, nodding; bracts very narrow, 5 to 15 mm long; calyxes glabrous to sparsely pubescent, ovoid to ellipsoid, inflated, 11 to 17 mm long, 6 to 10 mm wide, papery, prominently veined with purple or brown veins; calyx lobes ovate to triangular, 2 to 3 mm long; corollas pink, purple, or red, only slightly exceeding calyx, 1 to 4 mm long.

Fruits: Pedicels erect in fruit; capsules equaling or slightly longer than calyxes, opening by 10 teeth; seeds brown, broadly winged, 2 mm wide.

Ecology

Elevation: Known from 760 m in Alaska; 440 to 1,680 in Yukon.[184]

Landform: Tundra hummocks; also river banks, river terraces, and alpine slopes in Yukon.

Soil Type: Organic soils, sand, gravel, scree, talus; associated with calcareous substrates.

Moisture regime: Moist to wet.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Tundra, heath, tall willow shrubs.

Associated species: No information available.

Longevity: Perennial, longevity unknown.

Phenology: In flower in July.

Population estimate: There is one known occurrence in Alaska; population size in Alaska not known but at least one occurrence in Yukon is locally common.



ALA 133354

Similar Species[184]

Silene uralensis ssp. *ogilviensis* may not be taxonomically valid and requires further investigation.[42] The features distinguishing ssp. *ogilviensis* from ssp. *uralensis* intergrade,[184] and the most consistent way to distinguish between the two subspecies is by the pubescence (see table below).[42] The chromosome count between the two differs with 2n=48 for ssp. *ogilviensis* and 2n=24 for ssp. *uralensis*; however, the 2n=48 chromosome count should be double checked to ensure that they do not belong with the tetraploid *Silene soczavana* (referred to by Morton 2005 as *Silene uralensis* ssp. *porsildii*).[42]

Species	Pubescence	Habit	Stems	Flowers
Silene uralensis* ssp. *ogilviensis	Glabrous or sparsely pubescent	One to several stems from stout taprout	20 to 60 cm tall	Stems often branched with 2 to 10 flowers, flowers sometimes solitary on unbranched stems; flowers nodding
Silene uralensis* ssp. *uralensis	Densely pubescent above with purple hairs	Tufted, one to many stems from branched caudex and stout taproot	5 to 30 cm tall	Flowers usually solitary on unbranched stems, stems less commonly branched with 2 flowers; flowers nodding
Silene involucrata	Usually densely pubescent above	Tufted, stems several	10 to 45 cm tall	Inflorescences with 1 to 3 flowers; flowers erect
Silene soczavana	Densely pubescent with purple hairs	Tufted	10 to 35 cm tall	Stems sometimes branched with 2 to 3 flowers, flowers sometimes solitary on unbranched stems; flowers erect

Global Distribution: Endemic to Alaska.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Brooks Foothills (Lisburne Peninsula).

Conservation Status: S1 G1; BLM Watch.



Description[186, 187]

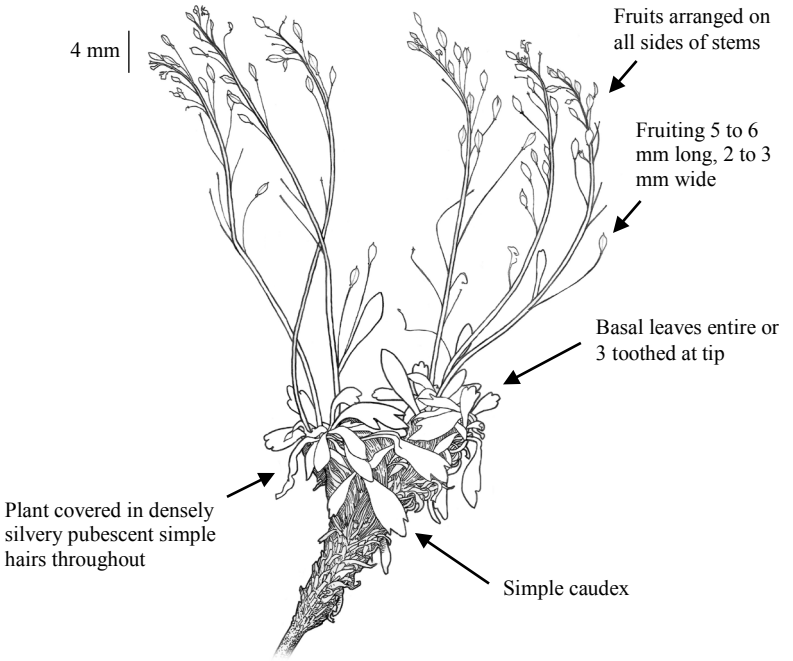


Illustration by Matthew L. Carlson

General: Perennial herb from simple caudex; entire plant densely covered in short, white hairs; stems several from base, unbranched or branched above, 4 to 16 cm tall.

Leaves: Petioles 8 to 13 mm long; basal leaves oblanceolate to spatulate, 8 to 18 mm long, 3 to 7 mm wide; margins entire, 3-toothed at leaf apex, or palmately lobed; apexes densely covered with long, simple, silver hairs; stem leaves subsessile and reduced upwards.

Flowers: Flowers arranged in compact racemes elongating in fruit; sepals 3 to 3.5 mm long; petals lavender to purple, obovate, 4 to 5 mm long, 3 to 4 mm wide.

Fruits: Fruiting pedicels ascending (often forming less than 40° angle with stem), straight, 11 to 27 mm long; fruits ellipsoid to obovoid, 5 to 6 mm long, 2 to 3 mm wide; styles 0.2 to 0.3 mm long.



ALA 138042

Ecology

Elevation: Known from near sea level to 620 m.

Landform: Alpine slopes, alpine ridges.

Soil Type: Talus, scree, unconsolidated rubble; associated with calcareous substrates.

Moisture regime: Dry.

Slope: Gentle to steep.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated.

Associated species: *Chrysosplenium wrightii*, *Cystopteris fragilis*, *Papaver mcconnellii*.

Longevity: Perennial, likely long-lived as some specimens show very thick, well-developed caudexes.

Phenology: Flowering June through late July; fruiting mid-July through August.

Population estimate: There are three occurrences in Alaska, none of which have been revisited since 1962; population sizes unknown.

Similar Species[186, 187]

Smelowskia johnsonii can be distinguished from all other *Smelowskia* species, including those in the table below, by the presence of dense, silver pubescence on the leaves, with hairs primarily simple and 1 to 1.8 mm long. Several other *Smelowskia* species are known from Northwest Alaska and can be confused with *Smelowskia johnsonii*. These species can be distinguished by the morphological characteristics described in the table below.

Species	Leaves	Inflorescences	Petals	Fruits
Smelowskia johnsonii	Densely covered with silver, simple hairs 1 to 1.8 mm long	Flowers and fruits arranged on all sides of stems	Lavender to purple	5 to 6 mm long, 2 to 3 mm wide
Smelowskia borealis	Densely covered with dendritic hairs and fewer simple hairs up to 1 mm long	Flowers and fruits arranged on one side of stems	Lavender to purple	12 to 28 mm long, 4 to 8 mm wide
Smelowskia porsildii	Densely covered with gray, dendritic hairs and fewer simple hairs up to 1 mm long	Flowers and fruits arranged on all sides of stems	White	6 to 10 mm long, 1.5 to 2.5 mm wide



ALA 133269

Smelowskia media (W.H. Drury & Rollins) Velichkin **Brassicaceae**

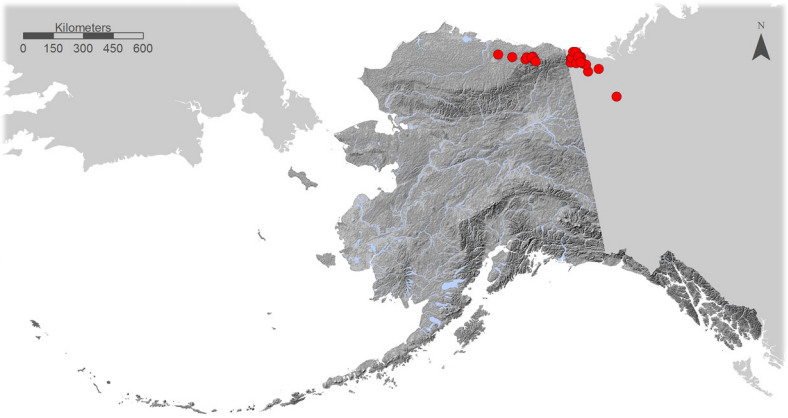
Synonyms: *Smelowskia calycina* var. *media*

Global Distribution: Endemic to northeastern Alaska, Yukon, and Northwest Territories.

Alaska Distribution: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain, Brooks Foothills, Brooks Range.

Conservation Status: S2S3 G2G3; BLM Watch.



Description[186]

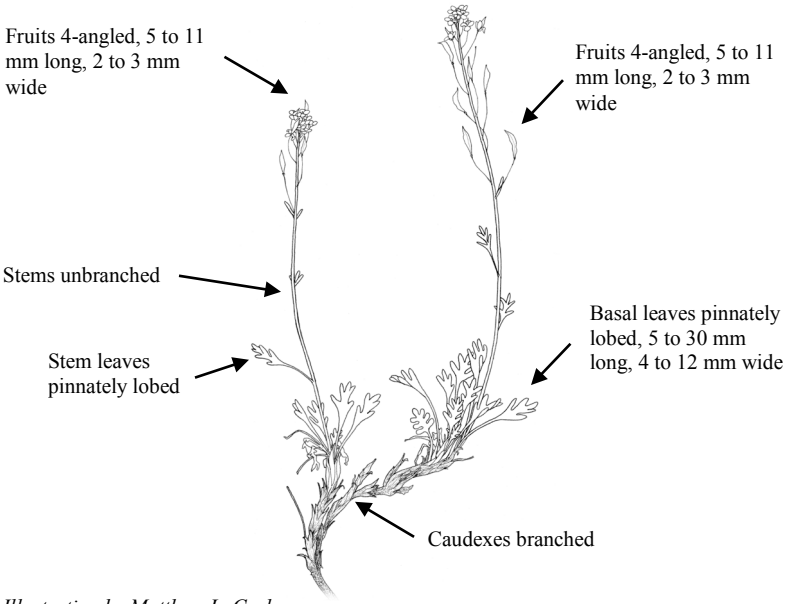


Illustration by Matthew L. Carlson

General: Perennial herb from branched caudex; stems several, unbranched, 5 to 14 cm long, covered with simple hairs 0.5 to 1.2 mm long and smaller, dendritic hairs.

Leaves: Petioles 7 to 35 mm long, ciliate; basal leaves oblanceolate to oblong, pinnately lobed or less commonly 3- to 5-lobed at the apex, 5 to 30 mm long, 4 to 12 mm wide; stem leaves short petiolate or sessile, reduced upwards.

Flowers: Flowers arranged in terminal racemes; sepals 2 to 3 mm long; petals white, obovate, 4 to 5 mm long, 2 to 3 mm wide.

Fruits: Racemes elongating in fruit; fruiting pedicels spreading, often forming greater than a 40° angle with the stem; fruits ellipsoid, 4-angled, 5 to 11 mm long, 2 to 3 mm wide with styles 0.1 to 0.5 mm long.



ALA 45532

Ecology

Elevation: Known from 180 to 1,240 m in Alaska; known from up to 1,500 m in western Canada.[186]

Landform: Alpine slopes, alpine ridges, river bluffs, rock outcrops, lake shores.

Soil Type: Scree, gravel, coarse-grained soil; sometimes associated with calcareous substrates, but also known from one collection on acidic substrate.

Moisture regime: Dry.

Slope: Gentle to steep.

Aspect: Often south to southwest, less commonly other aspects.

Vegetation type: Sparsely vegetated.

Associated species: *Braya humilis*, *Carex glacialis*, *Minuartia elegans*, *Papaver mcconnellii*, *Physaria arctica*, *Silene repens*, *Tephroseris yukonensis*.

Longevity: Perennial, likely long-lived as some specimens show extensive and well-developed caudexes.

Phenology: Flowering June through July;[186] fruiting late June through early August.

Population estimate: There are eight known occurrences in Alaska, none of which have been re-documented since 1982; one population was locally common in 1948.

Reproductive biology: Insect pollinated, likely by small bees or flies, or self-pollinated; high percentage of fruit set observed for an arctic species.[63]

Similar Species[186]

Smelowskia media was previously included in a broad concept of *Smelowskia calycina* as var. *media* along with *Smelowskia porsildii* as *Smelowskia calycina* var. *porsildii* or var. *integrifolia*. *Smelowskia borealis* also occurs in Northeast Alaska, but is readily distinguished when in flower by its lavender to purple petals. These species can be distinguished from each other by the morphological characteristics described in the table below.

Species	Basal Leaves	Stem Leaves	Fruits
Smelowskia media	Usually pinnately lobed	Usually pinnately lobed	4-angled
Smelowskia porsilidii	Entire or 3- to 5-lobed in apex	Usually entire, rarely 3- to 5-lobed in apex	Lacking angles or only slightly 4-angled
Smelowskia borealis	Palmately 3- to 7-lobed	Usually palmately 3- to 7-lobed, sometimes pinnately lobed	Flattened

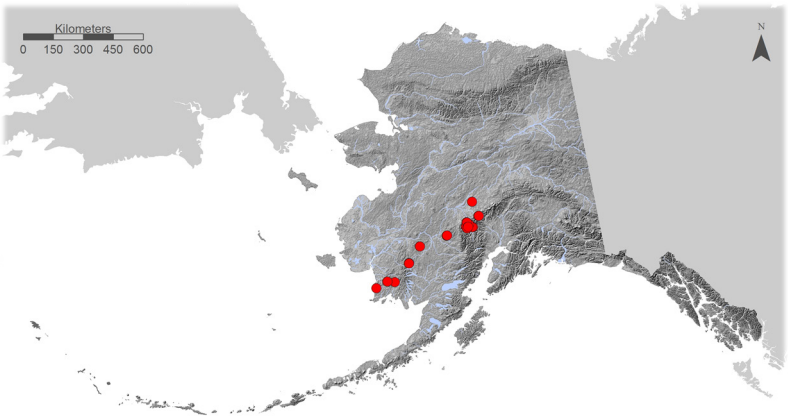

1 cm
ALA 137402

Global Distribution: Endemic to Alaska.

Alaska Distribution: Bering Taiga, Intermontane Boreal, Alaska Range Transition.

Ecoregions Occupied: Ahklun Mountains, Kuskokwim Mountains, Tanana-Kuskokwim Lowlands, Lime Hills, Alaska Range.

Conservation Status: S3 G3; BLM Sensitive.



Description

Illustration by Anne-Lillian Schell, courtesy of University of Alaska Museum

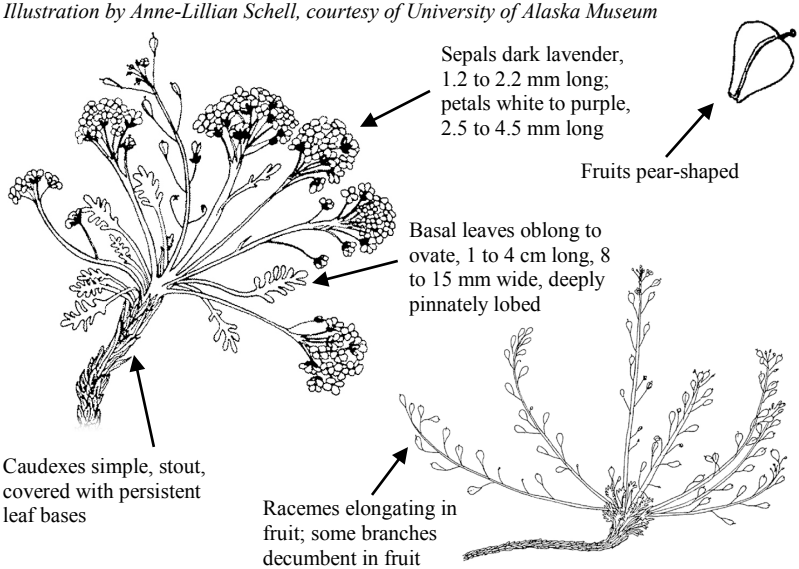


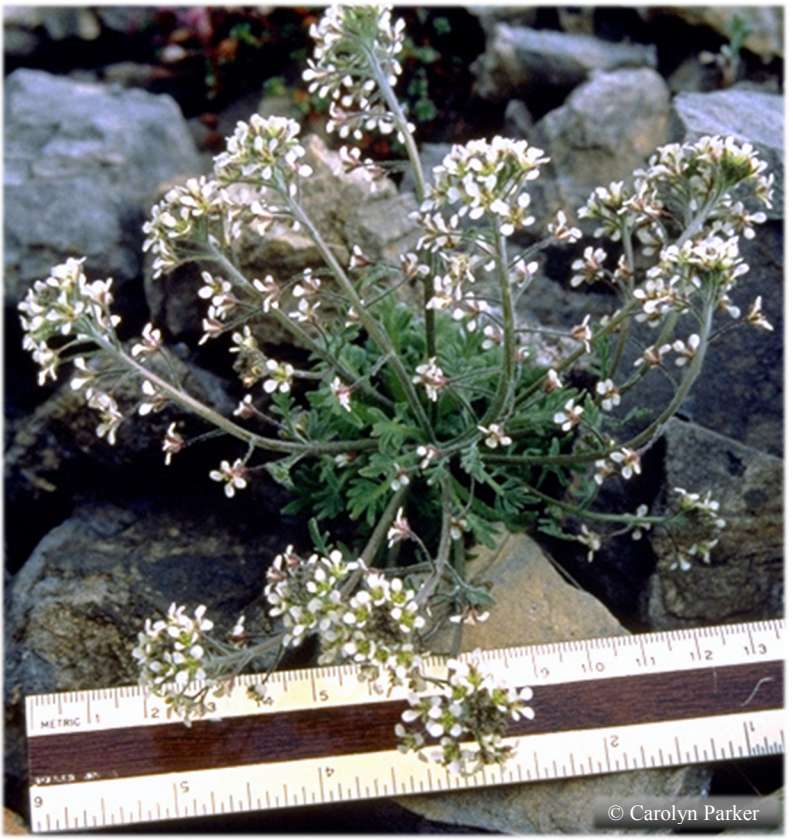
Illustration by Dominique Collet

General: Perennial herb from simple, stout caudex; caudexes covered with persistent leaf bases; stems usually several, usually unbranched 5 to 24 cm long, covered with simple hairs up to 1.3 mm long and smaller, dendritic hairs.

Leaves: Petioles 1 to 4 cm long, often ciliate; basal leaves broadly oblong to ovate, pinnately lobed, 1 to 4 cm long, 8 to 15 mm wide, covered with soft, white hairs; stem leaves short petiolate or sessile, reduced upwards.

Flowers: Flowers arranged in terminal racemes; sepals dark lavender, 1.2 to 2.2 mm long; petals white to purple, obovate, 2.5 to 4.5 mm long, 1 to 2.5 mm wide.

Fruits: Racemes elongating in fruit; fruiting pedicels ascending, often forming less than a 40° angle with the stems, 5 to 15 mm long, covered with simple and dendritic hairs; fruits pear-shaped, 5 to 9 mm long, 2.5 to 4 mm wide with styles 0.4 to 1.2 mm long.



Ecology

Elevations: Known from 200 to 1,700 m.

Landform: Alpine slopes, alpine ridges.

Soil Type: Usually in scree or unstable rubble, less commonly in talus; associated with both calcareous and non-calcareous (including shale and sandstone) substrates.

Moisture regime: Dry.

Slope: Steep.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, alpine *Dryas* tundra.

Associated species: Usually found with *Papaver mcconnellii*;[188] sometimes with *Aconitum delphinifolium, Arnica frigida, Chamerion latifolium, Minuartia arctica, Saxifraga oppositifolia*.

Longevity: Perennial, likely long-lived as some specimens show extensive and well-developed caudexes.

Phenology: Flowering June to mid-July; fruiting July to August.

Population estimate: There are 17 known occurrences in Alaska; several populations consist of few individuals and several are locally abundant.[188]

Similar Species

A collection of *Smelowskia pyriformis* from Yukon-Charley Rivers National Preserve is highly suspect and not included in the species distribution.[109, 189, 190] *Smelowskia pyriformis* is distinct among *Smelowskia* species in Alaska although it looks similar to *Smelowskia ovalis*, which occurs in the Pacific Northwest to southern British Columbia. The morphological features that distinguish *Smelowskia pyriformis* from superficially similar *Smelowskia* species that occur in Southwest and Central Alaska are described in the table below.

Species	Caudex	Basal Leaves	Fruits
Smelowskia pyriformis	Simple, stout	Deeply pinnately lobed	Pear-shaped, 5 to 9 mm long, 2.5 to 4 mm wide
Smelowskia borealis	Usually simple	Palmately 3- to 7-lobed	Flattened and ovate to oblong, 12 to 28 mm long, 4 to 8 mm wide
Smelowskia porsildii	Branched	Entire or 3- to 5-lobed at apex	Ellipsoid, 6 to 10 mm long, 1.5 to 2.5 mm wide


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Symphyotrichum pygmaeum (Lindl.) Brouillet & Selliah

Asteraceae

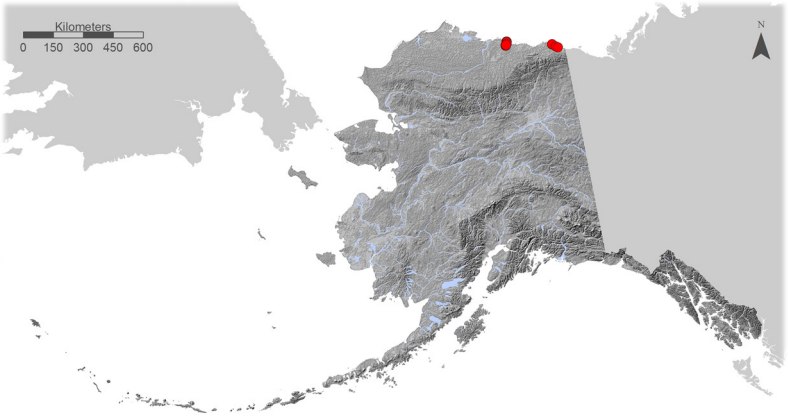
Synonyms: *Aster pygmaeus*, *Aster sibiricus* ssp. *pygmaeus*, *Eurybia pygmaea*

Global Distribution: Arctic North America from northeastern Alaska to Nunavut.

Alaska Region: Arctic Tundra.

Ecoregions Occupied: Beaufort Coastal Plain.

Conservation Status: S2 G2G4; BLM Sensitive.



Description[191]

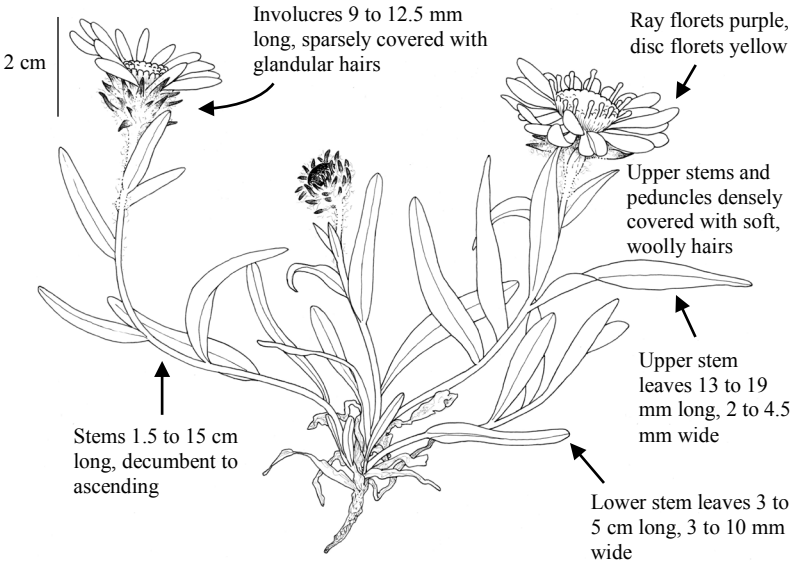


Illustration by Matthew L. Carlson

General: Perennial herb from branched caudex and long rhizomes; stems 1 to 10, decumbent to ascending, 1.5 to 15 cm long, purple, sparsely or densely covered with soft, woolly hairs in the upper half.

Leaves: Basal leaves spatulate, 5 to 19 mm long, 2 to 4 mm wide, entire, glabrous or sparsely covered with soft hairs in the lower half, petiolate, often withered by time of flowering; lower stem leaves sessile, sometimes clasping, lanceolate to oblong, 3 to 5 cm long, 3 to 10 mm wide; upper stem leaves sessile, sometimes clasping, lanceolate to oblong, 13 to 19 mm long, 2 to 4.5 mm wide, sparsely covered with soft, woolly hairs.

Flowers: Flower heads solitary at the ends of stems; peduncles densely covered with soft, woolly hairs; involucres 9 to 12.5 mm long with bracts in 3 to 4 rows; involucral bracts green to purple, linear to oblong, covered with soft, woolly hairs and glandular hairs; ray florets purple, 12 to 18 mm long, 2 to 3.2 mm wide; disc florets yellow.

Fruits: Achenes covered with bristles; pappi white to yellow, 5 to 7.2 mm long.



Ecology

Elevation: Known from near sea level to 40 m in Alaska; known from up to 220 m in arctic Canada.

Landform: River terraces, river banks, dunes, pingos; often associated with areas that are regularly disturbed by natural processes.

Soil Type: Sand, silt.

Moisture regime: Moist to dry.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, open *Dryas* tundra.

Associated species: *Arctagrostis latifolia*, *Armeria scabra*, *Artemisia borealis*, *Artemisia comata*, *Artemisia glomerata*, *Artemisia tilesii*, *Bistorta vivipara*, *Castilleja elegans*, *Hulteniella integrifolia*, *Dupontia fisheri*, *Juncus castaneus*, *Minuartia rossii*, *Salix arctica*, *Salix ovalifolia*, *Trisetum spicatum*, *Wilhelmsia physodes*.

Longevity: Perennial, longevity unknown.

Phenology: Flowering July through mid-August; fruiting early August through September.

Population estimate: There are nine known occurrences in Alaska; one occurrence is locally uncommon.

Herbivory: Seeds likely consumed by insect larvae.

Similar Species[191, 192]

Symphyotrichum pygmaeum has in the past been included as a race of *Eurybia sibirica*. It is easily confused with both *Eurybia sibirica* and *Symphyotrichum yukonense*. These species can be distinguished by the morphological features described in the table below.

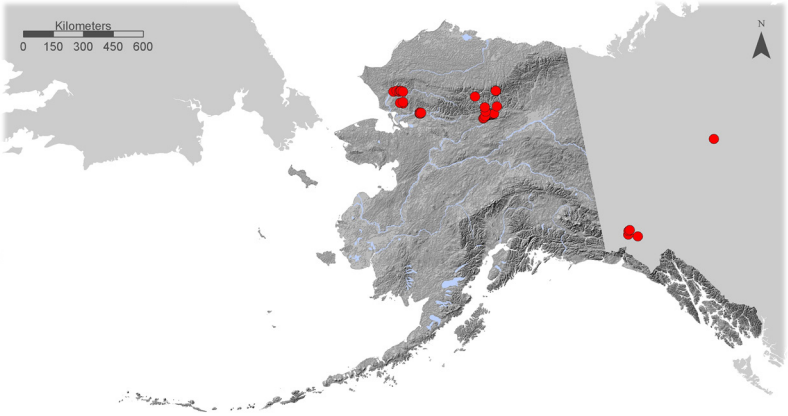
Species	Stems	Stem leaves	Involucres
Symphyotrichum pygmaeum	1.5 to 15 cm long, decumbent to ascending, lacking glandular hairs	Lower leaves 3 to 10 mm wide, upper leaves 2 to 4 mm wide	9 to 12.5 mm long, sparsely covered with glandular hairs
Symphyotrichum yukonense	5 to 30 cm long, erect, covered with glandular hairs	Lower leaves 1 to 4 mm wide, upper leaves 1 to 2.5 mm wide	7 to 10 mm long, densely covered with glandular hairs
Eurybia sibirica	5 to 60 cm long, decumbent to erect, lacking glandular hairs	Lower leaves 3 to 35 mm wide, upper leaves 1 to 12 mm wide	6 to 9 mm long, glandular hairs absent


2 cm
ALA 22181

Symphyotrichum yukonense (Cronquist) G.L. Nesom **Asteraceae**

Synonyms: *Aster yukonensis*

Global Distribution:	Endemic to Alaska, Yukon, and Northwest Territories.
Alaska Distribution:	Arctic Tundra, Intermontane Boreal.
Ecoregions Occupied:	Brooks Range, Kobuk Ridges and Valleys.
Conservation Status:	S3 G3; BLM Watch.



Description[191]

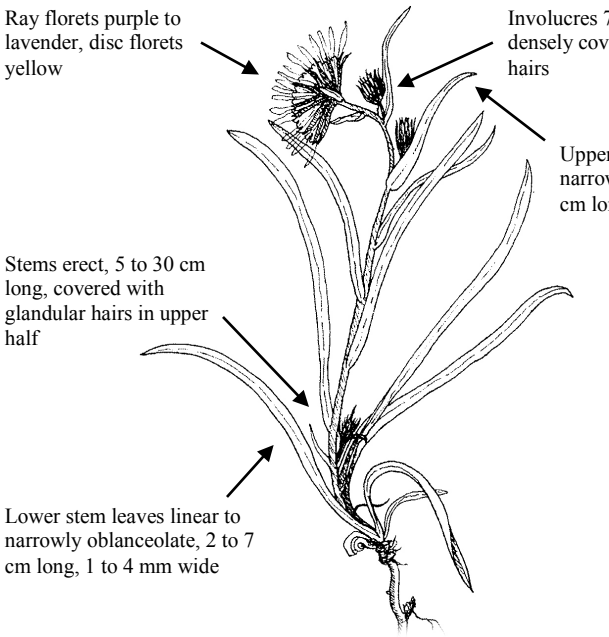


Illustration by Valerie Ford, courtesy of Canadian Science Publishing

General: Perennial herb from short, woody caudexes and long, thin rhizomes; forming tufts or colonies; stems 1 to 8, erect, purple to brown, slender, 5 to 30 cm long, villous, glandular hairs present in upper half.

Leaves: Basal leaves withering by time of flowering, linear to narrowly oblanceolate, 8 to 15 mm long, 1 to 3 mm wide, glabrous; lower stem leaves often withering by flowering, sessile with clasping bases, linear to narrowly oblanceolate, 2 to 7 cm long, 1 to 4 mm wide, glabrous or sparsely villous; upper stem leaves sessile, linear to narrowly lanceolate, 1 to 3 cm long, 1 to 2.5 mm wide, glabrous or sparsely villous, often covered with glandular hairs.

Flowers: Peduncles densely villous, densely covered with glandular hairs; flowers usually borne singly, sometimes several in open arrays; involucres 7 to 10 mm long; involucral bracts in 3 to 4 rows, linear, margins translucent or purple, densely villous, densely covered with glandular hairs; ray florets purple to lavender, 5 to 11 mm long, 0.5 to 2 mm wide; disc florets yellow.

Fruits: Achenes brown, narrowly obovoid, 3 mm long; pappi tan, 3.5 to 4.8 mm long.



Ecology

Elevation: Most occurrences in Alaska are known from 40 to 380 m; an occurrence from Oolah Valley in the Brooks Range is at an elevation of approximately 1,580 m.

Landform: River bars, river terraces, floodplains, sand blowouts, sand dunes, stream beds.

Soil Type: Sand, silt, gravel.

Moisture regime: Usually moist to wet; also known from dry sites.

Slope: Flat to gently sloped.

Aspect: No particular aspect.

Vegetation type: Sparsely vegetated, open willow shrub, open graminoid-willow shrub, open forb-willow shrub.

Associated species: *Arctous rubra*, *Artemisia furcata*, *Astragalus alpinus*, *Betula glandulosa*, *Calamagrostis canadensis*, *Calamagrostis purpurascens*, *Dasiphora fruticosa* ssp. *floribunda*, *Dryas ajanensis*, *Dryas integrifolia*, *Equisetum arvense*, *Eurybia sibirica*, *Hulteniella integrifolia*, *Lupinus arcticus*, *Papaver walpolei*, *Parnassia palustris*, *Picea glauca*, *Populus balsamifera*, *Oxytropis kobukensis*, *Salix alaxensis*, *Salix niphoclada*, *Saxifraga oppositifolia*, *Shepherdia canadensis*.

Longevity: Perennial, longevity unknown.

Phenology: Flowering July through late August; fruiting through mid-September.

Population estimate: There are 39 known occurrences in Alaska; populations range in size from 20 individuals to locally abundant.

Herbivory: Seeds likely consumed by insect larvae.

Similar Species[191, 192]

Symphyotrichum yukonensis is easily confused with *Symphyotrichum pygmaeum* and *Eurybia sibirica*. The morphological features that distinguish these three species are shown in the table below.

Species	Stems	Stem leaves	Involucres
Symphyotrichum yukonense	5 to 30 cm long, erect, covered with glandular hairs	Lower leaves 1 to 4 mm wide, upper leaves 1 to 2.5 mm wide	7 to 10 mm long, densely covered with glandular hairs
Symphyotrichum pygmaeum	1.5 to 15 cm long, decumbent to ascending, lacking glandular hairs	Lower leaves 3 to 10 mm wide, upper leaves 2 to 4 mm wide	9 to 12.5 mm long, sparsely covered with glandular hairs
Eurybia sibirica	5 to 60 cm long, decumbent to erect, lacking glandular hairs	Lower leaves 3 to 35 mm wide, upper leaves 1 to 12 mm wide	6 to 9 mm long, glandular hairs absent


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Trisetum sibiricum ssp. *litorale* Rupr. ex Rosh **Poaceae**

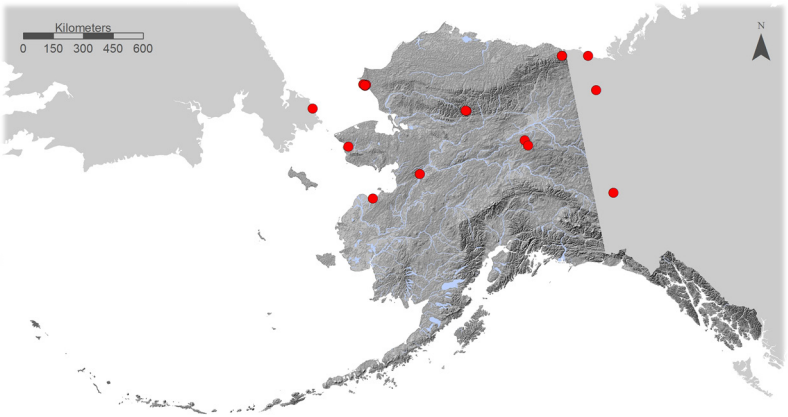
Synonyms: *Trisetum litorale*, *Trisetum sibiricum* var. *litorale*

Global Distribution: Arctic Eurasia from Russia through Siberia and Russian Far East to Alaska and Yukon.

Alaska Distribution: Arctic Tundra, Bering Tundra, Bering Taiga, and Intermontane Boreal.

Ecoregions Occupied: Brooks Foothills, Brooks Range, Seward Peninsula, Yukon-Kuskokwim Delta, Yukon River Lowlands, Ray Uplands, Yukon-Tanana Uplands.

Conservation Status: S3 G5T4Q; BLM Watch.



Description[193]

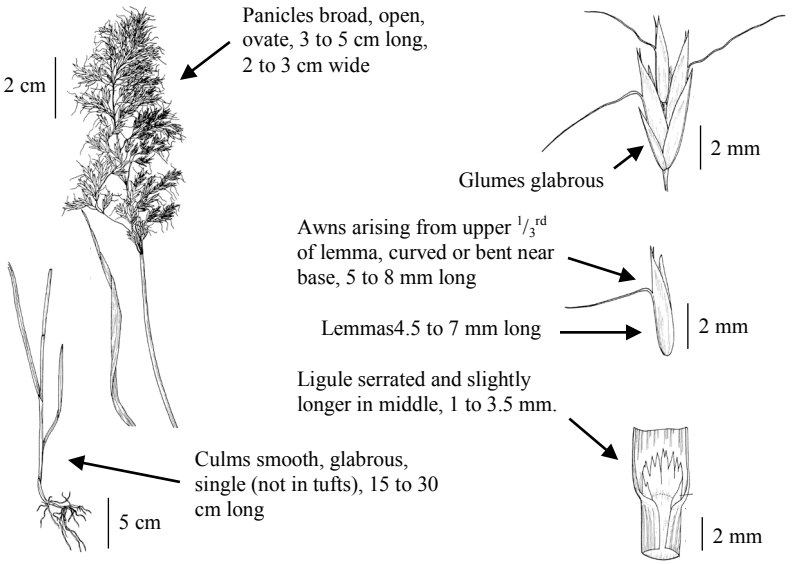


Illustration by Cindy Talbot Roché, courtesy of Intermountain Herbarium

General: Perennial grass from rhizomes, sometimes both sterile and fertile shoots present; stems 15 to 30 cm long, solitary, decumbent; nodes glabrous.

Leaves: Ligules 1 to 3.5 mm long, slightly longer in the center with a jagged edge; leaves 8 to 15 cm long, 2.5 to 4 mm wide, flat, erect or ascending, smooth.

Inflorescences: Panicles 3 to 5 cm long, 2 to 3 cm wide, ovate, sometimes interrupted near the base; branches 1 to 20 mm long, appressed to ascending with spikelets arranged on the upper portion of branches.

Spikelets: Spikelets 5 to 8 mm long with 2 florets; glumes lanceolate, glabrous; lower glumes 3 to 4.5 mm long, upper glumes 5 to 8 mm long; lemmas 4.5 to 7 mm long, glabrous, awned; lemma awns 5 to 8 mm long, arising from upper $^{1}/_{3}^{rd}$, exceeding lemmas, curved or bent near the base; anthers 2 to 3.5 mm long.



ALA 132547 ALA 59139

Ecology

Elevation: Known from near sea level to 1,040 m in Alaska.

Landform: River banks, river bluffs, stream banks, beach terraces, hill slopes above river valleys, wet meadows, mires.

Soil Type: Sand, silt, cobble.

Moisture regime: Moist to wet.

Slope: Flat to moderately sloped.

Aspect: No particular aspect.

Vegetation type: Willow shrub, forb-graminoid meadows, spruce-birch woodlands.

Associated species: *Luzula wahlenbergii*, *Salix* spp.

Longevity: Perennial, likely moderately long-lived because of survival of rhizomes.

Phenology: Mid-June to late August.

Population estimate: There are 11 known occurrences in Alaska. Population sizes are unknown.

Reproductive Biology: Wind-pollinated.

Herbivory: *Trisetum sibiricum* ssp. *litorale* is likely consumed by herbivores in Alaska as it is a nutritious forage grass.[193]

Similar Species[193, 194]

Trisetum sibiricum ssp. *litorale* is morphologically similar to *Calamagrostis purpurascens*, which can occur in similar habitats in northern Alaska. The morphological differences between these species are shown in the table below.

Species	Culms	Leaves	Glumes	Lemmas
Trisetum sibiricum* ssp. *litorale	Culms single, smooth, glabrous	Smooth, glabrous	Glabrous, not keeled	4.5 to 7 mm long; awns attached to the upper $^{1}/_{3}^{rd}$ of lemmas
Calamagrostis purpurascens	Culms arranged in tufts, scabrous	Lower surfaces scabrous, upper surfaces covered with long hairs	Scabrous, keeled	4 to 4.5 mm long; awns attached to the lower $^{1}/_{3}^{rd}$ of lemmas

Trisetum spicatum is usually easily distinguished from *Trisetum sibiricum* ssp. *litorale* based on its pubescent culms and leaves. However, *Trisetum sibiricum* ssp. *litorale* is very similar to glabrous forms of *Trisetum spicatum* and can be distinguished from the latter primarily by the general look of the panicle, which is usually broader and more open than in *Trisetum spicatum* (see table on next page). A report of *Trisetum sibiricum* ssp. *litorale* from Wrangell-St. Elias National Park was based on misidentified *Trisetum spicatum*.

Species	Culms	Leaves	Panicles	Anthers
Trisetum sibiricum* ssp. *litorale	Culms single, smooth, glabrous	Smooth, glabrous	Generally more open, broader (2 to 3 cm wide)	2 to 3.5 mm long
Trisetum spicatum	Culms arranged in tufts, usually pubescent, sometimes glabrous	Scabrous, usually pubescent but sometimes glabrous	Generally more dense, narrower (1 to 2.5 cm wide)	0.7 to 1.4 mm long





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ALA: *Alyssum obovatum* (6a, 6c); *Antennaria densifolia* (10); *Artemisia aleutica* (17); *Artemisia senjavinensis* (26); *Cardamine microphylla* (52, 54); *Carex adelostoma* (58); *Carex heleonastes* (60, 62); *Carex laxa* (66); *Claytonia arctica* (70a); *Corispermum ochotense* (82a, 82b); *Cryptantha shackletteana* (86a); *Cypripedium parviflorum* var. *exiliens* (90a, 90b); *Douglasia arctica* (94b); *Draba aleutica* (100); *Draba micropetala* (110a); *Draba mulliganii* (112, 114); *Draba murrayi* (118); *Draba ogilviensis* (122b); *Erigeron muirii* (134); *Eriogonum flavum* var. *aquilinum* (142a); *Erysimum angustatum* (146a, 146b); *Festuca edlundiae* (150a); *Koeleria asiatica* (154a); *Ligusticum calderi* (156); *Micranthes porsildiana* (169); *Montia vassilievii* ssp. *vassilievii* (174); *Oxygraphis glacialis* (177, 178a); *Oxytropis kokrinensis* (186a); *Papaver gorodkovii* (189, 190); *Parrya nauruaq* (194c); *Pedicularis hirsuta* (198a); *Physaria calderi* (206a); *Pleuropogon sabinei* (213); *Potentilla stipularis* (232); *Puccinellia wrightii* (244); *Ranunculus camissonis* (250a); *Ranunculus sabinei* (260); *Rumex aureostigmaticus* (268, 269); *Rumex beringensis* (274); *Saussurea triangulata* (280); *Symphyotrichum pygmaeum* (314); *Saxifraga aleutica* (286b)

Arnesen, Geir: *Draba micropetala* (108, 110b); *Draba subcapitata* (128); *Pleuropogon sabinei* (214)

Baldwin, Forrest: *Arnica lonchophylla* ssp. *lonchophylla* (12, 13); *Artemisia tanacetifolia* (28); *Boechera lemmonii* (33); *Claytonia arctica* (69); *Claytonia ogilviensis* (74a); *Cochlearia sessilifolia* (78); *Cryptantha shackletteana* (84, 86b); *Douglasia arctica* (92, 94a); *Douglasia beringensis* (96, 97); *Draba murrayi* (116); *Draba ogilviensis* (120); *Erigeron muirii* (132); *Eriogonum flavum* var. *aquilinum* (140, 142b); *Lupinus kuschei* (162a); *Micranthes porsildiana* (168); *Montia vassilievii* ssp. *vassilievii* (172); *Oxygraphis glacialis* (178b); *Oxytropis kokrinensis* (184, 186b); *Parrya nauruaq* (192); *Phacelia mollis* (200, 202a); *Physaria calderi* (204); *Plagiobothrys orientalis* (208, 209, 210); *Ranunculus camissonis* (254a); *Ranunculus sabinei* (262a, 262b); *Rumex beringensis* (272); *Rumex krausei* (276)

Batten, Ryan: *Botrychium spathulatum* (41b)

Bennett, Bruce: *Artemisia tanacetifolia* (30a, 30b); *Claytonia ogilviensis* (72, 74b); *Corispermum ochotense* (80, 81); *Cypripedium parviflorum* var. *exiliens* (88, 90c); *Draba ogilviensis* (122a); *Erigeron ochroleucus* (138b); *Erysimum angustatum* (144); *Podistera yukonensis* (224, 226a, 226b)

Carlson, Matthew: *Artemisia globularia* var. *lutea* (20, 22); *Artemisia senjavinensis* (24); *Boechera lemmonii* (32, 34); *Claytonia arctica* (68, 70b); *Lupinus kuschei* (160, 162b); *Oxygraphis glacialis* (176); *Papaver gorodkovii* (188); *Parrya nauruaq* (194a); *Primula tschuktschorum* (237, 238); *Ranunculus camissonis* (248, 250b); *Ranunculus turneri* ssp. *turneri* (264, 265, 266)

Cook, Alfred: *Alyssum obovatum* (4, 5, 6b)

Duffy, Mike: *Carex laxa* (64); *Oxytropis kobukensis* (180, 182a, 182b); *Phacelia mollis* (202b)

Farrar, Donald: *Botrychium spathulatum* (41a); *Botrychium tunux* (44a); *Botrychium yaaxudakeit* (48a, 48b)

Fulkerson, Justin: *Parrya nauruaq* (194b); *Primula tschuktschorum* (236)

Jones, Ian: *Artemisia aleutica* (16, 18b)

Jones, Pam: *Cypripedium parviflorum* var. *pubescens* (xi)

Kenney, Leah: *Saxifraga aleutica* (284, 286a)

Kristinsson, Hörður: *Carex adelostoma* (56)

Lavin, Matthew: *Erigeron ochroleucus* (136, 138a)

Lipkin, Rob: *Antennaria densifolia* (8); *Artemisia aleutica* (18a); *Physaria calderi* (206b); *Poa porsildii* (221); *Polystichum aleuticum* (228, 230a, 230b); *Potentilla stipularis* (234a, 234b); *Ranunculus glacialis* var. *alaskensis* (252, 254b); *Rumex krausei* (278)

Matson, Steve: *Botrychium ascendens* (36, 37a, 37b); *Draba densifolia* (104, 106a, 106b)

Oldham, Michael: *Koeleria asiatica* (152, 154b)

Overholt, Jo: *Mertensia drummondii* (164, 166a, 166b)

Sandbakk, Bjørn: *Draba pauciflora* (124, 126a, 126b); *Draba subcapitata* (130a, 130b); *Festuca edlundiae* (148, 150b, 150c); *Pedicularis hirsuta* (196, 198b)

Soreng, Robert: *Pleuropogon sabinei* (212); *Poa hartzii* ssp. *alaskana* (216, 218a, 218b); *Poa porsildii* (220, 222)

Stensvold, Mary: *Botrychium spathulatum* (40); *Botrychium tunux* (44b)

Studebaker, Stacy: *Cochlearia sessilifolia* (76)

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Botrychium tunux (Mary Stensvold), *Botrychium yaaxudakeit* (Mary Stensvold)

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Ranunculus camissonis (Anne Elven), *Ranunculus glacialis* var. *alaskensis* (Anne Elven)

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Festuca edlundiae (Susan Laurie Bourque)

Canadian Science Publishing:

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Carex laxa (Marcel Jomphe), *Micranthes porsildiana* (Valerie Ford), *Phacelia mollis* (Valerie Ford), *Physaria calderi* (Valerie Ford), *Podistera yukonensis* (Valerie Ford), *Silene uralensis* ssp. *ogilviensis* (Valerie Ford), *Symphyotrichum yukonense* (Valerie Ford)

Carlson, Matthew L.:
Alyssum obovatum, Antennaria densifolia, Arnica lonchophylla ssp. *lonchophylla*, *Cardamine microphylla, Claytonia arctica, Cypripedium parviflorum* var. *exiliens*, *Douglasia arctica, Draba mulliganii, Draba pauciflora, Erysimum angustatum, Papaver gorodkovii, Pedicularis hirsuta, Ranunculus ponojensis, Ranunculus sabinei, Ranunculus turneri* ssp. *turneri*, *Rumex aureostigmaticus, Rumex beringensis, Saussurea triangulata, Saxifraga rivularis* ssp. *arctolitoralis*, *Smelowskia johnsonii*, *Smelowskia media, Symphyotrichum pygmaeum*

Collet, Dominique:
Claytonia ogilviensis, Cochlearia sessilifolia, Draba aleutica, Draba ogilviensis, Physaria calderi, Poa hartzii ssp. *alaskana, Saxifraga aleutica, Smelowskia pyriformis*

Flora of North America Association:

> Reprinted from: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford.

Boechera lemmonii (Yevonn Wilson-Ramsey), *Carex adelostoma* (Susan A. Reznicek), *Carex heleonastes* (Susan A. Reznicek), *Carex laxa* (Susan A. Reznicek), *Corispermum ochotense* (Yevonn Wilson-Ramsey), *Draba aleutica* (Barbara Alongi), *Draba densifolia* (Barbara Alongi)

Intermountain Herbarium:

> Reprinted from: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford.

Koeleria asiatica (Linda Ann Vorobik), *Pleuropogon sabinei* (Linda Ann Vorobik, Hana Pazdirkova), *Poa hartzii* ssp. *alaskana* (Sandy Long), *Poa porsildii* (Sandy Long), *Puccinellia vahliana* (Cindy Talbot Roché), *Puccinellia wrightii* ssp. *wrightii* (Cindy Talbot Roché), *Trisetum sibiricum* ssp. *litorale* (Cindy Talbot Roché)

Missouri Botanical Garden:

> Reprinted from: Kelso, S., B. Yurtsev, and D. Murray. 1994. *Douglasia beringensis* (Primulaceae): A New Species from Northwestern Alaska. Novon. 4(4). 381-385 p.

Douglasia beringensis (Carolyn L. Crawford)

> Reprinted from: Al-Shehbaz, I., J. Grant, R. Lipkin, D. Murray, C. Parker. 2007. *Parrya nauruaq* (Brassicaceae), a new species from Alaska. Novon. 17(3). 275-278 p.

Parrya nauruaq (Ihsan Al-Shehbaz)

New York Botanical Garden:

> Reprinted from: Kelso, S. 1987. *Primula tschuktschorum* and *Primula eximia* (Primulaceae: Section Crytallophlomis): a distylous species and its homostylous derivative from the Bering Strait Region, Alaska. Brittonia. 39(1). 63-72 p.

Primula tschuktschorum (Kay Holmes)

Province of British Columbia:

> Reprinted from: Douglas, G., D. Meidinger, and J. Pojar. 2000. Illustrated Flora of British Columbia. British Columbia Ministry of Environment, Lands, and Parks and Ministry of Forests. Victoria, BC. Vol. 5, 389 pp.

Botrychium spathulatum (Jane Lee Ling)

> Reprinted from: Douglas, G., G. Straley, D. Meidinger, and J. Pojar. 1998. Illustrated Flora of British Columbia. British Columbia Ministry of Environment, Lands, and Parks and Ministry of Forests. Victoria, BC. Vol. 1, 436 pp.

Erigeron ochroleucus (Elizabeth Stephen), *Ligusticum calderi* (Donald Gunn)

Schell, Anne-Lillian (courtesy of University of Alaska Museum):
Artemisia aleutica, *Artemisia globularia* var. *lutea*, *Artemisia senjavinensis*, *Cryptantha shackletteana, Draba murrayi, Erigeron muirii, Eriogonum flavum* var. *aquilinum, Mertensia drummondii, Montia vassilievii* ssp. *vassilievii, Oxytropis kobukensis, Oxytropis kokrinensis, Podistera yukonensis, Polystichum aleuticum, Rumex krausei*

Stanford University Press (illustrations by Dagny Tande-Lid):

Reprinted from: Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 pp.

Artemisia tanacetifolia, Carex adelostoma, Draba micropetala, Draba subcapitata, Oxygraphis glacialis, Plagiobothrys orientalis, Potentilla stipularis

University of Washington Press:

Reprinted from: Hitchcock, C., A. Cronquist, M. Ownbey, and J. Thompson. 1955+. Vascular Plants of the Pacific Northwest. Vol. 1-5. University of Washington Press. Seattle, WA.

Carex heleonastes (R. A. With), *Lupinus kuschei* (Jeanne R. Janish), *Sidalcea hendersonii* (Jeanne R. Janish)

Wagner, David H.:
Botrychium ascendens

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Glossary

Achene: small, dry, single-seeded indehiscent fruit.

Adventitious: developing in an unusual position, such as roots originating along the stem.

Alternate: attached singly at each node with consecutive structures, usually leaves, pointing in different directions.

Amphi-Beringian: found on both sides of the Bering Strait, usually including Russian Far East and a combination of Alaska, Yukon, and Northwest Territories.

Androgynous: having staminate flowers above the pistillate flowers in the same spike.

Annual: one year life cycle, growing from seed, reproducing, and dying in one year.

Anthesis: time of flowering when flowers are fully expanded.

Anther: pollen-bearing portion of stamen.

Apex: (*pl.* **apexes, apices**) tip, usually in relation to a leaf.

Apomictic: any form of asexual reproduction, usually referring (as it does in this guide) to seed production without fertilization.

Appressed: Closely pressed against a surface.

Ascending: angled upward.

Auricle: ear-shaped lobe or appendage.

Awn: slender, bristle-shaped appendage; present on the spikelets of many grasses.

Axil: Point at which the leaf joins the stem.

Axillary: arising from the joint between a leaf and the stem.

Basal: related to or located at the base.

Beak: prolonged, slender tip of a thicker structure, usually in reference to fruits or perigynia.

Biennial: two year life cycle, usually growing from seed in the first year and reproducing in the second year.

Bract: small leaves at the base of an inflorescence or flower.

Bulb: short, vertical, thickened underground shoot surrounded by thickened leaves or leaf bases.

Bulbil: small, bulb-like reproductive structure often arising from axils of leaves or in place of flowers.

Caespitose: growing in tufts or clumps.

Calcareous: comprised in part of calcium, referring to minerals such as limestone and dolostone which contain calcium and carbonate (CO_3) and are basic.

Calyx: (*pl.* **calyxes, calyces**) the outer whorl of flowering parts; collective term for all the sepals of a flower.

Campanulate: bell-shaped.

Canescent: covered with short, fine white or grey hairs.

Capitate: aggregated into a compact cluster, forming a head.

Capsule: a dry fruit of more than one carpel that opens at maturity to release seed.

Carpel: a fertile leaf bearing undeveloped seeds, one or more carpels form a pistil.

Caudex: (*pl.* **caudexes, caudices**) the persistent, thickened base of a perennial plant.

Cauline: pertaining to or on the stem.

Ciliate: fringed with long, simple hairs.

Circumboreal: occurring in the boreal zone throughout or through much of the northern hemisphere.

Circumpolar: occurring in the arctic zone throughout or through much of the northern hemisphere.

Clasping: partially surrounding, usually in reference to leaf bases partially surrounding the stem.

Cordate: heart-shaped, usually referring to a leaf.

Cordillera: collective term for the mountains of western North America that generally run parallel to the Pacific Coast from Alaska to Mexico.

Corm: short, solid, thickened, vertical, underground stem.

Corolla: the inner whorl of flowering parts; collective term for all the petals of a flower.

Corymb: flat-topped cluster of flowers, the individual flower stalks grow upward from various points on the axis of the inflorescence so that all flowers reach the same approximate height.

Cruciform: cross-shaped.

Culm: the stem of graminoid plants.

Cuneate: wedge-shaped, tapering to a point.

Cyme: flat-topped or convex cluster of flowers in which the innermost and/or uppermost flowers open first.

Decumbent: lying on the ground with upper sections ascending upward.

Deltate: shaped like an equilateral triangle, usually referring to leaf.

Dioecious: Producing male and female flowers on separate individuals.

Dilated: expanded or widened.

Disjunct: geographically separated from the main range of the taxon.

Disk flower: flower with a tubular corolla found in the flower heads of Asteraceae.

Distylous: having two floral forms, one with short styles and long stamens and the other with long styles and short stamens.

Edaphic: relating to conditions of the soil.

Endemic: growing in only a limited and narrow geographic area.

Entire: without indentations or division, often referring to the margin of a leaf or a petal.

Filiform: thread-like.

Flag leaf: in reference to grasses, the upper most leaf on the stem.

Floret: small flower, usually in a cluster; most often applied to the small, specialized flowers of Poaceae and Asteraceae.

Flower head: dense cluster of florets surrounded by a whorl of bracts so that it appears as a single flower.

Frond: the leaf of a fern.

Fruit: the seed-bearing mature ovary and associated structures of a plant.

Gametophyte: the sexually reproducing (as opposed to spore producing) individuals of ferns and fern allies.

Gemma: (*pl.* **gemmae**) bud-like structure that separates from the parent plant and forms a new individual.

Glabrous: without hairs.

Glaucous: covered with a white, waxy layer.

Glandular: with secreting organs (glands), which can be stalked (on the summit of hairs) or sessile.

Globose: sphere-shaped.

Glume: one of the pair of bracts at the base of a spikelet in Poaceae.

Homostylous: having flowers of one form, all styles are the same length.

Hyaline: translucent.

Hypha: (*pl.* **hyphae**) multicellular, thread-like structures that comprise the primary body of a fungi.

Hypogynous: with flower parts (sepals, petals, stamens) attached to the receptacle below the pistil.

Imbricate: overlapping, like shingles on a roof.

Indehiscent: not splitting open at maturity.

Indusium: (*pl.* **indusia**) an outgrowth of the fern frond surface that covers or contains the sori.

Inflorescence: a flower cluster or arrangement of flowers on a stem.

Internode: the portion of a stem between two nodes.

Invasive plant: non-native plant that produces viable offspring in large numbers and has the potential to establish and spread in natural areas.

Involucre: one or more whorls of small leaves or bracts subtending an inflorescence, such as a flower head (Asteraceae).

Keel: a conspicuous, length-wise ridge.

Lanate: wooly, with long entangled hairs.

Lanceolate: lance-shaped, much longer than broad, widest below the middle and tapering to both ends.

Leaflet: leaf-like division of a single compound leaf.

Lemma: the lower of the two bracts enclosing a floret in Poaceae.

Ligule: the flat, membranous, upward outgrowth from the top of a sheath where a grass leaf separates from the stem.

Linear: long and narrow, the sides parallel or nearly so.

Lip: a projection of a structure, such as the lower petal of an orchid flower.

Loam: soil consisting of a mixture of sand, silt, clay, and organic matter.

Lobe: a rounded division of a leaf or other structure.

Lunate: crescent shaped.

Mafic: comprised of silicate minerals that are rich in iron and magnesium and are basic.

Monoecious: producing male and female reproductive structures in separate flowers on the same individual.

Mycorrhiza: (*pl.* **mycorrhizae**) symbiotic association of fungal hyphae with plant roots.

Nerve: simple vein or rib of a leaf or fruit.

Node: part of the stem where branches or leaves originate.

Non-native: plants that are present in a given area because of their accidental or intentional introduction by human activities.

Obcordate: inversely heart-shaped; attached at the narrower end and notched at the apex.

Oblanceolate: inversely lance-shaped; the structure is widest above the middle and tapers in both directions.

Obovate: inversely egg-shaped; structure is widest above the middle.

Opposite: attached doubly at each node with structures facing in opposing directions.

Orbicular: spherical or circular in outline.

Ovary: the expanded basal portion of a pistil containing the undeveloped seeds.

Ovate: egg-shaped, structure is widest below the middle.

Ovoid: three-dimensionally egg-shaped.

Palea: the upper of the two bracts enclosing a floret in Poaceae.

Palmate: divided into three or more lobes or leaflets diverging from a common point, like fingers from a palm.

Panicle: A flower cluster where the main axis branches into several lateral axes from which multiple flowers arise.

Papillose: having miniature bump-like projections.

Pappus: (*pl.* **pappi**) awns, scales, or bristles at the apex of the achenes of Asteraceae.

Pedicel: stalk of a single flower or fruit in an inflorescence.

Peduncle: stalk of a cluster of flowers or of a single flower when it alone is the entire inflorescence.

Peltate: with stalk attached in the center of the lower surface.

Perennial: multi-year life cycle, usually producing flowers and fruit each year once the individual has reached maturity.

Perigynium: (*pl.* **perigynia**) inflated tissue that encloses the pistil, and later the achene, in *Carex* species.

Persistent: remaining attached when dead or no longer functional.

Petal: one of the specialized inner flower leaves.

Petiolated: having a petiole, referring to the attachment of leaves.

Petiole: leaf stalk.

Phyllary: bract of the involucre of the composite flower.

Pilose: covered with soft, fine hairs.

Pinna: (*pl.* **pinnae)** used here for the primary division of a compound fern frond.

Pinnate: with leaflets or pinnae arranged on either side of a common axis.

Pinnately: lobes or divisions separated by deep indentations along a common axis and having therefore the appearance of a pinnately compound leaf.

Pinnatifid: lobe divisions reaching only halfway to the midrib of the leaf.

Pinnatisect: pinnately cleft at midrib.

Pistil: female organ of a flower including the stigma, style, and ovary.

Pod: dry fruit that opens at maturity to release seeds.

Pistillate: female, having one or more pistils but no stamens.

Prostrate: lying flat upon the ground.

Puberulent: covered with fine, very short, soft hairs.

Pubescent: covered with hairs.

Pustulate: having raised, blister-like areas.

Pyriform: pear-shaped.

Raceme: unbranched cluster of stalked flowers arising from a central stalk where the flowers at the bottom open first.

Ray flower: flower with a flattened, strap-shaped corolla found in the flower heads of Asteraceae.

Receptacle: the end of a stem to which a flower is attached.

Recurved: curving backwards.

Reflexed: abruptly bent downwards.

Rhizomatous: having rhizomes.

Rhizome: underground stem, distinguished from a root by the presence of nodes, buds, or scale-like leaves.

Rosette: cluster of leaves arising from a central point.

Runner: a horizontally spreading stem on the ground, usually rooting at nodes.

Scale: small, thin structure.

Scape: a leafless flower or inflorescence stalk arising from ground level.

Scapose: having flowers that are borne by a leafless stalk arising from ground level.

Scarious: thin, dry, membranous, not green.

Scree: unconsolidated angular rocks of small size, smaller than fist-sized.

Secund: arranged on one side of an axis, such as a stem.

Sepal: one of the specialized outer flower leaves.

Serrulate: having minute, short, sharp, forward-pointing teeth.

Sessile: without a stalk.

Setose: covered with bristles.

Sheath: structure that partially or completely surrounds another structure, usually referring to the to the portion of a grass leaf that surrounds the stem.

Silicle: dry, dehiscent seed pod, less than twice as long as wide, characteristic of Brassicaceae.

Silique: dry, dehiscent seed pod, more than twice as long as wide, characteristic of Brassicaceae.

Sorus: (*pl.* **sori**) cluster of sporangia in ferns.

Spatulate: spatula-shaped, rounded at tip and tapering toward the base.

Spike: unbranched cluster of unstalked flowers arising from a central stalk.

Spikelet: a small, clustered unit of florets in the inflorescences of Poaceae.

Sporangium: (*pl.* **sporangia**) spore-bearing structure.

Sporophyte: the spore producing (as opposed to sexually reproducing) individuals of ferns and fern allies.

Stamen: the male part of the flower that bears pollen, consists of an anther and the supporting filament.

Staminate: male, having one or more stamens but no pistils.

Stellate: star-shaped.

Stipe: referring here to the stalk of a fern frond.

Stipule: a leaf-like appendage at the base of a leaf stalk.

Stolon: an elongated horizontal stem running along the ground that bears roots at nodules, forming new plants.

Stoloniferous: having stolons.

Style: thin, often attenuated portion of the pistil occurring between the stigma and ovary.

Subcapitate: nearly head-shaped.

Subterete: almost round or cylindrical.

Succession: the process of change in plant communities over time.

T-shaped: 2-rayed with rays forming a roughly straight line bisected by the stalk.

Talus: unconsolidated angular rocks of large size, fist-sized and larger.

Taproot: a primary descending root.

Terete: cylindrical, therefore round in cross-section, and often tapering at both ends.

Ternate: divided into three parts.

Terrace: relatively flat surface cut into the side of a steep slope.

Till: unsorted sediments of glacial origin, including sand, silt, clay, gravel, rubble, and boulders.

Tomentose: covered with matted, soft, wool-like hairs.

Tube: the united portion of a corolla in which the petals are fused to one another.

Tuberculate: with wart-like thickenings or knobby projections.

Tufted: in a dense cluster.

Tussock: compact mound formed by tightly growing clump of graminoid plant.

Ultramafic: comprised of minerals with low silicate content that have very high iron and magnesium content and are basic.

Umbel: flat-topped cluster of flowers or flower clusters in which pedicels and peduncles arise from a common point.

Valve: a seed containing compartment of pod or capsule.

Villous: covered with long, soft, shaggy hairs, not matted.

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References

References are organized by the order of their appearance. The nomenclature in this guide primarily follows the Panarctic Flora Checklist (http://nhm2.uio.no/paf/). When species treatments were unavailable from Panarctic Flora Checklist, priority was given to names accepted by the Flora of North America publications. Several taxa did not have treatments in either of the aforementioned sources, and for those taxa the nomenclature in this guide followed a variety of sources, including ITIS (www.itis.gov) and The Illustrated Flora of British Columbia.

1. Sturm, M., J. McFadden, G. Liston, F. Chapin III, C. Racine, and J. Holmgren. 2001. Snow–shrub interactions in Arctic tundra: a hypothesis with climatic implications. Journal of Climate. 14(3). 336–344 p.
2. Hollister, R., P. Webber, and C. Tweedie. 2005. The response of Alaskan arctic tundra to experimental warming: Differences between short- and long-term responses. Global Change Biology. 11(4): 525-536 p.
3. Tape, K., M. Sturm, and C. Racine. 2006. The Evidence for shrub expansion in Northern Alaska and the Pan-Arctic. Global Change Biology. 12(4). 686-702 p.
4. Scenario Network for Arctic Planning (SNAP) and Ecological Wildlife Habitat Data Analysis for the Land and Seascape (EWHALE). 2012. Predicting Future Potential Climate-Biomes for the Yukon, Northwest Territories, and Alaska. Fairbanks, AK. 105 pp.
5. Rupp, T., F. Chapin III, and A. Starfield. 2000. Response of subarctic vegetation to transient climatic change on the Seward Peninsula in northwest Alaska. Global Change Biology. 6(5). 451-455 p.
6. Rupp, T., A. Starfield, F. Chapin III, and P. Duffy. 2002. Modeling the impact of black spruce on the fire regime of Alaskan boreal forest. Climatic Change. 55(1). 213-233 p.
7. Kasischke, E., and F. Chapin III. 2008. Increasing Vulnerability of Alaska's Boreal Forest as a Result of Climate Warming and the Changing Fire Regime. In: MacCracken, M., F. Moore, and J. Topping (Eds.). 2008. Sudden and Disruptive Climate Change: Exploring the Real Risks and How We Can Avoid Them. Earthscan Publications. London, UK. 175-192 p.
8. Carlson, M., and M. Shephard. 2007. Is the spread of non-native plants in Alaska accelerating? In: Harrington, T., and S. Reichard (eds.). Meeting the challenge: invasive plants in Pacific Northwest ecosystems. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, OR. General Technical Report PNW-GTR-694. 111-127 p.
9. Nawrocki, T., H. Klein, M. Carlson, L. Flagstad, J. Conn, R. DeVelice, A. Grant, G. Graziano, B. Million, and W. Rapp. Invasiveness of 50 Non-Native Plant Species for Alaska. Report for Alaska Association of Conservation Districts. Alaska Natural Heritage Program, University of Alaska Anchorage. Anchorage, AK. 253 pp.
10. Pimm, S., and M. Gilpin. 1989. Theoretical issues in conservation biology. In: Roughgarden, J., R. May, and S. Levin (eds.). Perspectives in Ecological Theory. Princeton University Press. Princeton, NJ. 394 p.
11. U.S. Congress, Office of Technology Assessment. 1993. Harmful non-indigenous species in the United States. OTA-F-565. U.S. Government Printing Office. Washington, D.C. 391 p.
12. Myers, N. 1997. Global biodiversity II: Losses and threats. In: Meffe, G., and C. Carroll (eds.). Principles of Conservation Biology 2nd Edition. Sinauer Associates. Sunderland, MA. 729 p.
13. Wilcove, D., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying Threats to Imperiled Species in the United States. BioScience. 48(8). 607-615 p.

14. Stein, B., L. Kutner, and J. Adams. 2000. Precious heritage: the status of biodiversity in the United States. Oxford University Press, Oxford. 416 p.
15. Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics. 52(3). 273-288 p.
16. Schemske, D., B. Husband, M. Ruckelshaus, C. Goodwillie, I. Parker, and J. Bishop. 1994. Evaluating Approaches to the Conservation of Rare and Endangered Plants. Ecology. 75(3). 584-606 p.
17. Rabinowitz, D. 1981. Seven forms of rarity. In: Synge, H. (ed.) The Biological Aspects of Rare Plant Conservation. John Wiley and Sons. NewYork, NY. 205–217 p.
18. Carlson, M. 2007. Tangle Lakes Bureau of Land Management Archeological District Rare Vascular Plant Inventory – 2006 Technical Report. Prepared for Glennallen Field Office, Bureau of Land Management, U.S. Department of the Interior. Prepared by Alaska Natural Heritage Program, University of Alaska Anchorage. Anchorage, AK. 24 pp.
19. Carlson, M., and T. Gotthardt. 2009. Reconnaissance Survey for Threatened, Endangered, and Sensitive Species at Clear Air Force Station, Alaska. Prepared for U.S. Air Force, Fort Deitrich, MD. Prepared by Alaska Natural Heritage Program, University of Alaska Anchorage. Anchorage, AK. 56 pp.
20. Carlson, M., and H. Cortés-Burns. 2011. Floristic Survey of the Delta National Wild and Scenic River. Prepared for Glenallen Field Office, Bureau of Land Management, U.S. Department of the Interior. Prepared by Alaska Natural Heritage Program, University of Alaska Anchorage. Anchorage, AK. 39 pp.
21. Carlson, M., S. Gisler, and S. Kelso. 2008. The Role of Reproduction Assurance in the Arctic: a Comparative Study of a Homostylous and Distylous Species Pair. Arctic, Antarctic, and Alpine Research. 40(1). 39-47 p.
22. Faber-Langendoen, D., L. Master, J. Nichols, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, and B. Young. 2009. NatureServe Conservation Status Assessments: Methodology for Assigning Ranks. NatureServe. Arlington, VA. 41 pp.
23. Nowacki, G., P. Spencer, M. Fleming, T. Brock, and T. Jorgenson. 2001. Unified Ecoregions of Alaska: 2001. U.S. Geological Survey Open-File Report 02-297 (map).
24. Cody, W. 1996. Flora of the Yukon Territory. National Research Council of Canada Monograph Publishing Program. Ottawa, ON. 634 pp.
25. Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 pp.
26. Porsild, A., and W. Cody. 1980. Vascular Plants of Continental Northwest Territories, Canada. National Museums of Canada. Ottawa, ON. 667 pp.
27. Al-Shehbaz, I. 2010. *Alyssum* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 7, p. 247-251
28. Kataeva, M., N. Alexeeva-Popova, I. Drozdova, and A. Bellajaeva. 2004. Chemical composition of soil and plant species in the Polar Urals as influenced by rock type. Geoderma. 122(2). 257-268 p.
29. Brooks, R., R. Morrison, R. Reeves, T. Dudley, Y. Akman. 1979. Hyperaccumulation of Nickel in *Alyssum* Linnaeus (Cruciferae). Proceedings of the Royal Society of London Series B Biological Sciences. 203(1153). 387-403 p.
30. Roland, C. 1996. The Floristics and Community Ecology of Extrazonal Steppe in the Yukon and Kolyma River Drainages. Master of Science Thesis. University of Alaska Fairbanks. Fairbanks, Alaska. 205 pp.
31. Howenstein, R. 1994. Ecology and biogeography of steppe vegetation on south-facing bluffs in interior Alaska. Master of Science Thesis. University of Alaska Fairbanks. Fairbanks, Alaska.
32. Achuff, P., and L. Roe. 1992. Botanical survey of the Goat Flat proposed research natural area, Deerlodge National Forest. Montana Natural Heritage Program. 31 pp.

33. Bayer, R. 2006. *Antennaria* Gaertner. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 19, p. 388-415
34. Bayer, R. Professor and Chair, Department of Biological Sciences, University of Memphis, 3774 Walker Avenue, Memphis, TN 38152. Tel: 901-678-2596 – pers. comm.
35. Bayer, R. 1989. A systematic and phytogeographic study of *Antennaria aromatica* and *A. densifolia* (Asteraceae: Inuleae) in the Western North American Cordillera. Madroño 36(4). 248-259 p.
36. Wolf, S. 2006. *Arnica* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 21, p. 366-377
37. Crowley, K. 1995. *Arnica lonchophylla*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [8 November 2012]
38. Schultz, L. 2006. *Artemisia* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 19, p. 503-534
39. Lipkin, R. 2008. *Artemisia aleutica*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [8 November 2012]
40. Vallès, J., and E. McArthur. 2001. *Artemisia* Systematics and Phylogeny: Cytogenetic and Molecular Insights. In: McArthur, E., and Fairbanks, D. (eds.) 2001. Shrubland Ecosystem Genetics and Biodiversity: Proceedings; 2000 June 13-15. Rocky Mountain Research Station, Forest Service, U.S. Department of Agriculture. 67-74 p.
41. Carlson, M., R. Lipkin, H. Cortés-Burns, and I. Lapina. 2006. Stewart River Training Area Rare Plant Survey. Report for Alaska Army National Guard, State of Alaska Department of Military and Veterans Affairs. 26 pp.
42. Elven, R., D. Murray, V. Yu, and B. Yurtsev (Eds.) 2011. Annotated Checklist of the Panarctic Flora (PAF) Vascular Plants. Version 1.0 http://nhm2.uio.no/paf/
43. Kelso, S. 1989. Vascular flora and phytogeography of Cape Prince of Wales, Seward Peninsula, Alaska. Canadian Journal of Botany. 67(11). 3248-3259 p.
44. Lipkin, R. 1997. *Artemisia senjavinensis*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [18 November 2012]
45. Watson, L. 2006. *Tanacetum* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 19, p. 489-491
46. Al-Shehbaz, I., and M. Windham. 2010. *Boechera* Á. Löve & D. Löve. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 7, p. 348-412
47. Windham, M., and I. Al-Shehbaz. 2007. New and Noteworthy Species of *Boechera* (Brassicaceae) III: Additional Sexual Diploids and Apomictic Hybrids. Harvard Papers in Botany. 12(1). 235-257 p.
48. Cook, M., C. Roland, P. Loomis. 2007. An Inventory of the Vascular Flora of Wrangell-St. Elias National Park and Preserve, Alaska. Published Report-2166497. Natural Resource Program Center, National Park Service, U.S. Department of the Interior. Fort Collins, Colorado. 481 pp.
49. Cook, M., and C. Roland. 2002. Notable Vascular Plants from Alaska in Wrangell-St. Elias National Park and Preserve with Comments on the Floristics. Canadian Field-Naturalist. 116(2): 192-304 p.
50. Miller, A., M. Carlson, P. Spencer, R. Lipkin. 2006. Vascular Plant Inventory & Baseline Monitoring of Nunatak Communities 2005: Lake Clark National Park and Preserve, Kenai Fjords National Park. Report for Alaska Region Inventory and Monitoring Program, National Park Service, U.S. Department of the Interior. Alaska Natural Heritage Program, University of Alaska Anchorage. Anchorage, AK. 44 pp.

51. Farrar, D. 2011. Systematics of moonworts *Botrychium* subgenus *Botrychium*. Department of Ecology, Evolution and Organismal Biology, Iowa State University. Ames, IA. Available: http://www.public.iastate.edu/~herbarium/botrychium.html
52. Wagner, W., and F. Wagner. 1993. Ophioglossaceae C. Agardh. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 2, p. 85-106
53. Douglas, G., D. Meidinger, and J. Pojar. 2000. Illustrated Flora of British Columbia. British Columbia Ministry of Environment, Lands, and Parks and Ministry of Forests. Victoria, BC. Vol. 5, 389 pp.
54. Farrar, D., and S. Popovich. 2012. Ophioglossaceae. In: Weber, W., and R. Wittmann. 2012. Colorado Flora: Western Slope 4th Edition. University Press of Colorado. Boulder, Colorado. 400 pp.
55. Johnson-Groh, C., C. Riedel, L. Schoessler, and K. Skogen. 2002. Belowground Distribution and Abundance of *Botrychium* Gametophytes and Juvenile Sporophytes. American Fern Journal. 92(2). 80-92 p.
56. Wagner, W., and F. Wagner. 1990. Notes on the Fan-Leaflet Group of Moonworts in North America with Descriptions of Two New Members. American Fern Journal. 80(3). 73-81 p.
57. Farrar, D. Emeritus professor. Department of Evolution and Organismal Biology, Iowa State University. dfarrar@iastate.edu – pers comm.
58. Stensvold, M., D. Farrar, and C. Johnson-Groh. 2002. Two New Species of Moonworts (*Botrychium* subg. *Botrychium*) from Alaska. American Fern Journal. 92(2). 150-160 p.
59. Oliver, L., A. Tomaino, R. Lipkin, and G. Davis. 2012. *Botrychium tunux*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [27 February 2012]
60. Stensvold, M. 2009. In: Goldstein, M., D. Martin, and M. Stensvold. 2009. 2009 Forest Service Alaska Region Sensitive Species List: Assessment and Proposed revisions to the 2002 List. [21 February 2012] Available: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev2_037658.pdf
61. Jørgensen, M., T. Carlsen, I. Skrede, and R. Elven. 2008. Microsatellites resolve the taxonomy of the polyploidy *Cardamine digitata* aggregate (Brassicaceae). Taxon. 57(3). 882-892 p.
62. Al-Shehbaz, I., K. Marhold, and J. Lihová. 2010. *Cardamine* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 19, p. 464-484
63. Cortés-Burns, H., M. Carlson, R. Lipkin, L. Flagstad, and D. Yokel. 2009. Rare vascular plant species of the North Slope, Alaska. Technical Report 58. Prepared for the Fairbanks District Office, Bureau of Land Management, U.S. Department of the Interior. 116 pp.
64. Murray, D. 2003. *Carex* Linnaeus sect. *Racemosae*. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 23, p. 401-414
65. Ball, P., and A. Reznicek. 2002. *Carex* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 23, p. 254-273
66. Catling, P., A. Reznicek, and W. Crins. 1990. Introduction "Symposium on Systematics and Ecology of the genus *Carex* (Cyperaceae)." Canadian Journal of Botany. 68(7). 1405-1408 p.
67. Piątek M., and Mułenko W. 2010. The calcareous mires in South-East Poland are home to two rare *Anthracoidea* species. Acta mycological. 45(2). 175-184 p.
68. Tande, G., and R. Lipkin. 2003. Wetland Sedges of Alaska. Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage. Anchorage, AK. 138 pp.
69. Douglas, G., D. Meidinger, and J. Pojar. 2001. Illustrated Flora of British Columbia. British Columbia Ministry of Environment, Lands, and Parks and Ministry of Forests. Victoria, BC. Vol. 6, 361 pp.

70. Toivonen, H. 2002. *Carex* Linnaeus sect. *Glareosae*. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 23, p. 311-321
71. Shackleford, R. 2004. Conservation Assessment for Hudson Bay Sedge (*Carex heleonastes* L.f.). Eastern Region, Forest Service, U.S. Department of Agriculture. [6 December 2012] Available: http://www.fs.fed.us/r9/wildlife/tes/ca-overview/docs/Plants/Carex_Heleonastes.pdf
72. Rothrock, P., and A. Reznicek. 2002. *Carex* Linnaeus sect. *Paniceae* G. Don. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 23, p. 426-431
73. Savchenko, K., M. Lutz, M. Piątek, V. Heluta, and E. Nevo. 2012. *Anthracoidea caricis-meadii* is a new North American smut fungus on *Carex* sect. *Paniceae*. Mycologia [e-publication ahead of print]
74. Ball, P. 2002. *Carex* Linnaeus sect. *Limosae* (Heuffel) Meinhauser. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 23, p. 416-419
75. Miller, J. 2004. *Claytonia* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 4, p. 465-475
76. Lozhkin, A., P. Anderson, S. Vartanyan, T. Brown, B. Belaya, and A. Kotov. 2001. Late Quaternary paleoenvironments and modern pollen data from Wrangel Island (Northern Chukotka). Quaternary Science Reviews. 20(1). 217-233 p.
77. McNeil, J. 1972. New Taxa of *Claytonia* sect. *Claytonia* (Portulacaceae). Canadian Journal of Botany. 50(9). 1895-1898 p.
78. Al-Shehbaz, I., and M. Koch. 2010. *Cochlearia* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 19, p. 514-516
79. Mulligan, G. 2000. Key to Brassicaceae (Cruciferae) of Canada and Alaska. Harvard Botany Libraries. 76 pp.
80. Parker, C. 2011. Vascular Plant Survey of Sitkalidak Island and Old Harbor Vicinity, Kodiak Island: Kodiak National Wildlife Refuge, Kodiak, Alaska. University of Alaska Museum of the North Herbarium, Fairbanks, Alaska. 48 pp.
81. Mosyakin, S. 2003. *Corispermum* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 4, p. 313-321
82. Yukon Data Conservation Centre. 2012. *Corispermum ochotense* var. *alaskanum*. Yukon Rare Plant Information sheet. Available: http://www.env.gov.yk.ca/animals-habitat/cdc.php [12 February 2013]
83. Higgins, L. 1969. New Combinations and a New Species of Perennial Cryptantha. Great Basin Naturalist. 29(1). 28-30 p.
84. Parker, C. 1995. Status and Trends Survey of Category 2 Plants in the Yukon-Charley Rivers National Preserve, Alaska. Report for National Biological Service, U.S. Department of the Interior. 78 pp.
85. Roland, C., and M. Cook. 1998. A Notable Range Extension for the Globally Rare Endemic Plant, *Cryptantha shackletteana* L. C. Higgins, in East-central Alaska. Canadian Field-Naturalist. 112(1). 158-160 p.
86. Armbruster, W., and D. Guinn. 1989. The Solitary Bee Fauna (Hymenoptera: Apoidea) of Interior and Arctic Alaska: Flower Associations, Habitat Use, and Phenology. Journal of the Kansas Entomological Society. 62(4). 468-483 p.
87. Sheviak, C. 2010. *Cypripedium parviflorum* in the Northwest, with the Description of a New Variety. The Native Orchid Conference Journal. 7(2). 1-15 p.
88. Doherty, John. 1997. The Genus *Cypripedium*. North American Native Orchid Journal. 3(1). 5-120 p.
89. Sheviak, C. Curator of Botany, Herbarium, New York State Museum. 222 Madison Avenue, Albany, New York 12230. Tel: (518) 474-5800 – pers. comm.
90. Kelso, S. 2009. *Douglasia* Lindley. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 8, p. 263-267

91. Kelso, S., B. Yurtsev, and D. Murray. 1994. *Douglasia beringensis* (Primulaceae): A New Species from Northwestern Alaska. Novon. 4(4). 381-385 p.
92. Lipkin, R., and A. Tomaino. 2007. *Douglasia beringensis*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [22 November 2012]
93. Al-Shehbaz, I.,Windham, M., and Elven, R. 2010. *Draba* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 7, p. 269-347
94. Douglas, G., G. Straley, D. Meidinger, and J. Pojar. 1998. Illustrated Flora of British Columbia. British Columbia Ministry of Environment, Lands, and Parks and Ministry of Forests. Victoria, BC. Vol. 2, 401 pp.
95. Aiken, S., M. Dallwitz, L. Consaul, C. McJannet, L. Gillespie, R. Boles, G. Argus, J. Gillett, P. Scott, R. Elven, M. LeBlanc, A. Brysting, and H. Solstad. 2003. Flora of the Canadian Arctic Archipelago. Version: May 2011. [4 February 2013] http://nature.ca/aaflora/data/index.htm
96. Alsos, I., G. Arnesen, R. Elven, and B. Sandbakk. 2011. The Flora of Svalbard. [14 February 2013] http://svalbardflora.net
97. Brochmann, C., and Elven, R. 1992. Ecological and genetic consequences of polyploidy in arctic *Draba* (Brassicaceae). Evolutionary Trends in Plants. 6(11). 111-124 p.
98. Mulligan, G. 1974. Confusion in the names of three *Draba* species of the Arctic: *D. adamsii*, *D. oblongata*, and *D. corymbosa*. Canadian Journal of Botany. 52(4). 791-793 p.
99. Al-Shehbaz, I. 2009. Two New North American Species of *Draba* (Brassicaceae): *Draba heilii* from New Mexico and *D. mulliganii* from Alaska. Harvard Papers in Botany. 14(1). 83-86 p.
100. Mulligan, G. 1979. Four new species of *Draba* in northwestern North America. Canadian Journal of Botany. 57(18). 1873-1875 p.
101. Murray, D., and C. Parker. 1999. On the Taxonomic Disposition of the Whitlow-grass, *Draba ogilviensis* Hultén. Canadian Field-Naturalist. 113(4). 659-662 p.
102. Nesom, G. 2006. *Erigeron* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 20, p. 256-348.
103. Nesom, G., and D. Murray. 2004. Notes on North American arctic and boreal species of *Erigeron* (Asteraceae: Astereae). Sida. 21(1). 41-57 p.
104. Lipkin, R., M. Carlson, B. Bennett, H. Cortés-Burns, A. Treher. 2012. *Erigeron muirii*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [21 February 2013]
105. Armbruster, W., and A. McGuire. 1991. Experimental assessment of reproductive interactions between sympatric *Aster* and *Erigeron* (Asteraceae) in interior Alaska. American Journal of Botany. 78(10). 1449-1457 p.
106. Douglas, G., G. Straley, D. Meidinger, and J. Pojar. 1998. Illustrated Flora of British Columbia. British Columbia Ministry of Environment, Lands, and Parks and Ministry of Forests. Victoria, BC. Vol. 1, 436 pp.
107. Reveal, J. 2005. *Eriogonum* Michaux. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 5, p. 221-430
108. Al-Shebaz, I. 2010. *Erysimum* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 7, p. 534-545
109. Murray, D. Professor of Botany and Curator Emeritus, University of Alaska Museum of the North, University of Alaska Fairbanks, Fairbanks, AK 99775. Tel: 907-479-0309 – pers. comm.
110. Harris, S. 1990. Status Report on the narrow-leaved wallflower, *Erysimum angustatum*, in Canada. Committee on the Status of Endangered Wildlife in Canada. 36 pp.

111. Lipkin, R., and A. Tomaino. 2009. *Erysimum angustatum*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [6 March 2013]
112. Aiken, S., L. Consaul, and L. Lefkovitch. 1995. *Festuca edlundiae* (Poaceae), a High Arctic, New Species Compared Enzymatically and Morphologically with Similar *Festuca* Species. Systematic Botany. 20(3). 374-392 p.
113. Darbyshire, S., and L. Pavlick. 2007. *Festuca* L. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 24, p. 389-443
114. Brochmann, C., and S. Steen. 1999. Sex and genes in the flora of Svalbard – implications for conservation biology and climate change. Det Norske Vitenskaps-Akademi. I. Matematisk Naturvitenskapelig Klasse, Skrifter, Ny Serie 38. 33-72 p.
115. Elven, R. Professor, Department of Research and Collections, Natural History Museum in Oslo. Postboks 1172 Blindern 0318 Oslo, Norway. Tel: +47-22851632 – pers. comm.
116. Bennett, B. Coordinator, Yukon Conservation Data Centre, Environment Yukon. Box 2703 (V-5N) Whitehorse, Yukon Canada Y1A 2C6. Tel: 867-667-5331 – pers. comm.
117. Standley, L. 2007. *Koeleria* Pers. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 24, p. 753-755
118. Lipkin, R. 2007. Investigation of Potentially Sensitive Plant Communities in the Old Dummy Burn, Kanuti National Wildlife Refuge, Alaska, 2006. Alaska Natural Heritage Program, University of Alaska Anchorage. Anchorage, AK. 24 pp.
119. Kazmin, V., and B. Abaturov. 2011. Quantitative Characteristics of Nutrition in Free-Ranging Reindeer (*Rangifer tarandus*) and Musk Oxen (*Ovibos moschatus*) on Wrangel Island. Biology Bulletin. 38(9). 935-941 p.
120. Stensvold, M. Regional Botanist. Alaska Region, Forest Service, U.S. Department of Agriculture. 204 Siginaka Way, Sitka, Alaska 99835. Tel: (907) 747-4210 – pers. comm.
121. Calder, J., and R. Taylor. 1968. Flora of the Queen Charlotte Islands. Part 1. Systematics of the Vascular Plants. Research Branch, Canada Department of Agriculture. Ottawa, ON. 148 pp.
122. Hultén, E. 1973. Supplement to the Flora of Alaska and Neighboring Territories: a study in the flora of Alaska and the Transberingian connection. Botaniska Notiser. 126. 459-512 p.
123. Mathias, M., and L. Constance. 1959. New North American Umbelliferae – III. Bulletin of the Torrey Botanical Club. 86(6). 374-382 p.
124. Douglas, G., D. Meidinger, and J. Pojar. 1999. Illustrated Flora of British Columbia. British Columbia Ministry of Environment, Lands, and Parks and Ministry of Forests. Victoria, BC. Vol. 3, 423 pp.
125. Lipkin, R., and K. Gravuer. 2008. *Lupinus kuschei*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [22 November 2012]
126. Lipkin, R. 1997. *Mertensia drummondii*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [11 March 2013]
127. Brouillet, L., and P. Elvander. 2009. *Micranthes* Haworth. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 8, p. 49-70
128. Razzhivin, V. 1994. Snowbed vegetation of far northeastern Asia. Journal of Vegetation Science. 5(6). 829-842 p.
129. Miller, J. 2003. *Montia* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 4, p. 485-488
130. Wencai, W., M. Tamura, and M. Gilbert. 2001. *Oxygraphis* Bunge. In: Flora of China Editorial Committee, eds. Flora of China. 25+ vols. New York and Oxford. Vol. 6, p. 435

131. Whittemore, A. 1997. *Ranunculus* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 3, p. 88-135
132. Welsh, S. 1974. Anderson's Flora of Alaska and Adjacent Parts of Canada. Brigham Young University Press. Provo, UT. 724 pp.
133. Lipkin, R. 2000. *Oxytropis kobukensis*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [21 March 2013]
134. Mulder, C., and R. Harmsen. 1995. The effect of muskox herbivory on growth and reproduction in an arctic legume. Arctic and Alpine Research. 27(1). 44-53 p.
135. Lipkin, R. 2000. *Oxytropis kokrinensis*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [21 March 2013]
136. Kiger, R., and D. Murray. 1997. *Papaver* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 3, p. 323-333
137. Al-Shehbaz, I. 2010. *Parrya* R. Brown. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 7, p. 511-514
138. Al-Shehbaz, I., J. Grant, R. Lipkin, D. Murray, C. Parker. 2007. *Parrya nauruaq* (Brassicaceae), a new species from Alaska. Novon. 17(3). 275-278 p.
139. Lipkin, R. 2005. *Parrya nauruaq*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [27 March 2013]
140. Fulkerson, J., J. Whittall, and M. Carlson. 2012. Reproductive ecology and severe pollen limitation in the polychromic tundra plant, *Parrya nudicaulis* (Brassicaceae). PLoS ONE. 7(3). e32790.
141. Gillett, G. 1963. Flowering responses and phylogeny in the *Phacelia franklinii* group (Hydrophyllaceae). American Journal of Botany. 50(8). 798-801 p.
142. O'Kane, S. 2010. *Physaria* (Nuttall ex Torrey & A. Gray) A. Gray. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 7, p. 616-665
143. Grundt, H., R. Elven, and C. Brochmann. 2005. A rare case of self-incompatibility in arctic plants: *Draba palanderiana* (Brassicaceae). Flora – Morphology, Distribution, Functional Ecology of Plant. 200(4). 321-325 p.
144. But, P. 2007. *Pleuropogon* R. Br. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 24, p. 103-109
145. Gauthier, G., J. Bêty, J. Giroux, and L. Rochefort. 2004. Trophic Interactions in a High Arctic Snow Goose Colony. Integrative and Comparative Biology. 44(2). 119-129 p.
146. Wilkinson, P., C. Shank, and D. Penner. 1976. Muskox-Caribou Summer Range Relations on Banks Island, N.W.T. The Journal of Wildlife Management. 40(1). 151-162 p.
147. Soreng, R. *Poa* L. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 24, p. 486-601.
148. Lipkin, R. *Poa hartzii* ssp. *alaskana*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [30 April 2013]
149. Mathias, M., and L. Constance. 1950. Four New American Umbelliferae. Bulletin of the Torrey Botanical Club. 77(2). 133-139 p.
150. Lipkin, R., and L. Oliver. 2009. *Podistera yukonensis*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [8 November 2012]
151. Jahrsdoerfer, S., and G. Balogh. 2007. Aleutian shield fern (*Polystichum aleuticum*) 5-Year Review: Summary and Evaluation. Anchorage Field Office, Fish and Wildlife Service, U.S. Department of the Interior. Anchorage, AK. 20 pp.

152. Christensen, C. 1938. On *Polystichum aleuticum* C. Chr., a New North American Species. American Fern Journal. 28(3). 111-113 p.
153. Wagner, D. 1993. *Polystichum* Roth. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 2, p. 290-299
154. Lipkin, R. 2008. *Polystichum aleuticum*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [27 May 2013]
155. Soltis, P. 1994. Isozyme Comparison of the species *Polystichum aleuticum* and *P. lachenense*. Unpublished report. University of Washington. Pullman, WA. 6 pp.
156. Kelso, S. 1987. *Primula tschuktschorum* and *Primula eximia* (Primulaceae: Section Crytallophlomis): a distylous species and its homostylous derivative from the Bering Strait Region, Alaska. Brittonia. 39(1). 63-72 p.
157. Kelso, S. 2009. *Primula* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 8, p. 286-301
158. Carlson, M., S. Gisler, and S. Kelso. 2008. The role of reproductive assurance in the arctic: a comparitive study of a homostylous and distylous species pair. Arctic, Antarctic, and Alpine Research. 40(1). 39-47 p.
159. Davis, J., and L. Consaul. 2007. *Puccinellia* Parl. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 24, p. 459-477
160. Whittemore, A. 1997. *Ranunculus* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 3, p. 88-135
161. Yurtsev, B., D. Murray, and R. Elven. 2012. *Ranunculus glacialis* subsp. *alaskensis* subsp. nov. (Ranunculaceae), a Beringian race of an otherwise Atlantic species. Journal of Botanical Research Institute of Texas. 6(1). 17-24 p.
162. Järvinen, A. 2006. The life history of Ranunculus glacialis, an arctic-alpine perennial herb, in Finnish Lapland. Ecography. 12(2). 152-162 p.
163. Diemer, M. 1996. The incidence of herbivory in high-elevation populations of *Ranunculus glacialis*: a re-evaluation of stress-tolerance in alpine environments. Oikos. 75(3). 486-492 p.
164. Komarov, V., and B. Shishkin. 1937. Flora of the U.S.S.R. Vol. 7. Izdatel'stvo Akademii Nauk. Leningrad, SSSR. 615 pp.
165. Rousi, A. 1955. Cytological observations on the *Ranunculus auricomus* group. Hereditas. 41(3). 516-518 p.
166. Steinbach, K., and G. Gottsberger. 1994. Phenology and Pollination Biology of Five *Ranunculus* species in Giessen, Central Germany. Phyton. 34(2). 203-218 pp.
167. Hörandl, E. 2008. Evolutionary implications of self-compatibility and reproductive fitness in the apomictic *Ranunculus auricomus* polyploid complex (Ranunculaceae). International Journal of Plant Science. 169(9). 1219-1228 p.
168. Sohlberg, E., and L. Bliss. 1984. Microscale pattern of vascular plant distribution in two high arctic plant communities. Canadian Journal of Botany. 62(10). 2033-2042 p.
169. Komarov, V., and M. Il'in. 1934. Flora of the U.S.S.R. Vol. 5. Izdatel'stvo Akademii Nauk. Leningrad, SSSR. 593 pp.
170. Mosyakin, S. 1997. *Rumex* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 5, p. 489-533
171. Morozova, L., S. Ektova. 2013. Salt marsh vegetation of the southern tundra subzone of Western Siberia: An example of the Baydaratskaya Bay coasts in the Kara Sea. Czech Polar Reports. 3(1). 58-68 p.
172. Lipkin, R. 1997. *Rumex krausei*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [7 June 2013]

173. Keil, D. 2006. *Saussurea* DC. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 19, p. 165-168
174. Brouillet, L., and P. Elvander. 2009. *Saxifraga* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 8, p. 132-146
175. Jørgensen, M., R. Elven, A. Tribsch, T. Gabrielsen, B. Stedje, C. Brochmann. 2006. Taxonomy and Evolutionary Relationships in the *Saxifraga rivularis* Complex. Systematic Botany. 31(4). 702-729 p.
176. Brochmann, C., and A. Håpnes. 2001. Reproductive strategies in some arctic *Saxifraga* (Saxifragaceae), with emphasis on the narrow endemic *S. svalbardensis* and its parental species. Biological Journal of the Linnean Society. 137(1). 31-49 p.
177. Alsos, I., E. Müller, P. Eidesen. 2013. Germinating seeds or bulbils in 87 of 113 tested arctic species indicates potential for ex situ seed bank storage. Polar Biology. 36(6). 819-830 p.
178. Westergaard, K., M. Jørgensen, T. Gabrielsen, I. Alsos, C. Brochmann. 2010. The extreme Beringian/Atlantic disjunction in *Saxifraga rivularis* (Saxifragaceae) has formed at least twice. Journal of Biogeography. 37(7). 1262-1276 p.
179. Hitchcock, C., A. Cronquist, M. Ownbey, and J. Thompson. 1961. Vascular Plants of the Pacific Northwest. Part 3: Saxifragaceae to Ericaceae. University of Washington Press. Seattle, Washington. 614 pp.
180. Kelly, L. 2006. 90-Day Finding on a petition to list *Sidalcea hendersonii* (Henderson's checkermallow) as threatened or endangered. Federal Register. 71(32). 8252-8257 p.
181. Stensvold, M. 2005. Henderson's Checkerbloom (*Sidalcea hendersonii*) Newly Discovered in Alaska. Alaska Region, Forest Service, U.S. Department of Agriculture. Available: http://www.fs.fed.us/wildflowers/rareplants/conservation/success/sidalcea_hendersonii_discovery.shtml [17 September 2013]
182. Thorpe, A. 2010. Introduction of *Sidalcea hendersonii* to Dean Creek ACEC, Coos Bay District BLM. Institute for Applied Ecology, Corvallis, Oregon and USDI Bureau of Land Management, Coos Bay District. 17 pp.
183. Marshall, M., and F. Ganders. 2001. Sex-biased seed predation and the maintenance of females in a gynodioecious plant. American Journal of Botany. 88(8). 1437-1443 p.
184. Morton, J. 2005. *Silene* Linnaeus. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 5, p. 166-214
185. Brunton, D. 1981. Taxonomy and status of *Silene uralensis* subsp. *ogilviensis* comb. nov. (Caryophyllaceae) in Yukon Territory, Canada. Canadian Journal of Botany. 59(7). 1361-1362 p.
186. Al-Shehbaz, I. 2010. *Smelowskia* C. A. Meyer. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 7, p. 671-675
187. Mulligan, G. 2001. Three New Taxa and a Summary of the Mustard Family, Brassicaceae (Cruciferae), in Canada and Alaska. Canadian Field-Naturalist. 115(2). 341-342 p.
188. Lipkin, R. 1997. *Smelowskia pyriformis*. In: NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life. Version 7.1. Arlington, VA. Available: http://www.natureserve.org/explorer [22 September 2013]
189. Parker, C. Research Professional, University of Alaska Museum of the North, University of Alaska Fairbanks, Fairbanks, AK 99775. Tel: 907-474-7109 – pers. comm.
190. Roland, C. Botanist, Denali National Park and Preserve, NPS Central Alaska Network Inventory and Monitoring Program, Fairbanks, AK 99709. Tel: 907-455-0672 – pers. comm.
191. Brouillet, L., J. Semple, G. Allen, K. Chambers, and S. Sundberg. 2006. *Symphyotrichum* Nees. In: Flora of North America Editorial Committee,

eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 20, p. 465-539

192. Brouillet, L. 2006. *Eurybia* (Cassini) Cassini. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 20, p. 365-382
193. Rumely, J. 2007. *Trisetum* Pers. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 24, p. 744-753
194. Marr, K., R. Hebda, C. Greene. 2007. *Calamagrostis* Adans. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 16+ vols. New York and Oxford. Vol. 24, p. 706-732

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Index of Common Names

Common names are not included in the species accounts because they are often nonsensical and little relate to the plant. Sometimes common names are more or less a translation of the scientific name, but more often they are arbitrary. An index of common names is provided here to increase clarity when common names are used. However, common names can be misleading and sometimes refer to more than one taxon. Several of the taxa in this field guide have no common name and the corresponding pages do not appear in the index below.

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