



Potential Federal Candidate Plant Species of Washington

Prepared for
US Fish and Wildlife Service, Region 1

Prepared by
Walter Fertig
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ON THE COVER: *Phlox solivaga* (Yeti phlox), Griffin Peak, Blue Mountains, WA.
Photograph by: Walter Fertig

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Introduction

The first federal "Endangered Species Preservation Act" was passed in 1966 and only authorized the US Fish and Wildlife Service (USFWS) to develop a list of endangered animals native to the United States. The law did not prohibit take or trade of listed animals, but did provide a potential funding mechanism for research and acquisition of habitat (Anderson 1998). In 1969 this law was amended to allow listing of mollusks and animals from outside the United States and provisions were included regulating take and outlining actions for recovery. The Endangered Species Act (ESA) of 1973 greatly expanded the regulation of trade, take, and impacts to the habitat of listed species from development projects and for the first time included the recognition of "Threatened" species (those which were likely to become Endangered in the foreseeable future). More importantly, the 1973 act extended ESA protections to vascular plant species for the first time (Anderson 1999, Master et al. 2000).

As part of the ESA, Congress directed the Smithsonian Institution to develop a comprehensive list of vascular plant species of the United States that might be eligible for listing under the new law. Over the next year experts were asked to identify potential endangered, threatened, or extinct species in state-level workshops held across the country. In January 1975, the Smithsonian Institution submitted a report identifying 761 endangered, 1,238 threatened, and 100 extinct plant species from the continental United States and another 1,088 endangered, threatened, and extinct plant taxa from Hawaii as potential candidates for listing under the ESA (Ayensu and DeFillips 1978).

USFWS proposed nearly 1700 plant species from the Smithsonian Report for listing under the ESA in 1976. The first four plant taxa to be listed were four endemics of California's Channel Islands in 1977. Amendments to the ESA in 1978 formalized the listing process and the mass proposal of 1,700 plant species was withdrawn. Under the new guidance, species were first identified as potential candidates for listing and subjected to study and review. Species were evaluated for potential listing based on five primary criteria: destruction of habitat; overutilization for sport or collection; disease or predation, inadequacy of protection; and other natural or man-made threats. Species that met these requirements could then be formally proposed for listing in a notice published in the Federal Register. The public was then given an opportunity to comment or provide additional data, after which USFWS would make a finding to list as Threatened or Endangered or not list.

From 1978 to 1995 potential candidate species were divided into three categories for assessment. Category 1 included species for which USFWS had sufficient information available to support a listing determination, but which had not yet been officially proposed for listing. Category 3 contained species that were no longer being considered for listing because of taxonomic issues, the species had been found to be more common, widespread or less threatened than initially suspected, or the species was extinct. Category 2 included species which appeared to warrant listing, but needed more research to corroborate their status. USFWS periodically published updates to the Candidate list in the Federal Register, and by the mid 1990s the list contained over 4,000 species (Master et al. 2000). None of the candidates were officially protected under the ESA, but federal agencies, such as the US Forest Service (USFS) and Bureau of Land

Management (BLM) often relied on the candidate lists to designate species as agency "Sensitive". Furthermore, Category 2 candidates were eligible for funding to better determine their range-wide status and suitability for upgrading to Category 1 or Proposed status.

In 1995, USFWS revised the three-tiered candidate system. Category 1 species were renamed "Candidates" for potential listing, but were not automatically proposed, pending backlogs in the listing process. Categories 2 and 3 were eliminated. The loss of the Category 2 program had an unfortunate effect in reducing funding for field research on possible candidates. The net result has been a decrease in the number of species being designated as candidates during the past 20 years and less attention being focused on newly described species (which initially often appear to be quite rare) or those undergoing rapid declines (Anderson 1999).

Natural heritage programs can help fill the void created by the cessation of the Category 2 candidate list. By employing standardized ranking criteria, such as the NatureServe Conservation Status Assessment methodology (Faber-Langendoen et al. 2012), natural heritage programs are able to assess the conservation status of species at global and state levels and draw attention to species at high risk of extinction or in need of research to clarify their status. Natural heritage data can be used by USFWS and other federal agencies to identify species that might warrant conservation attention as candidates for listing under ESA or for Sensitive designation (Stein et al. 2000).

In 2017, the Washington Natural Heritage Program (WNHP) received funding from USFWS to update natural heritage ranks for plant species identified as Endangered, Threatened, Extirpated, or Sensitive in Washington. Arnett (2017a) used this analysis to identify 11 Washington plant species that might warrant consideration as future Candidates for listing under the ESA. The revised ranks have also been incorporated in recent revisions to the state plant species of special concern list (WNHP 2018, 2019).

The following report builds on the work initiated by Arnett in 2017. It includes a summary of current information on the distribution, abundance, habitat, and threats to 53 potential candidate species in Washington (Table 1). The summaries include an assessment of the five listing factors used by USFWS to evaluate potential listings, as well as a summary of additional research and management needs. These species accounts are intended to provide USFWS personnel with critical information they need to better perform their duties under the ESA to evaluate potential candidates for federal listing.

Methods

The species discussed in this report were selected according to the following criteria:

- Global rank of G1, G1G2, or T1
- State Endangered or Threatened status in Washington
- Lack of current listing or Candidate status by USFWS (the status of 12 listed species in Washington is summarized in Fertig 2019).

- Demonstrated downward trend or high degree of threat
- Newly described species named in the past 10 years and not previously evaluated

Although WNHP tracks 365 vascular plant taxa as being of special concern, species that are secure globally (ranked G4 to G5 or T4 to T5) were excluded, regardless of their rarity within Washington. Six species were removed from consideration because of recent field data indicating they were more common than previously suspected (and in need of revised G or T ranks) or because of insufficient data (two potentially extirpated taxa). The final list of target species is shown in Table 1.

Each of the final 53 target species was evaluated based on their geographic range, number of occurrences in Washington, habitat, threats, and trends. Threats were assessed using the USFWS's 5 listing factors: (1) present or threatened destruction, modification, or curtailment of habitat or range; (2) overutilization for commercial, recreational, scientific, or education purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; (5) other natural or manmade factors affecting continued existence. Recommendations on additional research or management needs were summarized for each species. Data for these evaluations was compiled from recent field surveys and herbarium specimens, a review of published and unpublished literature, and WNHP's Biotics database.

Finally, the current status, degree of threat, and completeness of survey data were used to assign each of the 53 target species to one of three priority bins. Species with demonstrated high threats, low population numbers, downward trends, and relatively complete survey data were identified as being potential Candidates for listing under the ESA. Species with stable trends and low threats were recognized as being "probably secure" at present and not in need of additional formal protection under the ESA. Other species with incomplete survey information but potentially high threats, low numbers, or downward trends were recognized as "needing more data".

Table 1. High priority Washington State Rare Plant Taxa

Legend (for complete descriptions, see WNHP 2019). **Nat Her Rank:** (Natural Heritage Rank) G = Global Rank; T = Trinomial Rank (global rank of subspecies or variety); S = State Rank. 1 = Critically Imperiled; 2 = Imperiled; 3 = Vulnerable; 4 = Apparently Secure; 5 = Secure; H = Historical (last relocated in 1980 or earlier); X = Extirpated, Q = Questionable taxonomy; ? = rank is uncertain. **State Status:** E = Endangered; S = Sensitive; T = Threatened; X = Extirpated. **Federal Status:** E = Endangered; T = Threatened; B-Sens = BLM Sensitive; F-Sens = US Forest Service Sensitive. **Dist. (Distribution) Pattern:** LocEnd = Local Endemic; RegEnd = Regional Endemic; Disj = Disjunct; Periph = Peripheral. **County:** Ada = Adams, Aso = Asotin, Ben = Benton, Che = Chelan, Clm = Clallam, Clk = Clark, Col = Columbia, Dou = Douglas, Fer = Ferry, Fra = Franklin, Gar = Garfield, Gra = Grant, Grh = Grays Harbor, Jef = Jefferson, Ktp = Kitsap, Ktt = Kittitas, Kli = Klickitat, Lew = Lewis, Lin = Lincoln, Oka = Okanogan, Pac = Pacific, Pie = Pierce, Saj = San Juan, Skm = Skamania, Spo = Spokane, Ste = Stevens, Whk = Wahkiakum, Waw = Walla Walla, Whc = Whatcom, Wht = Whitman, Yak = Yakima. **Ecoregion:** BM = Blue Mountains, CP = Columbia Plateau, CR = Canadian Rockies, EC = East Cascades, NC = North Cascades, OK = Okanogan, PC = Pacific Northwest Coast, PT = Puget Trough, WC = West Cascades. **Managed Areas:** ACEC = Area of Critical Environmental Concern, BLM = Bureau of Land Management, BSA = Biological Study Area, DNR = Department of Natural Resources, ERP = Environmental Research Park, NAP = Natural Area Preserve, NF = National Forest, NM = National Monument, NP = National Park, NRC = Natural Resources Conservation Area, NRA = National Recreation Area, NSA = National Scenic Area, NWR = National Wildlife Refuge, RNA = Research Natural Area, SBA = Special Botanical Area, SP = State Park, SWA = State Wildlife Area. TC = Training Center, WA = Wilderness Area.

Species Common Name	Nat Her Rank	State Status	Federal Status	Dist. Pattern	County	Eco- region	Managed Areas
<i>Abronia umbellata</i> var. <i>acutalata</i> pink sand-verbena	G4G5 TUQ/S1	E		RegEnd	Clm, Ktp, Pac	PC, PT	Willapa NWR
<i>Allium dictyon</i> Blue Mountain onion	G2/S2	T	F-Sens	LocEnd	Col, Gar	BM	Umatilla NF, Wenaha- Tucannon WA
<i>Arabis olympica</i> (<i>A. furcata</i> var. <i>olympica</i>) Olympic rockcress	G2/SH	S	F-Sens	RegEnd	Clm, Jef	PC	Buckhorn WA, Olympic NF, Olympic NP, The Brothers WA
<i>Artemisia campestris</i> var. <i>wormskioldii</i> Wormskiold's sagewort	G5T1/S1	E	B-Sens F-Sens	RegEnd	Ben*, Fra*, Gra, Kli	CP, EC	Columbia River Gorge NSA, Gifford Pinchot NF, McNary NWR*
<i>Astragalus asotinensis</i> Asotin milkvetch	G2/S1	E	B-Sens	LocEnd	Aso	BM	Grande Ronde ACEC, Vale BLM
<i>Astragalus australis</i> var. <i>cottonii</i> (<i>A. a.</i> var. <i>olympicus</i>) Cotton's milkvetch	G5T2Q/ S2	T	B-Sens F-Sens	LocEnd	Clm	PC	Olympic NF, Olympic NP
<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> Ames' milkvetch	G4T2/S1	E		Disj	Kli	EC	Conboy Lake NWR
<i>Astragalus riparius</i> Piper's milkvetch	G2/S2	T	B-Sens	RegEnd	Gar, Wht	CP	
<i>Astragalus sinuatus</i> Whited milkvetch	G1/S1	E	B-Sens	LocEnd	Che	CP	Colockum SWA, Colockum Creek ACEC, Spokane BLM, Upper Dry Gulch NAP
<i>Boechera cascadiensis</i> (<i>Arabis microphylla</i> var. <i>thompsonii</i>) Littleleaf rockcress	G1Q/S1	E		RegEnd	Ktt, Yak	EC	Okanogan-Wenatchee NF
<i>Calochortus nitidus</i> Broad-fruited mariposa lily	G3/S1	E		RegEnd	Aso, Gar?, Wht	BM, CP	Steptoe Butte propNAP, Umatilla NF?
<i>Carex davyi</i> Davy's sedge	G2/SX	X		Periph	Yak	EC	
<i>Castilleja chambersii</i> Chambers' paintbrush	G1/S1	S		LocEnd	Pac	PC	
<i>Castilleja victoriae</i> Victoria owl-clover	G1/S1	E		LocEnd	Saj	PT	Iceberg Island SP

Species Common Name	Nat Her Rank	State Status	Federal Status	Dist. Pattern	County	Eco- region	Managed Areas
<i>Delphinium leucophaeum</i> Pale larkspur	G2/S1	E		RegEnd	Lew	PT	
<i>Delphinium viridescens</i> Wenatchee larkspur	G2/S2	T	B-Sens F-Sens	LocEnd	Che, Dou?, Ktt	CP?, EC	Camas Meadows NAP, Okanogan-Wenatchee NF
<i>Dodecatheon austrifrigidum</i> Frigid shootingstar	G2/S1	E	B-Sens F-Sens	RegEnd	Grh, Pac	PC	Colonel Bob WA, Olympic NF
<i>Draba taylorii</i> Taylor's draba	G1G2/S1	E	F-Sens	LocEnd	Oka	OK	Okanogan-Wenatchee NF
<i>Eremogone franklinii</i> var. <i>thompsonii</i> (<i>Arenaria f.</i> var. <i>t.</i>) Thompson's sandwort	G4T2Q/ S2	S		RegEnd	Ben, Gra	CP	Hanford ERP, South Columbia Basin SWA
<i>Erigeron basalticus</i> Basalt daisy	G2/S2	T	B-Sens	LocEnd	Ktt, Yak	CP	LT Murray SWA, Selah Cliffs NAP, Spokane BLM Yakima River Canyon ACEC Yakima TC
<i>Erigeron howellii</i> Howell's daisy	G2/S2	T	B-Sens F-Sens	LocEnd	Skm	WC	Columbia Falls NAP, Columbia River Gorge NSA Table Mountain NRCA
<i>Erythronium quinaultense</i> Quinault fawn-lily	G1G2/ S1S2	T	F-Sens	LocEnd	Clm, Grh, Jef	PC	Matheny Prairie SBA, Olympic NF
<i>Geum rossii</i> var. <i>depressum</i> Ross' avens	G5T1/S1	E	F-Sens	LocEnd	Che	EC	Alpine Lakes WA, Okanogan-Wenatchee NF
<i>Hackelia taylorii</i> Taylor's stickseed	G2/S2	T	F-Sens	LocEnd	Che	EC	Alpine Lakes WA, Okanogan-Wenatchee NF
<i>Isöetes minima</i> Midget quillwort	G1G2/S1	S	B-Sens F-Sens	RegEnd	Ktt, Oka, Spo	CP, EC, OK	Okanogan-Wenatchee NF
<i>Lathyrus holochlorus</i> Thin-leaved peavine	G2?/S1	E		RegEnd	Lew	PT	
<i>Lomatium knokei</i> Knoke's biscuitroot	G1/S1	T	B-Sens F-Sens	LocEnd	Ktt	EC	Okanogan-Wenatchee NF
<i>Lomatium roneorum</i> Leavenworth desert- parsley	G1/S1	E		LocEnd	Che	EC	Okanogan-Wenatchee NF
<i>Lomatium tamanitchii</i> (<i>L. packardiae</i> var. <i>tamanitchii</i>) Ribseed biscuitroot	G3?/S2	S	F-Sens	LocEnd	Kli	CP	Cleveland Shrub Steppe NAP?, Columbia River Gorge NSA
<i>Micranthes tischii</i> (<i>Saxifraga tischii</i>) Tisch's saxifrage	G1G2/ S1?	S	F-Sens	RegEnd	Clm, Jef	PC	Buckhorn WA, Olympic NF Olympic NP
<i>Myosurus sessilis</i> Vernal pool mousetail	G2/S1	E		Periph	Kli	CP	WA DNR?
<i>Navarretia leucocephala</i> ssp. <i>diffusa</i> Least pincushion-plant	G4T1/S1	T		LocEnd	Lin, Spo	CP	Spokane BLM, Swanson Lakes SWA
<i>Oxytropis campestris</i> var. <i>columbiana</i> Columbia crazyweed	G5T2/S1	E		RegEnd	Fer, Oka, Ste	CR, OK	Roosevelt Lake NRA
<i>Oxytropis campestris</i> var. <i>wanapum</i> Wanapum locoweed	G5T1/S1	E	B-Sens	LocEnd	Gra	CP	Spokane BLM
<i>Penstemon barrettiae</i> Barrett's beardtongue	G2/S2	T	B-Sens F-Sens	LocEnd	Kli, Skm	EC	Columbia River Gorge NSA Gifford Pinchot NF, Klickitat SWA, Spokane BLM

Species Common Name	Nat Her Rank	State Status	Federal Status	Dist. Pattern	County	Eco- region	Managed Areas
<i>Penstemon deustus</i> var. <i>variabilis</i> Hot-rock beardtongue	G5T1T2/ S1	T	B-Sens F-Sens	RegEnd	Kli	CP	Columbia Hills NAP, Columbia River Gorge NSA
<i>Penstemon hesperius</i> tall beardtongue	G1/S1	E		RegEnd	Clk	PT	Lacamas Prairie NAP
<i>Petrophytum cinerascens</i> Chelan rockmat	G1G2/S1 S2	E	B-Sens F-Sens	LocEnd	Che, Dou	CP, EC	Chelan SWA, Colockum SWA, Earthquake Point ACEC, Okanogan- Wenatchee NF, Spokane BLM
<i>Phacelia lenta</i> Sticky phacelia	G2?/S2?	T	B-Sens	LocEnd	Dou	CP	Rock Island Canyon ACEC Spokane BLM
<i>Phlox solivaga</i> yeti phlox	G1/S1	E	F-Sens	LocEnd	Col, Gar, Waw?	BM	Spokane BLM?, Umatilla NF, Wenaha-Tucannon WA
<i>Polemonium pectinatum</i> Washington polemonium	G2/S2	T	B-Sens	RegEnd	Ada, Lin, Spo, Wht	CP	Coal Creek ACEC, Spokane BLM
<i>Pyrocoma liatriformis</i> (<i>Haplopappus l.</i>) Smallhead goldenweed	G2/S2	T		RegEnd	Spo, Wht	CP	Campus Prairie BSA, Kramer Palouse BSA, Smooth Hill BSA, Steptoe Butte SP
<i>Pyrocoma scaberula</i> Palouse goldenweed	G2/S1	E	B-Sens F-Sens	RegEnd	Aso	BM, CP	Chief Joseph SWA, Fields Spring SP, Grande Ronde ACEC, Umatilla NF, Vale BLM
<i>Ranunculus tritermatus</i> (<i>R. reconditus</i>) obscure buttercup	G2/S1S2	E	B-Sens F-Sens	LocEnd	Kli	CP, EC	Columbia Hills Historical SP Columbia Hills NAP, Columbia River Gorge NSA Klickitat SWA, Spokane BLM
<i>Rorippa columbiana</i> Columbia yellowcress	G3/S1S2	T	B-Sens F-Sens	RegEnd	Ben, Fra, Kli, Skm	CP, EC, WC	Beacon Rock SP, Columbia River Gorge NSA, Hanford Reach NWR, McNary NWR Saddle Mountain NWR, South Columbia Basin SWA
<i>Rubus nigerrimus</i> (<i>R. leucodermis</i> var. <i>n.</i>) Northwest raspberry	G2/S2	T		LocEnd	Aso, Gar, Wht	BM, CP	Grande Ronde ACEC, Vale BLM
<i>Sabulina sororia</i> Twin Sisters sandwort	G1/S1	E		LocEnd	Whc	NC	Mt. Baker WA, Mt. Baker- Snoqualmie NF
<i>Sidalcea hirtipes</i> Bristly-stemmed checkermallow	G2/S2	T	B-Sens F-Sens	RegEnd	Clk, Lew, Whk	PC, PT, WC	Gifford Pinchot NF
<i>Sisyrinchium</i> <i>sarmentosum</i> pale blue-eyed grass	G2/S2	T	B-Sens F-Sens	LocEnd	Kli, Skm	EC, WC	Columbia River Gorge NSA, Conboy Lake NWR?, Gifford Pinchot NF, Trout Lake NAP
<i>Sullivantia oregana</i> Oregon coolwort	G2/S1	E	B-Sens F-Sens	LocEnd	Skm	WC	Beacon Rock SP, Columbia Falls NAP, Columbia River Gorge NSA, Gifford Pinchot NF
<i>Symphotrichum jessicae</i> (<i>Aster jessicae</i>) Jessica's aster	G2/S1S2	E		RegEnd	Spo, Wht	CP	Rose Creek Preserve, Turnbull NWR
<i>Thelypodium howellii</i> ssp. <i>howellii</i> Howell's thelypody	G1T1/ SH	X		RegEnd	Yak	CP	
<i>Trifolium douglasii</i> Douglas's clover	G2/S1	E	B-Sens F-Sens	RegEnd	Aso, Gar, Spo, Wht	BM, CP	Umatilla NF

Results

A total of 53 vascular plant species were selected for analysis (Table 1). Of these, 10 are newly described to science since 2000 and have not had a formal review of their potential listing status (Table 2). Nineteen additional species tracked by WNHP have never had a status review compiled. Another 19 have status reports, but these are over 10 years old and most have become outdated. Five species have recent reviews (since 2010) but are included in this assessment with updates from the 2018-2019 field seasons.

Table 2. Current State of Knowledge of Potential Candidate Plant Species from Washington

Review Category	Number of Species	Species
Newly Described since 2000 (no existing status review)	10	<i>Castilleja victoriae</i> , <i>Dodecatheon austrofrigidum</i> , <i>Draba taylorii</i> , <i>Erythronium quinaultense</i> , <i>Lomatium knokei</i> , <i>Lomatium roneorum</i> , <i>Lomatium tamanitchii</i> , <i>Navarretia leucocephala</i> ssp. <i>diffusa</i> , <i>Phlox solivaga</i> , <i>Sabulina sororia</i>
Species with a Status Review Over 10 Years Old	19	<i>Abronia umbellata</i> var. <i>acutalata</i> , <i>Astragalus australis</i> var. <i>cottonii</i> , <i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> , <i>Astragalus riparius</i> , <i>Astragalus sinuatus</i> , <i>Calochortus nitidus</i> , <i>Delphinium viridescens</i> , <i>Eremogone franklinii</i> var. <i>thompsonii</i> , <i>Erigeron basalticus</i> , <i>Erigeron howellii</i> , <i>Penstemon barrettiae</i> , <i>Petrophytum cinerascens</i> , <i>Phacelia lenta</i> , <i>Polemonium pectinatum</i> , <i>Pyrrocoma liatriformis</i> , <i>Rorippa columbiae</i> , <i>Rubus nigerrimus</i> , <i>Sidalcea hirtipes</i> , <i>Symphyotrichum jessicae</i>
Species with Recent Status Review (since 2010)	5	<i>Artemisia campestris</i> var. <i>wormskioldii</i> , <i>Astragalus asotinensis</i> , <i>Hackelia taylorii</i> , <i>Ranunculus triternatus</i> , <i>Sisyrinchium sarmentosum</i>
Species with No Status Review	19	<i>Allium dictyon</i> , <i>Arabis olympica</i> , <i>Boechera cascadiensis</i> , <i>Carex davyi</i> , <i>Castilleja chambersii</i> , <i>Delphinium leucophaeum</i> , <i>Geum rossii</i> var. <i>depressum</i> , <i>Isoetes minima</i> , <i>Lathyrus holochlorus</i> , <i>Micranthes tischii</i> , <i>Myosurus sessilis</i> , <i>Oxytropis campestris</i> var. <i>columbiana</i> , <i>Oxytropis campestris</i> var. <i>wanapum</i> , <i>Penstemon deustus</i> var. <i>variabilis</i> , <i>Penstemon hesperius</i> , <i>Pyrrocoma scaberula</i> , <i>Sullivantia oregana</i> , <i>Thelypodium howellii</i> ssp. <i>howellii</i> , <i>Trifolium douglasii</i>

Six species currently ranked GH, GNR, T2, TU, or TX were in the initial assessment pool for this project but were rejected (Table 2). Some of these species are now known to be more common or widespread than initially suspected due to recent field work and need to have their G or T ranks revised. Others are only known from historical records or are likely to be extinct. With no new data to change these ranks, they were left out of this assessment.

Table 3. Washington Rare Plant Species Excluded from this Assessment

Species	Rank	Reason for exclusion
<i>Astragalus kentrophyta</i> var. <i>douglasii</i> Douglas' thistle-milkvetch	G5TX/SX	Considered extinct; last observed in 1883. Probably extirpated following dam construction on the Columbia River
<i>Calochortus macrocarpus</i> var. <i>maculosus</i> Sagebrush mariposa lily	G5T2/S2	At least 4 new occurrences have been discovered in the Blue Mountains in 2018-19, bringing the number of occurrences in the state to 31; rank needs to be revised to T2T3/S2S3 or T3/S3
<i>Corispermum pallidum</i> Pale bugseed	GH/SH	Known from 4 historical records in Washington, last observed in 1953.
<i>Leptosiphon minimus</i> (<i>Linanthus bicolor</i> var. <i>m.</i>) True babystars	GNR/S1S2	Known from 7 extant occurrences in Washington. Status in British Columbia and NE California needs to be determined before G rank can be assigned; might be G2G3
<i>Packera bolanderi</i> var. <i>harfordii</i> Harford's ragwort	G4TUQ/S1	Known from 1 extant and 4 historical occurrences in southern Washington that are confirmed; an additional 6 historical records from northern WA are probably misidentified. Based on herbarium records in Oregon, this variety is probably a T3Q
<i>Penstemon eriantherus</i> var. <i>whitedii</i> Whited's fuzzytongue beardtongue	G4T2/S2	Known from 18 extant and 4 historical occurrences in central Washington. At least one new occurrence was found in 2019; rank should probably be T2T3/S2S3.

Appendix A contains species abstracts for each of the 53 target taxa. The abstracts contain information on the range, number of occurrences, habitat, threats, trends, research/management recommendations, and priority status for each of the target species.

Discussion

The purpose of this report is to assess whether 53 high-priority Washington plant species (ranked G1, G2, T1, or T2 or otherwise of high conservation concern) might qualify as Candidates for listing under the US Endangered Species Act. After reviewing the available data, there is a group of nine species that appear to have sufficient data on hand to qualify as Candidates (Table 4). These are species that have declined significantly in recent years (*Artemisia campestris* var. *wormskioldii*, *Ranunculus triternatus*), occur in highly threatened and fragmented sites (such as Palouse or Puget Trough prairie taxa: *Calochortus nitidus*, *Delphinium leucophaeum*, *Sidalcea hirtipes*, *Symphytotrichum jessicae*), or are otherwise at high risk due to small population size and specialized habitats (*Astragalus sinuatus*, *Castilleja victoriae*, *Lomatium roneorum*). Each of these species would still benefit from additional surveys and monitoring but also need active management to ensure their long-term survival. Candidate status will make it easier for these species to receive the attention and funding they need.

Table 4. Summary of Potential Candidate Plant Species in Washington

Priority	Number of Species	Species
Qualify for Candidate Status	9	<i>Artemisia campestris</i> var. <i>wormskioldii</i> , <i>Astragalus sinuatus</i> , <i>Calochortus nitidus</i> , <i>Castilleja victoriae</i> , <i>Delphinium leucophaeum</i> , <i>Lomatium roneorum</i> , <i>Ranunculus tritermatus</i> , <i>Sidalcea hirtipes</i> , <i>Symphyotrichum jessicae</i>
Need More Data	34	<i>Abronia umbellata</i> var. <i>acutalata</i> , <i>Allium dictuon</i> , <i>Arabis olympica</i> , <i>Astragalus asotinensis</i> , <i>Astragalus australis</i> var. <i>cottonii</i> , <i>Astragalus riparius</i> , <i>Boechea cascadenensis</i> , <i>Carex davyi</i> , <i>Castilleja chambersii</i> , <i>Delphinium viridescens</i> , <i>Dodecatheon austrofrigidum</i> , <i>Draba taylorii</i> , <i>Eremogone franklinii</i> var. <i>thompsonii</i> , <i>Erythronium quinaultense</i> , <i>Hackelia taylorii</i> , <i>Isöetes minima</i> , <i>Lathyrus holochlorus</i> , <i>Lomatium knokei</i> , <i>Micranthes tischii</i> , <i>Myosurus sessilis</i> , <i>Navarretia leucocephala</i> ssp. <i>diffusa</i> , <i>Oxytropis campestris</i> var. <i>columbiana</i> , <i>Oxytropis campestris</i> var. <i>wanapum</i> , <i>Penstemon deustus</i> var. <i>variabilis</i> , <i>Penstemon hesperius</i> , <i>Polemonium pectinatum</i> , <i>Pyrrocoma liatrififormis</i> , <i>Pyrrocoma scaberula</i> , <i>Rorippa columbiae</i> , <i>Rubus nigerrimus</i> , <i>Sabulina sororia</i> , <i>Sisyrinchium sarmentosum</i> , <i>Thelypodium howellii</i> ssp. <i>howellii</i> , <i>Trifolium douglasii</i>
Probably Secure at Present	10	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i> , <i>Erigeron basalticus</i> , <i>Erigeron howellii</i> , <i>Geum rossii</i> var. <i>depressum</i> , <i>Lomatium tamanitchii</i> , <i>Penstemon barrettiae</i> , <i>Petrophytum cinerascens</i> , <i>Phacelia lenta</i> , <i>Phlox solivaga</i> , <i>Sullivantia oregana</i>

A larger pool of species (34 taxa) appear to be rare but could use additional information to better determine their status or management needs (Table 4). In some cases, these species may have lingering taxonomic questions that need to be resolved (such as *Eremogone franklinii* var. *thompsonii*, *Penstemon deustus* var. *variabilis* and *Rubus nigerrimus*). Others may prove to be more common if they are targeted for surveys. Some of these species are cryptic or difficult to identify, and so may be under-sampled or overlooked (such as *Allium dictuon*, *Arabis olympica*, *Boechea cascadenensis*, *Carex davyi*, *Draba taylorii*, and *Lomatium knokei*). Some species may occur primarily on private lands that are often difficult to access (*Abronia umbellata* var. *acutalata*, *Astragalus riparius*, *Castilleja chambersii*, *Lathyrus holochlorus*, *Myosurus sessilis*, *Oxytropis campestris* var. *columbiana*, *Penstemon hesperius*, *Thelypodium howellii* ssp. *howellii*). Some of these species have not previously been targets for surveys, either because they are relatively recently described (*Dodecatheon austrofrigidum*, *Erythronium quinaultense*, *Sabulina sororia*) or have otherwise slipped through the cracks (*Isoetes minima*, *Micranthes tischii*, *Navarretia leucocephala* ssp. *diffusa*, *Oxytropis campestris* var. *wanapum*, *Trifolium*

douglasii). Other species would benefit from additional monitoring that would better determine their abundance, trend, or degree of threat. Examples of species in this group include *Astragalus asotinensis*, *Astragalus australis* var. *cottonii*, *Delphinium viridescens*, *Polemonium pectinatum*, *Pyrocoma liatriformis*, *Pyrocoma scaberula*, *Rorippa columbiae*, and *Sisyrinchium sarmentosum*.

Finally, not all of these species warrant candidate status. At least 10 are probably secure at the present time (Table 4) due to their presence in rugged cliff habitat or well-protected natural areas. These species should continue to be monitored, however, as their status could change based on new management directions or impacts of climate change.

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Appendix A. Species Summaries

Abronia umbellata var. *acutalata* (Pink sand-verbena)

Synonym: *Abronia umbellata* ssp. *breviflora*

Natural Heritage Rank: G4G5TUQ/S1

State and Federal Status: WA: Endangered

Range: *Abronia umbellata* occurs from southern British Columbia to Baja California (Hitchcock and Cronquist 2018). Variety *acutalata* is a regional endemic ranging from southern Vancouver Island, British Columbia to southwestern Washington, where it is known from scattered sites along the Pacific Coast and historically along the Puget Sound in Clallam, Kitsap, and Pacific counties (Figure 1). The only extant occurrence in Washington is in Willapa National Wildlife Refuge near Leadbetter Point in Pacific County. The type locality is given as “Olympic Mts., Clallam County, Washington” on the label of A.D. Elmer’s 1900 holotype (Tillett 1967), which is likely an error, as no suitable habitat is present there. This collection probably came from the Pacific coast north of the Olympic Mountains in the vicinity of Port Angeles.

WA Ecoregions: Pacific Northwest Coast, Puget Trough (historical).

Number of Occurrences: Known from one extant occurrence, discovered in 2006 (last observed in 2014) and five historical occurrences in Washington, observed from 1890 to 1950. In British Columbia, presently known from 2-3 extant occurrences (Douglas et al. 2002; Consortium of Pacific Northwest Herbaria, www.pnwherbaria.org).

Abundance: Lewis (2014) mapped and surveyed the Leadbetter

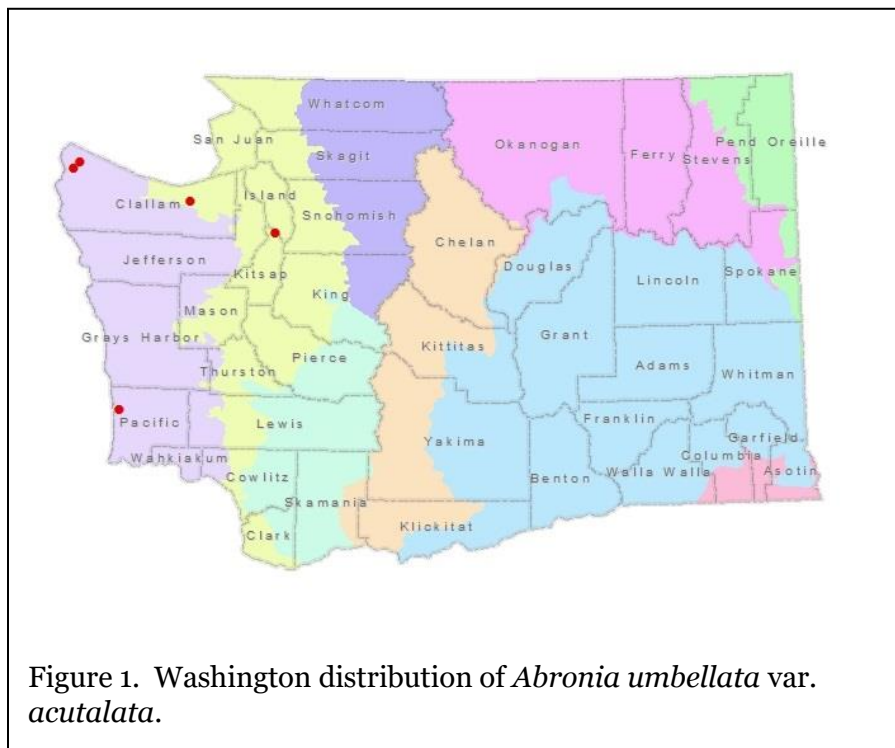


Figure 1. Washington distribution of *Abronia umbellata* var. *acutalata*.

Point occurrence and documented 101 plants at three sites along the Pacific Coast and Willapa Bay. He

also found several thousand plants in an extensive dune area on the Long Beach peninsula being managed for Snowy Plover habitat. When first documented in 2006, only two flowering plants were observed.

Habitat: Restricted to sandy areas on coastal beaches (Camp and Gamon 2011). Lewis (2014) notes that populations at Leadbetter Point tend to be on shorelines and strands that are impacted by strong winds and storms with shifting sand dunes. These sites are in a narrow elevational zone between areas inundated by high tides and stabilized dunes dominated by rhizomatous dune grasses, such as *Ammophila arenaria*, *A. breviligulata* (both introduced), and *Leymus mollis* (native). Populations at Willapa National Wildlife Refuge are most abundant in areas being actively managed for Snowy Plover habitat, in which sandy areas are plowed, scraped, and treated with herbicide in the fall to reduce competing grass cover (Lewis 2014).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: The primary threat to the extant population at Leadbetter Point is encroachment and competition from non-native beach grass (*Ammophila* spp.) (Lewis 2014). Historically, populations were probably impacted by construction of beachfront property and roads, recreational vehicles, and efforts to control beach erosion (Gamon et al. 1986).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: May be grazed by cattle or horses (Gamon et al. 1986).
4. Inadequacy of Existing Regulatory Mechanisms: The single extant occurrence in Washington is protected in Willapa National Wildlife Refuge. The species receives no legal protection in the state.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: The population at Leadbetter Point is stable to increasing due to management efforts to reduce competition with invasive grass species. Historical occurrences in Washington could not be relocated in surveys in the 1980s and are probably extirpated due to habitat destruction (Alverson 1985, Gamon et al. 1986). The long-term trend of this taxon in Washington is downward.

Managed Areas: Currently known only from Willapa National Wildlife Refuge. Historical populations were found on private and tribal lands.

Recommendations: Needs more data before being elevated to Candidate status. Based on its apparent rarity in Canada and Washington, the T rank of this variety should be re-ranked (it may be a T1). The Leadbetter Point population should be monitored periodically to better determine life history trends and assess impacts from management. Additional areas of suitable habitat along the Pacific coast of Washington should be revisited. Research may be needed on pollinators, especially since the related yellow sand verbena (*A. latifolia*) is the host of the rare sand verbena moth (*Copablepharon fuscum*) (Jordan 2013).

Allium dictuon (Blue Mountain onion)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened, USFS: Sensitive

Range: Local endemic of the Blue Mountains in southeast Washington (Columbia and Garfield counties) (Figure 2) and northeastern Oregon (Wallowa County). A recent report from western Idaho needs confirmation (Consortium of Pacific Northwest Herbaria, www.pnwherbaria.org). McNeal and Jacobsen (2002) in the *Flora of North America* report that the species only occurs at the type locality at Wellner's Butte, in Washington.

WA Ecoregions: Blue Mountains

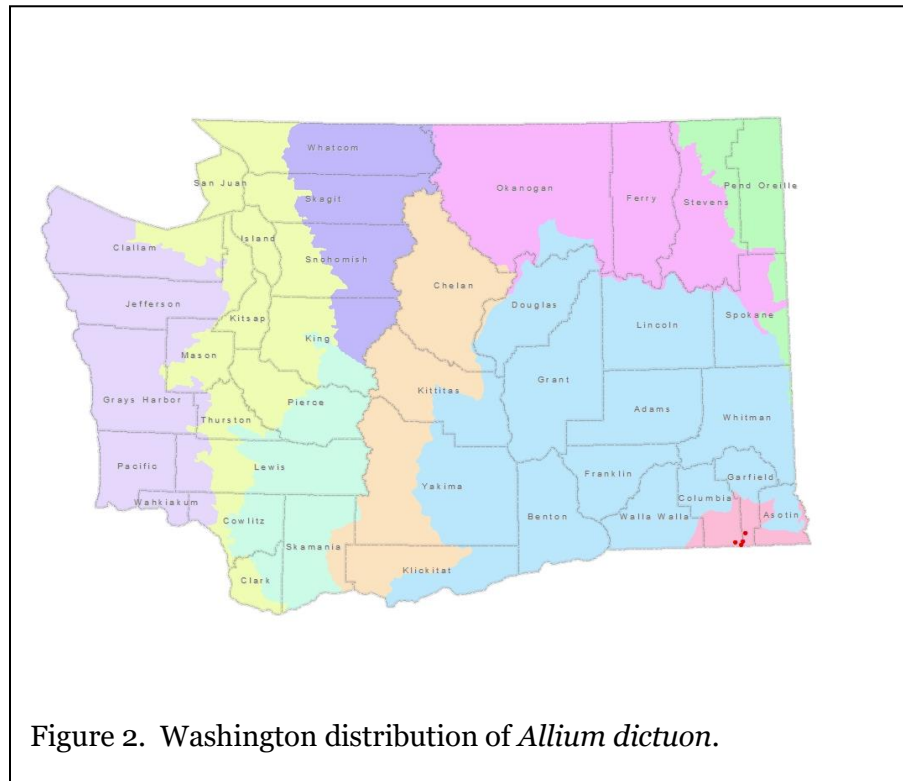
Number of Occurrences:
In Washington, known from only four occurrences, all discovered or relocated from 1998 to 2002.

Abundance: In Washington, the largest occurrence contained 3,200 plants in 1998. Other populations range in size from 7-525 individuals. Abundance in Oregon is not known, though the species is ranked S2 there (ORBIC 2019).

Habitat: Found on steep, unstable rocky slopes with less than 5% vegetation cover in forb or grass-dominated sites or near a forest ecotone. Parent material is basalt covered with loose gravel (Camp and Gamon 2011). One population is on a south-facing slope in an area that is moist during the spring.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Disturbance of habitat by livestock grazing or reduction in snow pack or spring precipitation due to climate change are potential threats.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Most wild onion species are edible and the species could be vulnerable to over-harvest due to its small population size.
3. Disease or Predation: Not known.



4. Inadequacy of Existing Regulatory Mechanisms: All four of the Washington population and at least one from Oregon are found within the Wenaha-Tucannon Wilderness Area. The species has no legal protection under state law in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known.

Managed Areas: Umatilla National Forest, Wenaha-Tucannon Wilderness Area.

Recommendations: Needs more data before being elevated to Candidate status. Extant occurrences should be periodically monitored to assess trends in population size and habitat condition. Additional areas of suitable habitat should be surveyed in the Blue Mountains to locate new populations. No data are available on the pollination biology, seed productivity and germination, or other life history attributes of this species.

Arabis olympica (Olympic rockcress)

Synonym: *Arabis furcata* var. *olympica*

Natural Heritage Rank: G2/SH

State and Federal Status: WA: Sensitive; USFS: Sensitive

Range: Regional endemic of the Olympic Mountains in Washington (Clallam and Jefferson counties) (Figure 3) and central and southern Vancouver Island, British Columbia (Al-Shehbaz 2010).

WA Ecoregions: Pacific Northwest Coast

Number of Occurrences: Known from six occurrences in Washington, all of which are now considered historical (no population has been relocated since 1980). Known from at least one extant occurrence in British Columbia.

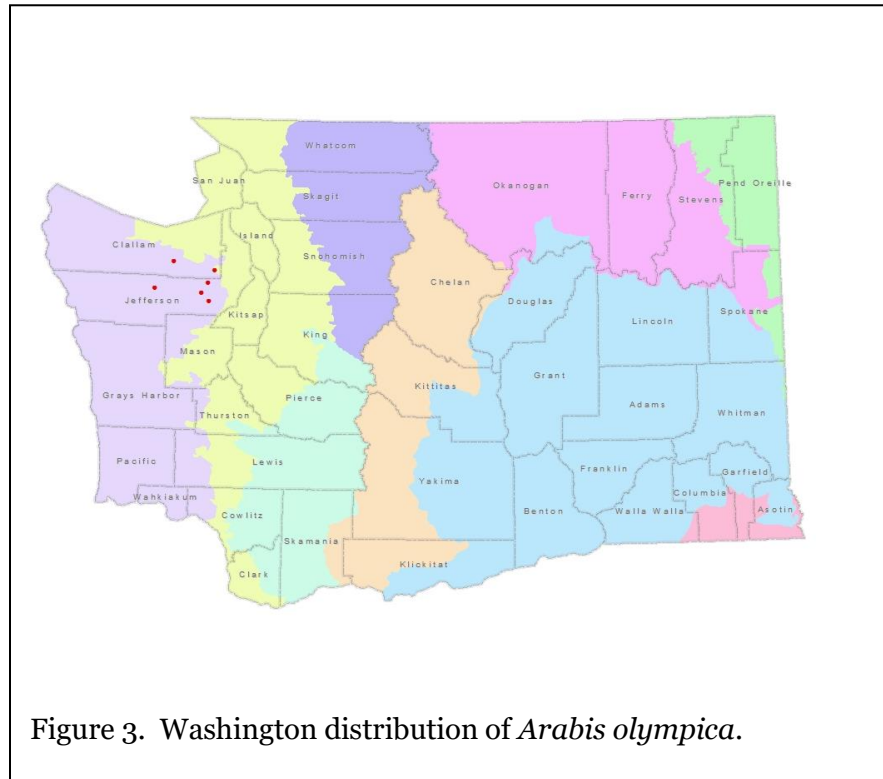


Figure 3. Washington distribution of *Arabis olympica*.

Abundance: Population size data are available for only two Washington occurrences, which contained 17 to 20 individuals when surveyed in 1980. Current abundance is not known. This species was not included in a recent study of climate change and Olympic Mountain endemics (Wershow and DeChaine 2018).

Habitat: Subalpine to alpine dry rocky meadows and turf areas amid rock outcrops at 3,000-4,500 feet (915-1,370 m).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Potentially threatened by changes to snowpack and moisture availability and changes in temperature that could increase competition from other plant species as a result of predicted climate change. Wershow and DeChaine (2018) have shown that other Olympic alpine endemics are likely to lose of 85-99% of their suitable habitat by 2080 based on future climate change projections.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: All known occurrences in Washington are protected in designated wilderness areas or Olympic National Park. The species receives no legal protection by the State of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Poorly known. All populations are currently considered historical, but little effort has been made to relocate older records due to the poor accessibility of some sites and the difficulty in identifying *Arabis* species.

Managed Areas: Buckhorn Wilderness Area, Olympic National Forest, Olympic National Park, The Brothers Wilderness Area.

Recommendations: Needs more data before being elevated to Candidate status. Known sites need to be revisited to determine if they are extant. Potential habitat should be systematically surveyed for this species. Habitat modeling might help identify likely areas to survey. Research is needed on basic life history of the species (pollination biology, seed persistence, plant longevity, annual recruitment) and specific habitat needs. Population and demographic monitoring are needed to assess trends in abundance and habitat condition.

Artemisia campestris var. *wormskioldii* (Wormskiold's northern wormwood)

Synonyms: *Artemisia campestris* ssp. *borealis* var. *wormskioldii*; *A. borealis* var. *wormskioldii*

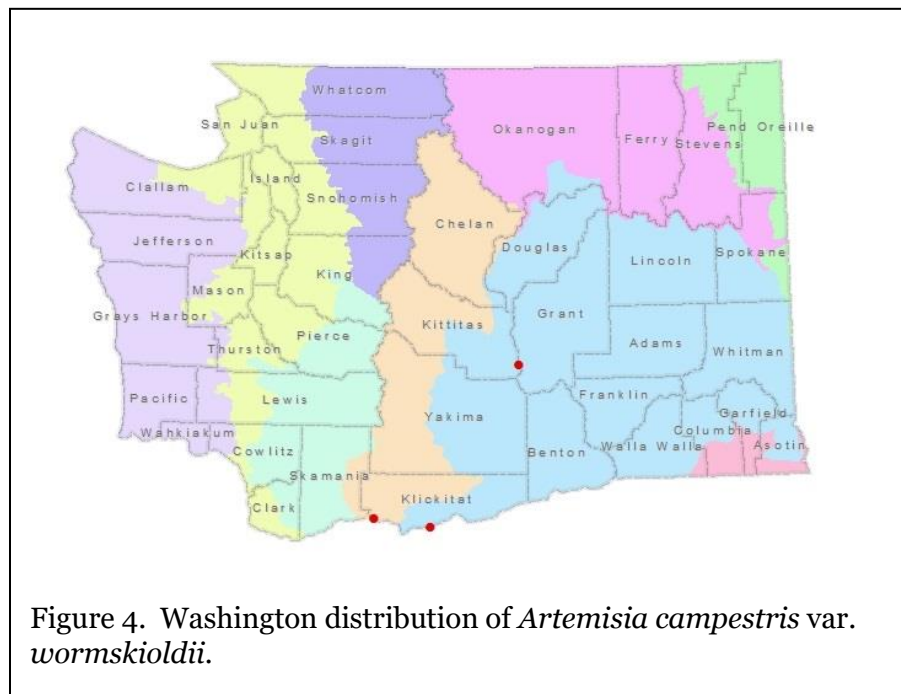
Natural Heritage Rank: G5T1/S1

State and Federal Status: WA: Endangered; USFWS: former Candidate; BLM: Sensitive; USFS: Sensitive

Range: Regional endemic of south-central Washington (Figure 4) and northern Oregon on islands in the Columbia River (Hitchcock and Cronquist 2018).

WA Ecoregions: Columbia Plateau, East Cascades

Number of Occurrences: Known from two extant and one historical occurrences in Grant and Klickitat counties, Washington. For conservation purposes, two additional populations have been introduced at Johnson Island (Benton Co.) and Island 18 (Franklin Co.) along the Columbia River in Washington, as well as three sites in Oregon (Sherman and Wasco counties). Native populations in Oregon are presumed to be extirpated (Arnett and Goldner 2017).



Abundance: As of 2019 the entire population of var. *wormskioldii* in Washington is 97 flowering plants. Out-planted occurrences in Oregon contained 182 flowering plants in 2017 (Gray 2019). In Fall 2019, the Beverly occurrence was augmented with seeds raised from native stock at BFI Native Seeds in an effort to boost population numbers (BFI Native Seeds 2019).

Habitat: Flats within the floodplain of the Columbia River on compacted cobbles, shifting sand, and basalt in shrub steppe vegetation with *Artemisia campestris* var. *scouleriana*, *A. ludoviciana*, *Eriogonum compositum*, and *Phacelia hastata* (Arnett 2012a).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Habitat loss has occurred due to dam construction and inundation or development of shoreline areas. Changes in the natural flooding regime may be favoring the establishment of *Artemisia campestris* var. *scouleriana* in

sites traditionally occupied by var. *wormskioldii*. Regulated water flows on the Columbia following the construction of several dams has resulted in a more even-distribution of flows year-round, rather than mimicking periods of low water in spring (prior to snowmelt in the headwaters of the Columbia) that historically may have favored var. *wormskioldii* over var. *scouleriana*. Remaining populations are threatened by competition from invasive weed species and trampling by people or recreational vehicles (Arnett 2017b).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Impacts from nesting waterfowl are poorly known but may be affecting seedling establishment or survival.
4. Inadequacy of Existing Regulatory Mechanisms: Two out-planted populations are protected in McNary National Wildlife Refuge. The Beverly occurrence is on lands managed by Bureau of Reclamation and Grant County PUD and is closed to recreational access, but not formally protected. The species receives no legal protection in the state. Var. *wormskioldii* was formerly a Candidate for listing under the Endangered Species Act, but was found to not warrant listing in 2016 (USFWS 2016).
5. Other Natural or Manmade Factors Affecting Continued Existence: Hybridization with *A. campestris* var. *scouleriana* is a significant potential threat. The two taxa may be capable of interbreeding, though normally they flower at different times of the year (var. *scouleriana* in summer and fall, var. *wormskioldii* in early to mid spring).

Trends: The Beverly population in Grant County is the largest in Washington and has been monitored annually since 2000. After reaching a maximum of 1,865 flowering individuals in 2005, the population decreased to 195 flowering plants in 2017 (Dresser 2016). Since then, the population crashed to 12 flowering individuals in 2018 and 48 in 2019. Likewise, the Miller Island occurrence in Klickitat County reached a peak in 1999 with 142 flowering plants, but dropped to only 19 flowering individuals in 2019. Of the three recent experimental out-plantings in Washington, the Satus Creek (Yakama Reservation) population has apparently failed, while only 6 flowering plants were found at Island 18 and 24 flowering plants were observed at Johnson Island in 2019 (down from 121 in 2016). Kaye (2004) conducted a preliminary population viability analysis for the Beverly, WA, population and predicted the population was stable but had an approximately 60% chance of declining by 50% in ten years. Monitoring data in the past 10-15 years have documented a precipitous downward trend at both extant Washington sites, especially since 2017.

Managed Areas: Native occurrences are found within Columbia River Gorge National Scenic Area and lands administered by Gifford Pinchot National Forest. Introduced occurrences are found in McNary National Wildlife Refuge.

Recommendations: The recent pronounced drop in numbers and lack of understanding of the causes of the decline suggest that this taxon should regain its former Candidate status. Annual monitoring is needed at all known extant and out-planted populations. Experiments are needed to assess different management strategies for enhancing population numbers, and might include targeted removal of competing vegetation (including mature individuals of *A. campestris* var. *scouleriana*), augmentation of existing populations with seed produced off-site, and establishment of new occurrences through seeding or out-planting.

Astragalus asotinensis (Asotin milkvetch)

Natural Heritage Rank: G2/S1

State and Federal Status: WA: Endangered, BLM: Sensitive

Range: Narrow endemic of the confluence of the Grande Ronde and Columbia rivers in extreme southeastern Washington (Asotin County) (Figure 5) and adjacent west-central Idaho (Nez Perce and Idaho counties) (Hitchcock and Cronquist 2018). Reports from Wallowa County, Oregon are erroneous. The entire known range of the species covers no more than seven square km (Björk 2010).

WA Ecoregions: Blue Mountains

Number of Occurrences: Known from a single occurrence in Washington, first documented in 1925 and most recently relocated in 2019.

Abundance: Björk and Fishbein (2006) estimated the total population of *Astragalus asotinensis* in Washington and Idaho to be “several thousand individuals” based on fieldwork from 1999-2005. Current numbers are not known for the entire population.

Roger Ferriell of the BLM observed 490 flowering and fruiting plants in scattered patches in 2013.

Approximately 500 plants were observed on the west half of Lime Hill in 2019 (Fertig, unpublished data).

Habitat: Restricted to outcrops of limestone and shale of the Hurwal and Martin Bridge formations on steep, north or west-facing slopes in open canyon grasslands dominated by *Pseudoroegneria spicata* and *Festuca idahoensis* (Björk 2010; Camp and Gamon 2011).

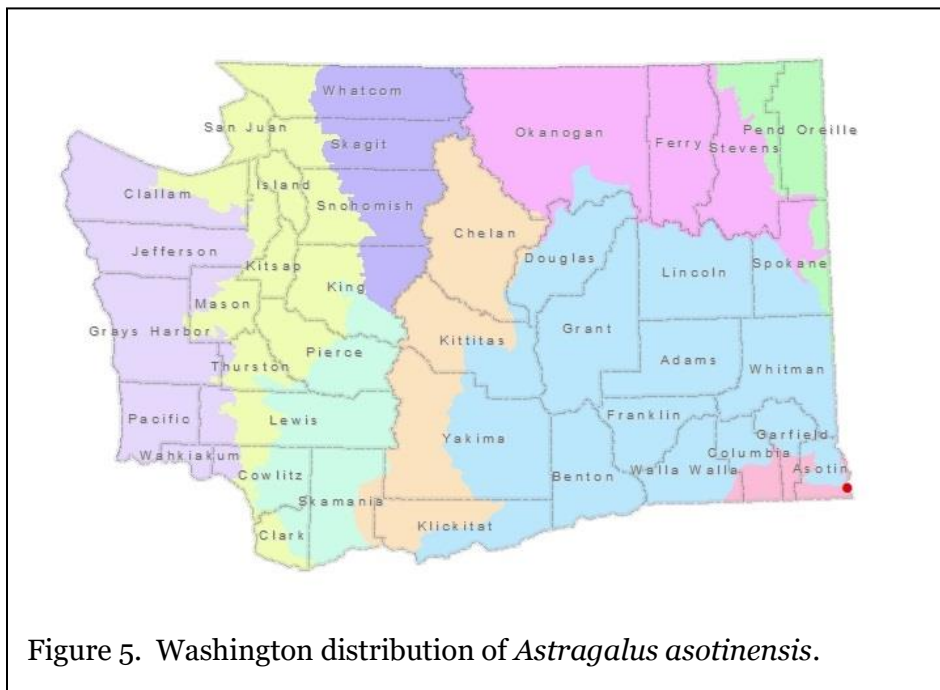


Figure 5. Washington distribution of *Astragalus asotinensis*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Threatened by competition from invasive weed species, increased wildfire (largely from dense cover of flammable annual weeds), off-road vehicle recreation (trampling of plants or erosion of soils and spread of invasive weeds), and mortality from herbicide drift (Björk 2010; Björk and Fishbein 2006).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: The single Washington occurrence is within the Grande Ronde ACEC, managed by the Vale BLM. The species receives no statutory protection in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Björk (2010) reported that the Lime Hill population appeared to have declined by 80-90% from 2005 to 2010. The following year, Joe Arnett revisited the population in 2011 and noted that the population was much more abundant. The site has been revisited at least twice since then (2013 and 2019), but the entire population has not been recounted. In 2019, approximately 500 plants were observed on the north slope of Lime Hill at a density of 1-3 plants per square meter (Fertig observation).

Managed Areas: Vale BLM, Grande Ronde Area of Critical Environmental Concern.

Recommendations: Needs more data before being elevated to Candidate status. Population should be monitored periodically to assess trends and impacts from potential threats. Sub-sampling should be done to derive a better population estimate. Demographic monitoring would be valuable to determine the longevity of reproductive plants, seedling recruitment, and whether the species is capable of prolonged dormancy during periods of drought stress.

Astragalus australis var. *cottonii* (Cotton's milkvetch)

Synonyms: *Astragalus australis* var. *olympicus*, *A. cottonii*

Natural Heritage Rank: G5T2Q/S2

State and Federal Status: WA: Threatened, BLM: Sensitive, USFS: Sensitive

Range: Local endemic of the northeastern Olympic Mountains in Clallam County, Washington (Figure 6).

WA Ecoregions: Pacific Northwest Coast

Number of Occurrences: Known from eight extant occurrences in three main areas.

Abundance: The population was estimated at 4,000 individuals by Sheehan and Kaye (1996). The most recent counts available for each occurrence (from 1981 to 2012) suggest a population size of approximately 4300 plants.

Habitat: Found on steep, south or west-facing talus slopes and ridges on gravelly or sandy soil derived from limestone (Sheehan and Kaye 1986). Populations are usually found in sparsely vegetated cushion plant communities in areas prone to landslides and frost heaving (Camp and Gamon 2011).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Some subalpine habitat could be impacted by hikers (Camp and Gamon 2011). Future climate projections for the Olympic Mountains suggest there will be a pronounced decrease in winter snow and an increase in drought stress during the growing season. Wershow and DeChaine (2018) modeled the effects of climate on several Olympic alpine endemics (though not *A. australis* var. *cottonii*) and found that 85-99% of their suitable habitat would be lost by 2080 due to rising temperatures and reduced moisture availability. This species already occurs in subalpine and alpine sites subject to droughty conditions, and so may be even more vulnerable to climate change.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Impacted by grazing and trampling (especially in dust wallows) by introduced mountain goats (Kaye 1989). Predation by weevil larvae can reduce seed production (Kaye 1989).

4. Inadequacy of Existing Regulatory Mechanisms: Seven of the eight known occurrences of this taxon are protected in Olympic National Park. It has no formal legal protection from the state of Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Kaye (1989) detected downward trends at his demographic monitoring plots in the late 1980s.

Managed Areas: Olympic National Forest, Olympic National Park.

Recommendations: Needs more data before being elevated to Candidate status. Extant populations should be monitored more frequently to detect changes in abundance or impacts from potential threats. Habitat modeling could be used to identify additional areas of potential habitat for survey or out-planting. Sites where mountain goats have been removed should be monitored to detect improvement in habitat condition.

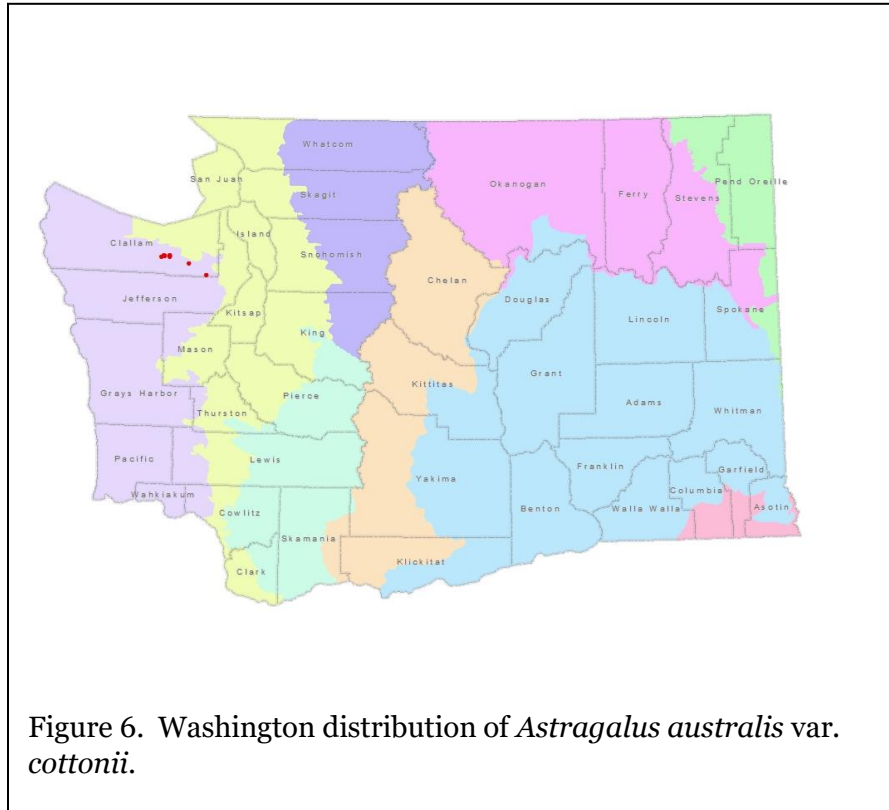


Figure 6. Washington distribution of *Astragalus australis* var. *cottonii*.

Astragalus pulsiferae var. *suksdorfii* (Ames' milkvetch)

Natural Heritage Rank: G4T2/S1

State and Federal Status: WA: Endangered

Range: Northern Sierra Nevada and Cascade Range in northern California, with a disjunct population in Klickitat County, Washington.

WA Ecoregions: East Cascades

Number of Occurrences: Known from a single occurrence in Washington in the Glenwood area, last relocated in 2019 (Figure 7). Formerly, this species was reported from four nearly confluent locations in Washington (Gamon 1995a), but these have been merged into one occurrence. Suksdorf's type locality is ambiguous, mentioning both the base of Mt. Adams and Falcon Valley (Conboy NWR area) but might represent a different, historical occurrence (Fertig et al. 2017).

Abundance: Population probably ranges between 500-1000 individuals in a total area of five square kilometers (less than two square miles) (Camp and Gamon 2011). In 2016, Rare Care volunteers observed 977 plants at multiple sites in Conboy National Wildlife Refuge and vicinity. A subpopulation on DNR lands had only 15 plants when visited in 2018.

Habitat: Open *Pinus ponderosa* forest on flat to gentle slopes on coarse-textured volcanic soils and at the edge of dirt roads at 1,850-1,980 ft. (Camp and Gamon 2011). Plants are often found in areas of bare ashy soil with only a thin layer of pine needles or other debris.

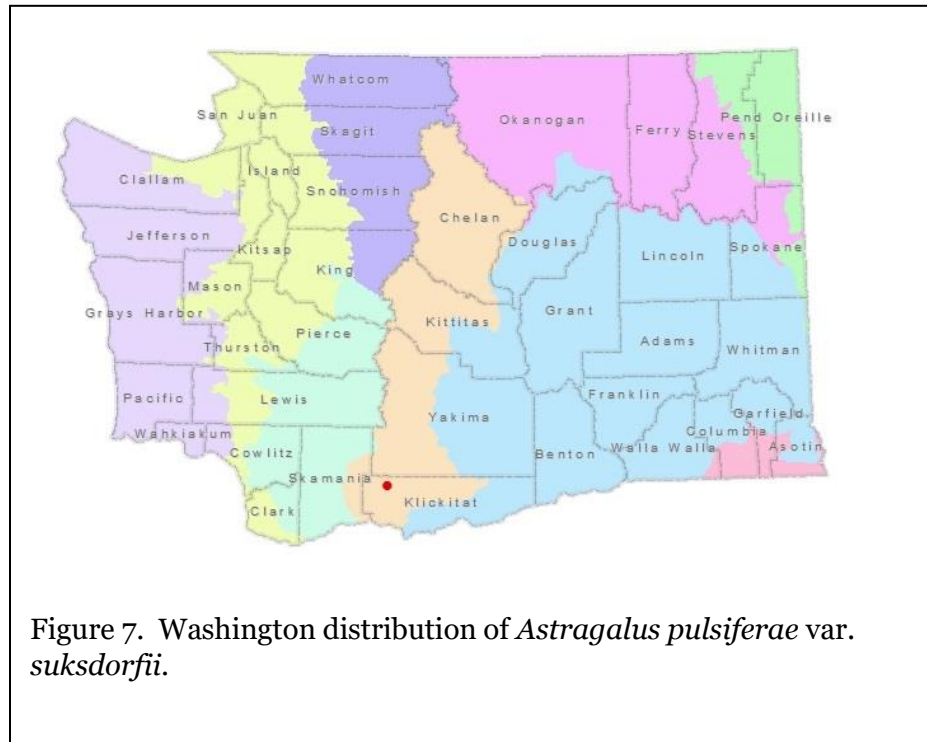


Figure 7. Washington distribution of *Astragalus pulsiferae* var. *suksdorfii*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Fire suppression has been a significant threat, which has allowed dense tree and shrub cover to develop and increased the risk of catastrophic wildfire. Habitat disturbance from timber harvesting, road construction and recreation are additional threats. One small sub-occurrence on WA DNR lands is within a hunting camp.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Part of the single Washington occurrence is protected within Conboy National Wildlife Refuge. Other subpopulations on state and private lands are not protected. The species receives no statutory protection in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Probably stable since the population was rediscovered in 1981. Longer-term trends are not known but may be downward.

Managed Areas: Conboy Lake National Wildlife Refuge, WA DNR, private.

Recommendations: Probably secure at present and candidate status not warranted, but this taxon should still be periodically re-evaluated. Subpopulations should be monitored every 2-5 years. Permanent plots should be established to record survivorship and recruitment. Demographic monitoring would be useful to identify key stages in the plant's life history that are important for long-term persistence. Habitat monitoring through repeat photography or sampling vegetation would be valuable in determining if succession is having an impact.

Astragalus riparius (Piper's milkvetch)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened, BLM: Sensitive

Range: Regional endemic of the Snake River drainage in southeastern Washington (Garfield and Whitman counties) (Figure 8) and western Idaho (Latah and Nez Perce counties). The Idaho occurrences are believed to be extirpated (Camp and Gamon 2011). A report from Asotin County is based on a misidentified specimen of *Astragalus sheldonii*. A syntype collection is cited for Columbia County, Washington, but this location may be erroneous and has never been relocated.

WA Ecoregions: Columbia Plateau

Number of Occurrences: Kemper (2005b) documented seven extant occurrences in Washington and six historical or possibly extirpated populations. An eighth extant population was discovered by Joe Arnett in 2006.

Abundance: Kemper (2005b) observed 7,300 plants at seven occurrences in 2005. Joe Arnett conducted surveys in 2006 and documented 500-700 additional plants, bringing the known population total to approximately 8,000 individuals. Hitchcock and Cronquist (1961) reported the species as "locally plentiful along the lower Snake R[iver] and affluent creeks between the mouth of the Clearwater and that of the Tucannon R[iver]". It is now considered extirpated in Idaho.

Habitat: Occurs on ridgelines and rocky slopes on north slopes on fine and moderately deep soils in native bunchgrass communities (Kemper 2005b).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Conversion of habitat for home sites, orchards, and rangeland has been the primary threat to this species. Habitat has also been lost from construction of reservoirs and competition from invasive weeds. Grazing, wildfire, and herbicides are additional threats (Kemper 2005e).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Seeds may be vulnerable to high rates of predation (Kemper 2005).

4. Inadequacy of Existing Regulatory Mechanisms: No populations in Washington are currently protected. This species has no statutory protection in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

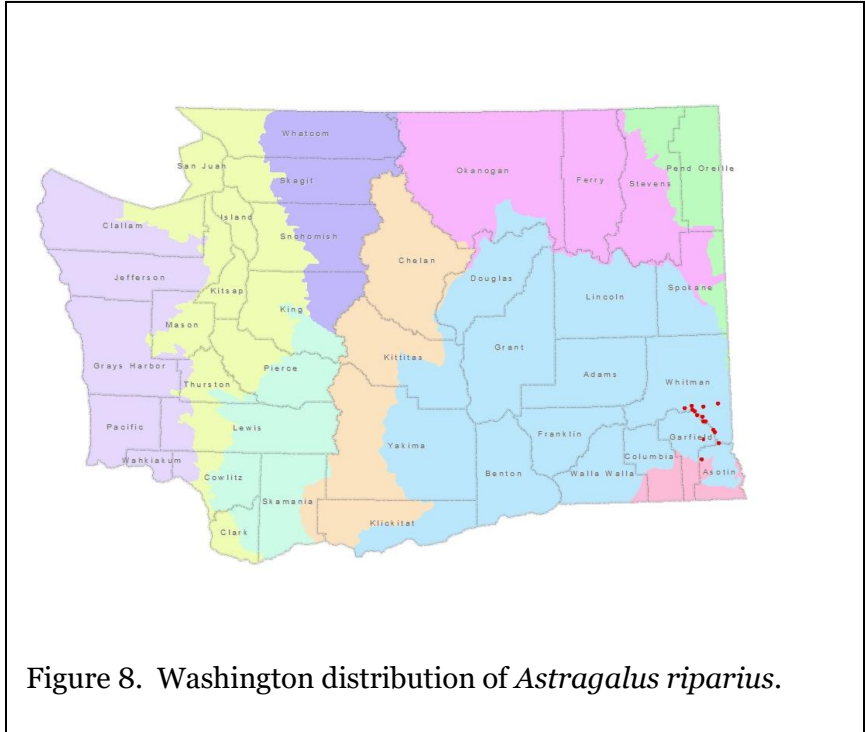


Figure 8. Washington distribution of *Astragalus riparius*.

Trends: Population numbers appear to be in decline based on the comments of Hitchcock and Cronquist 1961 (cited above).

Idaho occurrences are all considered extirpated. Most Washington populations have not been revisited since the surveys of Kemper (2005b).

Managed Areas: private, state of Washington, US Army Corps of Engineers, Department of Defense. Reports from Spokane BLM lands in Asotin County are based on a misidentified specimen.

Recommendations: Needs more data before being elevated to Candidate status. Distribution modeling could help identify additional areas of potential habitat to survey in Washington and Idaho. Extant occurrences in Washington should be periodically revisited to assess population trends and habitat condition. Demographic monitoring studies would be useful to determine the longevity of mature plants, survivorship of seedlings, persistence of a seed bank, and other life history characteristics that are informative for management.

Astragalus sinuatus (Whited's milkvetch, Colockum milkvetch)

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Endangered; BLM Sensitive

Range: Endemic to southern Chelan County, Washington in the Colockum Creek and Dry Gulch area (Figure 9).

WA Ecoregions: Columbia Plateau

Number of Occurrences: Formerly recognized from eight occurrences, all within a 3 square mile area (covering about 200 acres) (Gamon 1995b). Seven of these have been combined into one, large occurrence consisting of 13 subpopulations. A second historical occurrence (last observed in 1946) has a vague locality description and is perhaps better considered part of the Dry Gulch/Colockum occurrence (Fertig et al. 2017).

Abundance: Individual subpopulations contain 1,200-10,000 plants (Combs et al. 2011). The total population has been estimated at 25,000-27,000 individuals (Fertig et al. 2017). Wilderman (2019) estimated the current population at Upper Dry Gulch at 33,320 individuals based on extrapolation from long-term monitoring plot data.

Habitat: Occurs in shrub-steppe dominated by *Artemisia tridentata* and *Pseudoroegneria spicata* on hillsides of wind-deposited

volcanic ash over basalt bedrock. Historically, these areas had 10-30% cover of meter-high shrubs interspersed with bunchgrasses. Today, much of the area has been altered by wildfires and long-term grazing and has high cover of invasive annual grasses, including cheatgrass. *Astragalus sinuatus* populations may be adapted to periodic disturbances that reduce competing cover or create bare ground, though short-term population gains may be lessened over time as competing cover or fire frequency increase (Gamon 1995b).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: The highest threat to the species is increased risk from wildfire due to drought and the establishment of flammable

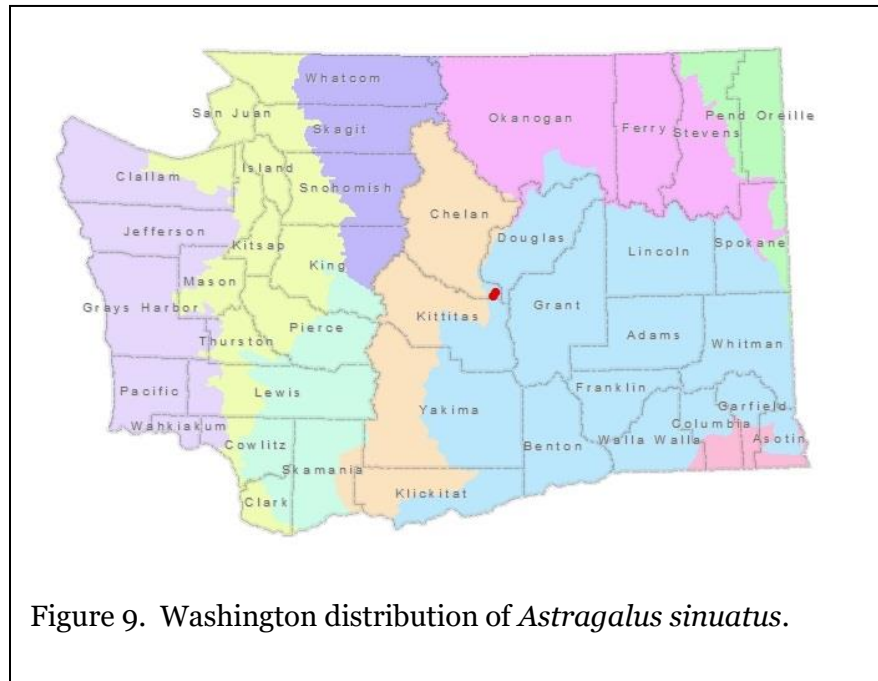


Figure 9. Washington distribution of *Astragalus sinuatus*.

annual invasive weeds, such as *Bromus tectorum*. Several fires have occurred over the Colockum Ridge area (most recently in 2017). Invasive annuals are also competitors for available space and resources. Some areas may be vulnerable to trampling by off-road vehicles.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: The species has high seed predation (Combs et al. 2011).
4. Inadequacy of Existing Regulatory Mechanisms: Most of the largest known occurrence is protected within the Upper Dry Gulch Natural Area Preserve (managed by WA DNR) and the BLM Colockum Creek Area of Critical Environmental Concern. A portion of this occurrence on adjacent private property is in the WA DNR state registry program. The species receives no legal protection in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Projected climate change (increased likelihood of drought) is a threat.

Trends: Twenty-five years of monitoring data at Upper Dry Gulch indicate that populations of *Astragalus sinuatus* fluctuate over time and in response to disturbances (Wilderman 2019). Based on extrapolations from the mean number of mature plants and seedlings in permanent transects, the population peaked at approximately 32,000 plants in 1999 and declined to 12,750 in 2014, before steadily increasing to 33,320 in 2019.

Managed Areas: Colockum Creek Area of Critical Environmental Concern, Colockum Wildlife Area, Spokane BLM, Upper Dry Gulch Natural Area Preserve, private (DNR registry site).

Recommendations: The limited range, population oscillations, and increasing threats from competition and wildfire, suggest that this species should be elevated to Candidate status. The University of Washington Rare Care program has been conducting out-planting experiments on BLM lands on Colockum Ridge to augment the existing population and potentially recover degraded habitats in the vicinity. This out-planting work could be continued on fire-impacted private lands within a DNR registry site or on the adjacent Natural Area Preserve. Annual monitoring should continue in Upper Dry Gulch NAP. Habitat modeling could identify other areas of potential habitat to survey (although searches of the ridge between Colockum Creek and Whitson Canyon in 2018 found no populations). Expansion of the Upper Dry Gulch NAP would protect more of the population.

Boechera cascadensis (Littleleaf rockcress)

Synonym: *Arabis microphylla* var. *thompsonii*

Natural Heritage Rank: G1Q/S1

State and Federal Status: WA: Endangered

Range: Regional endemic of central Washington, NE Oregon, and southern British Columbia. In Washington, known from the east slope of the Cascade Range in Kittitas and Yakima counties (Figure 10).

WA Ecoregions: East Cascades

Number of Occurrences: Known from one extant and one historical occurrence in Washington. This species was previously ranked SH (WNHP 2019) but was recently revised to S1 following the verification of a 2014 collection as belonging to this species. At least six occurrences have recently been discovered in the field or through a review of herbarium specimens in British Columbia. The single Oregon report is historical. Based on the recent discovery of additional occurrences in Canada, the G rank of this species may need to be revised to G2 or G3.

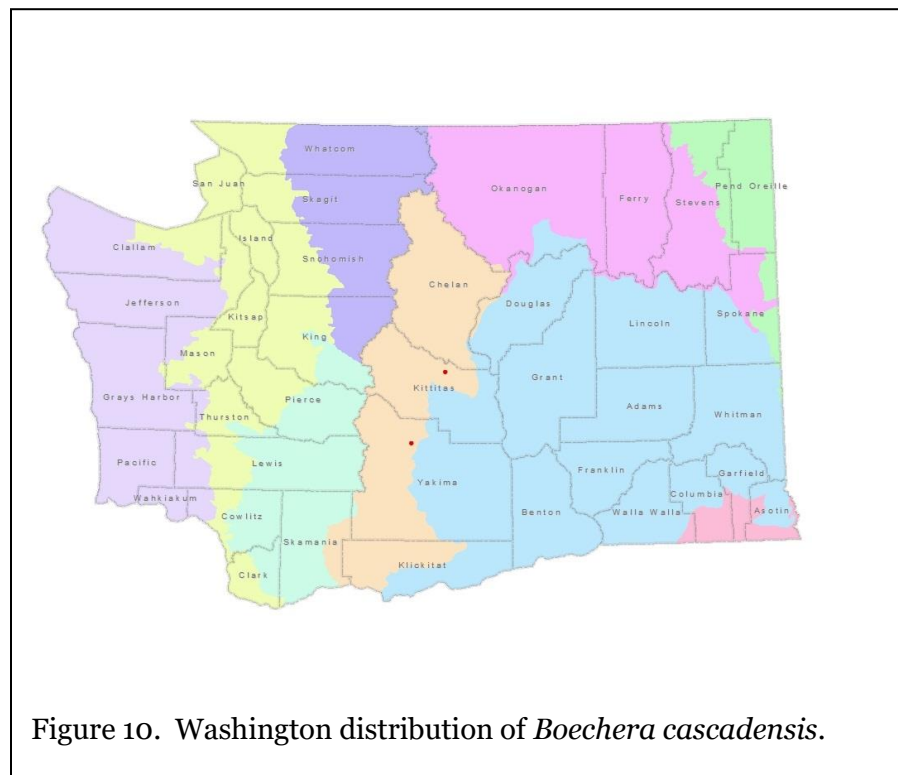


Figure 10. Washington distribution of *Boechera cascadensis*.

Abundance: Not known.

Habitat: In Washington, found on thin, ashy soil associated with basalt cliffs (Fertig and Kleinknecht 2020).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Poorly known, but threats to the habitat of this species are probably low.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: No populations in Washington are currently protected. The species receives no legal protection in the state.
5. Other Natural or Manmade Factors Affecting Continued Existence: *Boechea cascadiensis* is believed to be an apomictic species derived from hybridization between *B. microphylla* and *B. paupercula* (Windham and Al-Shehbaz 2007, 2010).

Trends: Presumed downward (and possibly extirpated in the state) until this species was rediscovered in 2014.

Managed Areas: Okanogan-Wenatchee National Forest.

Recommendations: Needs more data before being elevated to Candidate status. Habitat data from new populations in Canada could be used to help develop predictive range distribution models to target additional survey work. Herbarium specimens of *Boechea* from regional herbaria should be examined to locate potentially misidentified collections and identify new populations. Basic information is needed on the life history of this species. Due to its apomictic origin, it may have reduced fecundity or poor seedling survival. Monitoring studies are needed to determine population size and trends as well as changes in habitat conditions.

Calochortus nitidus (Broad-fruited mariposa lily)

Natural Heritage Rank: G3/S1

State and Federal Status: WA: Endangered

Range: Regional endemic of southeast Washington (Asotin, Garfield?, and Whitman counties), northeast Oregon, and north-central Idaho (Figure 11).

WA Ecoregions: Columbia Plateau (reports from Blue Mountains may be erroneous)

Number of Occurrences: Known from two extant occurrences in Washington (last observed in 2018). One other recent occurrence (discovered in 1995) has not been relocated in several recent site revisits and may be extirpated (Riser 2019) or misidentified. Two other historical occurrences have not been relocated since 1916 and 1965, respectively, and may be extirpated. A recent report from Pullman (*Hunter s.n.*, WS) needs confirmation. Reports in the Consortium of Pacific Northwest Herbaria (www.pnwherbaria.org) from Kittitas and Yakima counties are misidentifications.

Abundance: This species had been considered extirpated in Washington as recently as 1995 (Baxter and Gamon 1995), but was rediscovered on Umatilla National Forest that year and confirmed by the late Douglass Henderson of the University of Idaho herbarium. That occurrence has not been relocated since (including a search in 2019) and the habitat is occupied by a second *Calochortus* species, *C. macrocarpus* var. *maculosus*. James Riser (2019) discovered a population of just over 100 plants on the slopes of Steptoe Butte, just west of the state park in 2016 and relocated an historical occurrence near Oakesdale.

Habitat: In Washington, found primarily in moist swales among rolling hills in Palouse prairie on loess and alluvium at 900-1,040 m (2,950-3,400 ft) (Camp and Gamon 2011)

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Historically, most of the wet swale habitat in the Palouse Prairie region has been converted to crop agriculture or rangeland (Camp and Gamon 2011, Mancuso 1996). The species is also vulnerable to changes in hydrology within its habitat.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Due to its showy flowers, this species is vulnerable to overharvest for seed or bulbs.
3. Disease or Predation: Impacted by grazing by livestock and herbivory by gophers (Caicco 1988).
4. Inadequacy of Existing Regulatory Mechanisms: One occurrence is found within the proposed Steptoe Butte Natural Area Preserve, immediately south of Steptoe Butte State Park. No other populations in Washington are protected. This species is not formally protected under state law.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Downward. Based on the number of collections from the Pullman area from 1892-1916, this species appears to have declined sharply as its prairie habitat was converted to agriculture in the early 20th Century.

Managed Areas: Steptoe Butte proposed Natural Area Preserve, private. Report from Umatilla National Forest may be based on a misidentified specimen of *Calochortus macrocarpus* var. *maculosus*.

Recommendations: Based on its rangewide decline and high continued threats, this species qualifies for Candidate status. Additional field surveys are needed, especially on private lands in southeastern Washington. Demographic monitoring plots would be useful at Steptoe Butte to document basic life history traits of this species. This population should also be periodically monitored to assess population trends and potential impacts from recreation or competition with invasive plants.

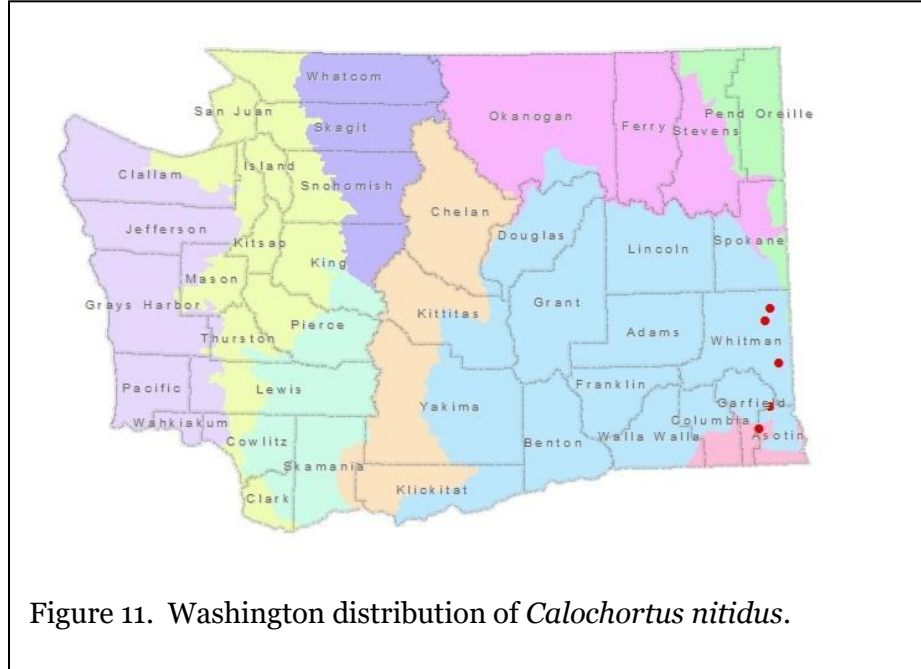


Figure 11. Washington distribution of *Calochortus nitidus*.

Carex davyi (Davy's sedge)

Synonym: *Carex constanceana*

Natural Heritage Rank: G2/SX

State and Federal Status: WA: Extirpated

Range: Occurs primarily from southern Oregon to eastern California with a disjunct population near Mount Adams in Yakima County, Washington (Figure 12).

WA Ecoregions: East Cascades

Number of Occurrences: Known from a single occurrence in Washington, last observed in 1909 and considered extirpated (Fertig and Kleinknecht 2020).

Abundance: Not known, but presumed extirpated.

Habitat: Seasonally moist sites in open conifer forest, scablands, or ephemeral watercourses (Wilson et al. 2008).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Vulnerable to habitat loss from grazing, changes in hydrology, or competition from invasive weeds.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: May be edible to livestock and vulnerable to high rates of grazing.
4. Inadequacy of Existing Regulatory Mechanisms: No occurrences are protected in Washington and the species has no legal protection in the state.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

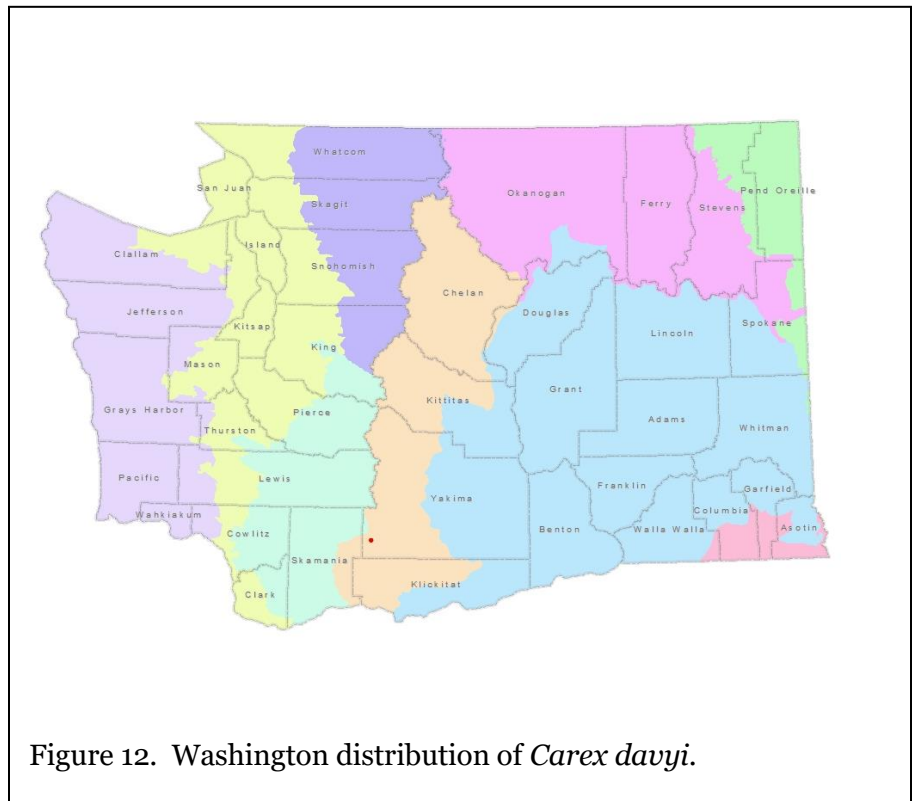


Figure 12. Washington distribution of *Carex davyi*.

Trends: Probably downward historically, and likely extirpated.

Managed Areas: The historical occurrence may be from either the Yakama Indian Reservation or the Mt. Adams Wilderness Area in Gifford Pinchot National Forest (Fertig and Kleinknecht 2020).

Recommendations: Needs more data before being elevated to Candidate status. The Mount Adams area should be surveyed to locate any potential habitat or undetected populations of this species. If rediscovered, basic information is needed on its life history, abundance, habitat preferences, and threats. Status and trend data are needed from Oregon and California.

Castilleja chambersii (Chambers paintbrush)

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Sensitive

Range: Local endemic of the Pacific Coast Range in northwestern Oregon (Clatsop County) and southwestern Washington in Pacific County (Figure 13) (Egger and Meinke 1999; Egger et al. 2019; Hitchcock and Cronquist 2018).

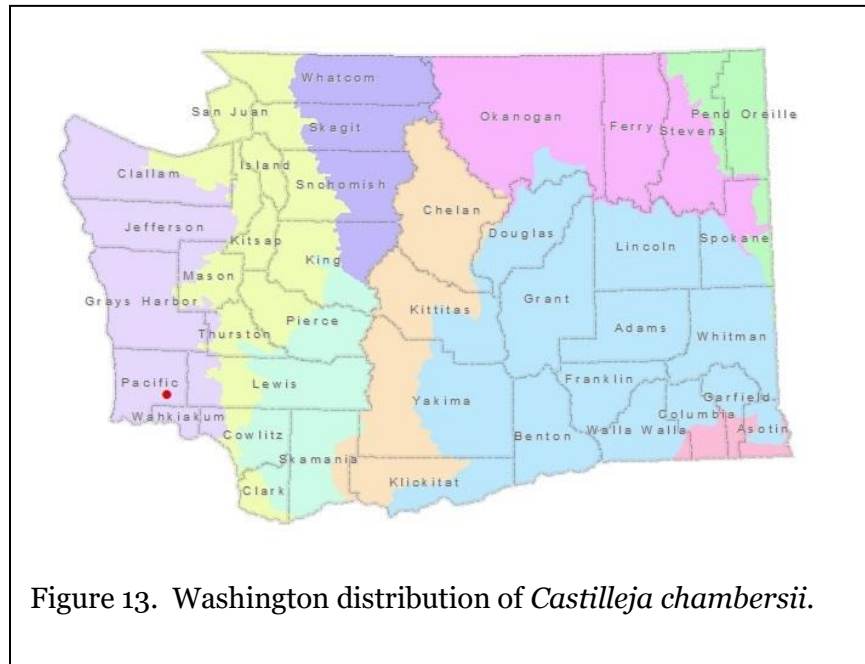
WA Ecoregions: Pacific Northwest Coast

Number of Occurrences:
Known from a single occurrence in Washington, discovered in 2015 (Egger 2015).

Abundance: The Washington occurrence consists of six small subpopulations all within 1 km of each other. Plants are reported as uncommon and scattered (Egger 2015).

Habitat: Found in seeps in crevices and ledges of basaltic cliffs at 610-750 m (2,000- 2,460 ft.) within a matrix of managed *Pseudotsuga menziesii*

timberland. One subpopulation occurs on a relatively flat, xeric, gravelly ridge top (Egger 2015). The Washington occurrence is found on uplifted Eocene-age basalt, while Oregon populations occur on Miocene flood basalts (Egger 2015). Often found on southeast to southwest aspects in sun or partial shade (Egger et al. 2019).



Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Changes in hydrology or drought could negatively impact the vigor of plants and the suitability of its habitat (several plants documented in 2015 were showing affected by drought). Populations may be threatened by disturbance or erosion associated with logging and road construction (Egger et al. 2019).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: No populations are protected. This species has no legal protection in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Populations can co-occur with *C. hispida*, but hybrids are considered rare.

Trends: Not known.

Managed Areas: Private forestry lands.

Recommendations: Needs more data before being elevated to Candidate status. Monitoring of the known population is needed to assess trends and potential threats. Demographic monitoring plots would be useful to determine basic life history data, such as longevity, seedling survivorship, and population viability. Modeling of potential habitat in Washington and targeted surveys of suitable basalt ridge habitat would be useful in identifying possible additional occurrences (Egger 2015).

Castilleja victoriae (Victoria's paintbrush)

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Endangered

Range: Local endemic of southern Vancouver Island, British Columbia and small adjacent islands in the Salish Sea in British Columbia and Iceberg Island in San Juan County, Washington (Figure 14) (Egger et al. 2019; Fairbarns and Egger 2007, Hitchcock and Cronquist 2018).

WA Ecoregions: Puget Trough

Number of Occurrences: Known from one occurrence in Washington that was first discovered in 2005 and most recently revisited in 2019.

Abundance: Population size at Iceberg Island has ranged from 50 plants to 5,631. Annual variability in numbers is extremely high, with populations increasing by as many as 3,970 plants in some years, or decreasing by as much as 2,343 plants in others.

Habitat: Small depressions and vernal pools, springs, and windswept or thin-soiled rocky knolls or benches on islands within 100 m of the ocean (Egger et al. 2019).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Loss of habitat from ocean-front development and inundation from raising sea levels with projected climate change (all known populations are likely to be under water or subjected to storm surges resulting from sea-level rise induced by global warming) (Egger et al. 2019). Monitoring plots on Iceberg Island have been impacted by goose feces (Peter Dunwiddie, personal observation).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known, but might be grazed by geese.
4. Inadequacy of Existing Regulatory Mechanisms:
The single Washington occurrence is within Iceberg Island State Park. The species does not receive formal legal protection in the state.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

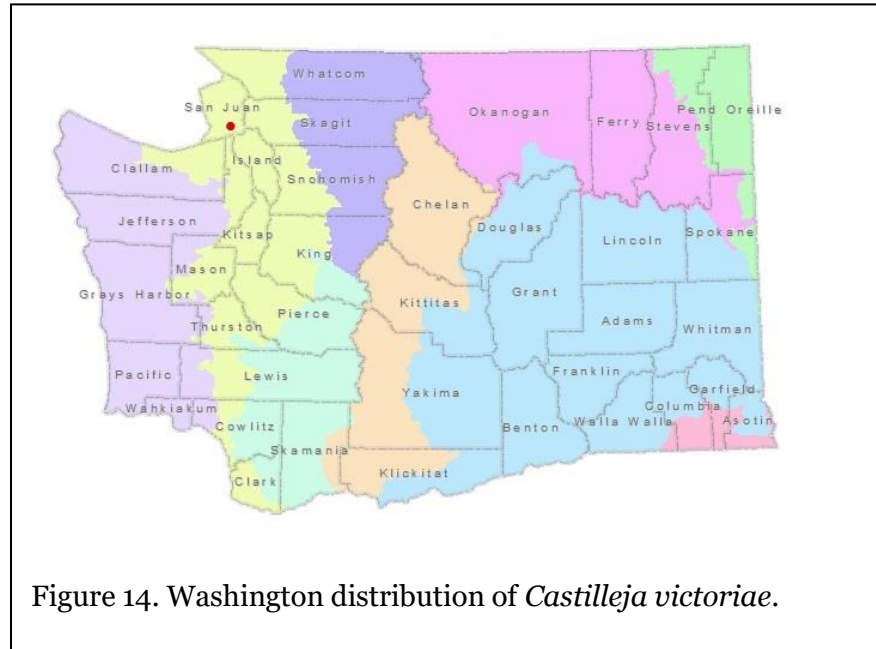


Figure 14. Washington distribution of *Castilleja victoriae*.

Trends: The Iceberg Island occurrence has been monitored every one to two years since 2010. From 2011 to 2015 the population numbered more than 1,100 individuals, with the highest count observed in 2012 (5,631 flowering or vegetative plants). Since 2017 the counts have been less than 560, with only 50 plants observed in 2019 (the lowest number ever recorded). Long-term trend data are lacking for this occurrence, but in the short term, numbers are down 99% from 2013 to 2019.

Managed Areas: Iceberg Island State Park.

Recommendations: The significant recent population decline, limited range, and threatened habitat suggest this species should be made a Candidate for potential listing under the ESA. Additional surveys of potential habitat on small islands in the San Juan Islands is needed. Seed has been deposited in the Miller Seed Vault at the University of Washington, but *ex situ* populations should also be established to increase seed production. Potential habitat modeling could be done to identify new places for surveys or out-plantings to create additional populations.

Delphinium leucophaeum (pale larkspur)

Natural Heritage Rank: G2/S1

State and Federal Status: WA: Endangered

Range: Regional endemic of the northern Willamette Valley of Oregon (Clackamas, Marion, Multnomah, Washington, and Yamhill counties) and western Lewis County, Washington (Figure 15) (Camp and Gamon 2011).

WA Ecoregions: Puget Trough

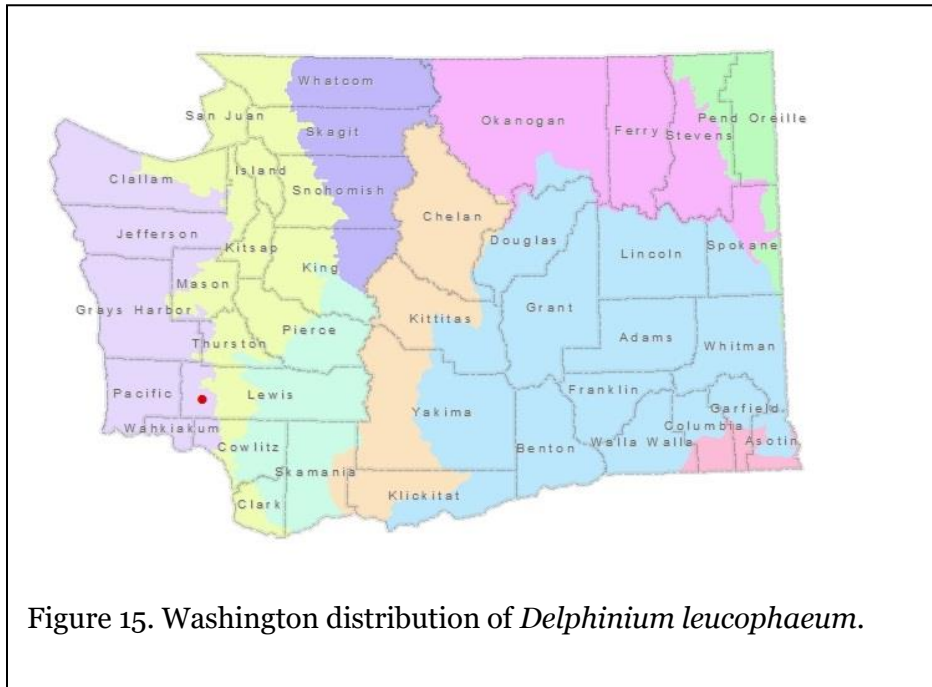
Number of Occurrences: Known from one extant occurrence in Washington, discovered in 1986 and most recently observed in 2019.

Abundance: Currently known from less than 30 individual plants, but the population has been as high as 1,291 individuals in the early 1990s.

Habitat: Historically found in dry bluffs, open areas, and moist lowland prairies (Camp and Gamon 2011). Remnant occurrences are now found mostly along fencerows and roadside ditches that are not plowed or disturbed. Common associated species include *Quercus garryana*, *Holodiscus discolor*, *Festuca rubra*, *Elymus glaucus*, *Symphoricarpos albus*, and *Spiraea douglasii*. The single Washington occurrence is found in the vicinity of several other state and federally rare species, including *Carex densa*, *Lathyrus holochlorus*, *Lupinus oregonus* var. *kincaidii*, and *Wyethia angustifolia*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Historically, most of the habitat occupied by this and other Puget Trough prairie species has been significantly altered through conversion to agriculture or urban development (Crawford and Hall 1997, Fertig 2018). More recently, populations have become fragmented and vulnerable to roadside herbicides, road improvement activities, and competition with introduced pasture species (Camp and Gamon 2011, Maxwell 1994).



2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known
3. Disease or Predation: Not known. *Delphinium* species are typically not favored forage for livestock,
4. Inadequacy of Existing Regulatory Mechanisms: No populations in Washington are formally protected and the species is not protected under state law.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Downward. The subpopulation at Cemetery Hill may no longer be present. Plants are still present along a fencerow ditch on a private dairy in Boistfort, but numbers appear to be declining in recent years (only 28 plants were observed in 2018). From 1986 to 1993 the total population was estimated between 925 and 1291.

Managed Areas: private.

Recommendations: The limited global range, high degree of threats, and downward population trajectory suggest this species should be elevated to Candidate status. At least one Washington occurrence should be formally protected under a conservation easement or outright purchase. No sites are enrolled in the state's registry program (Arnett 2009, 2014a). Areas of additional potential habitat should be identified from air photos or modeling for ground surveys or as reintroduction sites (though only if protected).

Delphinium viridescens (Wenatchee larkspur)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened; BLM: Sensitive; USFS: Sensitive

Range: Local endemic of the Wenatchee Mountains in Chelan and Kittitas counties (Figure 16). A 1980 report from Douglas County needs confirmation and may be a related species or based on an erroneous location.

WA Ecoregions: Columbia Plateau (?), East Cascades

Number of Occurrences: Known from 12 extant and two historical reports. Eight occurrences have been discovered or relocated since 2005 (most recently in 2019).

Abundance: This species is clonal and so can be difficult to census due to the difficulty in differentiating individual plants. Loomis (1985) estimated a population of 2450 individuals based on a ratio of four flowering stems to every one vegetative stem. Gamon (1987) summarized data from all of the state's known occurrences and estimated 5,800 plants. Based on more recent WNHP records, the statewide population is 5,000-10,000 plants (Fertig and Kleinknecht 2020).

Habitat: Occurs in moist meadows, springs, seeps, and seasonally wet areas along streams and openings in *Populus tremuloides* or conifer forests at 380-1,740 m (1,240-5,700 ft). Most populations are associated with the Swauk Sandstone (Gamon 1987). Surface water is usually present in the spring and summer and soils tends to be poorly drained.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Development of wet meadow habitat for orchards, farms, grazing land, or residential home sites has been the greatest historical threat, and is still a potential threat on privately owned sites. Habitat is also impacted by road-building, diverting water through channelization, and timber harvest (Gamon 1987, Loomis 1985). This species may be vulnerable to changes in moisture availability under

future climate change scenarios (Rocchio and Ramm-Granberg 2017). Fire suppression may have a negative impact on habitat quality and growth of *Delphinium viridescens* plants (Harrod et al. 1997).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Although most *Delphinium* species are toxic, *D. viridescens* is grazed by deer and sheep. Insect herbivory may be a localized threat (Gamon 1987).

4. Inadequacy of Existing Regulatory Mechanisms: At least four occurrences (28% of the total range) are protected in the Camas Meadows Natural Area Preserve and DNR private land registry sites. The species has no formal protection under state law.

5. Other Natural or Manmade Factors Affecting Continued Existence: Hybridization has been reported, but is infrequent (Varney 1979).

Trends: Poorly known. Probably stable at present, though downward over the past 150 years.

Managed Areas: Camas Meadows Natural Area Preserve (DNR), Okanogan-Wenatchee National Forest, DNR registry (private).

Recommendations: Needs more data before being elevated to Candidate status. Demographic monitoring would be informative to determine the longevity of plants and ascertain the critical transitions in its life history. Plot monitoring could help with estimating population size and trends and changes in habitat condition over time. Habitat modeling could identify additional sites for surveys or reintroduction. Studies of the response of this species to fire would be useful for developing best management practices.

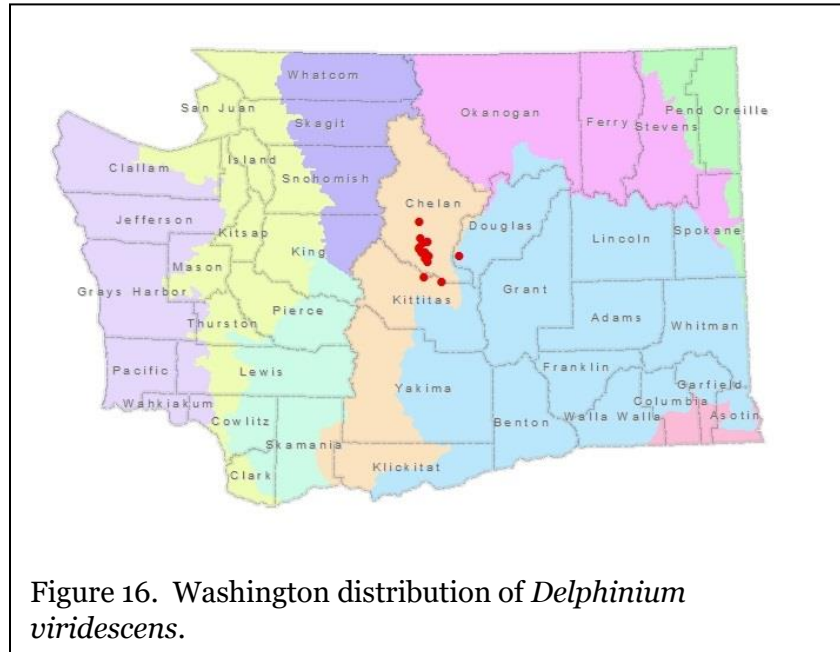


Figure 16. Washington distribution of *Delphinium viridescens*.

Dodecatheon austrofrigidum (Frigid shootingstar)

Natural Heritage Rank: G2/S1

State and Federal Status: WA: Endangered, BLM: Sensitive, USFS: Sensitive

Range: Regional endemic of the southern Olympic Mountains and Coast Range in Grays Harbor and Pacific counties, Washington (Figure 17) and Coast Range of northwestern Oregon (Chambers 2006).

WA Ecoregions: Pacific Northwest Coast

Number of Occurrences: Known from three occurrences in Washington, all discovered since 1983 (most recently surveyed in 2011).

Abundance: Populations range in size from 15 to over 100. The total state population may be less than 300 plants.

Habitat: Found in open or shaded rock crevices and cracks on basalt cliffs with pockets of shallow soil and associated with seeps or springs (Camp and Gamon 2011). Elevations range from 100-3,940 feet (30-1,200 m) (Chambers 2006).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Threats to Washington occurrences appear to be low at present, although the limited range of the species and its dependence on potentially ephemeral water sources make it vulnerable to projected climate change.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: One population is protected within the Colonel Bob Wilderness Area in Olympic National Forest. Other occurrences are on private lands without protection. The species has no protection under Washington state law.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

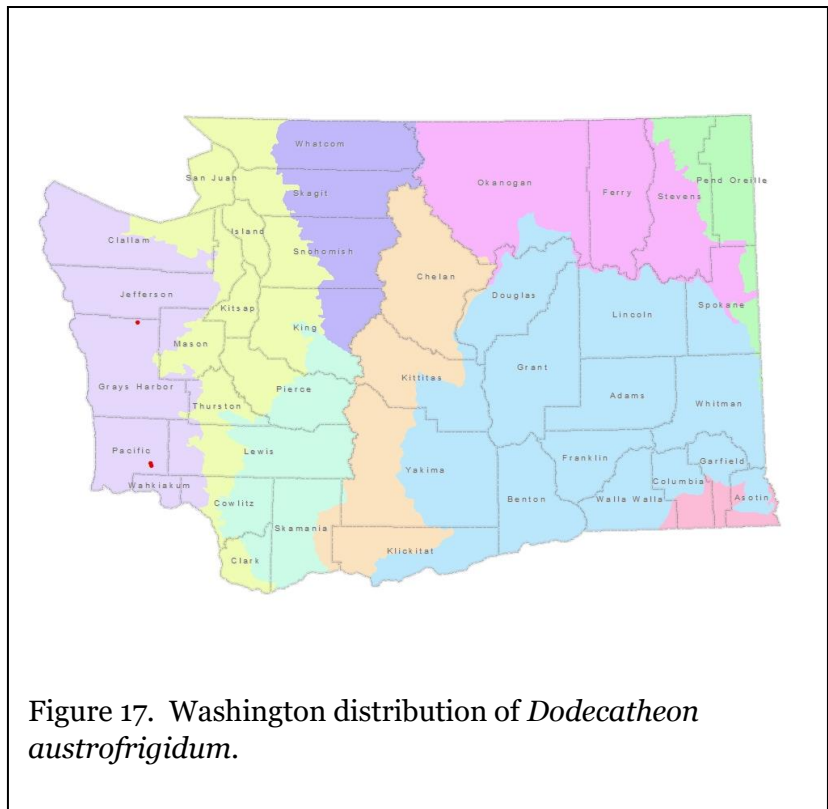


Figure 17. Washington distribution of *Dodecatheon austrofrigidum*.

Trends: Not known.

Managed Areas: Colonel Bob Wilderness Area, Olympic National Forest.

Recommendations: Needs more data before being elevated to Candidate status. Additional areas of potential habitat should be surveyed in western Washington, including sites in the Coast Range and in Olympic National Park. Habitat modeling would help identify potential survey sites. Searches should also include high elevation meadows on rocky sites with Pacific silver fir (a habitat type occupied in NW Oregon). Information is needed on basic life history and better data are needed on population trends.

Draba taylorii (Taylor's draba)

Natural Heritage Rank: G1G2/S1

State and Federal Status: WA: Endangered, USFS: Sensitive

Range: Local endemic of Cathedral Park in southern British Columbia and the Okanogan Mountains in northern Okanogan County, Washington (Figure 18) (Al-Shehbaz and Mulligan 2013; Hitchcock and Cronquist 2018).

WA Ecoregions: Okanogan

Number of Occurrences: Known from two extant occurrences in Washington (both observed since 2018).

Abundance: The occurrence in the Tiffany Lake region consists of two separate subpopulations on Rock Mountain and Middle Tiffany Mountain located about 1 mile apart along the same ridgeline. The Rock Mountain subpopulation contained 25 fruiting or vegetative plants when relocated in 2018 on a Rare Care weekend outing (this population was first documented by Charles Fiker in 1933). The Middle Tiffany Mountain subpopulation (discovered the next day on the same Rare Care field trip) also contained 25 flowering and fruiting individuals. The Chopaka Mountain occurrence contained an estimated 200 plants in 2019.

Habitat: In the Tiffany Mountain area, *Draba taylorii* is found on east and southwest-facing rims or exposed rocky summits of gneiss. It is often found in cracks or rock ledges with thin soils at the edge of krummholz dominated by *Pinus albicaulis* and *Juniperus communis* along with other cushion plants. Common associated species include *Antennaria umbrinella*, *Carex scirpoidea*, *Cherleria obtusiloba*, *Draba novolympica*, *Erigeron compositus*, *Penstemon davidsonii*, *Potentilla glaucophylla*, *Saxifraga bronchialis*, and *Smelowskia americana*. The Chopaka Mountain occurrence is found on a flat summit fellfield of metagabbro boulders and bedrock interspersed with dense turf of *Carex engelmannii*, *Juncus drummondii*, and *Trisetum spicatum*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Threats to known sites are low due to the rocky and rugged nature of the terrain. Trespass livestock grazing or trampling is a minor potential threat in the Chopaka Mountain NAP.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Not known.

4. Inadequacy of Existing Regulatory Mechanisms: One occurrence is protected in the Chopaka Mountain Natural Area Preserve managed by WA DNR. The species has no statutory protection in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: This species may be apomictic and not produce viable pollen (reproducing instead asexually through unfertilized seed) (Hitchcock and Cronquist

2018). As such, it may have low fecundity and difficulty establishing new populations. Known populations are small and may be vulnerable to stochastic events (rock fall, drought) or long term climate change.

Trends: Not known.

Managed Areas: Okanogan-Wenatchee National Forest, Chopaka Mountain Natural Area Preserve (WA DNR).

Recommendations: Needs more data before being elevated to Candidate status. Additional surveys in suitable alpine or upper subalpine rock ledge and fellfield habitat in the Pasayten Wilderness and other high elevation areas in the Okanogan Range are needed to document additional potential occurrences. This species is easily confused with *Draba novolympica*, *D. incerta*, *D. paysonii*, and *D. densifolia* so a thorough inspection of herbarium specimens might result in the discovery of additional populations. No monitoring data exist to assess longevity of mature plants, frequency of seedling establishment, or population trends.

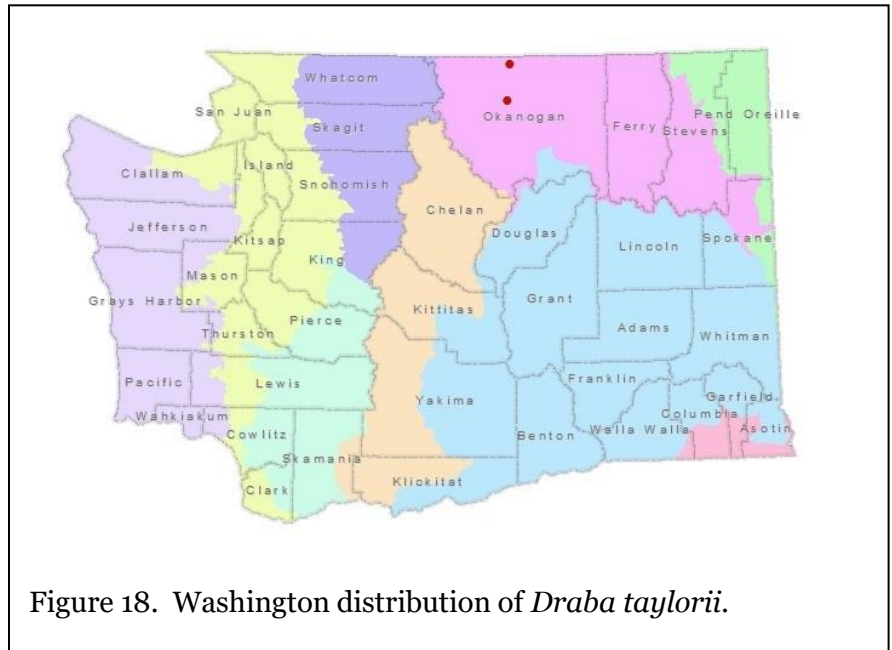


Figure 18. Washington distribution of *Draba taylorii*.

Eremogone franklinii var. *thompsonii* (Thompson's sandwort)

Synonym: *Arenaria franklinii* var. *thompsonii*

Natural Heritage Rank: G4T2Q/S2

State and Federal Status: WA: Sensitive

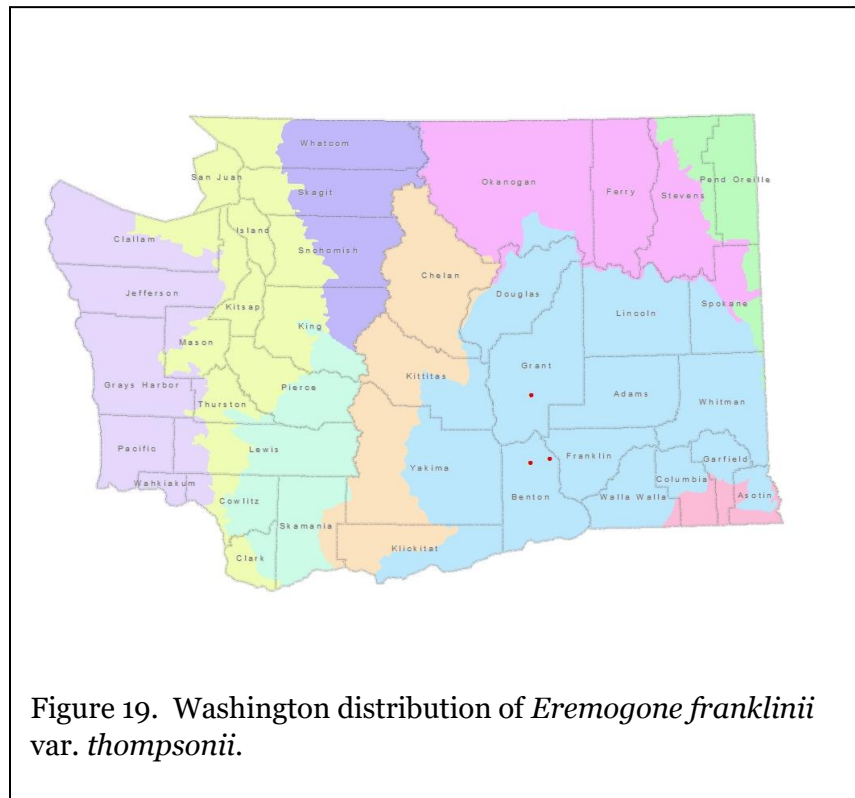
Range: Regional endemic of the Columbia River in north-central Oregon and central Washington in Benton and Grant counties (Figure 19) (Hitchcock and Cronquist 2018).

WA Ecoregions: Columbia Plateau

Number of Occurrences:
Known from three or four reported occurrences in Washington. Var. *thompsonii* was first documented in Washington in 1984, though some historical specimens date back to 1954 (these were initially identified as other taxa).

Abundance: Poorly known. Sites have been variously described as “locally common” to “occasional” (Fertig and Kleinknecht 2020).

Habitat: Found on stabilized to partially stabilized sand dunes with sparse cover of *Purshia tridentata*, *Hesperostipa comata*, and *Achnatherum hymenoides*.



Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Threatened by development of dune habitat for agriculture, trampling by off-road vehicles, and competition from invasive weeds.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: At least one population is protected in the WA Department of Fish and Wildlife's South Columbia Wildlife Area. This taxon receives no formal legal protection in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known.

Managed Areas: Hanford ERP, South Columbia Basin Wildlife Area.

Comments: Gamon (1986a) questioned whether the specimens from Washington were truly distinct from the typical variety and concluded that var. *thompsonii* was restricted to Oregon. Hartman et al. (2005) accepted the determination of at least one Washington collection from Benton County while reviewing specimens for their taxonomic treatment of *Eremogone* in the *Flora of North America*. The FNA treatment is also followed by the revised *Flora of the Pacific Northwest* (Hitchcock and Cronquist 2018). Var. *thompsonii* differs from the more widespread var. *franklinii* in having less tightly ball-like flower heads, shorter sepals, and petals that are slightly longer than the sepals (Hartman et al. 2005).

Recommendations: Needs more data before being elevated to Candidate status. More specimens are needed from central Washington to confirm that var. *thompsonii* is truly distinct from var. *franklinii* based on morphological and genetic traits. One recently documented population from dunes southeast of the Vantage Bridge in Grant County needs to be studied in the field, as it may consist of a mix of both varieties. More detailed abundance and trend data are needed for Washington occurrences. No data are available on demographic characteristics, longevity, seedling survivorship, pollination biology, or many other basic life history attributes.

Erigeron basalticus (Basalt daisy)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened, BLM: Sensitive

Range: Local endemic of cliffs along the Yakima River between Manastash Ridge and Yakima Ridge in Kittitas and Yakima counties, Washington (Figure 20).

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from six extant occurrences, all observed since 2007 (four populations have been revisited since 2018).

Abundance: Gible (2007) documented approximately 15,600 individuals rangewide. Gamon (1998) observed populations to range in size from 12 to over 5,000 plants.

Habitat: Cracks and crevices in cliffs of the Yakima Basalt Formation along sparsely vegetated canyon walls with north, east, or west aspects at 380-460 m (1,250-1,500 ft) (Camp and Gamon 2011, Gamon 1998)

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Primary threat is quarrying and highway expansion eliminating cliff habitat. Some populations in the vicinity of orchards may be impacted by herbicide drift (Gamon 1998).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Four of the six known occurrences are protected in the Selah Cliffs Natural Area Preserve, L.T. Murray Wildlife Area, and Yakima River Area of Critical Environmental Concern. The species receives no legal protection from the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Probably stable.

Managed Areas: L.T. Murray Wildlife Area, Selah Cliffs Natural Area Preserve, Spokane BLM, Yakima River Canyon ACEC, Yakima Training Center

Recommendations: Probably secure at present and not recommended for Candidate status. Periodic monitoring should continue to assess population size, trends, and changes in habitat condition. Potential habitat for additional surveys could be identified through modeling.

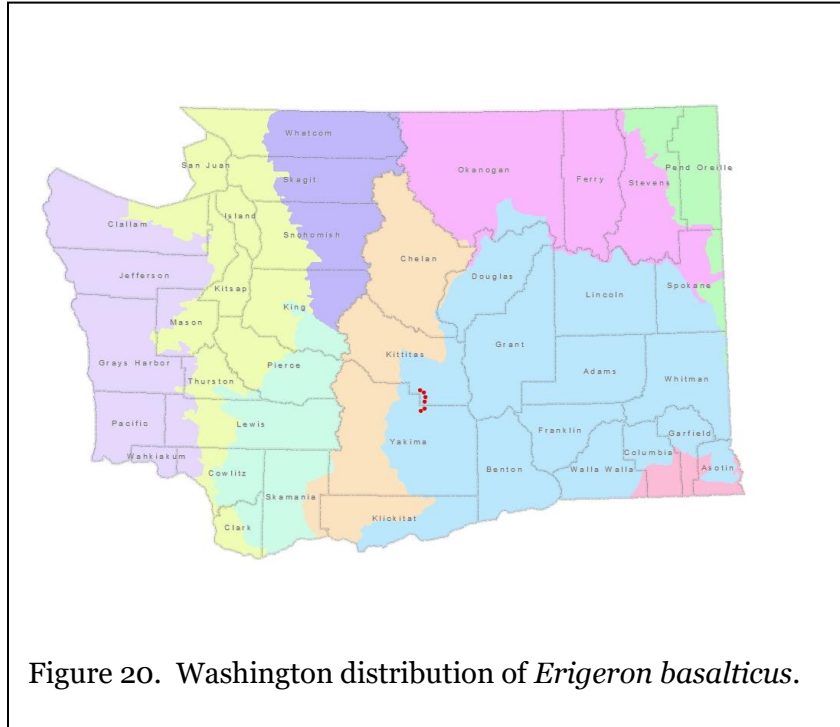


Figure 20. Washington distribution of *Erigeron basalticus*.

Erigeron howellii (Howell's daisy)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened, BLM: Sensitive, USFS: Sensitive

Range: Local endemic of the Columbia River Gorge in Oregon and Washington (Skamania County) (Figure 21).

WA Ecoregions: West Cascades

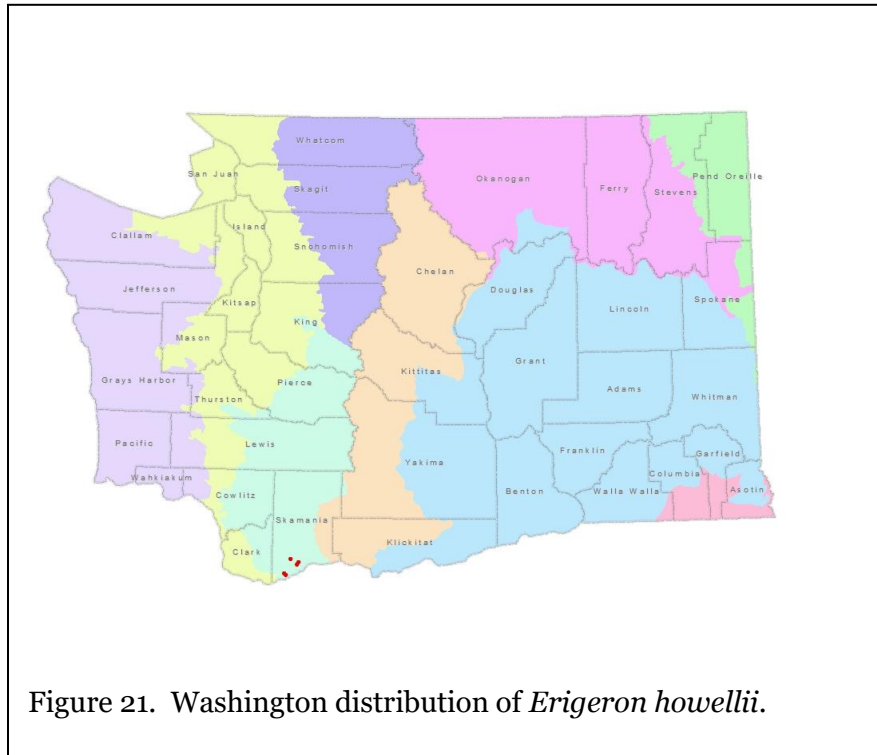
Number of Occurrences: Known from five extant occurrences in Washington, all surveyed since 2004.

Abundance: Recent surveys by Rare Care volunteers suggest that the current total state population is approximately 12,200 plants.

Habitat: Found on steep north and northeast-facing slopes of cliffs and rock ledges in moist, open microsites with sparse cover of herbs and grasses within more densely vegetated forests (Gamon 1996).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Rocky habitat has relatively few threats, though local areas may be impacted by recreation use, road construction, timber harvest, or competition from invading woody vegetation (Camp and Gamon 2011).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: At least three occurrences are protected within the Columbia Falls Natural Area Preserve and Table Mountain Natural Resource Conservation Area, managed by WA DNR. The species has no legal protection in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.



Trends: Abundance data were not collected for Washington occurrences when they were first documented in the late 1970s

and early 1980s. Recent surveys indicate that populations are stable to possibly increasing, though the increase may be an artifact of different observers estimating numbers in different ways.

Managed Areas: Columbia Falls Natural Area Preserve, Columbia River Gorge National Scenic Area, Table Mountain Natural Resource Conservation Area.

Recommendations: Probably secure at present and not recommended for Candidate status. Additional areas of potential habitat in the Columbia Gorge area should be surveyed. Better data are needed on basic life history characteristics, including longevity of mature plants, seedling survival, seed bank persistence, dispersal ability, pollination requirements, genetic structure, and other information that may be valuable for management. Periodic monitoring should continue to gauge relative population numbers and trends and possible impacts to its habitat.

Erythronium quinaultense (Quinault fawn-lily)

Natural Heritage Rank: G1G2/S1S2

State and Federal Status: WA: Threatened, USFS: Sensitive

Range: Local endemic of the southwestern Olympic Peninsula in Clallam, Grays Harbor, and Jefferson counties (Figure 22) (Hitchcock and Cronquist 2018).

WA Ecoregions: Pacific Northwest Coast

Number of Occurrences: Known from at least four extant occurrences. Originally discovered in 1983 and described as a new species in 2001 (Allen 2001). All populations have been resurveyed from 2009-2018.

Abundance: Individual occurrences are comprised of subpopulations containing several hundred clumped to scattered plants. The total population in the state is estimated at 20,000.

Habitat: Found in openings and rock ledges at mid elevations in forests dominated by *Thuja plicata*, *Pseudotsuga menziesii*, *Abies amabilis*, and *Tsuga heterophylla*, often on streamside terraces, roadcuts, or ridges. Allen (2001) notes that *E. quinaultense* is absent from young forest stands with closed canopies, so may be dependent on periodic disturbances.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Timber harvest could impact habitat in the near term, but post harvest succession might also result in early to mid-seral habitat favored by this species. Several populations are associated with areas that were selectively logged in the past.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known, but this species is showy and rare, making it a potential target for harvest as a garden ornamental.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: One population is found within the Matheny Prairie Old Western Red Cedar Special Botanical Area on Olympic National Forest. All other occurrences are

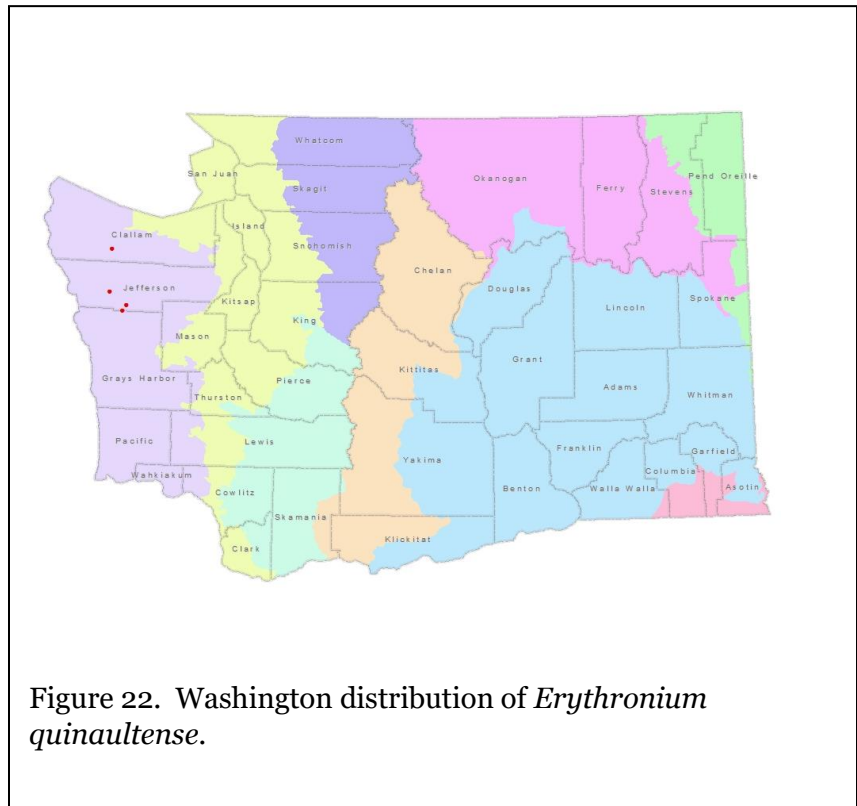


Figure 22. Washington distribution of *Erythronium quinaultense*.

on Forest Service or tribal lands managed for multiple use. The species has no legal protection in the state of Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: The hybrid origin of this taxon may result in reduced fecundity of seedlings or wasted reproductive efforts through back-crosses with parental species.

Trends: Not well documented. Repeat visits suggest that numbers may be stable to increasing, although differences could reflect bias by different observers.

Managed Areas: Matheny Prairie Old Western Red Cedar Special Botanical Area, Olympic National Forest.

Comments: *Erythronium quinaultense* is an allotetraploid hybrid between the pink-flowered *E. revolutum* (also a species of conservation concern in Washington) and white-flowered *E. montanum* (Allen 2001, Allen and Robertson 2002). The ranges of both parental taxa overlap in the Olympic Range, though *E. revolutum* tends to be a lower elevation forest species and *E. montanum* occurs in subalpine meadows and forest edges. Morphologically, *E. quinaultense* is intermediate in flower color between its two parents, but tends to occupy higher elevation forested sites than *E. revolutum*. Allen (2001) suggests that some populations traditionally ascribed to *E. revolutum* in the Olympic Range could be *E. quinaultense*.

Recommendations: Needs more data before being elevated to Candidate status. Standardized monitoring procedures should be adopted to estimate population size or assess population trends. Additional areas of potential habitat should be surveyed, including sites thought to be inhabited by *E. revolutum* in order to locate possible new occurrences of *E. quinaultense*. The Quinault Indian Reservation could have potential habitat for this species.

Geum rossii var. *depressum* (Ross' avens)

Natural Heritage Rank: G5T1/S1

State and Federal Status: WA: Endangered; USFS: Sensitive

Range: Var. *depressum* is a local endemic of the Wenatchee Mountains in Chelan County, Washington (Figure 23) (Camp and Gamon 2011; Hitchcock and Cronquist 1961). Rohrer (2015) and Hitchcock and Cronquist (2018) no longer recognize var. *depressum* as distinct from the circumboreal arctic-alpine var. *rossii*. At the full species level, *Geum rossii* is disjunct in Washington from populations of var. *rossii* in northern British Columbia (Douglas et al. 2002) and populations of var. *turbinatum* in the Wallowa Mountains of northeastern Oregon (ORBIC 2019). Reports from Lincoln and Kittitas counties, Washington, are based on misidentifications.

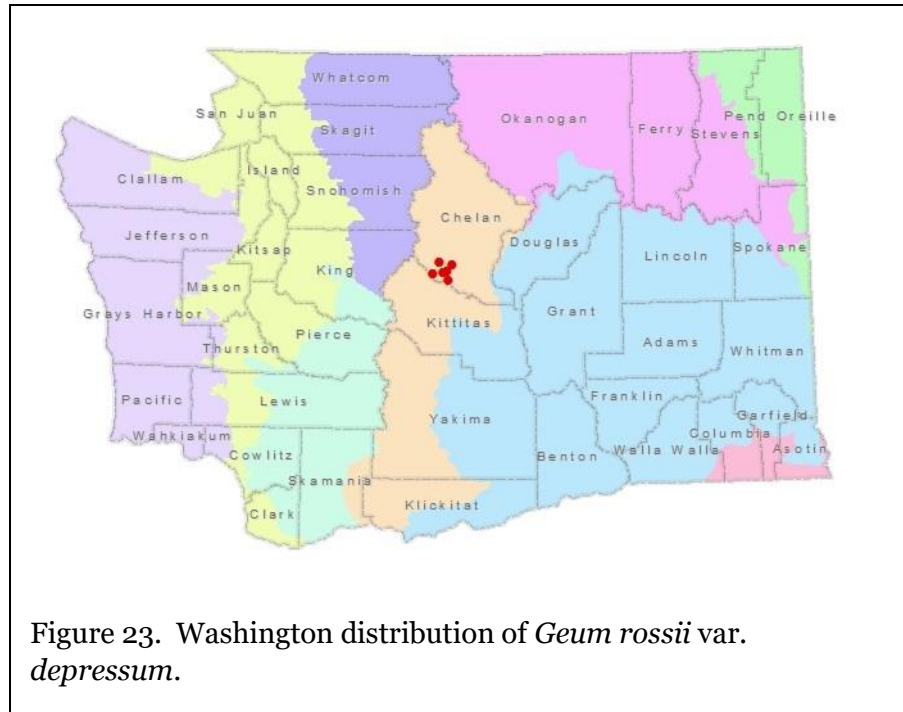
WA Ecoregions: East Cascades

Number of Occurrences: Var. *depressum* is known from four extant and one historical occurrences in Washington (and rangewide). Two of the extant occurrences could not be relocated in surveys by Rare

Care volunteers in 2005 and might be extirpated. The most recent observation of the species came in July 2018. Several former occurrence records are based on misidentifications of *Geum triflorum*.

Abundance: The largest known occurrence is found east of Colchuck Lake in the Stuart Range and contained more than 1000 plants in three subpopulations when surveyed in 2009. Another occurrence at Cashmere Mountain contained an estimated 50 plants in a 200 x 200 foot area in 2007. Reliable population numbers are not available for other occurrences.

Habitat: Found in subalpine or alpine talus slopes, cliffs, and bedrock crevices. Most occurrences are associated with the Mount Stuart Batholith (a pluton of gabbro, granite and quartz diorite), though one outlying occurrence in Three Brothers Peak is on serpentine. Associated species include *Pinus albicaulis*, *Heuchera cylindrica*, *Silene acaulis*, *Polemonium pulcherrimum*, and *Eremogone capillaris*.



Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: May be impacted by recreational use of alpine habitat. In the long-term, alpine populations are vulnerable to reductions in snow cover and higher summer temperatures due to climate change.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Four occurrences are protected in the Enchantment Special Botanical Area and Alpine Lakes Wilderness Area in Okanogan-Wenatchee National Forest. This species is not legally protected in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Several populations have not been relocated in recent years and may be extirpated, suggesting an overall downward trend.

Managed Areas: Alpine Lakes Wilderness Area, Enchantment Special Botanical Area, Okanogan-Wenatchee National Forest

Recommendations: Probably secure at present and Candidate status is not recommended. Suitable habitat in the Alpine Lakes Wilderness Area should be systematically surveyed to locate known or

additional occurrences. Monitoring data are lacking for known occurrences and no data are available on longevity, seedling survivorship, or fecundity. Better population estimates or census data are needed. More information is desirable to assess threats. If var. *depressum* is not taxonomically significant, the T Rank needs to be eliminated or modified (T1Q) to reflect this.

Hackelia taylorii (Taylor's stickseed)

Synonym: *Hackelia* "species novum" (Camp and Gamon 2011)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened; USFS: Sensitive

Range: Local endemic of the Wenatchee Mountains of Chelan County, Washington (Figure 24) (Hitchcock and Cronquist 2018)

WA Ecoregions: East Cascades

Number of Occurrences:

Known from four extant occurrences, last relocated in 2013.

Abundance: The total population is estimated at 730-950 plants, based on available survey data from 2006-2009.

Habitat: Occurs on steep, unstable, sparsely vegetated sandy-gravelly talus slopes at 1,800-2,300 meters (5,900-7,550 ft) derived from the Mount Stuart batholith (intrusive gabbro, granite and quartz diorite) (Arnett 2014a; Harrod et al. 2013).

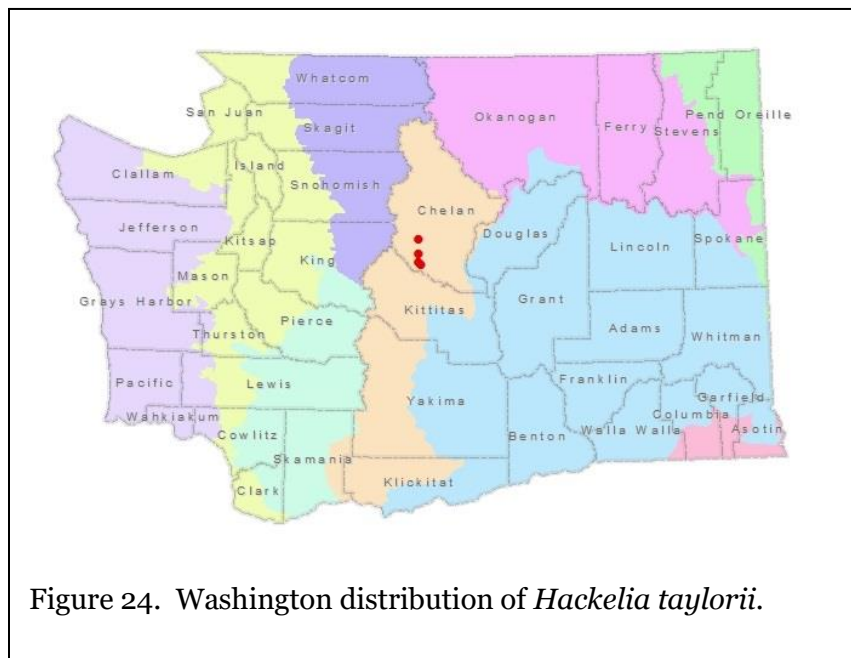


Figure 24. Washington distribution of *Hackelia taylorii*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Harrod et al. (1999, 2013) noted that populations of *Hackelia taylorii* were vulnerable to rock slide events or other stochastic disturbances within its limited geographic range. The population east of Colchuck Lake occurs in a popular mountain pass with much dispersed hiking (there is no single, well-defined trail). This species could be especially vulnerable to reduction in snowpack and available moisture due to climate change (Rocchio and Ramm-Granberg 2017).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: This species could be vulnerable to trampling or herbivory by mountain goats.
4. Inadequacy of Existing Regulatory Mechanisms: Three occurrences are protected in the Alpine Lakes Wilderness Area of Okanogan-Wenatchee National Forest.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: The Aasgard Pass occurrence has declined significantly after a rock slide took out most of the population in 2001 (only 3 plants were still present when last visited in 2006) (Arnett 2007). Trend data are unavailable for other occurrences.

Managed Areas: Alpine Lakes Wilderness Area, Okanogan-Wenatchee National Forest

Comments: Populations now recognized as *Hackelia taylorii* were included in *H. venusta* by Gentry and Carr (1976) in their monograph of *Hackelia*. The US Fish and Wildlife Service (2002) explicitly did not include the high elevation blue-flowered populations now treated as *H. taylorii* in the listing decision for *H. venusta*. Harrod et al. (1999) conducted a morphometric analysis of *H. venusta* and determined that it should be split into two taxa, though a genetic study by Hipkins et al. (2003) found little divergence between the *H. venusta* and *H. taylorii*. Harrod et al. (2013) published *H. taylorii* as a separate species and provided additional data confirming its distinctiveness from *H. venusta*.

Recommendations: Needs more data before being elevated to Candidate status. The Natural Heritage rank for this species should be re-assessed (may be G1/S1). Known populations should be resurveyed to assess population size, condition, and potential threats. Better information is needed on the longevity of plants, seedling survivorship, and fecundity. Habitat modeling would be useful to identify additional areas of suitable habitat for survey or potential out-planting.

References: Arnett 2007, 2014; Camp and Gamon 2011, Fertig et al. 2017, Gentry and Carr 1976, Harrod et al. 1999, 2013; Hipkins et al. 2003, Hitchcock and Cronquist 2018.

Isöetes minima (Midget quillwort)

Natural Heritage Rank: G1G2/S1

State and Federal Status: WA: Sensitive; BLM: Sensitive; USFS: Sensitive

Range: Regional endemic of southeastern British Columbia, eastern Washington (Kittitas, Okanogan, and Spokane counties) (Figure 25), and northeastern Oregon (Hitchcock and Cronquist 2018).

WA Ecoregions: Columbia Plateau, East Cascades, Okanogan

Number of Occurrences: Known from three extant and one historical occurrences in Washington. The extant populations have all been discovered or revisited since 2000, most recently in 2011.

Abundance: Poorly known. One occurrence had 30 plants and another 155 plants when surveyed in 2000. Data are lacking for other extant populations or are vague (“locally abundant” at one site in 2010).

Habitat: Found in vernal pools, moist swales, or gentle slopes in lithosols within *Artemisia* grasslands at 4,500-5,390 ft (1,370-1,640m). These sites typically become dry in the summer (Ceska and Ceska 2001). Common associated species include *Agoseris heterophylla*, *Allium douglasii*, *Antennaria luzuloides*, *Camassia quamash*, *Collinsia parviflora*, *Delphinium burkei*, *Deschampsia elongata*, *Erythranthe floribunda*, *E. guttata*, *Floerkea proserpinacoides*, *Hesperochiron pumilus*, *Juncus bufonius*, *Koeleria macrantha*, *Lomatium ambiguum*, *Pseudoroegneria spicata*, and *Sedum stenopetalum* (WNHP 2005).

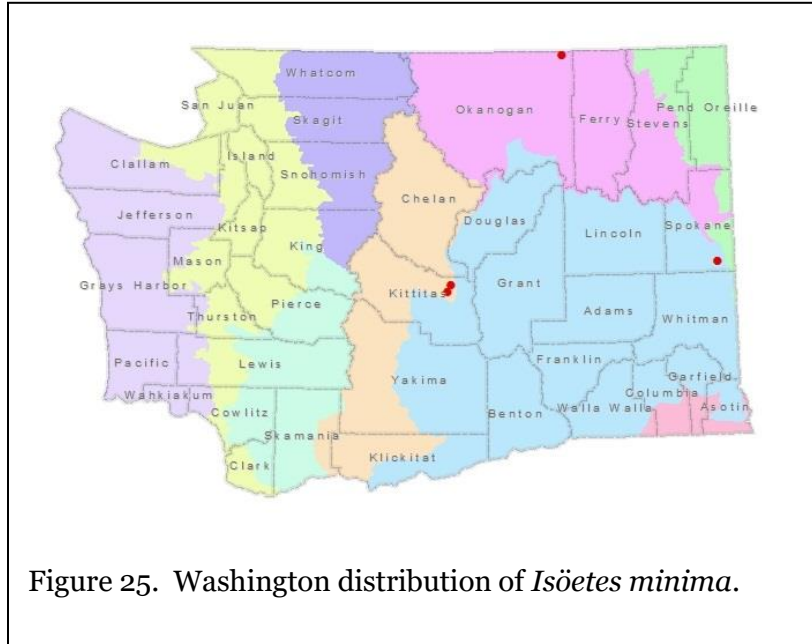


Figure 25. Washington distribution of *Isöetes minima*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Vernal areas have historically declined in eastern Washington due to land use changes associated with agriculture (Björk and Dunwiddie 2004). Brown (1999) found that cattle grazing in vernal areas resulted in greater soil compaction and higher abundance of non-native plant species.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: No occurrences are protected and this species is not legally protected by the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known.

Managed Areas: Okanogan-Wenatchee National Forest, WA DNR, private

Recommendations: Needs more data before being elevated to Candidate status. Additional surveys of potential vernal pool habitat should be conducted in appropriate areas of eastern Washington. Herbarium specimens of *Isöetes* should be re-evaluated to ensure that *I. minima* collections have not been misidentified. Baseline data are needed on population abundance and trends.

Lathyrus holochlorus (Thin-leaved peavine)

Natural Heritage Rank: G2?/S1

State and Federal Status: WA: Endangered

Range: Regional endemic of the Puget Trough (Lewis County, Washington) and Willamette Valley of western Oregon (Figure 26) (Hitchcock and Cronquist 2018).

WA Ecoregions: Puget Trough

Number of Occurrences: Known from a single occurrence in Washington, first discovered in 1991 and last observed in 2019.

Abundance: Currently known from about 30 plants in one subpopulation surveyed in 2018-19. Additional subpopulations have not been relocated in over ten years and may be extirpated or significantly reduced in size.

Habitat: Occurs in remnant prairies, roadsides, and fencerows, often scrambling over other vegetation (Camp and Gamon 2011). In Washington, this species is restricted to fencerow areas in fallow fields with *Rosa*, *Prunella vulgaris*, *Daucus carota*, *Leucanthemum vulgare*, *Triteleia hyacinthina*, and *Lotus corniculatus*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Loss of prairie habitat to homes, roads, and agricultural development is the primary long-term threat to this species. Maxwell (1994) reported that aerial spraying negatively impacted the Cemetery Hill subpopulation. Competition from invasive weed species and fire suppression/succession may also be threats (Camp and Gamon 2011).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation:

Livestock grazing is a potential threat (Camp and Gamon 2011).

4. Inadequacy of Existing Regulatory Mechanisms: No Washington occurrences are formally protected and this species has no legal protection in the state.

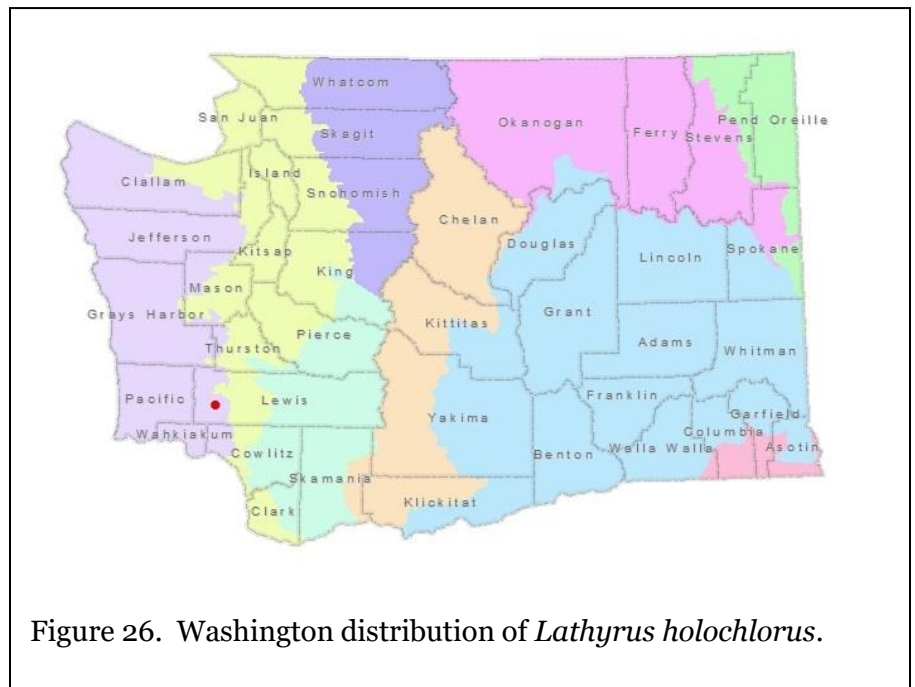


Figure 26. Washington distribution of *Lathyrus holochlorus*.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Apparently downward. Historically, this species may have been more widespread in the Puget Trough prior to European settlement in the 1850s. The single occurrence in the Boistfort area has declined from 425 plants in 1994 to about 30 today. Much of this decrease is attributed to the Cemetery Hill subpopulation, which has not been relocated since 2010 and may be extirpated or greatly diminished due to expansion of blueberry farming or crowding by invasive weed species.

Managed Areas: private

Recommendations: Needs more data before being elevated to Candidate status. No occurrences in Washington are formally protected, or are enrolled in the DNR registry program. Continued monitoring is needed of the extant population, including revisits to subpopulations that have not been observed in over ten years. Little information is available on longevity, seedling survival, and fecundity. Habitat modeling or aerial images could be used to identify potential sites for survey or future out-plantings to bolster population numbers.

Lomatium knokei (Knoke's desert-parsley)

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Threatened; BLM: Sensitive; USFS: Sensitive

Range: Local endemic of the Cle Elum Ridge area of Kittitas County, Washington (Figure 27).

WA Ecoregions: East Cascades

Number of Occurrences: Known from a single occurrence in the entire world, first discovered by local botanist Don Knoke in May 2002. The population was last visited in 2019.

Abundance: The population was estimated at 500-1,000 plants in 2018.

Habitat: Restricted to the Hakker soil series, a seasonally wettened, fine-grained clay loam (Darrach 2014) in slight depressions in species-rich meadows surrounded by *Pseudotsuga menziesii*, *Abies grandis* and *Pinus contorta* forests. Meadow areas are dominated by *Achnatherum*, *Wyethia*

amplexicaulis, *Castilleja miniata*, *Carex hoodii*, *Camassia quamash*, *Pyrocoma hirta* var. *sonchifolia*,

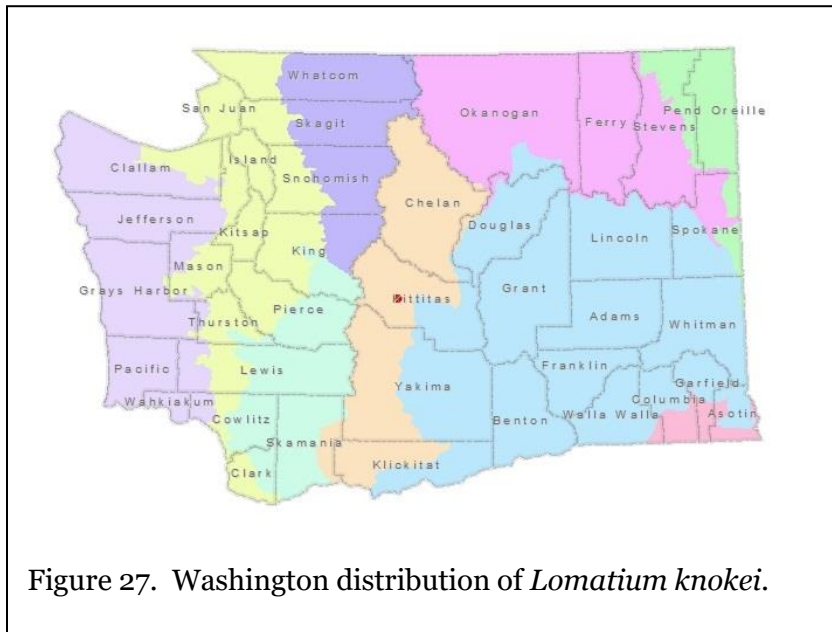


Figure 27. Washington distribution of *Lomatium knokei*.

and *Deschampsia danthonioides*. Some of these depressions are natural, and others are found in ruts within an infrequently-used two track.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: The habitat is bisected by an unauthorized four-wheel drive road that cuts through one of the low depressions occupied by *Lomatium knokei*. The emergence of *L. knokei* in the spring appears to be correlated with snow-melt, making this species vulnerable to alterations in hydrology and climate change (Darrach 2014).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known, though many *Lomatium* species are edible and are vulnerable to being over-harvested as a source of food.
3. Disease or Predation: Darrach (2014) noted that this species is occasionally impacted by outbreaks of heavy insect herbivory, especially aphids and gall-forming insects.
4. Inadequacy of Existing Regulatory Mechanisms: No populations are formally protected. This species is not legally protected in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known, but probably stable in the short term. It is not known whether there were other populations of this species in the vicinity historically, or whether this is the only occurrence.

Managed Areas: Okanogan-Wenatchee National Forest

Recommendations: Needs more data before being elevated to Candidate status. Additional survey of potential moist meadow habitats in the Cle Elum Ridge and Teanaway area should be a priority. Modeling of potential habitat would aid in this effort. Demographic monitoring is needed to determine seedling recruitment rates, fecundity, and the potential for prolonged dormancy. Permanent monitoring plots could be established to help estimate population size, frequency, and trends.

Lomatium roneorum (Leavenworth desert-parsley)

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Endangered

Range: Local endemic of the Wenatchee Range between Leavenworth and Plain in Chelan County, Washington (Figure 28) (Darrach 2018).

WA Ecoregions: East Cascades

Number of Occurrences: Known from five extant occurrences, all discovered since 1987 (and most recently relocated in 2017).

Abundance: Individual populations tend to be small, ranging from five individuals to about 800. (Darrach 2018). The entire population is thought to number as few as 1,000 plants (McCauley 2019).

Habitat: Restricted to steep, sparsely vegetated south or west-facing slopes with thin soil over crumbly tuff-like arkosic sandstones of the Chumstick Formation (Darrach 2018). Elevation ranges from 635-1,698m (2,080-5,570 ft).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Darrach (2018) noted that threats are currently low, though at least one occurrence is infested by the annual invasive species *Bromus tectorum*, which may increase the risk of the site to fire. Long-term, the populations are likely to be negatively impacted by climate change as the species is probably a poor disperser (Darrach 2018).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known, although many *Lomatium* taxa are edible and might be vulnerable to over-collection.

3. Disease or Predation: Not known.

4. Inadequacy of Existing Regulatory Mechanisms: No populations are currently protected and this species has no federal protection as a USFS Sensitive species. *Lomatium roneorum* has no formal legal protection in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known.

Managed Areas: Okanogan-Wenatchee National Forest

Recommendations: Based on small population size, highly specialized habitat, and inadequate protection, this species should be considered for potential Candidate status. Additional surveys of potential habitat in outcrops of the Chumstick Formation in the Wenatchee Mountains are needed. Demographic monitoring would be useful for determining the longevity of mature plants and rates of seedling survival or recruitment. Population monitoring is needed to gauge trends and threats and to derive better estimates of abundance.

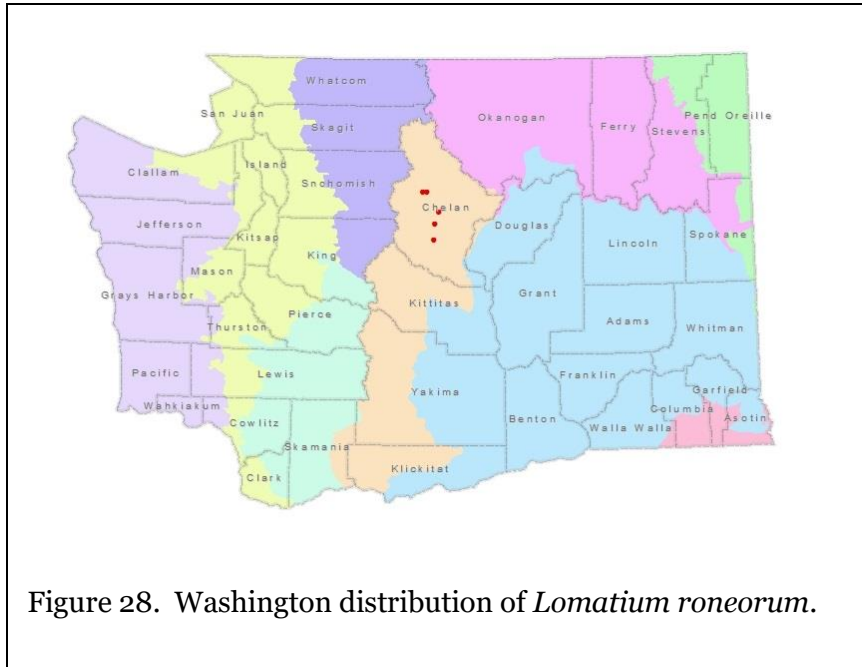


Figure 28. Washington distribution of *Lomatium roneorum*.

Lomatium tamanitchii (Ribseed biscuitroot)

Synonym: *Lomatium packardiae* var. *tamanitchii*

Natural Heritage Rank: G3?/S2

State and Federal Status: WA: Sensitive, USFS: Sensitive

Range: Endemic to the Columbia River Valley in southern Klickitat County, Washington (Figure 29).

Ecoregions: Columbia Plateau

Number of Occurrences: Known from nine extant occurrences, all discovered since 2008 and last surveyed in 2014.

Abundance: Populations are often reported as locally abundant. Based on extrapolations from limited density data the species may number in the hundreds of thousands within its narrow and specialized habitat (Darrach et al. 2010).

Habitat: Occurs on hardened, silica-rich volcanic ash layers within water-reworked deposits of volcanic basalt on plateau tops and gentle, often southerly slopes dominated by *Pseudoroegneria spicata*, *Poa secunda*, *Poa bulbosa*, *Ericameria nauseosa*, and *Lagophylla ramosissima*. Soils are shrink-swell clays and shallow over bedrock. Summit populations may be protected by armored surfaces (rock fragments). The species may co-occur with *Lomatium nudicaule*, *L. "grayii"* (these populations may be the newly described species *L. klickitatense*), *L. canbyi*, and *L. triternatum*. Elevation ranges from 630-3,160 ft (190-965m).

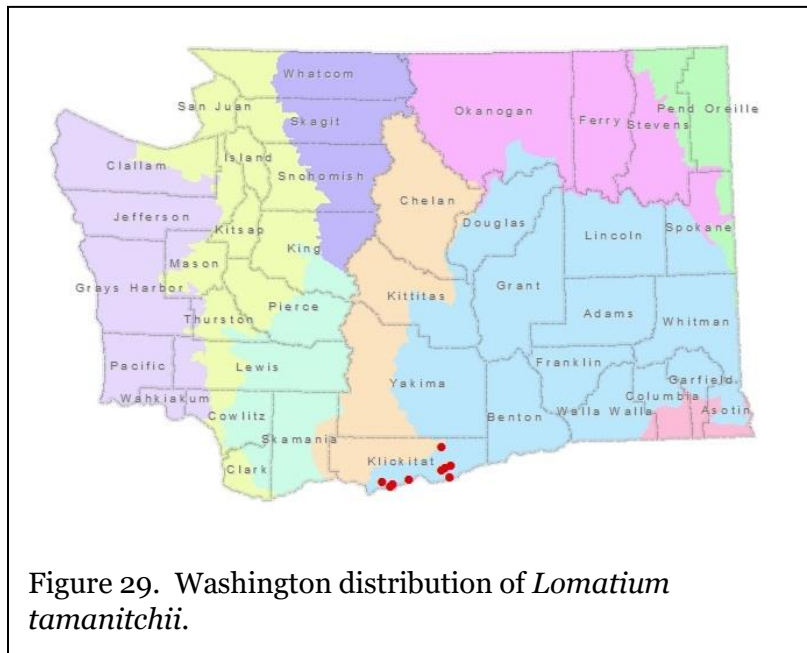


Figure 29. Washington distribution of *Lomatium tamanitchii*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Primary threats appear to be conversion of rangeland to crops and human habitations, impacts from invasive weeds, and wildfire (Darrach et al. 2010).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known. The species may be resilient to grazing impacts (Darrach et al. 2010).
4. Inadequacy of Existing Regulatory Mechanisms: This species has no federal protection status. One population may be protected in the Cleveland Shrub Steppe Natural Area Preserve managed by the WA Department of Natural Resources.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known.

Managed Areas: May occur in the Cleveland Shrub Steppe Natural Area Preserve, known from Columbia River Gorge National Scenic Area, Washington DNR, and private.

Recommendations: Probably secure at present and not recommended for Candidate status. Global rank should be revised to match the state rank. Few populations have been revisited to assess trends or gauge threats. Long-term monitoring plots would be useful for determining trends and for estimating population size. Habitat modeling or aerial photographs could be used to identify additional areas for survey.

Micranthes tischii (Tisch's saxifrage)

Synonym: *Saxifraga tischii*

Natural Heritage Rank: G1G2/S1?

State and Federal Status: WA: Sensitive, USFS: Sensitive

Range: Regional endemic of the Olympic Peninsula in northwest Washington (Clallam and Jefferson counties) (Figure 30) and southern Vancouver Island, British Columbia (Brouillet and Elvander 2009). A recent report from Okanogan County, Washington ([www.http://biology.burke.washington.edu/herbarium/imagecollection](http://biology.burke.washington.edu/herbarium/imagecollection)), appears to be a misidentified specimen of *Micranthes rufidula* based on flower color and leaf shape.

WA Ecoregions: Pacific Northwest Coast

Number of Occurrences: Known from four extant and four historical records in Washington.

Abundance: Individual populations are mostly small, often with 5-50 plants. The total abundance in the state may be less than 500 plants.

Habitat: Cool, shaded, moist ledges and rock crevices of basalt with thin soil at 4,500-6,500 ft (1,370-1,980 m) (Skelly 1988).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Threatened by changes in snowpack and moisture availability and increasing temperatures that would alter vegetation communities as a result of climate change. Wershow and DeChaine (2018) have shown that several Olympic alpine endemic plants are likely to experience loss of 85-99% of their suitable habitat by 2080 based on future climate change projections. Threats from recreationists are low.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: All of the populations of *Micranthes tischii* from the Olympic Mountains in Washington are protected within the Buckhorn Wilderness Area of Olympic National Forest or Olympic National Park. The species has no legal protection in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: Wendy Gibble (personal communication) has noted that *Micranthes* species typically found at lower elevations in the Olympic Range are moving uphill into the alpine zone inhabited by *M. tischii*.

Trends: Several populations have not been successfully relocated in recent years, suggesting a possible downward trend.

Managed Areas: Buckhorn Wilderness Area, Olympic National Forest, Olympic National Park.

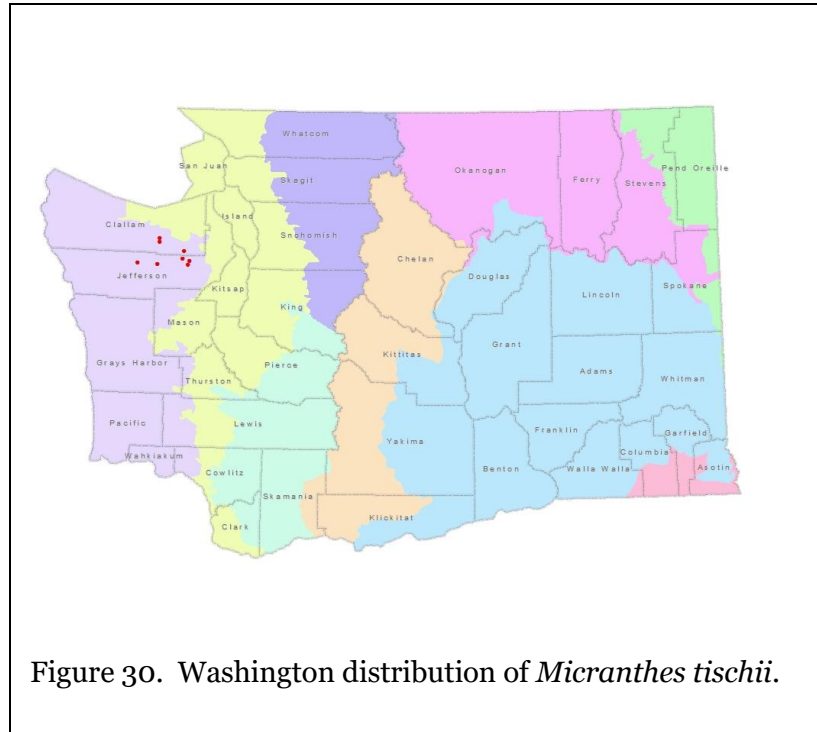


Figure 30. Washington distribution of *Micranthes tischii*.

Recommendations: Needs more data before being elevated to Candidate status. Additional surveys in suitable habitat in the alpine areas of the Olympic Mountains should be conducted. Monitoring data are needed for existing populations to better determine abundance and trends. Material from Okanogan County needs to be carefully studied to determine if *M. tischii* does occur there. Better information needed on its range-wide abundance and distribution (recent discoveries in Canada suggest it may be more common there than presently suspected).

Myosurus sessilis (Vernal pool mousetail)

Natural Heritage Rank: G2/S1

State and Federal Status: WA: Endangered

Range: Primarily found in central California with disjunct populations in northeastern Oregon and southern Washington (Klickitat County) (Figure 31) (Whittemore 1997a, Hitchcock and Cronquist 2018).

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from a single occurrence in Washington, first discovered in 2017 by Karen Brimacombe. Photos of the plant were confirmed by David Giblin at the University of Washington Burke Herbarium and represent a first report for Washington State (Fertig and Kleinknecht 2020).

Abundance: Not known.

Habitat: Found in vernal pools and alkali flats (Whittemore 1997a). The Washington population is associated with a seasonally wet cattle pond.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Vernal pool habitats in Washington have been significantly altered from changes in hydrology, conversion to agriculture, or invasion by non-native weed species (Björk and Dunwiddie 2004).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Not known.

4. Inadequacy of Existing Regulatory Mechanisms: The single Washington population may occur on WA DNR lands managed for multiple use or private lands. The species is not afforded any legal protection in the state.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known.

Managed Areas: Not known (may be WA DNR).

Recommendations: Needs more data before being elevated to Candidate status. More specific site data are needed for the occurrence, as well as information on abundance, habitat needs, and potential on-site threats. Additional vernal wetland sites should be surveyed in central Washington, including sites occupied by *Myosurus alopecuroides*, which is thought to be a species of hybrid origin with *M. sessilis* as one parent.

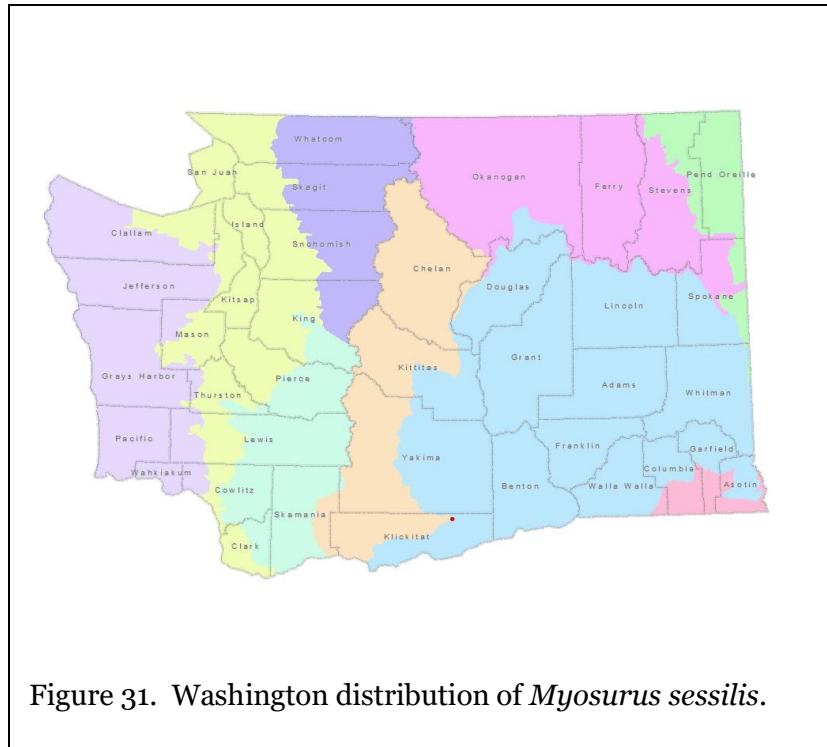


Figure 31. Washington distribution of *Myosurus sessilis*.

Navarretia leucocephala ssp. *diffusa* (Least pincushion-plant)

Natural Heritage Rank: G4T1/S1

State and Federal Status: WA: Threatened

Range: Local endemic of the eastern Columbia Plateau in Lincoln County, Washington (Figure 32). Also reported from Spokane County by Hitchcock and Cronquist (2018).

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from six extant occurrences, all discovered since 1996 and most recently revisited in 2014.

Abundance: Individual populations have been referred to as “common” but no quantitative data are available.

Habitat: Margins of shallow, rocky-bottomed vernal pools in channeled scablands at 690-800 m (2,260-2,625 ft). Common associated species include *Deschampsia danthonioides*, *Polygonum polygaloides*, *Psilocarphus*, *Boisduvalia*, and *Downingia yina* (Björk 2002).

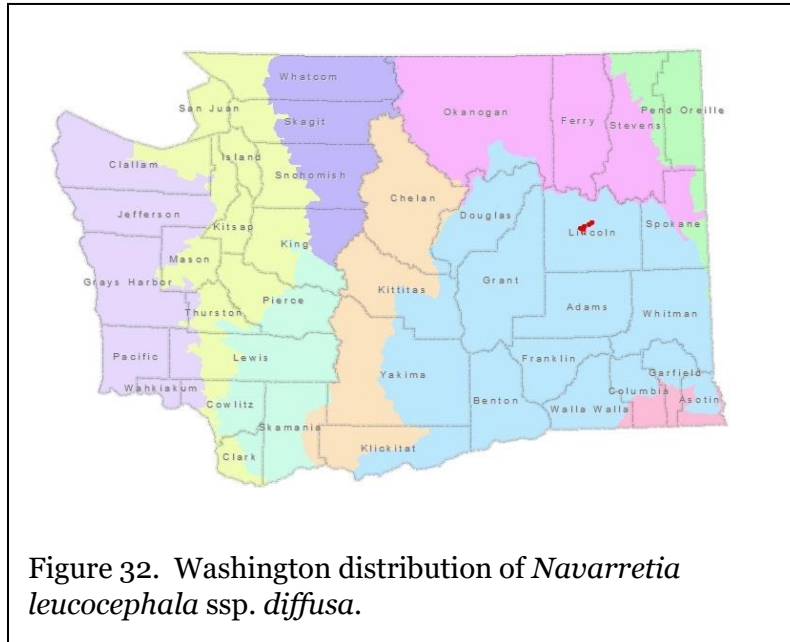


Figure 32. Washington distribution of *Navarretia leucocephala* ssp. *diffusa*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Impacts from grazing, recreational activities and changes in hydrology (Björk and Dunwiddie 2004, Camp and Gamon 2011).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: One population is protected in Swanson Lakes Wildlife Area. This taxon has no federal or state protection status.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known, but long-term trends are probably down due to degradation of vernal pool habitats in eastern Washington (Björk and Dunwiddie 2004).

Managed Areas: Spokane BLM, Swanson Lakes State Wildlife Area (DFW)

Recommendations: Needs more data before being elevated to Candidate status. Known populations should be monitored periodically to better assess abundance, trends, and response to threats. Additional areas of potential habitat should be identified and inventoried.

Oxytropis campestris var. *columbiana* (Columbia crazyweed)

Natural Heritage Rank: G5T2/S1

State and Federal Status: WA: Endangered

Range: Regional endemic of the Columbia and Methow rivers in northeastern Washington (Figure 33) and southern British Columbia, and the Flathead Lake region of northwestern Montana (Camp and Gamon 2011; Hitchcock and Cronquist 2018). In Washington, known from Ferry, Okanogan, and Stevens counties.

WA Ecoregions: Canadian Rockies and Okanogan Plateau

Number of Occurrences: Known from four extant and five historical occurrences in Washington, most recently documented in 2011.

Abundance: Populations are small, ranging from 87 to about 200 individual plants at three of the four extant occurrences in Washington. The total population in the state is thought to be less than 1,000 individuals. Lesica (2012) reports six populations from Montana with approximately 1,000 plants.

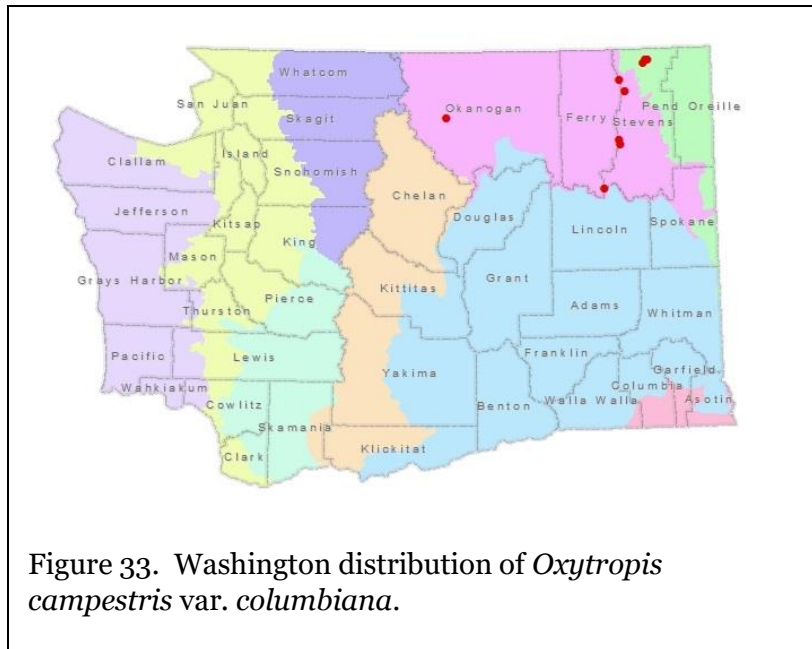


Figure 33. Washington distribution of *Oxytropis campestris* var. *columbiana*.

Habitat: Washington populations are found on gravel banks and shores of cobbles and sand within the flood zone of undammed rivers at 390-570 m (1,290-1,870 ft) (Camp and Gamon 2011).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Several historical Washington populations were probably extirpated following construction of the Grand Coulee Dam (Camp and Gamon 2011). Changes in natural flooding regimes due to dam construction and residential development of shoreline areas are primary threats in Washington and Montana (Lesica 2012).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.

4. Inadequacy of Existing Regulatory Mechanisms: One extant occurrence is protected within Roosevelt Lake National Recreation Area. This taxon has no legal protection from the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Apparently downward in Washington, due to apparent loss of almost half of the known occurrences since the 1940s.

Managed Areas: Roosevelt Lake NRA (falsely reported for Spokane BLM by WNHP 2019).

Comments: Columbia crazyweed was recognized as a separate species (*Oxytropis columbiana*) by Harold St. John (1928). It was later transferred to a variety of *O. campestris* by Barneby (1952), resurrected at the species level by Elisens and Packer (1980) and then synonymized under *O. campestris* by Barneby without recognition of varieties (Lesica 2012). The current consensus is that var. *columbiana* is worthy of taxonomic recognition and it is included in the new flora of the Pacific Northwest (Hitchcock and Cronquist 2018).

Recommendations: Needs more data before being elevated to Candidate status. Current status information is needed for extant occurrences in Washington. Potential habitat should be identified by modeling and these areas should be searched to document new occurrences. Much of the potential range of the taxon in Washington is on private lands, making survey efforts more difficult. A seed bank should be established and protocols developed for germination and out-planting.

Oxytropis campestris var. *wanapum* (Wanapum crazyweed)

Natural Heritage Rank: G5T1/S1

State and Federal Status: WA: Endangered; BLM: Sensitive

Range: Local endemic of Saddle Mountain, east of Wanapum Dam on the Columbia River in Grant County, Washington (Figure 34).

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from one occurrence, first discovered in 1984 and last observed in 2018.

Abundance: The total population was estimated at approximately 7,120 plants in 2002. Surveys in 2018 found patches to be very small, often with 6 to 11 individuals (though the entire population was not surveyed).

Habitat: Steep, north-facing slopes below rim in narrow band of whitish ashy mudstone or sandstone embedded within thick deposits of brown basalt talus and bedrock. Found mostly in an area dominated by *Ericameria nauseosa*, *Pseudoroegneria spicata*, and *Salvia dorrii* with 50-60% vegetative cover and 30% rock cover. Bare clay-silt comprises about 10% cover. Common associated species include *Balsamorhiza careyana*, *Collinsia parviflora*, *Monardella odoratissima*, *Sabulina franklinii*, *Astragalus caricinus*, *Eriogonum microthecum*, *Hackelia arida*, and *Penstemon richardsonii* (Joyal 1990).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: The extremely steep and loose slopes inhabited by this species protect it from many threats. Impacts to the surrounding area include grazing, off-road vehicle recreation, mineral exploration, and rock-hounding (Camp and Gamon 2011).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms:
The single occurrence is not protected. This species has no legal protection by the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known, but probably stable at present.

Managed Areas: Spokane
BLM, private

Recommendations: Needs more data before being elevated to Candidate status. Additional habitat

might occur farther east along Wanapum Ridge. Habitat modeling or aerial photographs might be useful in identifying additional areas for survey. The known occurrence should be periodically monitored to assess trend and threats. Subsampling would help with estimating total population size. Demographic data are needed to determine the lifespan of mature plants, the survivorship of seedlings, the persistence of a seed bank, and other basic life history attributes.

References: Camp and Gamon 2011, Fertig et al. 2017, Hitchcock and Cronquist 2018, Joyal 1990.

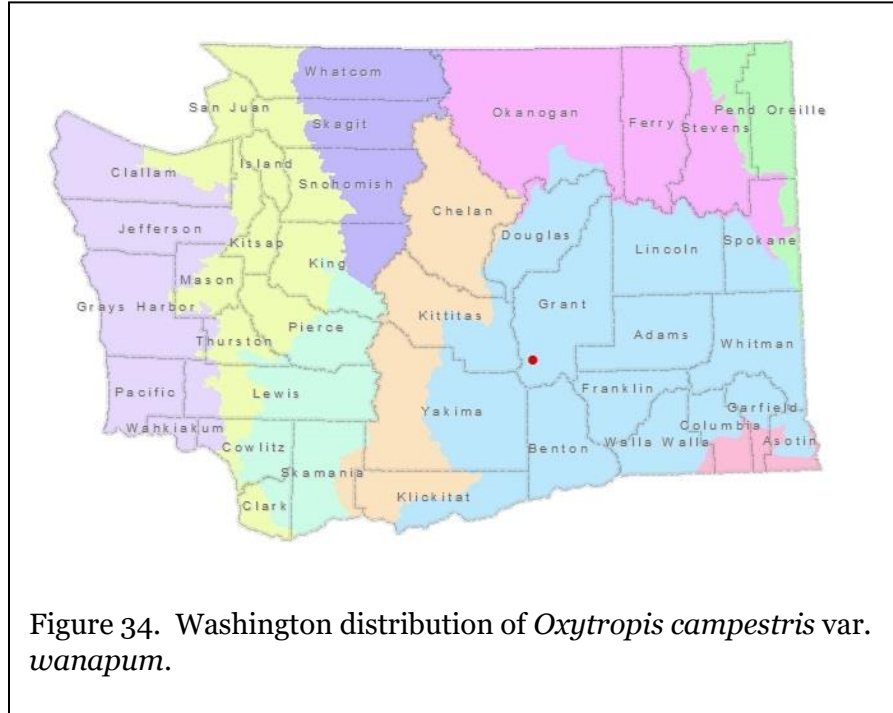


Figure 34. Washington distribution of *Oxytropis campestris* var. *wanapum*.

Penstemon barrettiae (Barrett's beardtongue)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened, BLM: Sensitive, USFS: Sensitive

Range: Local endemic of the Columbia River Gorge and Klickitat River Canyon region of southern Washington (Klickitat and Skamania counties) (Figure 35) and northern Oregon (Hood River, Multnomah, and Wasco counties (Freeman 2019).

WA Ecoregions: East Cascades

Number of Occurrences: Known from 11 extant and two historical occurrences in Washington. Eight populations have been discovered or resurveyed since 2011.

Abundance: *Penstemon barrettiae* can occur as scattered individuals or in dense patches of up to 1,600 plants. Wentworth (1996) estimated the total population in Washington at approximately 5,000.

Habitat: Found in sparsely vegetated crevices and ledges of basalt cliff faces and talus slopes in thin soil or occasionally on roadcuts at or below 1,000m (3,200 ft) elevation (Strickler 1997, Wentworth 1996).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Quarrying, road construction, impacts from timber harvest, and rock climbing have been cited as potential threats (Wentworth 1996). Changes in moisture availability could have a negative impact (Camp and Gamon 2011).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: This is a showy species with potential as a rock garden plant in cultivation, so populations could be vulnerable to over-harvest (Wentworth 1996).
3. Disease or Predation: Not known; populations are usually too remote to be affected by livestock grazing.
4. Inadequacy of Existing Regulatory Mechanisms: At least four populations are protected within the Klickitat Wildlife Area (WA DFW) and a WA DNR private land registry site. This species has no legal protection from the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

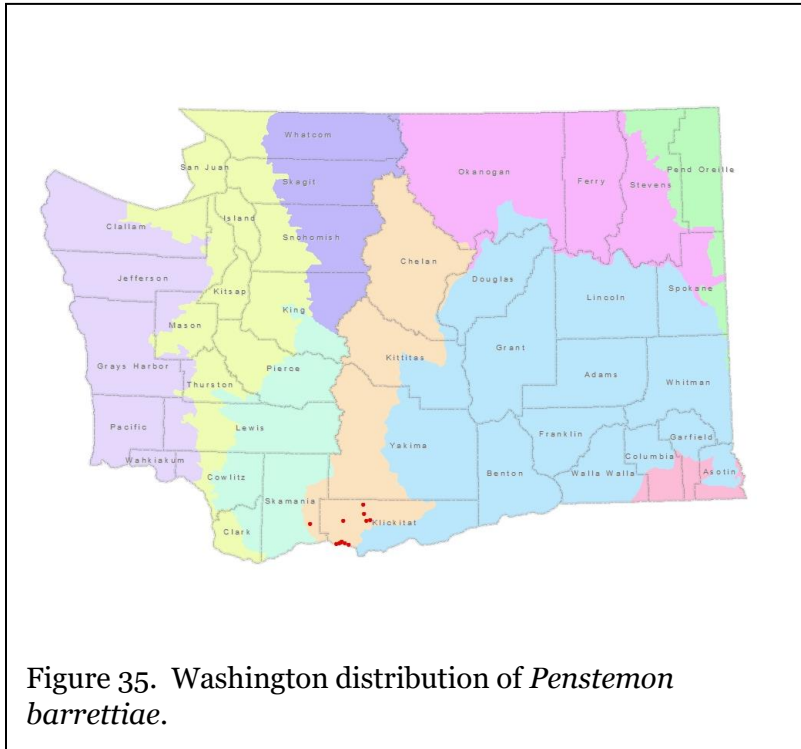


Figure 35. Washington distribution of *Penstemon barrettiae*.

Trends: Poorly known, but may be stable.

Managed Areas: Columbia River Gorge National Scenic Area, Gifford Pinchot National Forest, Klickitat Wildlife Area, Spokane BLM

Recommendations: Probably secure at present and Candidate status not recommended. Efforts should be made to relocate historical occurrences and locate new populations in areas of suitable habitat. Modeling could help identify habitat for ground surveys or reintroduction. Monitoring data would be useful to estimate abundance and detect population trends or changes in habitat suitability. Better data are needed on longevity of mature plants, seedling survival rates, and other life history parameters.

Penstemon deustus var. *variabilis* (Hot-rock beardtongue)

Natural Heritage Rank: G5T1T2/S1

State and Federal Status: WA: Threatened, BLM: Sensitive, USFS: Sensitive

Range: Regional endemic of southern Washington (Klickitat County) (Figure 36) and central and eastern Oregon (Strickler 1997), but reportedly also in the Blue Mountains of northeast Oregon (Freeman 2019). Washington populations from the Blue Mountains are intermediate between var. *variabilis* and var. *deustus*, but are typically included in the latter variety (Hitchcock and Cronquist 2018).

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from three extant occurrences (last observed in 2013) and one historical record in Washington.

Abundance: The largest known population has 300-400 plants. Other occurrences have not been surveyed recently, but may have under 35 plants each (Fertig and Kleinknecht 2020).

Habitat: Found in dry foothill grasslands dominated by Bluebunch wheatgrass and Idaho fescue with low shrub cover over basalt (Camp and Gamon 2011). Elevation ranges from 130-3,200 ft (40-975 m).

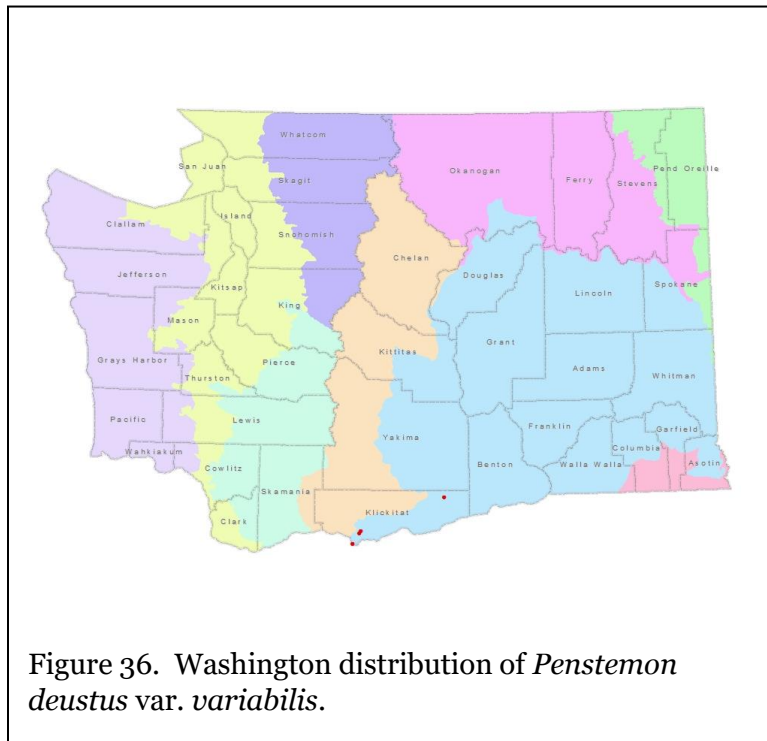


Figure 36. Washington distribution of *Penstemon deustus* var. *variabilis*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Conversion of grassland habitat to farmland or rangeland, increased wildfire, competition from invasive weeds, and impacts from herbicide drift are the primary threats (Camp and Gamon 2011).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: This species is edible and may be adversely affected by livestock grazing.
4. Inadequacy of Existing Regulatory Mechanisms: One occurrence is protected in the Columbia Hills Natural Area Preserve. This species is not formally protected under Washington state law.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known, but presumably downward in the past 150 years.

Managed Areas: Columbia Hills Natural Area Preserve, Columbia River Gorge National Scenic Area

Recommendations: Needs more data before being elevated to Candidate status. Potential habitat should be surveyed in southern Washington for additional populations. Morphological and genetic studies should be done on material from the Blue Mountains in Washington to determine if it belongs to var. *variabilis*. Monitoring data are needed to better estimate abundance and population trend.

Penstemon hesperius (tall beardtongue)

Synonym: *Penstemon rydbergii* var. *oreocharis*, *P. rydbergii* var. *varians*, misapplied

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Endangered

Range: Regional endemic of the northern Willamette Valley in Oregon (Clackamas and Washington counties) and the greater Vancouver area in Clark County, Washington (Figure 37). Historically, this species may have also occurred near North Bonneville in Skamania County.

WA Ecoregions: Puget Trough, West Cascades?

Number of Occurrences: Known from one extant occurrence in Washington, last surveyed in 2018. One or two additional vague historical records were collected by David Douglas in 1825 “near the Grand Rapids” (thought to be the vicinity of North Bonneville) and “between Fort Vancouver and the Grand Rapids”.

Abundance: DNR staff observed 75-100 individuals in an approximately 4 x 16 foot area within Lacamas Prairie Natural Area Preserve in May 2018 (Fertig and Wilderman data). This population was first discovered in 2014 and was revisited in 2017.

Habitat: In Washington, found in small openings in a forested wetland dominated by *Quercus garryana* and *Fraxinus latifolia* in slight depressions of fine clay-loam soil that is seasonally flooded. Common

associates include *Rubus bifrons*, *Symphoricarpos albus*, *Spiraea douglasii*, *Cirsium arvense*, *Ranunculus uncinatus*, *Poa pratensis*, *Rumex salicifolius*, *Myosotis laxa*, and *Carex unilateralis*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Competition from non-native plants, such as *Rubus bifrons* and *Cirsium arvense*, may be a threat at Lacamas Prairie. Habitat loss or development of wetland sites is a potential threat throughout its range.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Vulnerable to over-collection as a garden ornamental.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: One population in Washington is protected within the Lacamas Prairie Natural Area Preserve. This species is not protected by state law in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Not known.

Managed Areas: Extant populations in Washington are restricted to the Lacamas Prairie Natural Area Preserve (WA DNR). In Oregon, this species is found in Tualatin River National Wildlife Refuge (Christy and Maffitt 2018).

Comments: *Penstemon hesperius* was first recognized as a distinct species by Peck (1932) based on its atypically tall stems, unusual rhizome-like roots, and wetland

habitat. Keck (1945) also recognized *P. hesperius* as a distinct species in his monograph of *Penstemon* section *Spermunculus*, but noted its affinity with the more montane taxon, *P. rydbergii* var. *oreocharis*. Arthur Cronquist synonymized *P. hesperius* under *P. rydbergii*, noting that its distinctive pubescence and robust size could be found in widely scattered populations of *P. rydbergii* (Hitchcock et al. 1959). Hitchcock and Cronquist (1973) treated Pacific Northwest material of *P. rydbergii* as var. *varians*, which in turn was later synonymized as *P. rydbergii* var. *rydbergii* by Cronquist et al. (1984). In 2008, *P. hesperius* was rediscovered in Oregon after not being seen for nearly 75 years (Christy and Maffitt 2018). *Penstemon* experts Craig Freeman (2019) and Noel Holmgren (Hitchcock and Cronquist 2018) examined these new specimens and independently concluded that *P. hesperius* was distinct from *P. rydbergii* and worthy of resurrection as a good species.

Recommendations: Needs more data before being elevated to Candidate status. Surveys of potential riparian forest habitats should be conducted in the greater Vancouver, WA area and similar sites along the

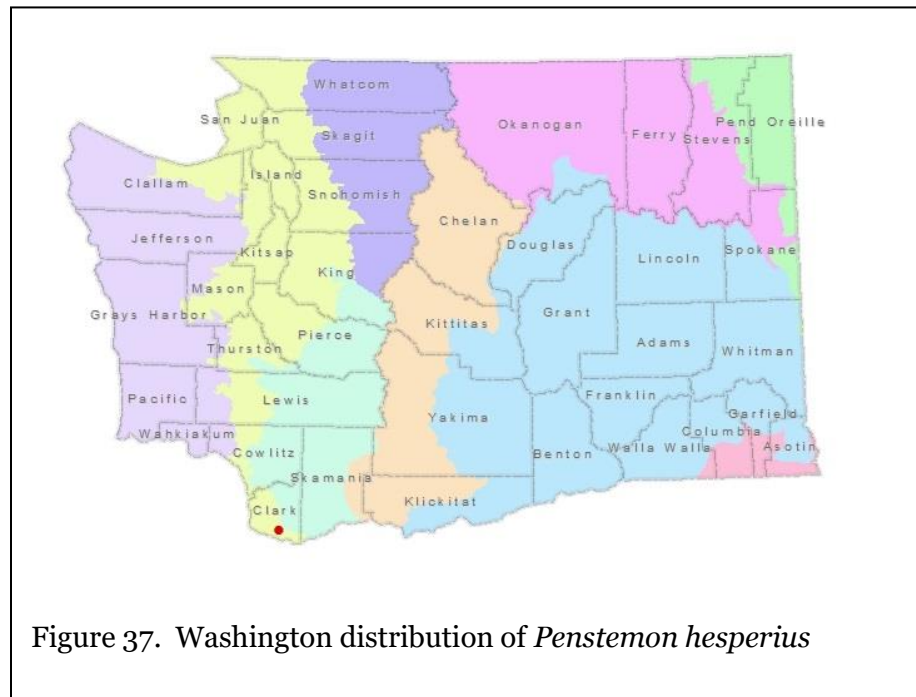


Figure 37. Washington distribution of *Penstemon hesperius*

Columbia River below the Columbia Gorge. In particular, the relatively undeveloped forest areas in Camp Bonneville should be explored. Monitoring should be initiated at Lacamas Prairie to detect changes in population size and habitat suitability and to elucidate basic life history characteristics, such as longevity of reproductive plants, survivorship of seedlings, or the significance of asexual reproduction.

Petrophytum cinerascens (Chelan rockmat)

Natural Heritage Rank: G1G2/S1S2

State and Federal Status: WA: Endangered; BLM: Sensitive; USFS: Sensitive

Range: Endemic to central Washington (Chelan and Douglas counties) along the Columbia River between Chelan and Wenatchee (Figure 38).

WA Ecoregions: Columbia Plateau, East Cascades

Number of Occurrences: Known from five extant occurrences, all located within a 27 km band along the Columbia River. All known populations have been observed since 2008, with the most recent observation in 2018.

Abundance: Population estimated at about 8,200 genets (this species forms dense clumps, with each clump presumed to represent a single genet). Almost 98% of the total population is found in just two sites (Earthquake Point and Rocky Reach Dam) (Fertig et al. 2017).

Habitat: Sparsely vegetated east or west-facing metamorphic granitic cliffs.

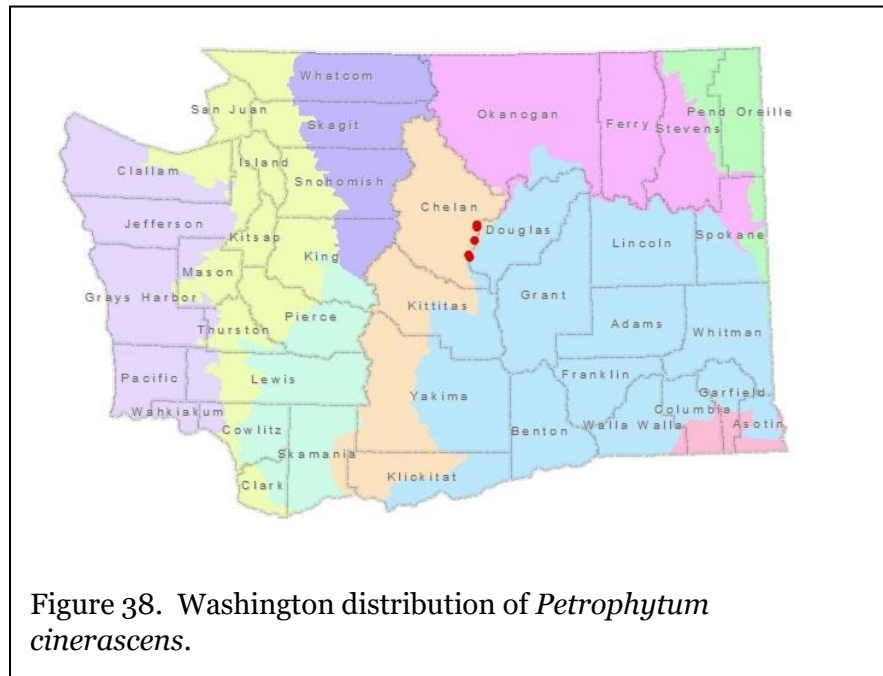


Figure 38. Washington distribution of *Petrophytum cinerascens*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Cliff habitat could be impacted by road-widening and highway construction or quarrying (Gamon 1989).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Potentially at risk for over-collection as an ornamental plant for rock gardening.
3. Disease or Predation: Not known.

4. Inadequacy of Existing Regulatory Mechanisms: Three occurrences are protected in the Chelan and Colockum Wildlife Areas, Earthquake Point Area of Critical Environmental Concern (BLM) and a DNR registry site. This species is not protected by Washington statute.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Probably stable in the short term.

Managed Areas: Chelan Wildlife Area, Colockum Wildlife Area, Earthquake Point Area of Critical Environmental Concern, Okanogan-Wenatchee National Forest, Spokane Bureau of Land Management

Recommendations: Probably secure at present and Candidate status not recommended. Monitoring data are needed for all populations, but are difficult to gather due to the steep cliffs and rugged terrain occupied by this species. Photo-monitoring by drones could augment observations made by binoculars.

Phacelia lenta (Sticky phacelia)

Natural Heritage Rank: G2?/S2?

State and Federal Status: WA: Threatened, BLM: Sensitive

Range: Local endemic of the east side of the Columbia River in the Badger Mountain area of Douglas County, Washington (Figure 39).

WA Ecoregions: Columbia Plateau

Number of Occurrences:
Known from nine extant occurrences in Washington, all discovered or relocated since 1981. Four populations have been resurveyed since 2015.

Abundance: Gamon (1986b) estimated the state population at 3,000 individuals. Based on the most recent data from each occurrence, the total population is currently estimated at 2,700 plants. Individual occurrences range in size from 10-750.

Habitat: Sparsely vegetated, arid basalt cliffs, ledges and talus below cliffs at 400-1,040

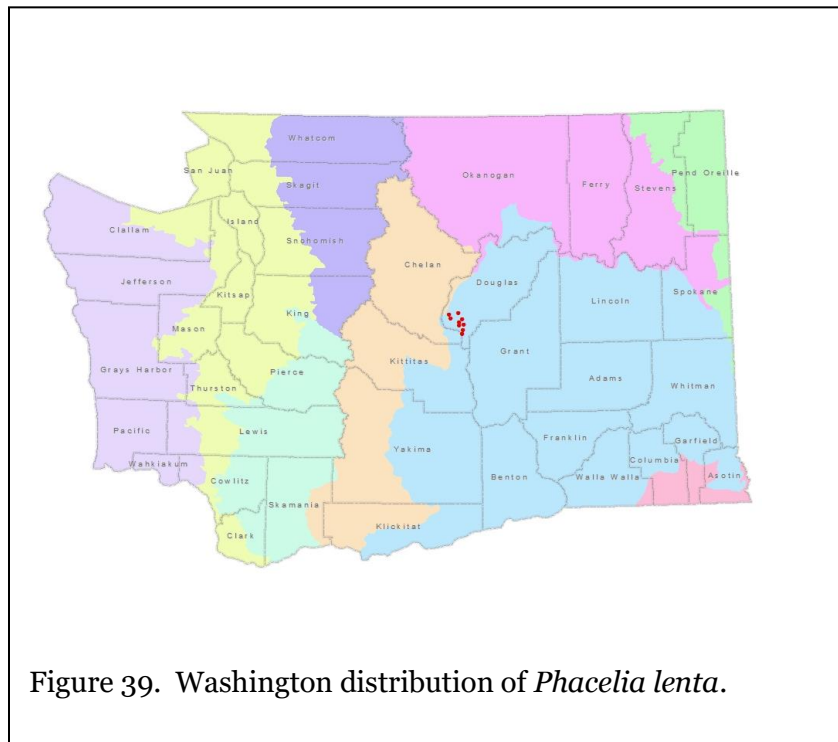


Figure 39. Washington distribution of *Phacelia lenta*.

m (130-3,400 ft) (Camp and Gamon 2011). Often associated with *Artemisia tridentata*, *Ericameria resinosa*, *Eriogonum sphaerocephalum*, *Pseudoroegneria spicata*, *Cymopterus terebinthinus*, *Heuchera cylindrica*, and *Penstemon richardsonii* (Gamon 1986b).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: The poor accessibility and lack of forage in the cliff sites occupied by *Phacelia lenta* protects it from most threats associated with habitat conversion, grazing, or recreation impacts. Some sites are threatened by rock quarrying and road construction. A few populations could be impacted by drift of aerially-applied herbicides from nearby orchards (Camp and Gamon 2011).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Only one occurrence is protected in a BLM-managed Area of Critical Environmental Concern. An adjacent private land site is enrolled in DNR's volunteer registry program. This species has no formal protection from the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Apparently stable at most sites, based on periodic site revisits. No systematic monitoring transects have been established.

Managed Areas: Rock Island Canyon ACEC, Spokane BLM

Recommendations: Probably secure at present and Candidate status not recommended. Periodic monitoring is needed (especially at older sites that have not been relocated in recent years) to determine population size, trends, and changes in habitat condition. Basic demographic data are lacking on plant longevity, seedling survival, pollination biology, genetic structure, and dispersal ability.

Phlox solivaga (Yeti phlox)

Synonym: *Phlox solivagus* (orthographic variant)

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Endangered; USFS: Sensitive

Range: Endemic to the Blue Mountains of southeastern Washington (Columbia, Garfield, and possibly Walla Walla counties) (Figure 40). This species likely occurs in extreme northeastern Oregon, but has not been documented yet.

WA Ecoregions: Blue Mountains

Number of Occurrences: Known from six extant and one historical occurrences. Five occurrences have been discovered or relocated since 2018.

Abundance: Total population estimated at 2,000-3,000 at three known occurrences in 2015 (Ferguson et al. 2015). Surveys in 2018 documented 11,975-14,350 plants at five locations (Fertig unpublished data).

Habitat: Ferguson et al. (2015) reported that *Phlox solivaga* is restricted to flat paleo-surfaces of basalt lithosols. New populations discovered in 2018 (Fertig 32753, 33017, 33086 WTU) were found on upper west and southwest-facing slopes of volcanic bedrock and rubble with cushion plant vegetation exposed to high winds. Rock cover in these areas averages 60-80% and vegetation cover is 10-40%. Dominant cushion plant species in these sites include *Astragalus whitneyi* var. *sonneanus*, *Eremogone congesta*, *Sedum stenopetalum*, *Phlox solivaga* and *Monardella odoratissima*, interspersed with bunches of *Poa secunda*. Populations can also occur on hard-packed cobblestone surfaces of infrequently used unpaved roads. Elevation ranges from 4,460-5,960 ft (1,360-1,815 m).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: May be threatened by competition from invasive annual grasses (especially *Ventenata dubia*, *Bromus hordeaceus*, and *Apera interrupta*) and increased incidence of wildfire at some sites. Roadside occurrences could be compacted or dislodged by vehicle traffic.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known. Some *Phlox* species are cultivated as rock garden ornamentals, and the rarity and unusual gray woolly foliage of this species might make it vulnerable to over-exploitation.

3. Disease or Predation: Much of this species range is grazed by cattle, but the low stature and spiny herbage of the plant suggests that herbivory is low.

4. Inadequacy of Existing Regulatory Mechanisms: At least two occurrences are

protected in the Wenaha-Tucannon Wilderness and Asotin Wildlife Area (WA DFW). This species is not protected under Washington state law.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

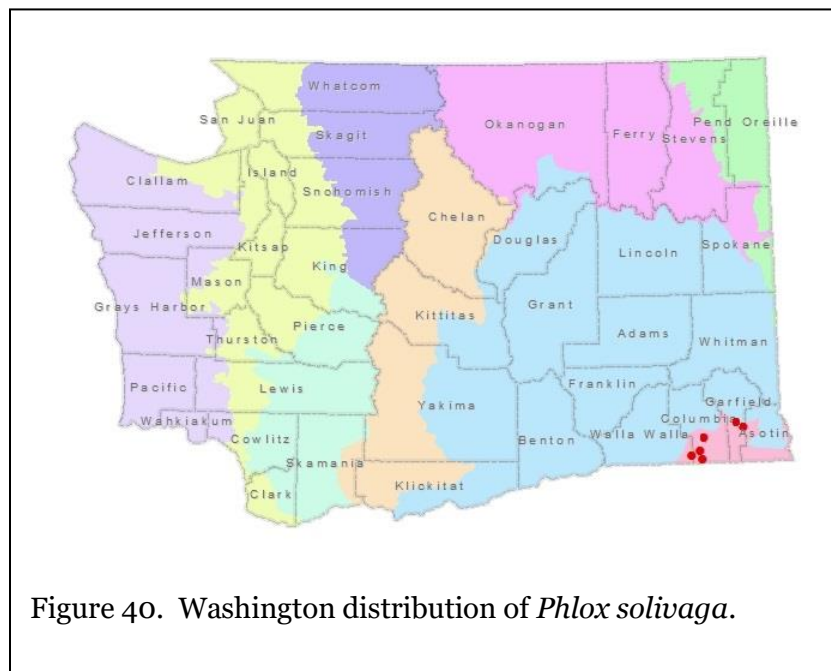


Figure 40. Washington distribution of *Phlox solivaga*.

Trends: Thought to be declining (Ferguson et al. 2015) due to the population structure being skewed to mature individuals. Trend data are not available for recently discovered populations. These occurrences also tend to have predominantly mature plants, though this may reflect infrequent recruitment events. The longevity of mature plants is not known.

Managed Areas: Spokane BLM?, Umatilla National Forest, Wenaha-Tucannon Wilderness Area.

Recommendations: Probably secure at present and Candidate status not recommended. Additional surveys should be conducted in late spring when flowers are still fresh and plants are easier to identify (Ferguson et al. 2015). There are extensive areas of under-surveyed cobblestone ridgetop and old roadbed habitats in the Wenaha-Tucannon Wilderness. Potential habitat probably exists across the state line in Oregon, where this species has not yet been documented. Demographic monitoring would be useful for determining the longevity of mature plants and documenting the frequency of seedling establishment and survival (Ferguson et al. 2015). The cushion plant communities in which *Phlox solivaga* occurs are poorly described — they may represent occurrences of *Eriogonum douglasii*/*Poa secunda* Dwarf-shrub Grassland (G2/S2) or another, as yet, undescribed community in the *Eriogonum* spp./ *Poa secunda* Dwarf-shrub Steppe Alliance (A1568).

Polemonium pectinatum (Washington polemonium)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened, BLM: Sensitive

Range: Regional endemic of eastern Washington, known from Adams, Lincoln, Spokane and Whitman counties (Figure 41). The Spokane County occurrence is historical and probably extirpated.

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from 39 extant and five historical occurrences in Washington.

Abundance: Individual occurrences range in size from five to 3,300 plants. In some areas, *Polemonium pectinatum* can provide up to 90% of the local cover, while in other places it may contribute less than 5% (Gamon 1985). The statewide population was estimated at 15,000-20,000 individuals in 1994 (Gamon and Baxter 1995).

Habitat: Found in moist areas along streambanks, terraces, depressions, and talus slopes at

the base of coulee walls on soils of mixed loess, volcanic ash, and volcanic alluvium and colluvium (Gamon 1985). It is mostly restricted to open areas dominated by grasses and forbs and with low cover of shrubs. *Polemonium pectinatum* is primarily associated with the *Leymus cinereus* Alkaline Wet Meadow (G2G3Q/S1), *Artemisia tripartita* ssp. *tripartita*/*Festuca idahoensis* Shrub Grassland (G3/S3), and

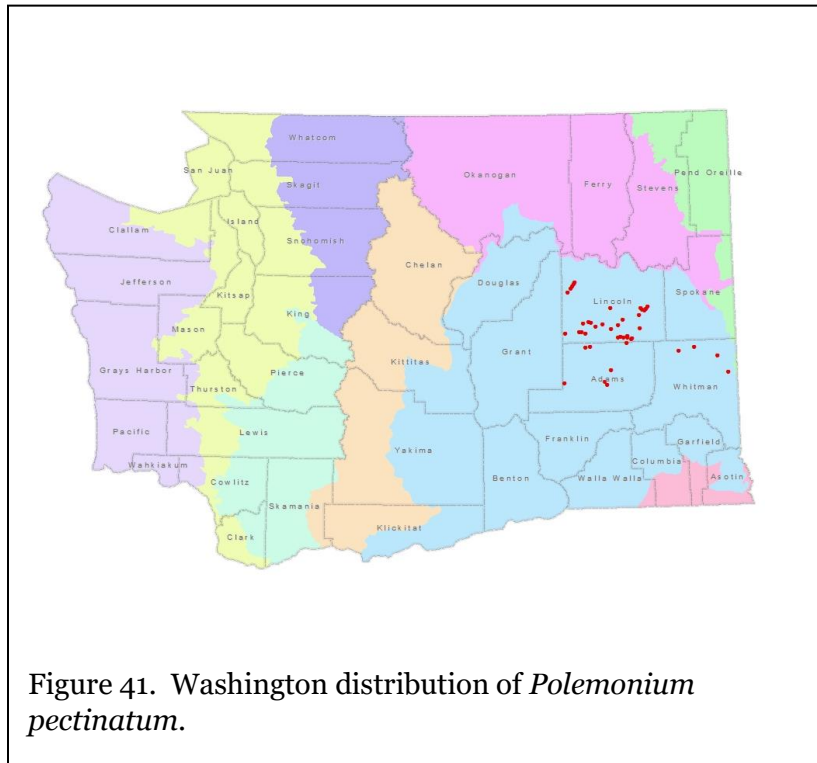


Figure 41. Washington distribution of *Polemonium pectinatum*.

Artemisia tridentata ssp. *tridentata*/*Leymus cinereus* Shrubland (G2/S1) shrub-steppe communities (globally imperiled (G2/S1) (Gilbert 1998, WNHP 2017).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: The moist floodplain habitat occupied by this species has historically been at high risk for development for farms and rangeland. Populations are vulnerable to changes in hydrology, impacts from wildfire, disturbance from gravel mining, grazing, and competition from invasive weed species (Crawford and Rocchipo 2012, Gamon and Baxter 1995).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: None.
3. Disease or Predation: Vulnerable to grazing or trampling by livestock (Gamon and Baxter 1995).
4. Inadequacy of Existing Regulatory Mechanisms: At least 4 occurrences are afforded protection in the Coal Creek Area of Critical Environmental Concern (managed by BLM) and DNR volunteer registry sites. This species is listed as Sensitive by the BLM. It receives no legal protection by the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Historically, trends are downward due to the conversion of moist streambank habitats to agriculture. At least five occurrences are known to be historical and four of these are likely extirpated due to loss of habitat. Trend data are lacking for most extant occurrences, or limited sampling suggest that populations are stable. Demographic studies by Gilbert (1998) at Coal Creek suggest the population there is stable.

Managed Areas: Coal Creek ACEC, Spokane BLM.

Recommendations: Needs more data before being elevated to Candidate status. At least 21 occurrences (mostly on private land) have not been revisited since the mid 1980s or late 1990s and should be re-surveyed to assess current abundance and trends. Some of these populations might be suitable for voluntary conservation efforts through the DNR registry program.

Pyrrocoma liatriflorum (Smallhead goldenweed)

Synonym: *Haplopappus liatriflorus*

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened

Range: Regional endemic of eastern Washington (Spokane and Whitman counties) (Figure 42) and adjacent western Idaho (Björk and Darrach 2009). Populations from Asotin County (Kemper 2005) and the Camas Prairie region of western Idaho are now considered a separate species, *P. scaberula* (Björk and Darrach 2009, Smith et al. 2010).

WA Ecoregions: Columbia Plateau

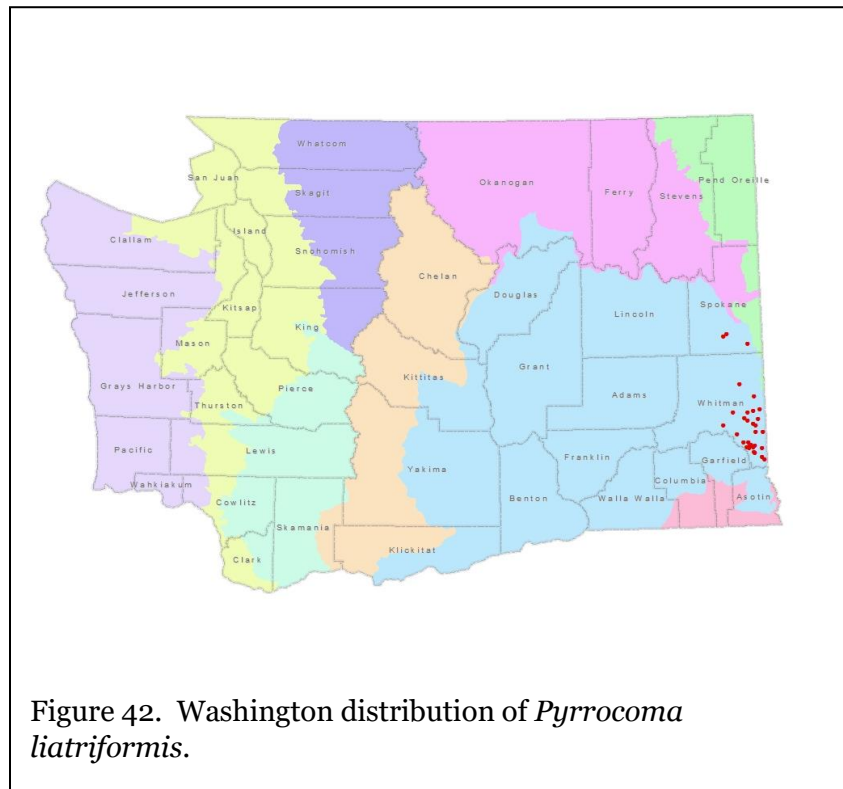
Number of Occurrences: Known from 26 extant and five historical occurrences. Nineteen populations have been discovered or re-surveyed since 2005.

Abundance: The largest known occurrences contain 1,000-2,600 plants, but most populations are much smaller with only 4-100 individuals. The total Washington population is currently estimated at 5,800 plants. Kemper (2005c) reported higher numbers, but was including some large populations from Asotin County that are now considered *Pyrracoma scaberula* instead.

Habitat: Found in remnant Palouse prairie grasslands and the ecotone between prairie and open *Pinus ponderosa* woodlands on middle to upper slopes, often on north aspects. Soils usually silty-loam loess (Kemper 2005c, Gamon and Lorain 1991).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Historically, the greatest threat to *Pyrracoma liatrifomis* has been conversion of its native Palouse prairie habitat to tilled agriculture and the fragmentation of its available range. Additional threats include competition from exotic weeds, herbicide drift, and competition from woody vegetation in the absence of periodic fire (Kemper 2005e).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Livestock grazing is a significant threat to remaining populations (Kemper 2005e).
4. Inadequacy of Existing Regulatory Mechanisms: At least eight populations are protected at the Campus Prairie, Kramer Palouse, and Smoot Hill Biological Study Areas managed by Washington State University, the Rose Creek Preserve (TNC), Steptoe Butte State Park, the proposed Steptoe Butte Natural Area Preserve (WA DNR) and one private DNR registry site. This species has no legal protection under Washington state law.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.



Trends: Long-term trends are downward due to extensive loss of Palouse Prairie habitat.

Managed Areas: Campus Prairie BSA, Kramer Palouse BSA, Rose Creek Preserve (TNC), Smoot Hill BSA, Steptoe Butte SP, Steptoe Butte proposed NAP, private (DNR registry).

Recommendations: Needs more data before being elevated to Candidate status. Additional populations on private lands in eastern Washington should be entered into the DNR voluntary registry program. Land trust properties in eastern Washington should be studied for the feasibility of reintroducing populations. Monitoring data are needed at most occurrences to better estimate population size and trends and to assess response to management actions or habitat change. Modeling of potential habitat might help identify new areas to survey for this species.

Pyrrcoma scaberula (Palouse goldenweed)

Synonym: Formerly included in *Haplopappus liatriformis* (Cronquist 1955)

Natural Heritage Rank: G2/S1

State and Federal Status: WA: Endangered, BLM: Sensitive, USFS: Sensitive

Range: Regional endemic of the Snake River/Camas Prairie area of southeastern Washington (Asotin County) (Figure 43), northeastern Oregon, and west-central Idaho (Björk and Darrach 2009).

WA Ecoregions: Blue Mountains, Columbia Plateau

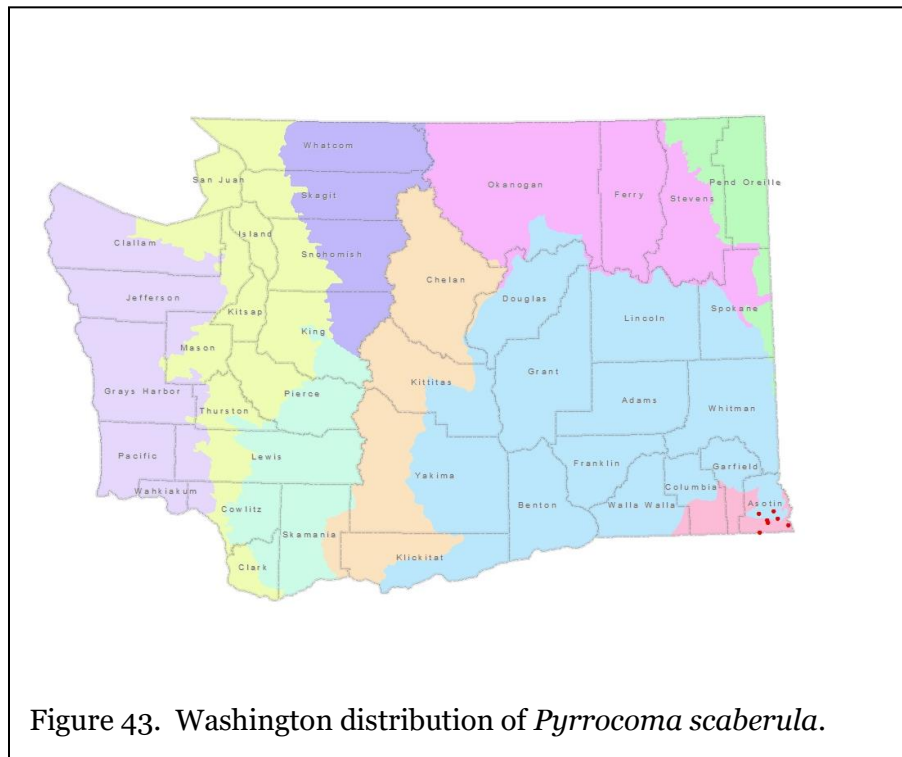
Number of Occurrences: Known from seven extant occurrences in Washington, all discovered or surveyed since 2003.

Abundance: About 1,300 plants have been observed at the six known sites in Washington. Populations are apparently larger in Idaho (often numbering over 1,000 individuals) and the species is considered less of a conservation priority there (Björk and Darrach 2009).

Habitat: Prairies dominated by *Festuca idahoensis* and *Pseudoroegneria spicata* and ecotone of prairie and *Pseudotsuga menziesii* or *Pinus ponderosa* dominated woodlands in canyons and ridgetops on loess soil over basalt or limestone at 730-1,300m (2,400-4,300 ft).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or



Range: Conversion of prairie habitat to farmland has been the largest impact to this species. Other threats include competition from invasive weeds, grazing, and wildfire (Fertig and Kleinknecht 2020).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Impacted by livestock grazing.

4. Inadequacy of Existing Regulatory Mechanisms: Three populations are found within the Chief Joseph Wildlife Area, Fields Spring State Park, and Grande Ronde Area of Critical Environmental Concern.

This species is not formally protected under Washington state law.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Historically downward, due to extensive loss of grassland habitat to cultivation.

Managed Areas: Chief Joseph Wildlife Area, Fields Spring State Park, Grande Ronde ACEC, Umatilla National Forest, Vale BLM

Comments: Although originally recognized as a distinct species by E.L. Greene in 1909, later monographers lumped *Pyrocoma scaberula* with its close relative, *P. liatrisformis* (as *Haplopappus liatrisformis*) (Cronquist 1955). In part this was due to an inadequate quantity of good specimens for study. When more collections became available in the 1990s, researchers began to notice subtle but consistent differences in the morphology, habitat, and distribution of the two taxa. *Pyrocoma scaberula* was resurrected based on morphological traits by Björk and Darrach (2009) and later confirmed to be distinct due to genetic differences (Smith et al. 2010). *Pyrocoma scaberula* is not mentioned at all (even in synonymy) in the *Flora of North America* treatment by Bogler (2006) but is accepted in the revised Hitchcock and Cronquist (2018) manual.

Recommendations: Needs more data before being elevated to Candidate status. Additional surveys of potential habitat should be conducted, particularly in the northeast foothills of the Blue Mountains. Long-term monitoring studies are needed to estimate population numbers and trends and assess habitat changes. Demographic monitoring would help identify critical stages in the plant's life cycle where it might be most vulnerable.

Ranunculus triternatus (obscure buttercup)

Synonym: *Ranunculus reconditus*

Natural Heritage Rank: G2/S1S2

State and Federal Status: WA: Endangered, BLM: Sensitive, USFS: Sensitive

Range: Local endemic restricted to the east end of the Columbia River Gorge in Klickitat County, Washington (Figure 44) and adjacent Hood River and Wasco counties, Oregon (Hitchcock and Cronquist 2018). Plants intermediate with *Ranunculus glaberrimus* are known in Klickitat and Yakima counties (Arnett 2013). Reports from Idaho and Nevada and Idaho (Whittemore 1997; Camp and Gamon 2011) appear to be erroneous (Holmgren et al. 2012).

WA Ecoregions: Columbia Plateau, East Cascades.

Number of Occurrences:

Known from five extant occurrences (last observed in 2019) and one historical population in Washington.

Abundance: The entire state population of *Ranunculus tritermatus* was estimated at approximately 7,500 plants by Sheehan (1985). Surveys from 2010-2014 suggest a current statewide population of at least 9,800 plants (WNHP data).

Habitat: Grasslands dominated by perennial bunchgrasses and forbs on north or south-facing slopes and ridge crests of basalt overlain by loess deposits at 2,240-3,220 feet (Camp and Gamon 2011; Sheehan 1985). Soils vary from shallow and rocky to deep and finely-textured. Recently documented from a site in an oak woodland on open slopes with clay soil and angular basalt rock and an understory of bunchgrasses and native forbs.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Some historical habitat has been lost due to conversion for agriculture or pasture. Competition from invasive weeds and increased fire frequency are additional threats (Camp and Gamon 2011). This species may be flowering earlier in response to climate change (Dave Wilderman, personal communication). Long-term impacts from climate change may make occupied habitat too dry or warm to support *Ranunculus tritermatus*.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Four occurrences are protected in the Columbia Hills Natural Area Preserve (managed by WA DNR) and a preserve managed by the Columbia Land Trust.
5. Other Natural or Manmade Factors Affecting Continued Existence: Wilderman (2001) summarized long-term demographic monitoring studies at the preserve and found that seed survival, germination, and seedling establishment were the limiting stages in the species' life cycle.

Trends: Long-term trends are probably downward in Washington, as the amount of potentially suitable habitat has declined. Monitoring at the Columbia Hills NAP site documented a decrease in frequency of 39-76% at each of five sampling sites from 2003-2012 (Wilderman 2012). Since 2013, frequency in these same plots has been relatively stable, though still significantly lower than in 2003 (Dave Wilderman 2019 unpublished data).

Managed Areas: Columbia Hills Historical State Park, Columbia Hills Natural Area Preserve (WA DNR), Columbia River Gorge National Scenic Area, Klickitat State Wildlife Area (WA DFW), Spokane BLM.

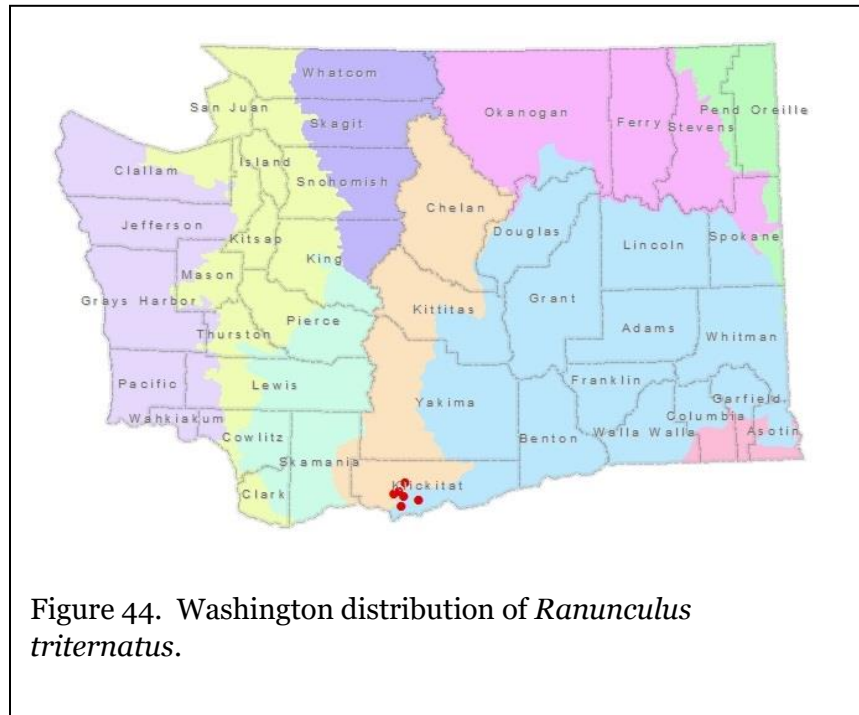


Figure 44. Washington distribution of *Ranunculus tritermatus*.

Recommendations: Based on downward trends, high threats, and limited range, this species warrants Candidate status. Arnett (2013) recommended conducting additional monitoring studies at the Canyon Creek site (Klickitat Wildlife Area) in oak forest habitat to compare population trends with plots from the more open grassland sites on the Columbia Hills NAP. Additional population monitoring is desirable at other locations to derive more current abundance and trend data and assess habitat changes. Habitat modeling would be beneficial to identify potential new sites for survey or out-planting.

Rorippa columbiae (Columbia yellowcress)

Natural Heritage Rank: G3/S1S2

State and Federal Status: WA: Threatened; BLM: Sensitive; USFS: Sensitive

Range: Occurs along the Columbia River in Washington and Oregon and from southern Oregon to northern California. Washington populations are known from Benton, Franklin, Klickitat, and Skamania counties (Figure 45). Extant populations are restricted to two un-dammed segments of the river along the Hanford Reach (upper Columbia) and below Bonneville Dam (lower Columbia) (Habegger et al. 2001).

WA Ecoregions: Columbia Plateau, East Cascades, West Cascades

Number of Occurrences:

Known from two extant and two historical occurrences in Washington (most recently surveyed in 2019).

Abundance: Salstrom and Gehring (1994) estimated that several million ramets might be present along the 40 miles of shoreline in the Hanford Reach, with densities of 10-70 stems per square meter. The actual number of individuals is difficult to measure because the species is rhizomatous.

Habitat: Gently to

moderately sloping banks

and islands within the remaining free-flowing (undammed) sections of the Columbia River, in areas that are seasonally flooded (Camp and Gamon 2011). Found on clay, sandy, sandy silt, gravel, or cobblestone substrates. Historically, this species may have occurred on higher banks of the river that were kept scoured by spring flooding events but which today are more densely vegetated with cottonwood, willow or brush or have deeper silt deposits (Habegger et al. 2001).

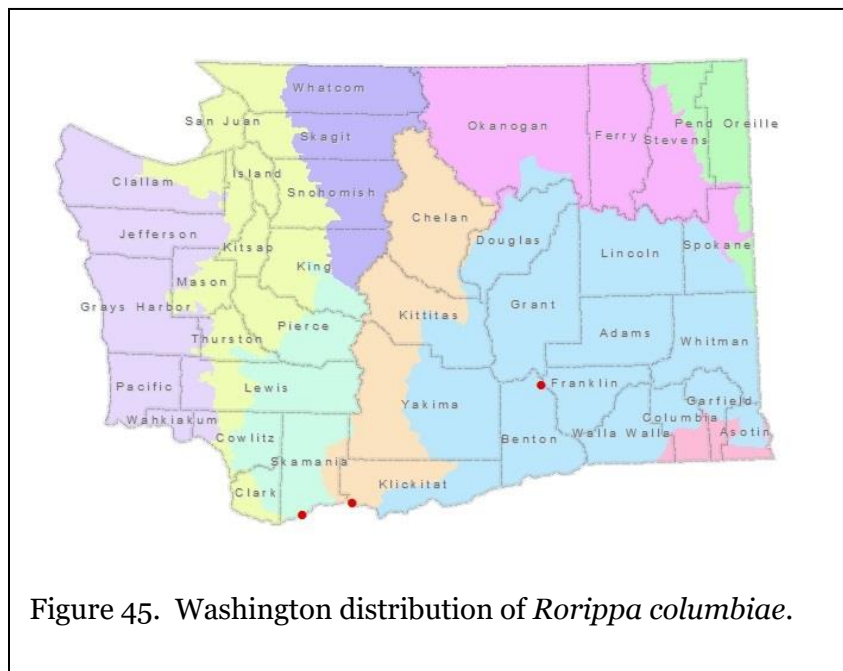


Figure 45. Washington distribution of *Rorippa columbiae*.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Dam construction has eliminated much of the potential shoreline habitat available to this species along the main stem of the Columbia River (today it only occurs along two undammed reaches of the river). Changes in the magnitude of spring floods and increased siltation have altered the vegetation of riverbanks, allowing areas higher upslope on the banks to become permanently vegetated and unsuitable as *Rorippa columbiae* habitat (Habegger et al. 2001). Competition from invasive weeds can also reduce habitat suitability (Fertig et al. 2017).
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Two large occurrences are protected within the Hanford Reach National Monument, McNary, Pierce, and Saddle Mountain National Wildlife Refuges, Yakima River-Columbia River Island ACEC, South Columbia Basin Wildlife Area, and the Columbia Land Trust's Pierce Island Preserve. This species is not protected under Washington state law.
5. Other Natural or Manmade Factors Affecting Continued Existence: Historically, *R. columbiae* may have flowered earlier in the spring after peak floods and had a longer growing season in which to produce viable seed. Monitoring data at Pierce Island in the lower Columbia from 1991-1998 found that flowering occurred in just three of eight years. Wide fluctuations in daily water levels in late summer (due to hydrologic peaking associated with electricity generation by upstream dams) may affect the ability of *R. columbiae* plants to complete their life cycle before the onset of senescence in the fall (Habegger et al. 2001).

Trends: Historically downward due to loss of seasonally flooded or scoured reaches of the Columbia River from dam and reservoir construction. Long-term population trends have been downward at Pierce Island in the lower Columbia River since the 1980s (Habegger et al. 2001, Scherer 1991). Crone and Gehring (1998) performed a population viability analysis for Pierce Island transects and determined that five of seven sites were likely to be extirpated within 100 years due to poor recruitment. Debra Salstrom (personal communication) reported large populations along the Hanford Reach in 2019.

Managed Areas: Beacon Rock State Park, Columbia River Gorge National Scenic Area, Hanford Reach National Monument, McNary National Wildlife Refuge, Pierce Island Preserve (Columbia Land Trust), Pierce National Wildlife Refuge, Saddle Mountain National Wildlife Refuge, Spokane BLM, Yakima River-Columbia Island Area of Critical Environmental Concern.

Recommendations: Needs more data before being elevated to Candidate status. Continued monitoring studies would help determine the longevity of mature plants, survivorship of seedlings, and persistence of seed banks and help inform management of riverside populations. Monitoring of sites along the Hanford Reach of the Columbia would help establish population estimates and trends. Studies of pollination biology, seed fecundity and germination requirements are needed if new populations are established within its historical range. Vegetation treatments might be needed on higher banks of islands to open up areas for establishment of new populations.

Rubus nigerrimus (Northwest raspberry)

Synonym: *Rubus leucodermis* var. *nigerrimus*

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened

Range: Local endemic of the Snake River in southeastern Washington (Asotin, Garfield, and Whitman counties) (Figure 46). Reports from northeastern Oregon and Idaho (Kemper 2005d) need to be corroborated in the field (Alice et al. 2014).

WA Ecoregions: Blue Mountains, Columbia Plateau

Number of Occurrences: Known from 16 extant and two historical occurrences in Washington. Two to five “extant” populations have not been relocated in subsequent site visits (most recently in 2019) and may be extirpated. The last systematic survey was conducted in 2005, when eight occurrences were resurveyed (Kemper 2005d).

Abundance: Individual plants are difficult to distinguish from each other, making it a challenge to estimate abundance. Most occurrences range in size from one to 130 plants. Kemper (2005d) reported approximately 700 genets in 2005.

Habitat: Bottoms and slopes of steep, narrow canyons in shrubby thickets and woodlands along streams or side channels of rivers. Often found associated with *Alnus rhombifolia* or *Celtis reticulata* and *Bromus*

tectorum (Kemper 2005d). *Rubus nigerrimus* may tolerate slightly more xeric conditions than other blackberry species and tends to occur in drainages with lower flows that may be dry on the surface by late summer and are not scoured by floods in the spring (Kemper 2005d).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Some historical occurrences may have been inundated following construction of Lower Granite Dam on the Snake River (Kemper 2005e). Competition with aggressive introduced blackberries (especially Himalayan blackberry,

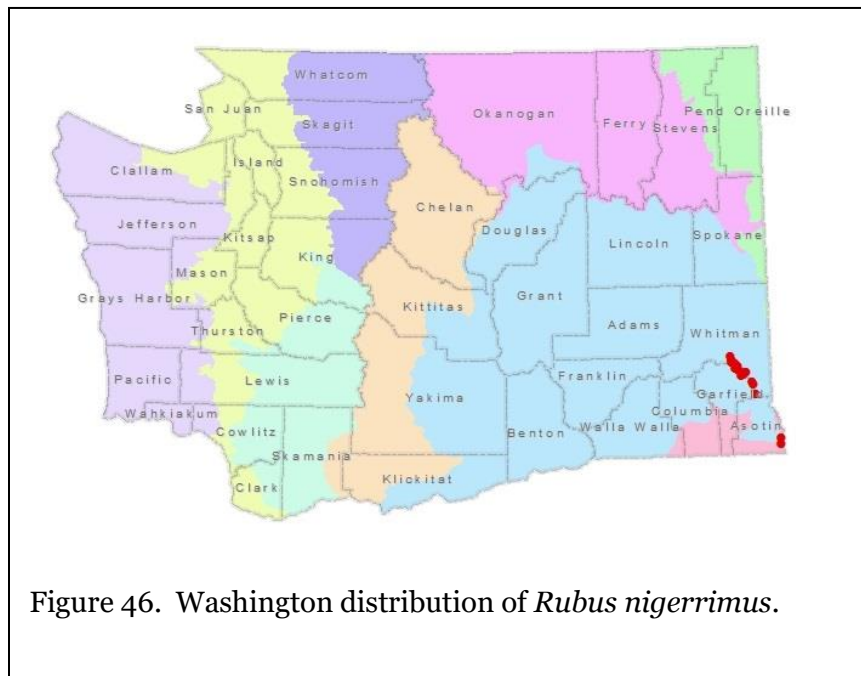


Figure 46. Washington distribution of *Rubus nigerrimus*.

Rubus bifrons) is a major threat. Efforts to contain the spread of Himalayan blackberry by herbicides, mowing, or hand thinning could negatively impact *R. nigerrimus* plants in the same area. Rush (1999) suggested that declines in pollinators or native bird species that disperse fruit could be affecting this species.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Fruit is less edible than introduced blackberry species and is not widely sought.

3. Disease or Predation: Not a preferred forage species, but livestock grazing contributes to the spread of competing weed species.

4. Inadequacy of Existing Regulatory Mechanisms: One population on private land is found in a WA DNR registry site. This species has no formal protection under Washington state law.

5. Other Natural or Manmade Factors Affecting Continued Existence: Potential for hybridization with introduced blackberry species (Kemper 2005e).

Trends: Apparently downward. At least five occurrences have not been relocated in recent efforts. A large population of *Rubus nigerrimus* in Wawawai Canyon has declined sharply in numbers and cover since 2005 (only one plant was observed in 2019) and is being displaced by *R. bifrons*.

Managed Areas: Grande Ronde ACEC, Army Corps, WA DNR, Vale BLM, private.

Comments: Alice et al. (2014) recognize this taxon (as a variety of the more widespread *R. leucodermis*), but question whether its primary distinguishing characteristic (glabrous to glabrate leaf under-sides) is genetically based or environmentally influenced. Kemper (2005d) noted the presence of plants intermediate between *R. leucodermis* and *R. nigerrimus* in the field and suggested that either hybridization may be occurring, or the taxa are still not completely diverged.

Recommendations: Needs more data before being elevated to Candidate status. Taxonomic issues relating to *R. nigerrimus* need to be resolved through more detailed morphologic study, greenhouse hybridization or reciprocal gardening experiments, or genetic analysis. The Global Rank of the species should be amended with a “Q” to indicate that taxonomic questions exist. Additional surveys and monitoring of known sites are needed. Few data are available on relative abundance (perhaps best measured by frequency or cover, rather than stem counts or estimates of numbers of genets) and no quantitative data exist on trends. Control of *Rubus bifrons* may be necessary to recreate suitable habitat for *R. nigerrimus*, but any herbicide spraying or hand thinning would need to be done judiciously to minimize impacts to *R. nigerrimus* plants.

Sabulina sororia (Twin Sisters sandwort)

Natural Heritage Rank: G1/S1

State and Federal Status: WA: Endangered

Range: Local endemic of the Twin Sisters Range in the Cascades Mountains of Whatcom County, Washington (Figure 47) (Legler and Dillenberger 2017).

WA Ecoregions: North Cascades.

Number of Occurrences: Known from one extant occurrence (discovered in 2016) and one historical record (last observed in 1968). Before being described as a new species, previous collections were identified as *Arenaria rossii* or *A. rubella*.

Abundance: Legler and Dillenberger (2017) observed *Sabulina sororia* to occur "as scattered individuals, forming a minor component of the sparse, low vegetation cover" in its limited range. No population estimates were made when the site was surveyed in 2016. Potential habitat within the Twin Sisters covers about 16 square kilometers, so the population could be more abundant than presently known.

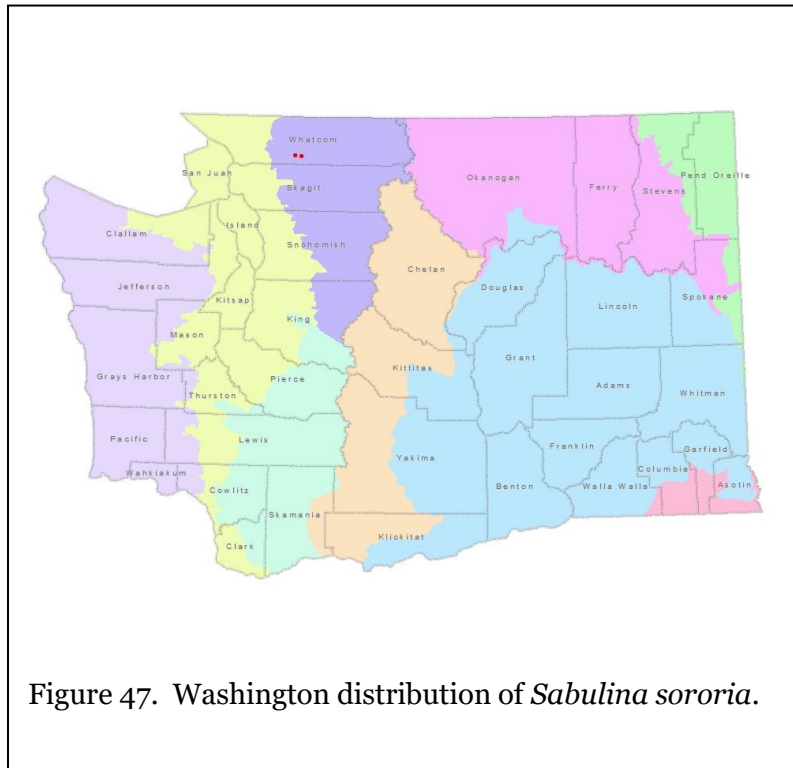


Figure 47. Washington distribution of *Sabulina sororia*.

Habitat: Restricted to sparsely vegetated, mesic, rocky or gravelly subalpine or alpine slopes. The substrate is derived from crystalline, ultramafic rock (dunite) rich in magnesium, chromium, and nickel and low in available calcium (Legler and Dillenberger 2017). These "serpentine" sites typically have sparse cover and are notable for locally endemic species (Kruckeberg 2002). This species tends to avoid areas of late-lying snow or krummholz vegetation, but occurs on flats or slopes with mat-forming herbs, bunchgrasses, and ferns with 5- 20% total vegetative cover (Legler and Dillenberger 2017).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: The high elevation habitat occupied by this species currently receives few impacts from humans or livestock. Long-term climate change, particularly effects on snowpack and hydrology, could negatively impact its persistence.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.

4. Inadequacy of Existing Regulatory Mechanisms: Populations are protected within the Mt. Baker Wilderness Area. The species is not presently listed as Sensitive by the US Forest Service and has no legal protection in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: One population has not been relocated since 1968. No monitoring data are available for the single extant occurrence.

Managed Areas: Mt. Baker Wilderness Area, Mt. Baker-Snoqualmie National Forest.

Recommendations: Needs more data before being elevated to Candidate status. Additional areas of suitable habitat in the Twin Sisters Range need to be surveyed and better data are needed on total population size. No long-term monitoring data are available for population trend or to study critical links in the species life history (such as, the longevity of individuals, seed production and fecundity, seedling survivorship, pollination biology, dispersal limitations, etc.). Impacts from climate change are poorly known.

Sidalcea hirtipes (Bristly-stemmed checkermallow)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened, BLM: Sensitive, USFS: Sensitive

Range: Regional endemic of southwestern Washington (Clark, Lewis, and Wahkiakum counties) (Figure 48) and northwestern Oregon. Hitchcock and Cronquist (2018) only recognize populations from Clark County, Washington, as being native and genetically pure. They consider records from Lewis County to be possible hybrids with *S. campestris*.

WA Ecoregions: Pacific Northwest Coast, Puget Trough, West Cascades

Number of Occurrences: Known from 13 extant and 4 historical occurrences in Washington. Nine populations have been newly discovered or relocated since 2005.

Abundance: Population counts are difficult to make because genets produce multiple stems that may appear to be distinct individuals. Current estimates for each occurrence suggest a statewide population of 500-2,500 plants.

Habitat: In Washington, found mostly in moist remnant prairies, fencerows, and roadside ditches up to 3,800 feet (1,200 m) in elevation on silty clay loam soils (Salstrom 1994). Oregon populations also occur in grassy coastal bluffs and mountain slopes. In both states, fire was probably important in maintaining open prairie conditions (Salstrom 1994).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Historically, extensive areas of moist prairie habitat in western Washington have been converted to farmland or rural

and urban development. Road maintenance and herbicide use or mowing have eliminated at least one recent occurrence. Fire suppression has allowed some areas of formerly suitable habitat to become too dense with trees, shrubs, and other competing vegetation. Competition with invasive weed species may also make habitat less suitable.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Some checkermallow species are used in horticulture, which could create a demand for live plants or seeds.

3. Disease or Predation: Herbivory or trampling by deer, elk or livestock is a potential threat (Salstrom 1994). Seed predation is common in other species of *Sidalcea*.

4. Inadequacy of Existing Regulatory Mechanisms: Two occurrences on private land are in the Washington Register of Natural Areas. A population at Camp Bonneville is within a proposed county park. An historical report from “Lacamas Creek” might be within the existing or proposed boundaries of the Lacamas Prairie Natural Area Preserve/Natural Resources Conservation Area managed by WA DNR in Clark County. This species is not formally protected under state law in Washington.

5. Other Natural or Manmade Factors Affecting Continued Existence: May hybridize with *Sidalcea campestris*, a closely related species native to the Willamette Valley in Oregon but also occasionally introduced as a garden plant in Washington (Hitchcock and Cronquist 2018).

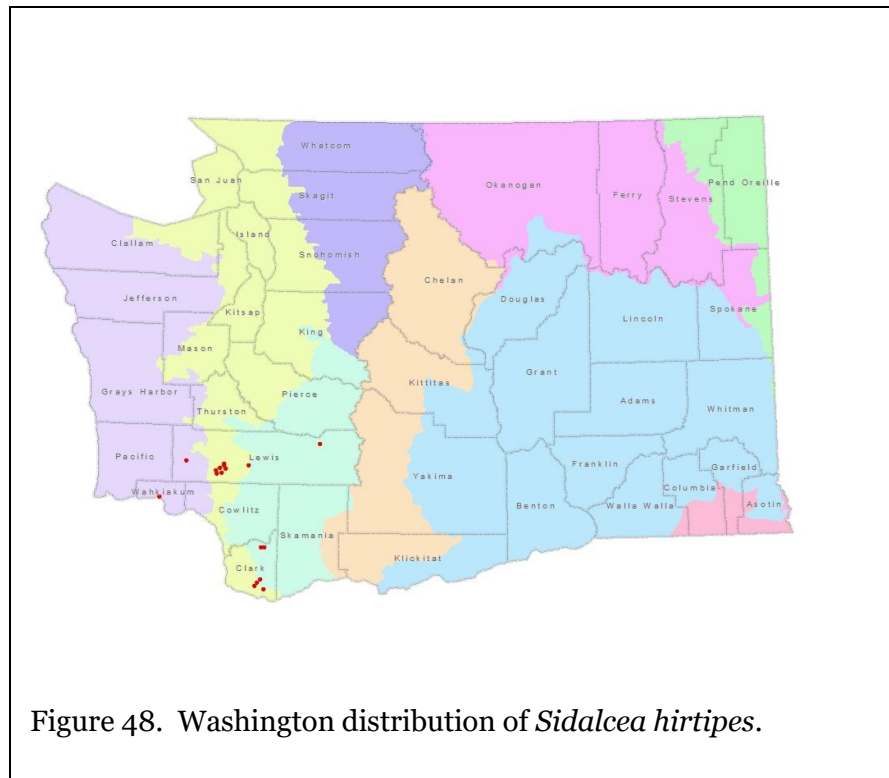
Potential hybrids between these two taxa occur in Camp Bonneville in Clark County, just 8-9 miles north of the Columbia River and the

Oregon state line. These individuals have the pink flower color of *S. hirtipes* but the open, elongated inflorescence of *S. campestris* (Fertig and Kisler 32863 WTU). Supposed hybrids from Lewis County mostly appear to be authentic *S. hirtipes*.

Trends: Population trends are downward historically due to extensive habitat conversion to agriculture and urbanization.

Managed Areas: Gifford Pinchot National Forest, private.

Recommendations: Based on threats, low population size, and downward trend, this species should be considered for Candidate status. Additional private land sites should be added to DNR’s state registry program or protected under conservation easements between willing sellers and land trusts. The Lacamas Prairie NAP should be considered as a potential site for reintroduction. The taxonomic status of potential



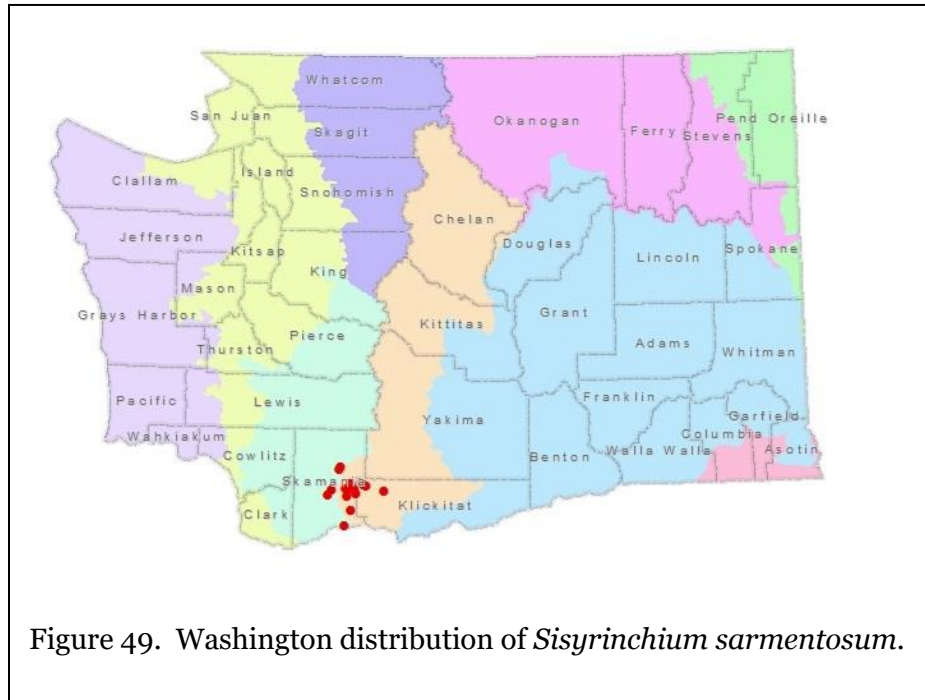
hybrid plants in Camp Bonneville needs to be resolved. Monitoring data are needed for all populations to assess their abundance (or at least cover or frequency) and trends. Habitat modeling could be used to identify areas for survey.

Sisyrinchium sarmentosum (Pale blue-eyed grass)

Natural Heritage Rank: G2/S2

State and Federal Status: WA: Threatened; BLM: Sensitive; USFS: Sensitive

Range: Endemic to northern Oregon and southern Washington (Klickitat and Skamania counties) in the vicinity of Mount Adams and Mount Hood (Figure 49). Additional reports from the East Cascades in Yakima County and the Wenatchee Mountains of north-central Washington are based on misidentifications (Arnett 2012b).



WA Ecoregions: East Cascades, West Cascades

Number of Occurrences:

Known from 14 extant occurrences and two historical populations in Washington. Eight populations have been discovered or re-surveyed since 2011.

Abundance: Raven (2003) estimated the entire Washington population of *S. sarmentosum* to be 33,000-39,000 individuals. Nearly 2/3 of the state's plants are found in a single occurrence at South Prairie (Arnett 2014c).

Habitat: In Washington, *Sisyrinchium sarmentosum* is usually found in wet meadows that are seasonally flooded in late spring but become dry from late June to early August. This habitat may be limited to a small subset of potential landforms that form shallow catchments and have porous geologic substrates. This species may also be found in small openings created by logging (Reagan 2018).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Changes in hydrology, agricultural practices (haying, plowing, flood irrigation, grazing), noxious weeds, timber

management (especially silt deposition from erosion), road construction, residential development of private lands, and recreational activities have been cited as potential threats (Gamon and Sprague 1986, Raven 2003, Reagan 2018). Some agricultural and silvicultural practices that create or maintain early seral meadow openings might be beneficial to this species. In the absence of periodic and localized disturbances (such as fire or wind-throw), suitable wet meadow sites may be lost or degraded due to succession (Fertig 2017).

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Some populations are impacted by grazing by livestock and wild ungulates (Reagan 2018). Raven (2003) found a 134% increase in *S. sarmentosum* plants in exclosures protected from grazing.

4. Inadequacy of Existing Regulatory Mechanisms: Three occurrences in Washington are protected in the Trout Lake Natural Area Preserve (managed by WA DNR), Conboy Lake National Wildlife Refuge (last observed in 1909), and South Prairie Special Botanical Area on Gifford Pinchot NF. At least 12 occurrences on Gifford Pinchot National Forest are managed through a Conservation Agreement signed in 2011. The South Prairie site has been recommended as a Research Natural Area by the Washington Native Plant Society (2011). This species is not formally protected under Washington state law.

5. Other Natural or Manmade Factors Affecting Continued Existence: Hybridization with *Sisyrinchium idahoense* is a significant natural threat where the two species co-occur. Arnett (2014) identified five occurrences in Washington where hybridization is suspected to occur. Hybrids have been identified primarily based on intermediate morphological characters (attempts to detect hybridization through genetic studies have had mixed success; DeWoody and Hipkins 2006). Hybrid individuals can further dilute the *S. sarmentosum* gene pool by back-crossing with their parents. Hybrid progeny may also be competitors for pollinators and germination sites.

Trends: Most populations have been stable over the past 15 years, although a small population at Little Mosquito Creek has declined by nearly half (Fertig 2017). Trends are difficult to assess due to problems with identifying *S. sarmentosum* plants in dense vegetation when they are not in flower, or in populations that are intermixed with *S. idahoense* or F1 hybrids (Arnett 2014c).

Managed Areas: Columbia River Gorge National Scenic Area, Conboy Lake National Wildlife Refuge, Gifford Pinchot National Forest, Trout Lake Natural Area Preserve (WA DNR).

Comments: *Sisyrinchium sarmentosum* was petitioned for potential listing under the ESA in 2009. In 2018 the Service issued a decision that listing was not warranted.

Recommendations: Needs more data before being elevated to Candidate status. Periodic monitoring is needed to assess the population size, trends, and threats to populations, and to detect the presence or extent of hybridization. Monitoring data are needed for many occurrences, but developing a simple protocol has proven difficult (Arnett 2012b).

Sullivantia oregana (Oregon sullivantia)

Natural Heritage Rank: G2/S1

State and Federal Status: WA: Endangered; BLM: Sensitive; USFS: Sensitive

Range: Local Endemic of the lower Willamette Valley in north central Oregon (Clackamas, Columbia, Hood River, and Multnomah counties) and the Columbia River Gorge in southern Washington (Skamania County) (Figure 50) (Camp and Gamon 2011; ORBIC 2019).

WA Ecoregions: West Cascades

Number of Occurrences: Known from two extant occurrences in Washington, both last observed in 2011. The Archer Falls/Archer Mountain occurrence consists of at least seven subpopulations and has been considered two separate occurrences in the past.

Abundance: In 2011, three of the seven subpopulations in the Archer Falls/Archer Mountain occurrence were surveyed by Rare Care volunteer Steven Clark who reported thousands of plants in a scattered-patchy pattern. In 2006, Clark observed over 3,000 individuals from one of the subpopulations. Barry Wendling estimated the population to contain 125,000 individuals in a 2,500 square foot area. An estimated 430 individuals were observed at one subpopulation by Steven

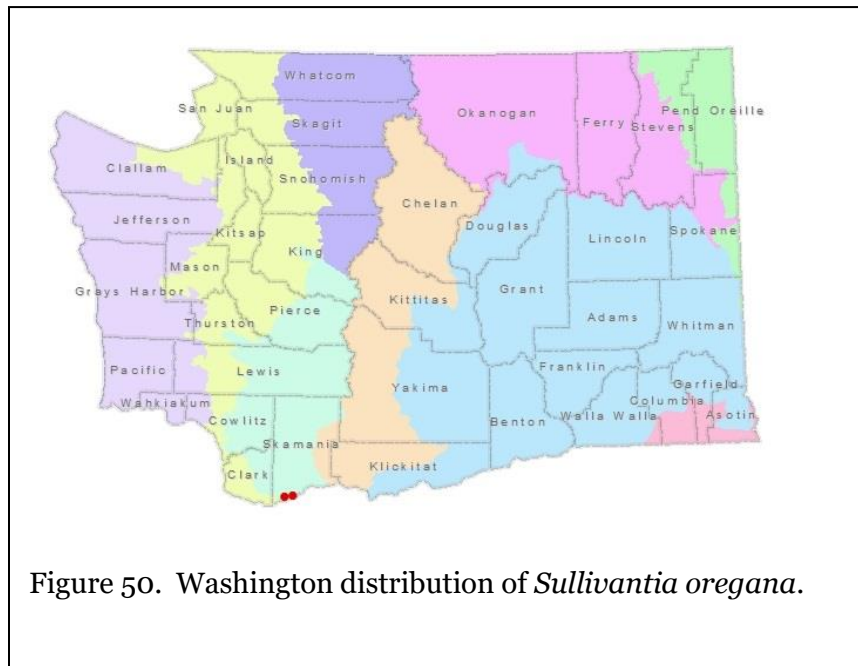


Figure 50. Washington distribution of *Sullivantia oregana*.

Clark in 2004. No abundance data are available from earlier site visits in 1989 and 1980. The Beacon Rock occurrence contained just two individuals when it was last relocated in 2011 by Rare Care volunteers. This population is difficult to observe without climbing gear, however, and may be underestimated. For several years from 2004-2010 volunteer surveyors failed to note any plants.

Habitat: Restricted to moist basalt cliffs with shallow pockets of soil, often in the spray zone of waterfalls or that remain moist year-round (Camp and Gamon 2011). These are often sites with low vegetative cover.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Rock climbing has been identified as a threat to the population at Beacon Rock State park. In response, the occupied

habitat has been closed to climbing. Changes in hydrology would likely have a significant negative impact on populations.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Two populations are protected in Beacon Rock State Park and the Columbia Falls Natural Area Preserve. This species has no legal protection in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Soltis (1982) found very low levels of genetic variability in *S. oregana* and other taxa in the genus *Sullivantia*, making them potentially less able to adapt to rapid environmental changes.

Trends: Stable to possibly decreasing at Beacon Rock State Park, though long-term quantitative monitoring data or reliable census counts are lacking.

Managed Areas: Beacon Rock State Park, Columbia Falls Natural Area Preserve, Columbia River Gorge National Scenic Area, Gifford Pinchot National Forest.

Recommendations: Probably secure at present and not recommended for Candidate status. Populations should be revisited to determine their current abundance and status. Plots established through random sampling could be used to estimate overall abundance and assess changes in frequency or trend over time. Habitat monitoring with repeatable photographic points should be used to visually assess changes in habitat condition and suitability over time. Demographic trend monitoring would be valuable for determining basic life history traits, such as longevity, fecundity, and survivorship of seedlings. Impacts from recreation or other potential threats need to be better assessed. Areas of additional unsurveyed habitat (or sites for possible reintroduction) might be determined through simple modeling or analysis of air photo images.

Symphyotrichum jessicae (Jessica's aster)

Synonym: *Aster jessicae*

Natural Heritage Rank: G2/S1S2

State and Federal Status: WA: Endangered

Range: Regional endemic of eastern Washington (Spokane and Whitman counties) (Figure 51) and north-central Idaho.

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from eight extant populations, all relocated or discovered since 1990 (most recently in 2017).

Abundance: Accurate counts are difficult to make because individual genets may have multiple stems and grow close to each other. Some counts are only of stems, making it hard to compare results across years.

Most populations contain 10-250 plants, although one site was reported as having several thousand stems (not individuals) in 2005 (Fertig et al. 2017).

Habitat: Palouse prairie communities and the prairie/forest transition zone on banks, roadcuts, slopes, “eyebrows”, and the rim of draws (Kemper 2005a). In Idaho, populations often occur along undisturbed roadsides bordering agricultural fields (Lorain 1991).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Historically, most of the habitat of this species has been converted to agriculture or human habitations. Other impacts include herbicide drift from agricultural fields, road construction and maintenance, and competition with invasive weeds (Kemper 2005e)
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: Three populations are protected in the Rose Creek Preserve, Turnbull National Wildlife Refuge, and a site in the Washington Register of Natural Areas on private property. This species has no legal protection from the state of Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Small population size and habitat fragmentation reduce the opportunity for gene exchange between occurrences (Kemper 2005e).

Trends: Historically, declining due to extensive conversion of Palouse prairie habitat to agricultural uses. Current trends are probably stable to declining, but accurate numbers of genets vs. stems makes comparisons across years difficult.

Managed Areas: Rose Creek Preserve (TNC), Turnbull NWR, private (registry)

Recommendations: Limited geographic range, downward trends, and high threats suggest this species should be afforded Candidate status. Standardized and repeatable monitoring protocols are needed for all extant occurrences. More complete monitoring data would allow for better estimations of population size, trends, and response to environmental

change. Modeling might be informative in identifying new places for survey or reintroduction of populations. Additional private land sites should be considered for the DNR voluntary registry program. Additional surveys should be done in Turnbull National Wildlife Refuge.

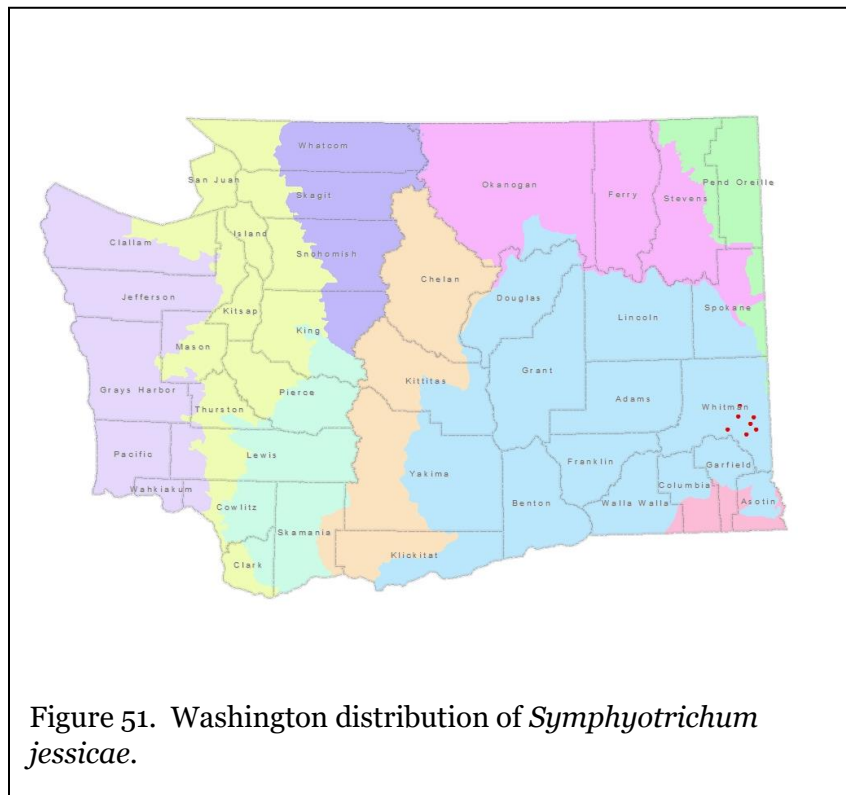


Figure 51. Washington distribution of *Symphyotrichum jessicae*.

Thelypodium howellii ssp. *howellii* (Howell's thelypody)

Natural Heritage Rank: G1T1/SH

State and Federal Status: WA: Extirpated

Range: Regional endemic of central Washington (Yakima County) (Figure 52), central Oregon, and northeastern California (Al-Shehbaz 2010).

WA Ecoregions: Columbia Plateau

Number of Occurrences: Known from a single historical occurrence in Washington, last observed in 1898. Subspecies *howellii* is known from fewer than five extant occurrences in Oregon and 5 locations in California. A second subspecies (*spectabilis*) is endemic to Oregon and listed as Threatened under the US Endangered Species Act.

Abundance: Considered historical and probably extirpated in Washington. Rare throughout its range and ranked S1 in California and Oregon.

Habitat: Alkaline meadows and flats in desert shrub communities (Al-Shehbaz 2010b).

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Much of the alkaline wet meadow habitat in central Washington has been converted to irrigated cropland, orchards, or residential development. Areas that still persist are impacted by grazing, recreational vehicles, and invasive weeds.

2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.

3. Disease or Predation: Impacts from grazing are not known.

4. Inadequacy of Existing Regulatory Mechanisms: No populations in Washington are protected and the species has no formal legal protection from the state.

5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Downward - probably extirpated in Washington due to loss of its alkaline meadow habitat. Most occurrences in Oregon and California are also historical (Consortium of Pacific Northwest Herbaria

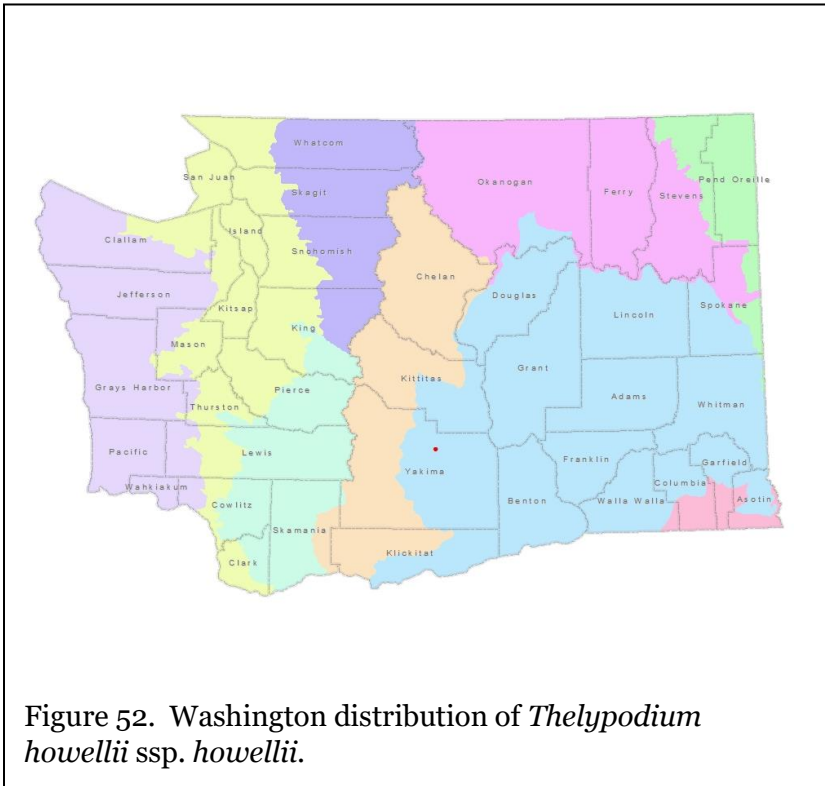


Figure 52. Washington distribution of *Thelypodium howellii* ssp. *howellii*.

website, [www. http://pnwherbaria.org/](http://pnwherbaria.org/) and Consortium of California Herbaria website, [www.http://ucjeps.berkeley.edu/consortium/](http://ucjeps.berkeley.edu/consortium/)).

Managed Areas: none.

Recommendations: Needs more data before being elevated to Candidate status. This species is critically imperiled throughout its range and likely extirpated in Washington. Modeling of potentially suitable habitat could help identify remnant patches of habitat for survey or reintroduction from plants or seeds from California or Oregon populations.

Trifolium douglasii (Douglas' clover)

Natural Heritage Rank: G2/S1

State and Federal Status: WA: Endangered, BLM: Sensitive, USFS: Sensitive

Range: Regional endemic, historically known from eastern Washington, northeastern Oregon, and west-central Idaho (Figure 53). Reports from Beaverhead County, Montana, are based on a misidentified specimen of *T. beckwithii*. Camp and Gamon (2011) reported that extant populations are currently known only from Whitman County (WA) and Umatilla and Union counties (OR), but about a dozen occurrences are still present in western Idaho based on records from the Consortium of Pacific Northwest Herbaria website ([www. http://pnwherbaria.org/](http://pnwherbaria.org/)). In Washington, this species is considered extirpated in Spokane County and historical in Whitman County (last observed in 1952), but extant occurrences are known from Asotin and Garfield counties.

WA Ecoregions: Blue Mountains, Columbia Plateau

Number of Occurrences: Known from two extant occurrences in Washington (both discovered or relocated since 2012) and at least five historical populations that may be extirpated (last observed from 1873 to 1959).

Abundance: The largest extant population in the state contained about 1,000 individuals when last surveyed

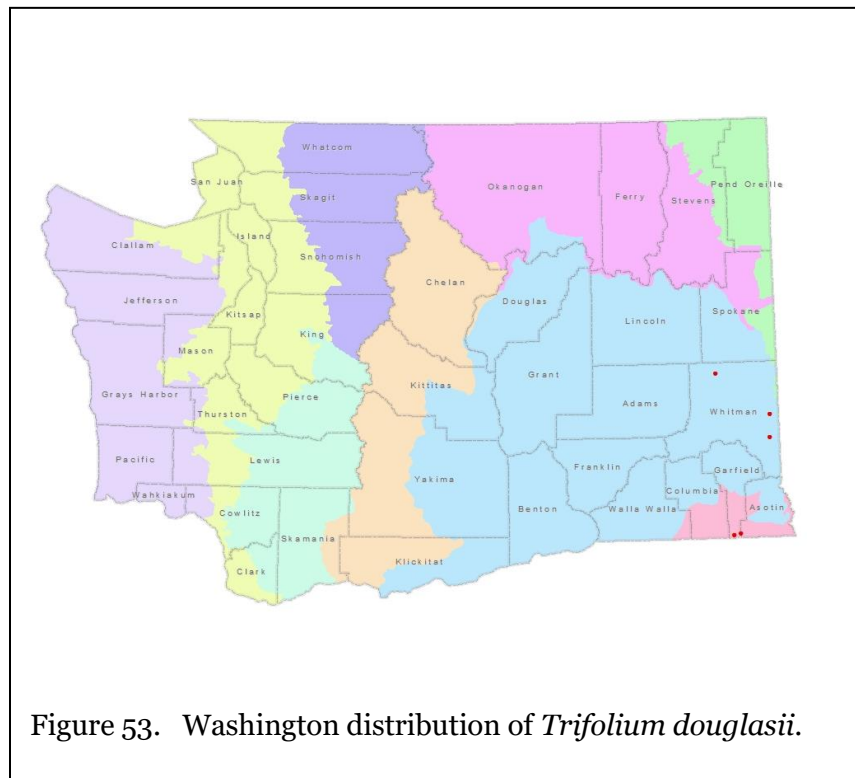


Figure 53. Washington distribution of *Trifolium douglasii*.

in 2012. A small population discovered in 2013 in Asotin County had only six plants.

Habitat: Stream banks, forested wetlands, and wet meadows, reported from moist sand or rich loam.

Threats (USFWS Five Listing Factors):

1. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range: Conversion of wet meadow habitat to agriculture is the primary reason for the extirpation of at least five occurrences in Washington. Populations are also vulnerable to competition from invasive species. One population is in a forested wetland that was recently logged.
2. Overutilization for Commercial, Recreational, Scientific, or Education Purposes: Not known.
3. Disease or Predation: Not known.
4. Inadequacy of Existing Regulatory Mechanisms: No populations are formally protected. The species receives no legal protection in Washington.
5. Other Natural or Manmade Factors Affecting Continued Existence: Not known.

Trends: Downward. At least five occurrences in Washington are probably extirpated due to conversion of wet meadow and stream habitats to croplands or rangelands. One extant population has been stable from 1993 to 2012.

Managed Areas: Umatilla National Forest.

Recommendations: Needs more data before being elevated to Candidate status. Potential habitat in the foothills of the Blue Mountains should be a priority for survey to locate additional populations. Extant occurrences have not been monitored since the early 2010s. Habitat modeling might identify other areas of potentially suitable habitat for survey or reintroduction in eastern Washington.