

**DEMOGRAPHIC MONITORING OF *ASTER JESSICAE* (JESSICA'S ASTER):
SECOND-YEAR RESULTS**

by

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ABSTRACT

Aster jessicae (Jessica's aster) is a tall, rhizomatous aster endemic to the Palouse region of southeastern Washington and adjacent Idaho. Its habitat has been severely reduced by conversion of this region to intensive agricultural uses. It is restricted almost entirely to private lands and has received little attention in terms of survey and monitoring. Five permanent monitoring plots were established in 2001, to monitor demographic parameters in populations occupying contrasting sites. Monitoring sites differ in amount of edge, degree of isolation from other populations, habitat extent, and amount of forest cover. This report summarizes two consecutive years of data from demographic monitoring plots established in 2001.

TABLE OF CONTENTS

ABSTRACT.....	i
TABLE OF CONTENTS.....	ii
LIST OF TABLES.....	iii
LIST OF FIGURES.....	iii
LIST OF APPENDICES.....	iii
INTRODUCTION.....	1
GENERAL SPECIES INFORMATION	
Description.....	1
Similar species.....	1
Present legal or other formal status.....	4
Geographical distribution.....	4
Precise occurrences.....	4
Habitat description.....	5
Other rare or vulnerable species occurring with <i>Aster jessicae</i>	5
Phenology.....	6
Current land ownership and management responsibility.....	6
MONITORING	
Objective.....	6
Methods.....	6
Results.....	8
RECOMMENDATIONS	
Stewardship/Monitoring.....	10
Management.....	11
REFERENCES.....	12

TABLE

Table 1. Demographic data from 2001 and 2002	9
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LIST OF FIGURES

Figure 1. Idaho range of <i>Aster jessicae</i>	2
Figure 2. Line drawing of <i>Aster jessicae</i>	3

LIST OF APPENDICES

Appendix 1. Monitoring plot locations.	
Appendix 2. Diagrams of monitoring plots showing locations of <i>Aster jessicae</i> clusters.	
Appendix 3. Sketches of monitoring plot locations.	
Appendix 4. Demographic data: second-year results	
Appendix 5. Community composition at <i>Aster jessicae</i> monitoring plots.	
Appendix 6. Photos of monitoring plot locations at Gold Hill, Fraser Cemetery, and Freeman Creek Peninsula.	

INTRODUCTION

Aster jessicae (Jessica's aster) is a tall, rhizomatous aster with lavender flowers, endemic to the Palouse region of southeastern Washington and adjacent Idaho (Figure 1). As a result of the intensive clearing and cultivation of the Palouse region, *Aster jessicae* is now largely restricted to fencerows, field corners, wooded draws and other small remnants of its native habitat. Because it occurs almost entirely on private lands, it has received little attention in terms of survey and monitoring. During a biological inventory of Army Corps of Engineers (ACOE) lands adjoining Dworshak Reservoir (Bowers and Nadeau 2000), three new occurrences of *Aster jessicae* were found, essentially representing the only populations known on public land. In 2001, the Idaho Conservation Data Center (IDCDC) took part in a Challenge Cost-share project to do further survey in these areas and to establish a monitoring program for *Aster jessicae*. Surveys in 2001 expanded the extent of the distribution on ACOE land, and found one new occurrence on Bureau of Land Management (BLM) land. In addition, five demographic monitoring plots were established (Lichthardt and Gray 2002). In 2002, we revisited those five plots. Data collected in 2001 and 2002 are presented here along with recommendations for future research and monitoring needs.

GENERAL SPECIES INFORMATION

Description

Aster jessicae is a robust, erect, perennial herb with thick creeping rhizomes (Figure 2). Plants can grow to 1.5 m, but average 1 m. Stems and leaves, particularly on upper portion of the plant are covered with a dense, soft, uniform pubescence. Stems are leafy with entire, broadly lance-shaped leaves. The middle stem leaves partially clasp the stem and the lower leaves tend to dry up and wither as the season progresses. Flowers are numerous on each stem, lavender in color, 2.5-3.5 cm in diameter, and form a broad cluster at the top of the plant (Lorain 1991).

Similar species

Two other asters are partially sympatric with *Aster jessicae*: *Aster conspicuus* (showy aster) and *A. occidentalis* var. *intermedius* (western aster). *Aster jessicae* is distinguished from other, leafy, lavender-flowered asters by its dense pubescence and cordate leaf bases. The pubescence gives the leaves a dull, gray appearance. In contrast to *Aster jessicae*'s lance-shaped leaves, the leaves of *Aster conspicuus* are wide, with an oval or elliptical shape, and plants are glandular in the upper part (Cronquist 1955). It may have a few hairs, but the leaves appear green rather than gray. *Aster occidentalis* var. *intermedius*, which generally inhabits more mesic microhabitats, has smaller flowers (about half the size), has sparse to lacking pubescence, and lacks cordate leaf bases. However, hybrids between it and *A. jessicae* are suspected (Lorain 1991).

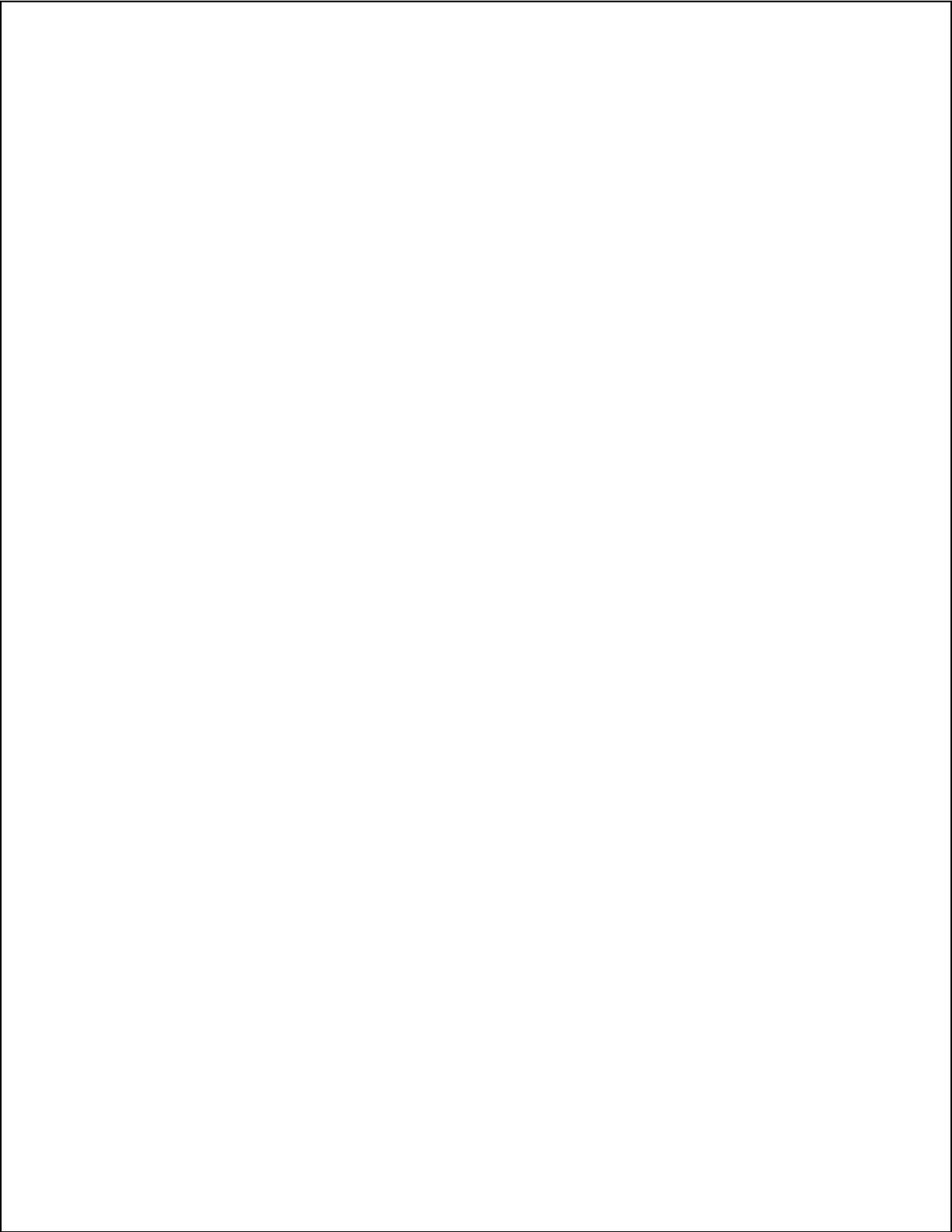


Figure 1. Idaho range of *Aster jessicae*

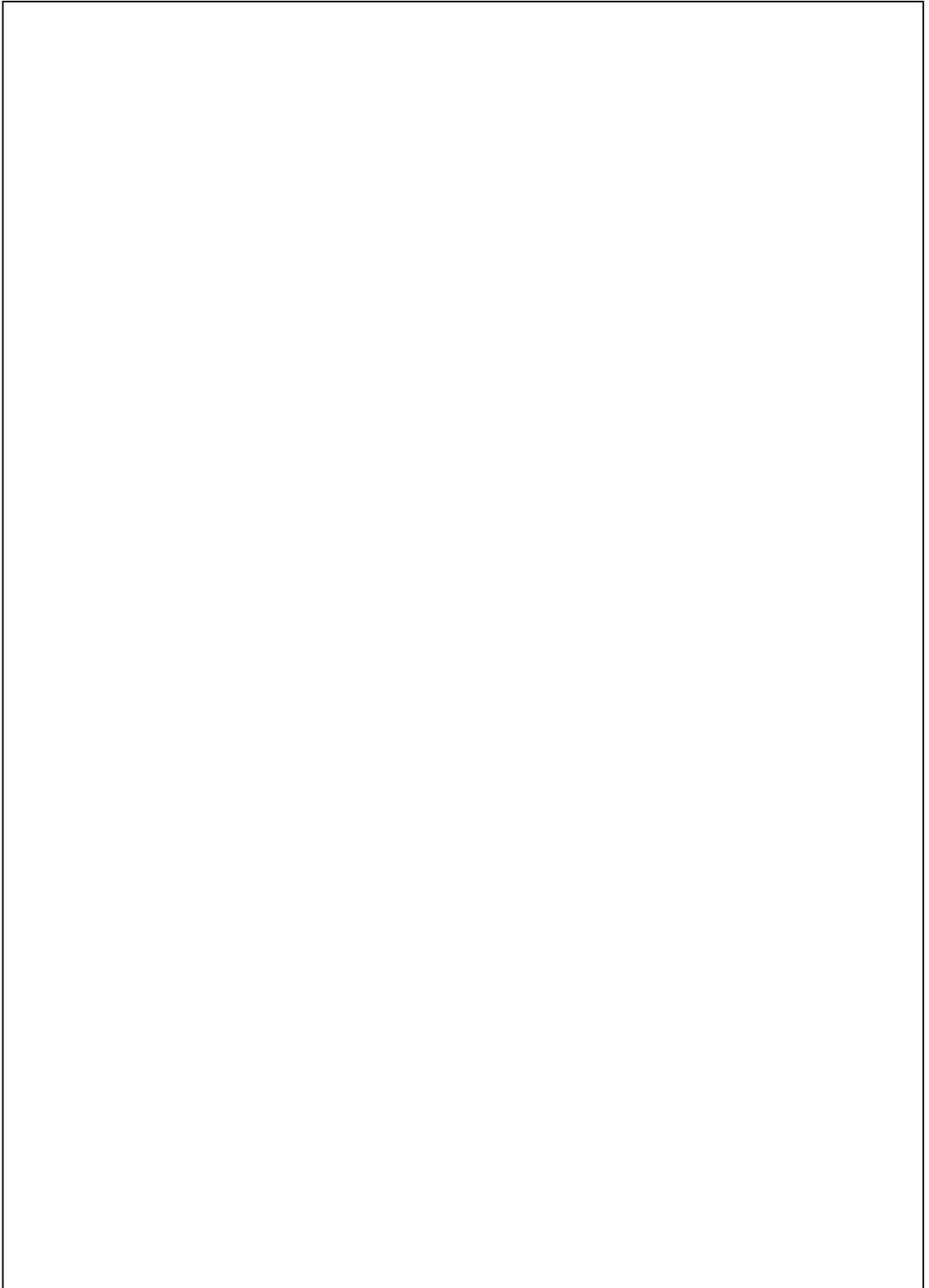


Figure 2. Line drawing of *Aster jessicae* (Cronquist 1955)

Present legal or other formal status

National: *Aster jessicae* is a U.S. Fish and Wildlife Service Species of Concern. Globally, it is ranked G2 (imperiled throughout its range because of rarity or because of other factors demonstrably making it very vulnerable to extinction; NatureServe 2002).

State: In Idaho, *Aster jessicae* is ranked S2 (imperiled because of rarity or because of other factors making it very vulnerable to extinction) by the IDCDC. In Washington, *Aster jessicae* is currently ranked S1 (critically imperiled because of extreme rarity or because some factor of its biology makes it especially vulnerable to extinction) by the Washington Natural Heritage Program.

Review of past status: In 1975, *Aster jessicae* was listed by the U.S. Fish and Wildlife Service as a candidate threatened species (Federal Register, 1 July 1975). In 1980, the species was listed as a Category 2 candidate for listing (Federal Register, 15 December 1980). In 1993, *Aster jessicae* was removed from the candidate list as a result of changes in criteria for federal candidates.

Geographical distribution

Aster jessicae is a narrow endemic unique to the Palouse region of southeastern Washington and adjoining Idaho, extending into river canyons to the east. It occurs in Whitman County, Washington and Latah, Nez Perce, Lewis, Clearwater, and Idaho counties, Idaho. Two major rivers, the Snake and the Clearwater, converge within its range and it extends upstream into the canyons of the Clearwater, but not the Snake.

Precise occurrences

Washington: There are currently nine Element Occurrence Records (EORs)¹ for *Aster jessicae* in the Washington Natural Heritage Program database. All occur within a 21-km (13-mi) radius of Pullman, four along a 10-km (6-mi) stretch of the South Fork Palouse River.

Idaho: There are currently 68 EORs for *Aster jessicae* in the IDCDC database (IDCDC 2002). Five of these are considered historical (not observed since prior to 1980). Information on Idaho occurrences can be obtained from the Idaho Department of Fish and Game, Conservation Data Center in Boise.

¹ As used here, Element Occurrence (EO) refers to a geographic location within which all reported observations of the species are tracked by a single database record (Element Occurrence Record or EOR).

Habitat description

Although endemic to the Palouse region, *Aster jessicae* does not appear to have been associated with open, bunchgrass communities but rather the dry, open forest of drainageways and canyon breaklands at the eastern edge of the Palouse. It is usually associated with shrubs, often growing up through the branches; however, it can occur in the open, where it is among the tallest plants present. *Aster jessicae* occurs between 420 and 1,220 m (1,380 to 4,000 ft) elevation, although seldom lower than 610 m (2,000 ft).

Habitat types: *Aster jessicae* is associated with the following habitat types, in order of decreasing prevalence.

- Pinus ponderosa*/*Symphoricarpos albus* (ponderosa pine/snowberry)
- Festuca idahoensis*/*S. albus* (Idaho fescue/snowberry)
- Crataegus douglasii*/*S. albus* (black hawthorn/snowberry)
- Festuca idahoensis*/*Rosa nutkana* (Idaho fescue/Nootka rose)
- Pseudotsuga menziesii*/*Physocarpus malvaceus* (Douglas-fir/ninebark)
- Pinus ponderosa*/*Physocarpus malvaceus* (ponderosa pine/ninebark)

Forest types follow Cooper et al. (1991) and shrub/grassland types Daubenmire (1970).

Frequently associated species: The following list of frequently associated species was compiled from those mentioned most frequently in *Aster jessicae* EORs, and those occurring with high constancy in monitoring plots. In parentheses is the number of EORs in which the species is mentioned.

Native trees:

- Pinus ponderosa* (41)
- Pseudotsuga menziesii* (17)

Native shrubs:

- Amelanchier alnifolia* (19)
- Crataegus douglasii* (9)
- Holodiscus discolor* (13)
- Philadelphus lewisii*
- Prunus virginiana* (9)
- Rosa nutkana*
- Spiraea betulifolia* (8)
- Symphoricarpos albus* (37)

Native forbs:

- Achillea millefolium*
- Fragaria vesca*
- Helianthella uniflora* (10)
- Lithospermum ruderale*
- Perideridia gairdneri*(6)
- Potentilla gracilis*

Mosses:

- Brachythecium albicans*
- Rhytidiadelphus triquetrus*

Non-natives:

- Hypericum perforatum*
- Phalaris arundinacea*
- Dactylis glomerata*

Other rare or vulnerable species occurring with *Aster jessicae*

Sites supporting *Aster jessicae* also commonly support *Calochortus nitidus* (broad-fruit mariposa lily). Three other Palouse endemics, *Cirsium brevifolium* (Palouse thistle),

Haplopappus liatriformis (Palouse goldenweed) and *Trifolium plumosum* var. *amplifolium* (plumed clover) occur at some sites.

Phenology

Aster jessicae flowers from late July through mid-September. In 2001, flowering was not observed until mid-August. Fruit and seed maturation occur in September and early October, with seed dispersal likely in mid- to late October (Lorain 1991).

Current land ownership and management responsibility

All but four of the known occurrences of *Aster jessicae* are on, or primarily on, private land. Public land ownership includes Army Corps of Engineers (ACOE; three occurrences at Dworshak Reservoir) and Bureau of Land Management (BLM; one occurrence). Small areas of public land are part of EO 005 (BLM) and 042 (ACOE). Minor amounts and portions of populations occur on highway or railroad right-of-ways and several are associated with small cemeteries.

MONITORING

Aster jessicae generally occurs in small patches and strips of land surrounded by roads and fields. Sites include fencerows, field corners, cemeteries, and slopes within stream breaklands. Assuming that population vigor and persistence may be affected by degree of isolation, edge effects, and habitat characteristics such as tree cover and weediness, we proposed to monitor demographic variables at sites differing in these respects.

Objective

Our objective was to measure changes in demographic variables over time as an indication of population vigor and growth, at sites of differing quality (proximity to disturbance, isolation from other populations, habitat extent).

Methods

We selected five populations for monitoring, representing four EOs (Appendix 1). They differ in degree of isolation, extent of habitat, and threats. Accessibility was also a consideration in site selection. Monitoring sites are described briefly below.

Community composition at the five sites is shown in Appendix 5. All plots are in dry forests. All but one are in *Pseudotsuga menziesii*/*Physocarpus malvaceus* (Douglas-fir/ninebark) habitat types. The other (Gold Hill) is apparently a *Pinus ponderosa*/*P. malvaceus* (ponderosa pine/ninebark) habitat type. Seral stage varies from mid- to late-seral.

Gold Hill: Plot 1 is on a short, forested slope at a drainage head, in an isolated stand of medium (25-45 cm dbh) ponderosa pine (*Pinus ponderosa*/*Physocarpus malvaceus* habitat type). Although a large habitat remnant by *Aster jessicae* standards (approximately 0.1 ha), adjoining areas have been either cultivated, grazed, or logged, resulting in sharp edges on most of the perimeter. This site is part of a large, discontinuous metapopulation in the upper Potlatch River drainage (EO 023). There are other subpopulations close by.

Fraser Cemetery: Plot 2 is in a small, approximately 400 m², forested “island” adjoining a cemetery on one side and surrounded on others by access roads. The stand is made up of fairly dense, mostly pole-sized Douglas-fir with a shrub understory. The entire stand represents an edge environment.

Freeman Creek Peninsula (FCP) and Little Bay: On ACOE ownership, these populations represent the most natural (i.e., unfragmented) conditions with the least edge effects, and have the most potential for continued monitoring and protection. Little Bay is an area being evaluated for possible prescribed burning. One plot was established at FCP (plot 3) and two plots (4 and 5) at Little Bay.

At FCP there exists extensive, undisturbed habitat for *Aster jessicae*. The habitat is south-facing and very patchy, with widely scattered ponderosa pine of a variety of size classes, interspersed with bunchgrass (*Festuca idahoensis*–*Agropyron spicatum*) balds and rock outcrops. Bunchgrass openings have a large non-native component. *Aster jessicae* is found in and near clumps of shrubs with scattered trees. Through additional survey in 2002, we extended the population to the east and west. Additional subpopulations in the area are likely. Plot 3 is at the edge of a patch of young forest, extending into the adjoining bunchgrass community (i.e., it occurs on a natural edge environment).

Little Bay South (plot 4): This population has high cover of mature Douglas-fir and ponderosa pine with a patchy understory of ocean spray (*Holodiscus discolor*). Edge effects are probably minimal. This may be an example of habitat where stand closure has reduce vigor of *Aster jessicae*.

Little Bay North (plot 5): *Aster jessicae* plants are on the exposed western edge of a small fragment of late-seral Douglas-fir/tall shrub, at the top of a road cut. The area is mostly open, shrubby, and criss-crossed by old skid roads. The several populations in this area are small and widely scattered.

At each site, a circular, 11-m radius plot was marked at the center using a fencepost or rebar stake. The center post was located in such a way as to include as much as possible of the local subpopulation. This plot size is standard in describing forest vegetation (Bourgeron et al. 1991) and is an area that can be searched reasonably thoroughly for inconspicuous, vegetative stems. As it turned out, this plot size encompassed an entire subpopulation, or highly a contagious group of plants at most sites.

From the centerpost, we measured distance (in meters) and azimuth (in degrees) to the center of each cluster of *Aster jessicae* stems. (A back-azimuth was actually taken at the plant, to avoid magnetic interference from the steel post). Stems generally grow in loose clusters which may represent single, or multiple genets. At the scale we were mapping (1 cm: 1 m) it was impractical to separate stems less than 2 dm apart. Stems growing within 4 dm of one another were generally mapped as part of the same genet unless they appeared to belong to two separate, discernable clusters. In 2002, plants that were part of the same subpopulation, but outside the plot, were also mapped. We later decided to limit monitoring to plants within the plot, which provides a reasonably searchable, defined area. We numbered each genet and recorded the number of stems (ramets), the number of flowering stems, and the number of stems with the top nipped off (“grazed”). In 2002, we first observed rosettes (plot 3) that appeared to be *Aster jessicae*. We documented and mapped them in order to determine their identity in future visits.

In order to accurately reestablish the plot, as well as to quantify tree density, we recorded the distance and azimuth to the inside face of each tree inside and near the plot. Other physical landmarks such as fences and stumps were also documented. The distances and azimuths measured were used to make a diagram of each plot (Appendix 2).

The plot centerpost was also used to define a circular plot for describing the plant community. An 11-m radius plot was used where the community accommodates this. At Fraser Cemetery, Little Bay North, and Little Bay South, a 6-m radius was used (113 m²), making 1 m² approximately 1%. In 2001 this plot was used to estimate canopy cover by species (Appendix 5). At that time, habitat type, slope, and aspect were also recorded.

All plot center locations were recorded using a GPS unit set at NAD 27. Locations were mapped on USGS 7.5' quads (Appendix 1), and a sketch was made to help in relocating the plot (Appendix 3).

Results

Demographic data collected at the five monitoring sites are summarized in Table 1. Tables showing distance and azimuth to each cluster, and stem number and type for each, can be found in Appendix 4. Photos of plots 1, 2, and 3 can be found in Appendix 6.

The largest number of genets, 39 to 41 by our estimate, is in plot 3 at Freeman Creek Peninsula (FCP). However, the Gold Hill population had a much larger number of stems, in only 13 clusters (primarily the result of one very large cluster). Stems generally occur in clusters of one to ten. However, the large cluster at Gold Hill had more than 150 stems in a 2 m diameter area.

The total number of clusters and of stems, over all plots, was higher in 2002 than 2001, but Freeman Creek Peninsula showed a net decrease in number of clusters. Clusters were not defined at Little Bay South in 2001. Some of the changes in numbers of clusters may be the result of new ramets being mapped as new genets (i.e., we may be defining genets too narrowly) or of genets moving spatially, which some appeared to do. Also, the possibility that small vegetative stems were missed in 2001 cannot be ruled out.

Table 1. Demographic data from 2001 and 2002.

Site (plot no.)	Number of clusters*		Total number of stems		Reproductive stems		Grazed stems		Area (m ²) ***
	2001	2002	2001	2002	2001	2002	2001	2002	
Gold Hill (1)	12	14	314	351	**	75	86	49	703
Fraser Cemetery (2)	7	10	28	38	13	18	0	0	13
Freeman Creek (3)	41	39	132	121	9	3	42	58	217
Little Bay North (4)	6	9	25	33	13	15	0	2	11
Little Bay South (5)	6-8	5	15	9	2	3	1	2	24
Totals	72	77	514	552	**	114	129	111	

* As an estimate of genets.

** Reproductive stems were not counted at Gold Hill in 2001

*** Area of the smallest rectangle that can encompass all plants.

The number of clusters identified is subjective, since it is impossible to discern whether stems are connected to each other underground or not. This inability to identify genets detracts from our ability to quantify recruitment or mortality. Nevertheless, comparing maps from year to year may allow us to estimate these parameters. The total number of stems is one indicator of population vigor, but the number of genets in a population is important from the standpoint of genetic diversity, even if we can only make an estimate of that number. The number and proximity of subpopulations may be another important factor in population viability that is not currently part of plot methodology.

By examining the plot maps (Appendix 2) we can identify new genets that occurred at large distances from any others, and therefore were not present in 2001 or were overlooked. This synthesis of the data leads to the following conclusions for each plot (a “gain” means a plant not present or overlooked in 2001).

- Plot 1: A gain of two genets (13 and 14). All previous genets relocated.
- Plot 2: A gain of at least two genets (8 and 13). Other losses and gains may be a result of movement.
- Plot 3: A loss of four genets that occurred in upslope, apparently drier, weedy area. Also a gain of five (nos. 43, 45, 46, 47, and 48).
- Plot 4: A gain of two to three genets (7, 8 and/or 9).
- Plot 5: Genets were estimated at six to eight in 2001 with only genet 1 being clearly distinct. In 2002 a loose group of 14 stems was broken into four genets (2-5). Therefore no change in genet number was detectable.

Stem numbers varied somewhat between years which would be expected for a rhizomatous species. FCP and Little Bay South are characterized by high proportions of vegetative stems.

In 2001, 25% of total stems were grazed; in 2002, 20%. Grazing has not been observed at Fraser Cemetery, but is prevalent at Gold Hill and FCP. Grazed stems could not be classified as to reproductive status. Grazers are assumed to be deer or elk in all cases.

RECOMMENDATIONS

Stewardship/monitoring

Due to the reduction in its historical habitat and numerous threats inherent in the size and isolation of most occurrences of *Aster jessicae*, we believe that the species could become threatened by extinction in the foreseeable future. We therefore recommend the following:

- 1) Because populations with the highest potential for viability occur on ACOE ownership, a conservation agreement should be written and cosigned by ACOE and the USFWS.
- 2) A conservation strategy should be written.
- 3) Seed should be collected from populations throughout the species' range for testing and long-term storage. This would provide *ex-situ* gene conservation and facilitate any future reintroduction effort. Data on seed production could be collected. Plants grown from seed at a local nursery could provide information on growth and development.
- 4) Monitoring plots should be revisited annually for four years, after which an appropriate monitoring interval would be proposed. Only plants within the 11 m radius will be used for data comparison, but plants outside that radius will still be mapped.
- 5) We recommend that current, population-based monitoring at Dworshak reservoir be augmented with monitoring on the stand and landscape level. If *Aster jessicae* populations are effected by either wildfire or prescribed fire, effects may be indirect, through alteration of the plant community.
- 6) Tests of genetic variation within and among populations would be useful in determining how that variation is partitioned. This could have a bearing on a conservation strategy, preserve design, seed collection, and prioritizing populations for conservation.

Management

The ACOE should carefully monitor stands in which *Aster jessicae* occurs, and no management should be used which may effect a downward trend in the populations. Prescribed fire is part of the management plan for the Dworshak Project Area. Known *Aster jessicae* locations should be protected from the direct effects of fire fighting, fire management (fire breaks etc.), and weed control. Effects of fire on *Aster jessicae* should be monitored.

Roads represent an avenue of weed introduction and increase. Motorized recreation should be discouraged in these areas and the primitive roads that currently exist should not be improved.

REFERENCES

- Bailey, R., P. Avers, T. King, and W. McNab. 1994. Ecoregions and subregions of the United States (map). USDA Forest Service. Washington, DC.
- Bourgeron, P.S., R.L. DeVelice, L.D. Engelking, G. Jones, and E. Muldavin. 1991. Western Heritage Task Force site and community survey manual. Version 91C. Western Heritage Task Force, Boulder, CO. 24 p.
- Bowers, D. and S. Nadeau. 2000. Inventory of fungi, plants, and wildlife in the Dworshak Reservoir Project Area, Idaho. Interim report. Idaho Department of Fish and Game, Region 2, Lewiston. 75 p.
- Cooper, S.V., K.E. Neiman, and D.W. Roberts. 1991. Forest habitat types of northern Idaho: A second approximation. USDA Forest Service General Technical Report INT-236. Intermountain Research Station, Ogden, UT. 143 p.
- Cronquist, A. 1955. Part 5: Compositae. In C.L. Hitchcock, A. Cronquist, M. Ownbey, and J.W. Thompson, Vascular Plants of the Pacific Northwest. University of Washington Press. 343 p.
- Daubenmire, R. 1970. Steppe vegetation of Washington. Technical Bulletin 62. Washington Agricultural Experiment Station. 129 p.
- Idaho Conservation Data Center. December, 2002. Biological and Conservation Data System. Idaho Department of Fish and Game, Boise. Database.
- Lichthardt, J. and K. Gray. 2002. Survey for *Aster jessicae* (Jessica's aster) and establishment of demographic monitoring plots. Idaho Department of Fish and Game, Conservation Data Center, Boise, Idaho. 13 p. plus appendices.
- Lorain, C.C. 1991. Report on the conservation status of *Aster jessicae*, in Idaho and Washington. Idaho Department of Fish and Game, Conservation Data Center, Boise. 57 p. plus appendices.
- NatureServe. 2002. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.6. Arlington, Virginia, USA: NatureServe. Available: <http://www.natureserve.org/explorer>.

