



Updated
Palouse Goldenweed
(*Pyrrocoma liatrifomis*)
Occurrences on BLM Land,
Craig Mountain, Idaho

Karen Gray
Janice Hill
Michael Mancuso

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ABSTRACT

Palouse goldenweed (*Pyrrcoma liatrisformis* [=*Haplopappus liatrisformis*]) is a perennial grassland forb endemic to the Palouse bioregion of Idaho and southeastern Washington, including the river canyons that dissect the region. Much of its original habitat has been converted to agricultural uses or degraded by weed invasion. The most recent status survey for Palouse goldenweed was conducted in 1991, at which time it was not known from public lands in Idaho. In 1993, the Idaho Conservation Data Center discovered Palouse goldenweed on Craig Mountain, Idaho. Subsequent surveys by The Nature Conservancy and the Idaho Conservation Data Center further extended the known Craig Mountain distribution. Knowledge of the distribution of Palouse goldenweed is essential to the implementation of management tools such as fire, pesticide and herbicide spraying, and biological weed control. Information on extent, condition, and trends of Palouse goldenweed populations can provide a basis for a conservation strategy for the species and its habitat. Due to the rarity of this species, special attention to its conservation is warranted to prevent listing under the Endangered Species Act. In 2004, the Idaho Conservation Data Center updated population, habitat, and threat information for all known Palouse goldenweed occurrences on Bureau of Land Management land at Craig Mountain.

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BACKGROUND

Palouse goldenweed (*Pyrrocoma liatrisformis* [= *Haplopappus liatrisformis*]) is a perennial grassland forb (family Asteraceae) endemic to the Palouse Bioregion (Bailey 1995) of Idaho and southeastern Washington, including the river canyons that dissect the region. In Idaho, it occurs in Palouse Grassland (Lichthardt and Moseley 1997) and Canyon Grassland (Tisdale 1986) communities. Palouse Grassland in Idaho consists of the Palouse Prairie north of the Clearwater River and the Camas Prairie south of the Clearwater River (Lichthardt and Moseley 1997). Less than 1% of the Palouse Prairie is presently uncultivated, making it one of the most endangered ecosystems in the United States (Noss et al. 1995). Scattered populations of Palouse goldenweed occur on rocky or steep inclusions within cropland on the Palouse and Camas prairies, and along road edges, generally between cultivated or grazed fields and roads. The largest populations are found in the Canyon Grasslands, in the rugged, uncultivated terrain of the river canyons of the Snake and Clearwater rivers and their tributaries. Native vegetation in these canyon areas is becoming increasingly degraded by weed invasions.

A rangewide status report for Palouse goldenweed was written in 1991 (Gamon 1991), at which time it was not known from public lands in Idaho. In 1993, Palouse goldenweed was discovered in the Canyon Grasslands on Craig Mountain, located in northern Hells Canyon, approximately 32 km (20 miles) south of Lewiston, Idaho (Mancuso and Moseley 1994). Subsequent surveys by The Nature Conservancy (TNC) and Idaho Conservation Data Center (IDCDC) extended the known distribution on Craig Mountain (Hill and Gray 1999, Hill et al. 2001, Lichthardt and Gray 2002). The Craig Mountain area supports the only occurrences in Idaho known to be located on public land, including lands managed by the Bureau of Land Management (BLM), Idaho Department of Fish and Game (IDFG), and the Idaho Department of Lands (IDL). Occurrences extend across ownership boundaries in many cases at Craig Mountain.

Palouse goldenweed is a special status plant species for the Idaho BLM (IDCDC 2005). Conservation information for most Palouse goldenweed occurrences in Idaho is > five years old, and in some cases, > ten years old. In 2004, the BLM contracted with the IDCDC to visit known Palouse goldenweed occurrences located on BLM property at Craig Mountain. The objective of this project was to obtain updated location, population, threat, and other conservation information for all Palouse goldenweed occurrences under BLM ownership. Accurate and up-to-date distribution and other conservation information is essential to minimize adverse effects to Palouse goldenweed when the BLM and other cooperating resource agencies implement prescribed fire, herbicide and pesticide spraying, biological weed control, and other management activities at Craig Mountain. In addition, information on extent, condition, and trends of Palouse goldenweed populations can provide a basis for a conservation strategy for the species and its habitat. Due to the rarity of this species, special attention to its conservation is warranted to prevent listing under the Endangered Species Act.

SPECIES INFORMATION

Description: Palouse goldenweed is a perennial forb with a stout taproot and one to several stems up to about 1 m (3 ft) tall (Figure 1). The stems, leaves, and involucre bracts have hairs that vary from being somewhat long and soft to short and stiff. The leaves are somewhat leathery or stiff, often scabrous on the margins, and sometimes have a few sharp teeth. The basal leaves are tufted and generally long and narrow, while the stem leaves become progressively smaller and more sessile going up the stem. The narrow, elongate inflorescence is comprised of one to several flower heads in a raceme or narrow panicle. Individual flower heads are < 2.5 cm (1.0 in) across and approximately 1.3 cm (0.5 in.) high. The involucre bracts are pointed, firm, often pubescent, and green and leafy or green-tipped. The heads generally have 13-21 yellow ray flowers, which are < 1.3 cm (0.5 in) in length (adapted from Cronquist 1955).

The genus *Pyrrocoma* has a base chromosome number of $x = 6$. Palouse goldenweed is hexaploid, with a chromosome count of $n = 18$ (Anderson et al. 1974, Mayes 1976).



Figure 1. Photo of Palouse goldenweed.

Taxonomy: E. L. Greene (1909) described three species: one from near Pullman, Washington, with villous pubescence (*Pyrrocoma liatrifolius*); another from Forest, Idaho, with scabrous hairs (*Pyrrocoma scaberula*); and the third from Spokane County prairies that had reticulate, somewhat scaberulous leaves (*Pyrrocoma suksdorfii*).

Subsequently, all three species were treated as subspecies of *Haplopappus integrifolius* by Hall (1928). He combined *Pyrrocoma liatrifolius* Greene and *Pyrrocoma suksdorfii* Greene under *Haplopappus integrifolius* ssp. *liatrifolius* (Greene) Hall, and designated *Pyrrocoma scaberula* (Greene) as *Haplopappus integrifolius* ssp. *scaberulus* (Greene) Hall. Ray J. Davis (1952) followed Hall's classification, calling plants with villous-tomentulose herbage *Haplopappus integrifolius* ssp. *liatrifolius*, and those with scabrid leaves *H. integrifolius* ssp. *scaberulus*.

St. John (1937) recognized only the villous form of the plant, describing it as *Haplopappus liatrifolius* (Greene) St. John. He believed that *Haplopappus integrifolius* was a very different plant, and removed *H. liatrifolius* from its position as a subspecies. He mentioned neither *Pyrrocoma suksdorfii*, *Pyrrocoma scaberula*, nor Hall's *Haplopappus integrifolius* ssp. *scaberulus*. His flora provides descriptive information only for villous plants.

Cronquist (1955) considered *Haplopappus scaberula*, *H. suksdorfii*, *H. liatrifolius*, and both of Hall's *Haplopappus integrifolius* subspecies to be one species, *Haplopappus liatrifolius*.

Mayes (1976) also considered Greene's three described species to be one species – *Pyrrocoma liatrifolius* Greene. He returned it to the genus *Pyrrocoma*, where it had originally been placed by Greene in 1909. The name *Pyrrocoma liatrifolius* is the preferred taxonomy at present.

None of the above authors mentions resin glands in their descriptions. Plants on Craig Mountain and the Camas Prairie have scabrous leaves and bear glands that secrete a sticky yellow resin. The glands are prominent on the involucre and also often appear on the leaves. These resin glands are present on an isotype, *Heller and Heller 3469* (UC), of *Pyrrocoma scaberula* that was collected near Forest, Idaho (personal communication, J. L. Strothers, 11 January 2005). It is possible that plants from the Craig Mountain vicinity are different from those centered on the Palouse Prairie. Palouse Prairie plants lack resin glands and have herbage that is villous rather than scabrous. A biosystematic review is needed to resolve this question.

Distribution: Palouse goldenweed is known from southeastern Washington and adjacent Idaho. There are approximately 60 known occurrences in Idaho, located in Clearwater, Latah, Lewis, Nez Perce, and Idaho counties (Figure 2). The largest are in the Canyon Grasslands of Craig Mountain, under BLM and IDFG ownership (Figure 3). In Washington, Palouse goldenweed is known from approximately 20 occurrences. Its range is centered in Whitman County, with one occurrence in Spokane County.

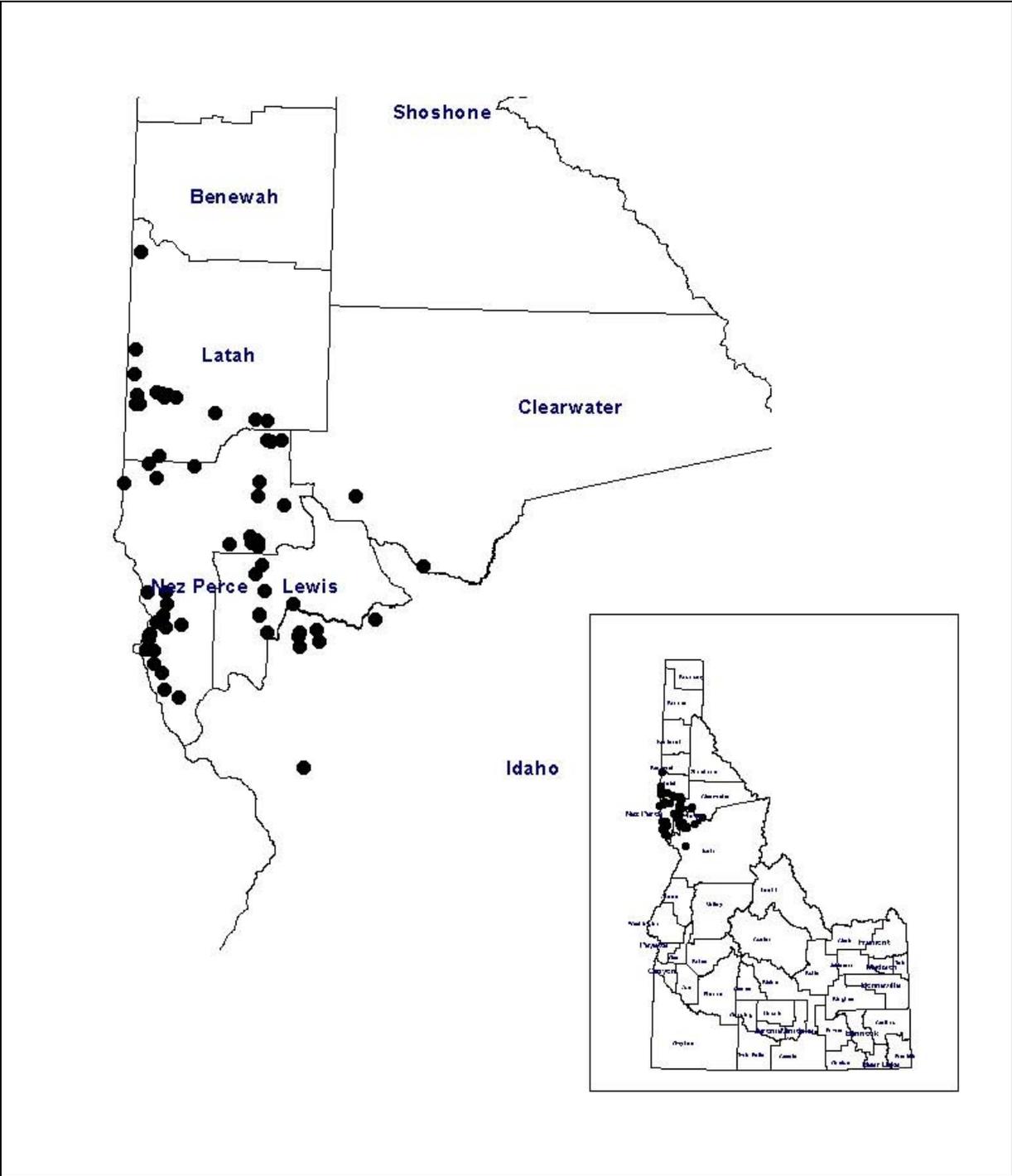


Figure 2. Idaho distribution of Palouse goldenweed.



Figure 3. Known distribution of Palouse goldenweed on Craig Mountain.

Habitat: Palouse goldenweed occupies native bunchgrass grasslands in the Palouse Grasslands and Canyon Grasslands, and transition zones between grasslands and ponderosa pine (*Pinus ponderosa*) or Douglas-fir (*Pseudotsuga menziesii*) habitats. High quality representation of these habitats is very limited within the range of Palouse goldenweed. Most of the original Palouse Grasslands have been converted to agricultural uses. In more recent decades, large-scale invasion by yellow starthistle (*Centaurea solstitialis*), cheatgrass (*Bromus tectorum*), and several other introduced, aggressive weeds has degraded large segments of the Canyon Grasslands ecosystem.

Palouse goldenweed usually grows with the native grasses Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and prairie junegrass (*Koeleria macrantha*). Shrub patches often grow interspersed within the bunchgrass communities. Snowberry (*Symphoricarpos albus*), and native roses (*Rosa woodsii* and *R. nutkana*) are the most common shrub associates, but serviceberry (*Amelanchier alnifolia*), Oregon grape (*Mahonia repens*) and others can also co-occur. Native forbs are usually abundant. Some of the most common include arrowleaf balsamroot (*Balsamorhiza sagittata*), western hawkweed (*Hieracium albertinum*), prairie smoke (*Geum triflorum*), showy fleabane (*Erigeron speciosus*), field chickweed (*Cerastium arvense*), and slender cinquefoil (*Potentilla gracilis*). One or more other rare plant species, such as Spalding's catchfly (*Silene spaldingii*), Palouse thistle (*Cirsium brevifolium*), Jessica's aster (*Aster jessicae*), plumed clover (*Trifolium plumosum* var. *amplifolium*), broadfruit mariposa lily (*Calochortus nitidus*) and greenband mariposa lily (*Calochortus macrocarpus* var. *maculosus*), often occur with Palouse goldenweed.

Conservation status: Palouse goldenweed is globally rare and has a conservation rank of G2 (imperiled globally because of rarity or other factors making it very vulnerable to extinction or elimination; Nature Serve 2004). In Idaho, the species is ranked S2 (imperiled because of rarity or some other factors making it very vulnerable to extirpation from the state; Idaho Conservation Data Center 2005). It is also ranked S2 in Washington state (Washington Natural Heritage Program 2005).

Palouse goldenweed is an Idaho BLM Type 2 special status plant species. This designation is reserved for rangewide/globally imperiled species with high endangerment. It includes species that are experiencing declines throughout their range with a high likelihood of being listed under the Endangered Species Act in the foreseeable future due to their rarity and significant endangerment factors.

METHODS

We visited all known Palouse goldenweed occurrences on BLM lands between 1 July and 18 August 2004, and collected information on population size and area, associated species, habitat condition, and threats. In addition, we obtained a series of GPS readings to more accurately map each occurrence and its component subpopulations. We completed standard rare plant observation forms for each occurrence to document the information collected. This information was used to update the Palouse goldenweed Element Occurrence Records (EORs) in the IDCDC database. We also documented occurrence information for other rare plant species encountered during our Palouse goldenweed survey.

RESULTS

We visited six Palouse goldenweed occurrences on Craig Mountain that are owned, at least in part, by the BLM (Table 1). We extended or refined prior records and documented occurrences not previously in the IDCDC database. Element Occurrence Records (Appendix

A) and maps (Appendix B) for the six occurrences are attached, along with photos from some sites (Appendix C).

Table 1. Palouse goldenweed occurrences visited in 2004.

EO #	Occurrence name	Number of subpopulations	Ownership
34	Billy Creek/Camp Creek Divide	1	BLM, IDFG
38	Tepee Peaks	6	BLM, IDFG
45	Redemsky/Corral Creek	7	BLM
51	Captain John Creek	2	BLM, IDFG, IDL
52	Cave Gulch	1	BLM
62	Middle Creek	9	BLM

Billy Creek/Camp Creek divide (Element Occurrence # 34): A nearly continuous population stretches for more than 1.6 km (1 mile) along a ridge south of Billy Creek from around 560 m (1840 ft) to 927 m (3040 ft) elevation. Our 2004 survey extended this occurrence about 0.8 km (0.5 mile) further down the ridge and 0.4 km (0.25 mile) further up the ridge compared to the area originally mapped in 1993. More plants may occur higher up the main ridge or on its spur ridges in areas unexplored in 2004. An estimated 600 plants were present, primarily in a narrow band on the northerly aspects of the ridge. Other plant species of concern occurred with Palouse goldenweed, including Spalding’s catchfly, Palouse thistle, and greenband mariposa lily. The Element Occurrence rank for this occurrence was downgraded from B in 1993 to C in 2004 because of an increase in weeds. Common crupina (*Crupina vulgaris*), has recently begun to invade the lower slopes of the ridge, and yellow starthistle, white top (*Cardaria chalapensis*), Kentucky bluegrass (*Poa pratensis*), and cheatgrass present threats to the native plant community surrounding the Palouse goldenweed.

Tepee Peaks (Element Occurrence # 38): This occurrence comprises six subpopulations. One new subpopulation was discovered in 2004, along with slight extensions of two others. Subpopulations range in size from approximately 25 plants along less than 0.32 km (0.2 mile) of ridgeline, to 1800 plants dispersed over nearly 1.6 km (1 mile) of ridgecrest habitat. A total of approximately 3000 Palouse goldenweed plants were tallied in 2004. Palouse goldenweed occurs on convex ridgecrests and associated gentle to steep upper slopes on west, north and east aspects. The majority of the occurrence area supports Canyon Grassland communities in good ecological condition, although introduced, aggressive weed species are widespread and locally common in places. The entire occurrence is vulnerable to increased weed invasion.

Redemsky/Corral Creek (Element Occurrence # 45): Seven subpopulations constitute this occurrence. One subpopulation consists of a single plant in Redemsky Flats that was first

observed in 2000 (Hill et al. 2001) in an area that subsequently burned in the Corral Creek Fire of 2001. We observed a plant at the same location in 2004. Another subpopulation occurs near the “Red Barn” in an opening in a dry forest of scattered ponderosa pine and Douglas-fir. The Red Barn population had an estimated 200-300 plants in 1996. In 2004, we counted 86 plants. The area is not yet very weedy, but scattered sulfur cinquefoil (*Potentilla recta*) plants are present, and common crupina occurs nearby. The remaining subpopulations are scattered along two ridges and a connecting swale near Redemsky Creek. The largest subpopulation, of approximately 1100 plants, is scattered over two to three acres near a ridge top in a relatively good-quality native plant community. The adjacent southerly faces, however, support several invasive weeds, including yellow starthistle, scotch thistle (*Onopordum acanthium*), sulfur cinquefoil, and cheatgrass. In the 1990s, a Russian knapweed (*Acroptilon repens*) infestation was treated in the area. Four small subpopulations of Palouse goldenweed occur to the east of the large subpopulation, one in a swale in a grassy opening in a shrubby, open forest, and three on the forest/grassland ecotone along a small ridge to the northeast. These four subpopulations were burned in the Corral Creek fire of 2001, and all grow in close proximity to weeds. Spalding’s catchfly occurs near all seven Palouse goldenweed subpopulations.

Captain John Creek (Element Occurrence # 51): An estimated 600 Palouse goldenweed plants extend along the northwest-southeast trending ridge south of the confluence of Captain John and Madden creeks to a northeast-facing hillside in Section 6. Most of the ridge plants are on IDL and IDFG lands. The hillside subpopulation is in the BLM’s Captain John Creek Research Natural Area (RNA). Additional Palouse goldenweed subpopulations occur north of Captain John Creek on ridges east of Madden Creek. Further surveys of potential habitat in the area would probably extend the distribution of this occurrence further. Spalding’s catchfly, Palouse thistle, and greenband mariposa lily also occur in the area. The Element Occurrence rank was downgraded from B to C in 2004 because of increased weed invasion. Soil disturbance from “trespass cows” in the Captain John/Madden creeks drainage has probably played a role in weed spread and establishment. Yellow starthistle and cheatgrass are particularly abundant, and teasel (*Dipsacus sylvestris*), ventenata (*Ventenata dubia*), and sulfur cinquefoil also present threats. Bur-chervil (*Anthriscus scandicina*) is established on the lower slopes near Captain John Creek. Degradation of the native plant communities near Captain John Creek appears to be occurring rapidly.

Cave Gulch (Element Occurrence # 52): This is the only known occurrence in the Cave Gulch drainage. In 1998, 103 plants were counted (Hill and Gray 1999). Subsequently, Cave Gulch burned in the Maloney Creek fire of 2000. In 2004, we observed only 27 plants. The Palouse goldenweed grows in a relatively high quality grassland community that also supports Spalding’s catchfly, Palouse thistle, and greenband mariposa lily. However, nearby flat areas and south-facing slopes in the area are weedy. Also, aerial herbicide drift has affected native forb species in the area. Palouse goldenweed (Figure 4) and other forbs such as arrowleaf balsamroot (Appendix C, Photo 8), silky lupine (*Lupinus sericeus*), and white-stemmed frasera (*Frasera albicaulis*) exhibited symptoms of herbicide exposure in 2001. Timely control of satellite weed infestations near the Palouse goldenweed would slow habitat degradation within this occurrence.



Figure 4. Photo of Palouse goldenweed exposed to herbicide drift in Cave Gulch, 6 June 2001. The area was backburned in 2000 during the Maloney Creek fire.

Middle Creek (Element Occurrence # 62): Palouse goldenweed occurs on the two major ridges south of Middle Creek. The ridge immediately south of Middle Creek (the Fourth North Bench) has an estimated 4000 plants scattered on open, grassy hillsides and near bunchgrass/dry forest ecotones. Flat areas and southern slopes adjacent to the populations are very weedy, with abundant yellow starthistle and cheatgrass. About 550 plants occur on the second ridge south of Middle Creek (Third North Bench). There are three small subpopulations on the hillside below the road that runs from Corral Creek toward Middle Creek. They occur in relatively good quality bunchgrass communities. However, there are some yellow starthistle satellites on the hillside, and the flat ridgetop above them is heavily infested with yellow starthistle, cheatgrass, field bindweed (*Convolvulus arvensis*), medusahead (*Taeniatherum caput-medusae*) and cylindrical goatweed (*Aegilops cylindrica*). Above the road, Palouse goldenweed occurs in a relatively flat area in a snowberry-rose/bunchgrass mosaic, and also in grassy openings in the dry forest stringer on the northerly aspects of the ridge to the east. The south-facing aspects adjacent to the subpopulations have yellow starthistle/cheatgrass patches that have begun to encroach upon the more northerly aspects that support Palouse goldenweed habitat. A patch of Canada thistle (*Cirsium arvense*) is established just east of the road.

We encountered several other plant species of conservation concern during our survey: greenband mariposa lily, broadfruit mariposa lily, Palouse thistle, Spalding's catchfly, and the moss *Tripterocladium leucocladulum*. Information collected for each of these species has been entered into the IDCDC database. We also revisited the goldback fern (*Pentagramma*

triangularis ssp. *triangularis*) occurrence in Cave Gulch. The occurrence is still extant after the Maloney Creek fire of 2000.

DISCUSSION

On Craig Mountain, the primary threat to the persistence of Palouse goldenweed is degradation of its native plant community due to weed invasion. We encountered several invasive forb species near one or more occurrences on BLM property, including yellow starthistle, Canada thistle, Scotch thistle, Russian knapweed, common crupina, white top, field bindweed, and bur chervil. The annual grasses cheatgrass, Japanese brome (*Bromus japonicus*), ventenata, medusahead and cylindrical goatweed have become more common in the past decade, and stand to increase fire intensity and frequency. In addition, non-native perennial grasses such as Kentucky bluegrass, Canada bluegrass (*Poa compressa*), smooth brome (*Bromus inermis*), and wheatgrass cultivars (*Agropyron* spp.) are present and may be extremely difficult to control. They may have been introduced as pasture grasses or their seeds may have been imported in hay. The Captain John Creek population (EO # 51) is threatened by “trespass” cows that cause ground disturbance and facilitate weed spread and establishment.

Some level of insect depredation is occurring. We observed distorted growth on several Palouse goldenweed flower heads during our survey. After dissecting several heads and finding larvae present, we gathered infested flower stalks and grew the larvae to maturity. We deposited the adults at the William H. Barr Entomological Museum at the University of Idaho. They were identified as *Anthonomus squamosus*, a native weevil (personal communication, F. Merickel, 4 August 2004). These weevils affect reproductive capacity by consuming ovaries and seeds.

In addition to seed depredation, some leaf mining is taking place. It was not uncommon to observe plants with many of the leaves brown and lacy, the tissue between the veins consumed by an unknown agent (Figure 5). Loss of green tissue reduces the ability of the plant to photosynthesize.



Figure 5. Leaf herbivory of Palouse goldenweed. The green tissue has been mined, leaving a filigree pattern of veins.

Aerial herbicide spraying has taken place in some areas that support Palouse goldenweed (Figure 4) and other rare plant species. Herbicide drift can have a direct adverse effect on rare plants and their associated native plant community (Appendix C, Photo 8).

The effect of fire on Palouse goldenweed and the native canyon bunchgrass community is not known. There is little specific information bearing on natural fire intervals in Pacific northwest bunchgrass steppe. Most estimates are based on extrapolation from midwestern prairie, shrub steppe, or dry coniferous forests (Weddell 2001). Because steppe is by definition treeless, the usual methods of inferring fire intervals, charcoal layers or tree ring scars, cannot be used. Historical accounts of canyon grassland vegetation are few, often vague, and rarely mention fire (Gray 2001).

Two of the primary authorities on northwest bunchgrass communities, R. Daubenmire and E. Tisdale, considered the grasslands to be stable, with boundaries, distribution, and species composition determined by climate and soil moisture rather than by fire (Daubenmire 1968,

1970, Tisdale 1986). They considered most native species in the grasslands to be fire-adapted, but not fire-dependent. Franklin and Dyness (1973) also believe that the shrub and grassland components in the *Festuca idahoensis/Symphoricarpos albus* zone (meadow steppe) form a stable mosaic. Grasslands in stable, self-perpetuating stages of succession usually occur under semi-arid or arid conditions. They have lower productivity and produce less biomass than those in more humid regions, thus the “controlling effects of fire are probably minimal” (Kucera 1981).

Fire can aid in conversion of native-dominated *Agropyron* steppe to grasslands dominated by invasive species (Bunting et al. 2003). The invasion of annual grasses into steppe communities affects the fire cycle by providing continuous, dry fuel early in the season. Fires ignite and spread more easily in communities invaded by weeds. In the Intermountain West, fires enhance invasion by cheatgrass and other annual weed species. Ultimately, the fire return interval decreases, which further increases cheatgrass establishment (D’Antonio and Vitousek 1992, Hobbs and Huenneke 1992, Tausch et al. 1995). Because many weed species are well-established in the Craig Mountain area, fire probably has an overall negative effect on native plant community stability and resilience.

BLM lands on Craig Mountain support some of the largest and least fragmented populations of Palouse goldenweed in Idaho. Its presence seems to be indicative of relatively good condition canyon grassland habitat. Maintaining the quality of the remaining canyon grassland communities is important for the conservation of native plants, including rare species.

RECOMMENDATIONS

Further surveys on BLM property between Madden Creek and Middle Creek would help fill in gaps in knowledge about Palouse goldenweed distribution on Craig Mountain. In addition, the habitat between the subpopulations in the Corral Creek/Redemsky Creek area (EO # 45) should be surveyed to ascertain the full extent of that occurrence. The eastern flanks of Craig Mountain, including the Eagle Creek drainage, may also support undiscovered Palouse goldenweed.

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