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Rare Vascular Plants of the South Puget Sound Prairie Landscape **John Gamon**

Abstract

The Washington Natural Heritage Program (WNHP) currently tracks eighteen vascular plant taxa that occur, or have historically occurred, within the South Puget Sound Prairie Landscape (SPSPL). Six of these occur within grassland habitats and are the subject of this paper. The species, and their WNHP status, are: *Agoseris elata* (Sensitive), *Aster curtus* (Sensitive), *Castilleja levisecta* (Endangered), *Githopsis specularioides* (Sensitive), *Meconella oregana* (Threatened), and *Sidalcea malviflora* var. *virgata* (Possibly Extirpated from Washington).

Aster curtus and *Castilleja levisecta* are endemic to the Puget Trough/Willamette Valley region. *Sidalcea malviflora* var. *virgata* occurs primarily in and south of the Willamette Valley; there is one record from the early 1980's from Thurston County. *Agoseris elata*, *Githopsis specularioides* and *Meconella oregana* all occur in California, Oregon and Washington. However, in Washington they are not restricted to the SPSPL.

Three of the grasslands species are currently thought to be extirpated from the SPSPL: *Agoseris elata*, *Meconella oregana*, and *Sidalcea malviflora* var. *virgata*. *Githopsis specularioides* is currently known from on site within the region, and that site is a grassy bald isolated from the extensive prairie systems. *Castilleja levisecta* is known from only one site within the SPSPL. However, as the largest and healthiest of the world's twelve remaining populations, it is extremely significant. *Aster curtus* is currently known from approximately 50 sites in Washington, most of which are from the SPSPL.

The grassland species in the SPSPL have been under threat since Europeans began settling the region. Conversion to agriculture, housing and business development, gravel extraction, grazing, recreational pressure, invasion of non-native species, fire suppression leading to undesirable plant succession have cumulatively accounted for a phenomenal loss of habitat for plants native to this ecoregion. What little habitat remains is increasingly isolated, fragmented, and further degraded.

The state Department of Natural Resources manages three Natural Area Preserves within the SPSPL that have grassland ecosystems and rare plants: Bald Hill (*Githopsis specularioides*), Mima Mounds (*Aster curtus*), and Rocky Prairie (*Aster curtus* and *Castilleja levisecta*). Fort Lewis, McChord Air Force Base, the Department of Fish and Wildlife, and Thurston County also manage areas with significant populations of *Aster*

curtus. However, in order for the combined conservation efforts of agencies and organizations to be successful, more work is needed. In particular, we need to learn more about how these ecosystems function, and how the rare species respond to management activities and disturbances under both natural and disturbed conditions.

Introduction

The Washington Natural Heritage Program (WNHP) currently tracks eighteen vascular plant taxa that occur, or have historically occurred, within the South Puget Sound Prairie Landscape (SPSPL)(WNHP 1994; Rolph 1996). Six of these occur within grassland habitats and are the subject of this paper. The species, and their WNHP status (WNHP 1994), are:

Endangered

Castilleja levisecta golden Indian Paintbrush

Threatened

Merconella oregano white meconella

Sensitive

Agoseris elata tall agoseris
Aster curtus white-top aster
Githopsis specularioides common bluecup

Possibly Extirpated

Sidalcea malviflora rose checker-mallow
var. *virgata*

These status categories (e.g., Sensitive) describe the status of the species within Washington State. It should be noted that there currently is no state endangered species law in Washington that applies to plants. The status categories assigned by the WNHP are, therefore, meant to be advisory and descriptive only.

In addition to being listed by the WNHP, three of these taxa have standing with the U.S. Fish and Wildlife Service. *Castilleja levisecta* has been formally proposed for listing as threatened under the federal Endangered Species Act (U.S. Fish and Wildlife Service 1994). A final ruling on its status is pending. *Aster curtus* and *Meconella oregana* were previously identified as candidates for listing under the Endangered Species Act (U.S. Fish and Wildlife Service 1993), but are presently considered species of concern (Thomas, pers. com.).

Distribution patterns, occurrence summary information, threats, existing protection, and conservation needs of these species are discussed below.

Distribution Pattern

The rare vascular plants of the SPSPL exhibit a variety of overall distribution patterns. Two of the six taxa tracked by WNHP are unquestionably globally rare species: *Aster curtus* and *Castilleja levisecta*. Both are endemic to the Puget Trough/Willamette Valley region. *A. curtus* occurs from Lane County, Oregon in the southern Willamette Valley to the southern tip of Vancouver Island, British Columbia. *C. levisecta*, historically known from the Willamette Valley northward, is now restricted to the northern portion of its former range, from Thurston County, Washington to the southern tip of Vancouver Island, British Columbia. Within the SPSPL, *A. curtus* is found much more consistently than *C. levisecta*. This is

likely due to a combination of *A. curtus* having a somewhat broader ecological amplitude and its being less susceptible to disturbance than *C. levisecta*. A second pattern is exhibited by *Agoseris elata*, *Githopsis specularioides* and *Meconella oregana*. Each of these occurs from California to Washington, but generally in small, relatively isolated populations. *A. elata* has the broadest ecological amplitude of the three, occurring from the lowlands to moderate elevations in the mountains. It historically occurred in the Puget lowlands, on the Olympic Peninsula, and on both sides of the Cascades.

Githopsis specularioides also occurs in several physiographic provinces, but always at fairly low elevations and in similar habitat conditions. It is found in grass dominated sites in shallow soils over basalt. These sites are quite wet in spring, but dry rapidly as spring and summer progress.

Meconella oregana is the most restricted in Washington of this group, occurring only in the Puget Trough and in the Columbia River Gorge in Klickitat County.

The rarity of these three taxa (i.e., *Agoseris elata*, *Githopsis specularioides*, and *Meconella oregana*) within Washington is partially a function of their being at the edge of their respective ranges within our state. Additionally, *Githopsis specularioides* and *Meconella oregana* are both diminutive annuals that are visible for only very short periods each year. This shared characteristic may contribute to a greater perceived rarity for both species than their actual rarity.

The remaining taxon, *Sidalcea malviflora* ssp. *virgata*, occurs primarily in and south of the Willamette Valley (Hitchcock and Kruckeberg 1957). Its occurrence within the SPSPL represents a disjunction of at least 100 miles from the nearest population in Oregon. Unfortunately, the Thurston County, Washington population is no longer extant. Its presence may simply have represented an unsuccessful colonization event.

Occurrence Summary

The occurrence information presented below was summarized from files of the WNHP, including historic information obtained from old herbarium collection records and information gained from more recent inventory efforts.

Three of the grassland species that are the subject of this paper are currently thought to be extirpated from the SPSPL: *Agoseris elata*, *Meconella oregana*, and *Sidalcea malviflora* var. *virgata*.

Agoseris elata was collected in the late 1800s from the Rochester/Grand Mound vicinity in southern Thurston County. It has apparently not been collected since that time from within the SPSPL. *A. elata* was also collected in the late 1800s from Whidbey Island and from the Olympic Peninsula in 1931. Although *A. elata* is considered extirpated from the SPSPL, several extant populations are known from the Cascades of Washington.

Meconella oregana was collected by J.B. Flett near “Lucama” and near “Edison” in 1896. Although the exact location of the “Lucama” collection is

unknown, it may have been from along Lacamas Creek south of Chehalis. There is also some confusion regarding the “Edison” collection, although it seems likely that it was from near the Edison School, which is just west of I-5 south of the Tacoma Mall. *M. oregana* was also observed within Deception Pass State Park as recently as 1985. Elsewhere in Washington, *M. oregana* is known from the Columbia River Gorge in Klickitat County, where it occurs within open, savanna-like stands of *Quercus garryana* and *Festuca idahoensis*.

Sidalcea malviflora var. *virgata* was observed by two very experienced and reliable botanists in the Scatter Creek Wildlife Area. No collections were made because of the extremely small number of plants present. Seen in the early 1980s, several attempts since then to relocate the taxon have proven unsuccessful. There are currently no known extant sites in Washington of this taxon.

Of the three grassland species of interest that are extant, *Castilleja levisecta* is the highest priority. As stated in the introduction, it has been proposed for listing as threatened under the federal Endangered Species Act (US Fish & Wildlife Service 1994). It is currently known from only twelve sites in the world: 10 in Washington and 2 in British Columbia. Only one of the extant occurrences is within the SPSPL in Thurston County. This population is currently the southernmost known extant population. *C. levisecta* was historically known from Clark County, Washington and from the Willamette Valley in Oregon. The Thurston County occurrence is one of the two best

remaining populations in the world. In addition to the known extant site within the SPSPL, it was collected in 1898 from near Roy, Pierce County, Washington.

Aster curtus is currently known from approximately 50 sites in Washington, most of which are from within the SPSPL. The individual occurrences range in size from just a few clumps within an area of a few square meters to thousands of clumps over hundreds of acres. It occurs in open grasslands as well as in areas that are a mosaic of grassland and oak woodland.

Githopsis specularioides was collected by J.B. Flett in 1896 from “Prairie, Tacoma, Wash.” It is currently known from one site within the region, although that site is a grassy bald isolated from the extensive prairie systems. The site has scattered *Quercus garryana* and *Arbutus menziesii* with an understory containing *Festuca idahoensis*. *G. specularioides* can be very difficult to inventory for, particularly in less than optimal years. It tends to be quite small and the flowers often do not open entirely. Outside of the SPSPL in Washington, *G. specularioides* is known from similar habitats on both sides of the Cascades and in the Columbia River Gorge in Klickitat County.

Threats

The grassland species in the SPSPL have been under threat since Europeans began settling the region. In 1833, the Hudson’s Bay Company built a trading post, Fort Nisqually, near the present-day town of DuPont. Cattle and sheep were raised there, and some land was converted to crop production

(Weyerhaeuser Real Estate Company 1990). By current standards, the development of Fort Nisqually was quite small, but the changes in the landscape were clearly underway.

Since that time, conversion to agriculture, housing and business development, gravel extraction, grazing, recreational pressure, invasion of non-native species, and fire suppression have cumulatively accounted for a phenomenal loss of habitat for plants native to this ecoregion. The extent and nature of the loss of prairie habitat is the topic of a paper by Crawford and Hall (1997) in these proceedings. They report that less than 10% of the original prairie remains in a restorable (or better) condition. This outright loss of habitat has probably been the most significant factor for the perennial species of rare plants. For the two annual species (*Githopsis specularioides* and *Meconella oregana*), competition with the many non-native grass and herbaceous species that accompanied early settlement and livestock grazing may have been the single most significant factor contributing to their present-day rarity. No matter what the cause or causes, the small amount of habitat that does remain for all of these species is increasingly isolated, fragmented, and further degraded.

All of the factors identified above are familiar to those who have studied or been involved in conservation issues. They are not unique to the SPSPL. However, some of these factors warrant additional discussion because of their significance to the region.

The primary existing threats to rare plants within grasslands of the SPSPL

are the ongoing invasions of Douglas fir (*Pseudotsuga menziesii*) and Scot's broom (*Cytisus scoparius*). Even casual examination of aerial photographs taken of prairies 10 to 20 years ago shows a dramatic increase in Douglas fir. Kruckeberg (1991) presents a thorough discussion of this topic, illustrating the changes with photographs and maps. The rapid invasion of the prairies is primarily attributable to aggressive fire suppression over the last 50 to 100 years. In addition to decreasing light availability, conifer invasion eventually changes soil characteristics, leading to a change in the suite of species present. *Aster curtus*, with its extensive rhizomes, can probably persist much longer than species with more limited root systems, such as *Castilleja levisecta*. However, even *A. curtus* will eventually disappear from sites once they become forested. Another potential factor in the decline of *C. levisecta* is the likelihood that the species utilizes mycorrhizal associations with other prairie species. If either the other vascular plant(s) or the fungus involved in such associations declines as a result of conifer invasion, then *C. levisecta* may also decline.

Scot's broom is also posing a serious threat to all remaining prairie habitat in the SPSPL, including habitats for rare plants. Unfortunately, this invader is now ubiquitous within the SPSPL. Even if mowing and/or prescribed fire prove to be effective both at controlling Scot's broom and maintaining native vegetation, such management will need to be continued in perpetuity; there will likely always be a source of seeds close by.

Although Scot's broom is probably the most notorious invader within the SPSPL, other non-native species also pose significant threats to the rare plant species present. For example, *Hieracium pilosella*, a Class A noxious weed (Washington Administrative Code 1996), is present within one area that harbors both *Castilleja levisecta* and *Aster curtus*. *H. pilosella* poses a direct threat through competition, but efforts to control it also pose a threat. That is, spraying herbicides, or even pulling the *H. pilosella*, may create a habitat more favorable for it and other weeds.

Various recreational pursuits also contribute to the endangerment of our native prairies and the rare plants that inhabit them. Horseback riding does occur within some prairie areas, even those managed for their natural features. Mountain bike and dirt bike riding are potential uses of some prairie areas. One of the *Aster curtus* sites is within a county run frisbee golf course. The area is regularly mowed and receives considerable public use. Not surprisingly, the *A. curtus* appears quite stressed at this site.

Many of the rare plant sites within the two military installations within the SPSPL are subject to military training activities. The provisions for protecting the rare plants at these locations are mentioned in the following section.

Existing Protection

Each of the known extant rare vascular plants in the SPSPL have some degree of protection via land management policies and practices of various governmental agencies. The state Department of Natural Resources manages three

Natural Area Preserves within the SPSPL that have grassland ecosystems and rare plants: Bald Hill (*Githopsis specularioides*), Mima Mounds (*Aster curtus*), and Rocky Prairie (*Aster curtus* and *Castilleja levisecta*). The DNR manages Natural Area Preserves for their natural features. All three Natural Area Preserves are thus managed for both the rare plants and the high quality of the native ecosystems found within them. Mima Mounds NAP has a developed recreational component, while use of Bald Hill and Rocky Prairie is limited to approved scientific and educational endeavors.

Fort Lewis, McChord Air Force Base, the Washington State Department of Fish and Wildlife, and Thurston County also manage areas with significant populations of *Aster curtus*. Fort Lewis is probably the single-most important area for the long term survival of *A. curtus*. The Fort contains more populations than any other single land managing agency, several of the populations are larger than those in other ownerships, and the populations are probably better distributed in terms of long-term viability.

The primary objective of management of the Fort landscape is obviously to meet the installation's military mission. As a result, much of the habitat for *A. curtus* is subjected to intensive military training activity. However, there is recognition by the Fort command and personnel of the importance of this species and the ecosystem within which it is found. Some of the *A. curtus* within the Fort is located within areas identified as Research Natural Areas, although the protection that such designation provides within the Fort is uncertain. Some

training activities continue within these areas.

The populations of *Aster curtus* within McChord Air Force Base are much smaller, more isolated and fragmented, and in habitat that is much more degraded than many of those within Fort Lewis. Populations are located within training areas, the approach zone to the main airfield, and within areas open to the base-going public. A very small occurrence of *A. curtus* is within an area that has been recommended for special management for its biological resource values, including wetlands, rare plants, etc. This occurrence of *A. curtus*, however, is extremely small and probably cannot be considered viable.

The Scatter Creek Wildlife Area is managed by the Washington State Department of Fish and Wildlife. A large, healthy population of *A. curtus* is scattered throughout the southern portion of this area. The Department's emphasis on managing the site for its natural values has generally been compatible with *A. curtus*. Mechanical control of Scot's broom is a significant component of that management.

Thurston County manages the Glacial Heritage site for its natural features, including both the vegetation and the mounded topography. A significant commitment to managing the site to control Scot's broom, the greatest threat to *A. curtus* at this site, has been made by the county.

Unfortunately, property boundaries and land management designations are not necessarily adequate to defend against all threats. Weed invasions, the results of fire suppression activities, etc.

continue to threaten the rare plants present within existing managed areas.

Conservation Needs

In order to be successful in retaining the rare vascular flora of the SPSPL, at least four distinct needs must be addressed. First, inventory efforts should continue within the SPSPL for the six rare vascular plant taxa discussed in this paper, as well as for other potentially rare taxa. It is probable that additional populations of rare plants will be discovered within the SPSPL.

Additional populations of any of these taxa would increase the likelihood of success in our collective attempts to retain viable populations within the SPSPL.

Second, we need to have a much more complete understanding of the biology of the individual taxa. What are the breeding systems of each species? How is pollination carried out? What are the habitat requirements of the various pollinators? How do the individual species respond to various disturbance regimes? By answering these, and many other questions, we can begin to construct reasonable models of how the ecosystems function.

Third, our attempts to maintain viable populations of these taxa will depend on our ability to manage the prairie ecosystem as a whole, using the ecological models as our guide. Armed with better information about the individual species and how they interact with other species and the environment, we can hopefully successfully manage at an ecosystem level. Otherwise, we will simply be reduced to gardening remnants of our past.

Finally, an overall conservation plan for the region, such as that developed by The Nature Conservancy of Washington (Rolph 1996), needs to be implemented. Individual conservation activities need to be carefully planned with the entire ecoregion in mind. The full spectrum of protection methods needs to be employed, from simply providing information to landowners, to acquisition of land for natural area preserve designation.

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