

**SURVEY FOR *ASTER JESSICAE* (JESSICA'S ASTER) AND
ESTABLISHMENT OF DEMOGRAPHIC MONITORING PLOTS**

by

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May 2002

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**Report prepared for
Idaho Department of Parks and Recreation
through Section 6 funding from
U.S. Fish and Wildlife Service, Region 1**

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. This report documents the results of further survey for *Aster jessicae* and the establishment of demographic monitoring plots. One new occurrence of *Aster jessicae* was recorded (068) and 11 occurrences revisited and updated, in most cases expanding the extent of the occurrence. A permanent monitoring plot was established in each of five populations of *Aster jessicae*. Baseline demographic data are reported.

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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. However, two of these discoveries were made too early in the year to do efficient surveys. In 2001, the Idaho Conservation Data Center (CDC) took part in a Challenge Cost-share project to do further survey in these areas and to establish a monitoring program for *Aster jessicae*.

Objectives of this project were to: 1) revisit sites discovered in 2000 on ACOE lands adjoining Dworshak Reservoir, 2) conduct further survey for *Aster jessicae* on public lands, and 3) establish demographic monitoring plots in at least three different *Aster jessicae* populations.

This report is organized in two parts:

- 1) The first part contains general information about *Aster jessicae* and is organized under standard headings used in status survey reports to the U.S. Fish and Wildlife Service (USFWS). This provides essential background information to those using this report, and facilitates updating of information contained in the most recent status survey report (Lorain 1991) or in the Plant Characterization Abstract (PCA) for *Aster jessicae*, a database record maintained by the Idaho CDC.
- 2) The second part details survey and monitoring work accomplished in 2001.

GENERAL SPECIES INFORMATION

Classification and nomenclature

Scientific name: *Aster jessicae* Piper

Pertinent synonyms: *Aster latahensis* Henderson and *Symphyotrichum jessicae* (Piper) Nesom.

History of knowledge of the taxon

This is covered in detail in Lorain (1991). *Aster jessicae* was apparently first collected in the vicinity of Pullman, Washington by C. V. Piper in 1893, and initially identified as *Aster integrifolius* Nutt. Piper did not describe the taxon until 1898. Over the next 90

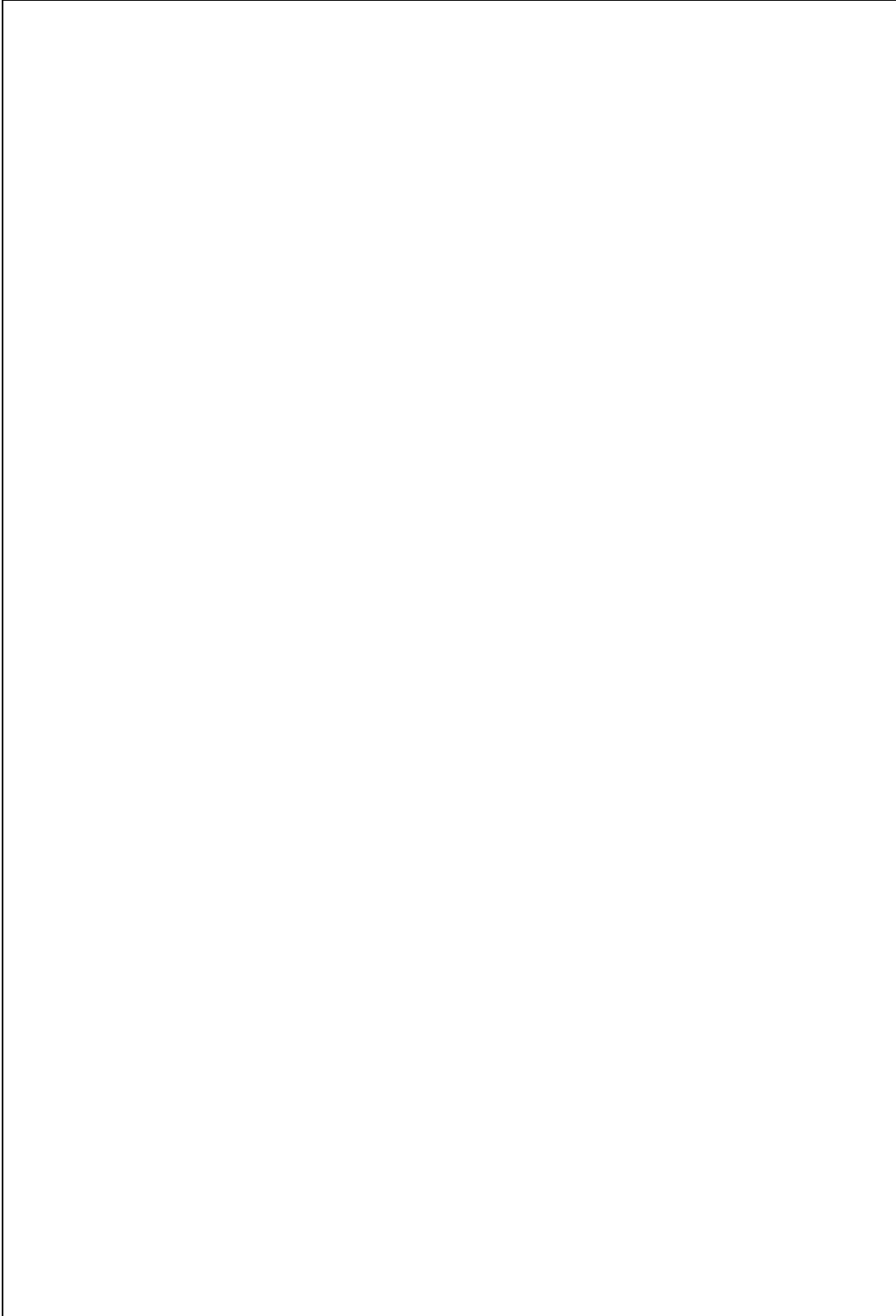


Figure 1. Idaho range of *Aster jessicae*.

years very few specimens were collected and little was known about the species. Then, an *Aster* researcher at the University of Victoria, Dr. Geraldine Allen, discovered 35 new populations between 1984 and 1986. In 1990, status surveys for *Aster jessicae* were conducted in Idaho and Washington, resulting in the addition of 20 occurrences¹ to the Idaho database. Nine previously known populations were relocated in Washington, all in Whitman County. During the past 10 years, 7 new occurrences have been added to the Idaho database, and none to the Washington database.

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) by the Natural Heritage network.

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 Idaho CDC. 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.

Description

General, nontechnical description: *Aster jessicae* is a robust, erect, perennial herb with thick creeping rhizomes (Figure 2), that typically grows in large clumps. Plants can grow to 5 ft, but average 3 ft. 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, 1-1.5 inches in diameter, and form a broad cluster at the top of the plant.

Technical description: *Aster jessicae* is a stout perennial from short or elongate rhizomes, 4-15 dm tall, the herbage densely and uniformly soft-pubescent or puberulent, or the lower parts glabrate; leaves ample, the lower abruptly petiolate, often deciduous, the middle ones sessile, broadly lanceolate or broader, 6-13 cm long and 1.5-3.5 cm

¹ An “occurrence” is an observation submitted to the Idaho Conservation Data Center for entry into a national database. Each occurrence is mapped and all available information entered into a database record (Element Occurrence Record or EOR). Nearby occurrences may be grouped into the same EOR.

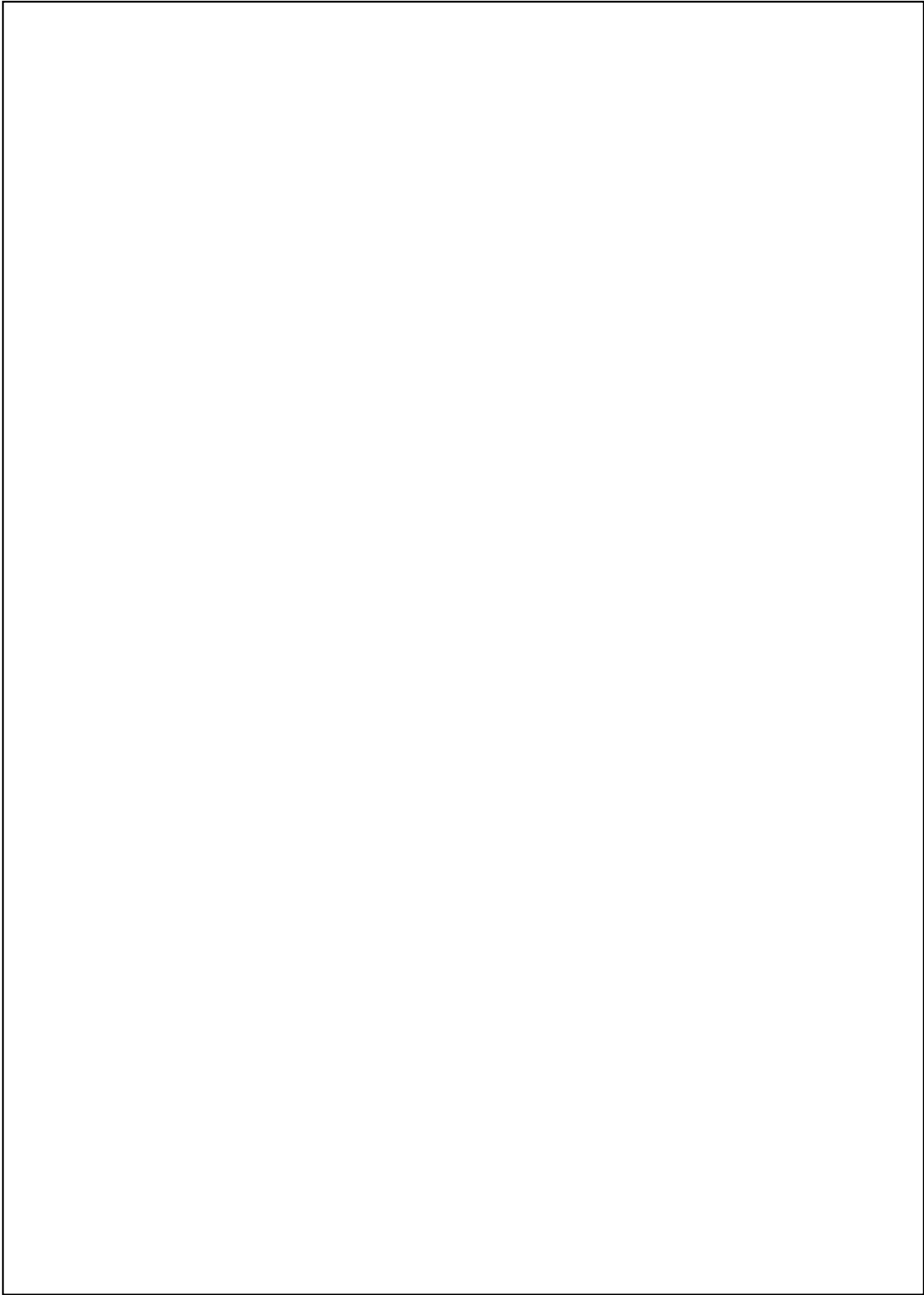


Figure 2. Line drawing of *Aster jessicae* (Cronquist 1955).

wide; inflorescence paniculiform, usually with numerous heads; involucre 7 – 10 mm high, the bracts pubescent, slightly to evidently imbricate; rays mostly 18 – 30, mostly bluish, 12 – 20 mm long; pappus tawny; achenes pubescent (Cronquist 1955).

Local field characters: *Aster jessicae* is distinct from other, leafy, lavender-flowered asters in its unusually robust nature, dense pubescence, and cordate leaf bases. Plants tend to grow in clumps of 10-50 or more stems. The only sympatric aster is *A. 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 the two species are suspected (Lorain 1991).

Geographical distribution

Range: *Aster jessicae* is a localized endemic unique to the Palouse region of southeastern Washington and adjoining Idaho, and river canyons just 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.

Major population centers in Idaho include Little Bear ridge east of Moscow, the Little Potlatch River, lower tributaries of the Clearwater River, and the north end of the Camas prairie.

Precise occurrences

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

Idaho: There are currently 68 EORs for *Aster jessicae* in the Idaho CDC database. 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.

General environment and 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 1,400 and 4,000 ft elevation, although seldom lower than 2,500 ft.

Physiographic province: The range of *Aster jessicae* lies entirely within the Palouse Prairie Section of the Great Plains–Palouse Dry Steppe Province (Bailey et al. 1994).

Vegetation physiognomy and community structure: The first five habitat types below were listed by Lorain (1991) in order of decreasing association with *Aster jessicae*. The sixth was added by the current authors.

Pinus ponderosa/*Symphoricarpos albus* (Ponderosa pine/snowberry)
Festuca idahoensis/*S. albus* (Idaho fescue/snowberry)
Crataegus douglasii/*S. albus* (black hawthorn/snowberry)
F. 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 ruderales
Perideridia gairdneri (6)
Potentilla gracilis

Mosses:

Brachythecium albicans
Rhytidiadelphus triquetrus

Non-natives:

Hypericum perforatum
Phalaris arundinacea
Dactylis glomerata
Cirsium spp.

Other rare or vulnerable species occurring in habitat of this taxon: Sites supporting *Aster jessicae* also commonly support *Lomatium dissectum* var. *dissectum* (fern-leaved desert parsley), a west-coast disjunct, or *Calochortus nitidus* (broad-fruit mariposa lily; G3/S3). Two other Palouse endemics, *Haplopappus liatrifolius* (Palouse goldenweed; G2/S2) and *Trifolium plumosum* var. *amplifolium* (plumed clover; S2) 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 (three occurrences; Dworshak Reservoir) and Bureau of Land Management (BLM; one occurrence). EORs 005 and 042 include small areas of public land. Minor amounts and portions of populations occur on highway or railroad right-of-way; several are associated with small cemeteries.

Evidence of threats to survival

Roadwork and spraying have severely impacted or extirpated one subpopulation that is part of the Upper Ford Creek Road occurrence (060) and one that is part of the Greer grade occurrence (064).

SURVEY AND MONITORING

Survey

Ninety-four percent of the Idaho occurrences of *Aster jessicae* are on private lands where no legal protection is afforded them. In 2000, several populations were discovered on federal lands adjoining Dworshak Reservoir where additional areas of suitable habitat exist. In August of 2001 we relocated the three Dworshak Reservoir populations, conducted further survey on ACOE and BLM lands, and revisited several previously known populations.

Methods: The three occurrences of *Aster jessicae* found at Dworshak Reservoir in 2000 (065, 066, and 067) were relocated, and thorough surveys conducted while plants were in flower (late August). Two monitoring plots were established at Little Bay (066) and one at Freeman Creek Peninsula (065)² One additional area of ACOE land was surveyed at Merry's Bay. Habitat is limited to the lower portions of the reservoir, downstream from Dent bridge.

In addition, we examined land ownership maps for areas of public ownership in potential habitat. These were primarily isolated BLM parcels along the Clearwater River Canyon. In traveling to these parcels we also revisited any known locations in the vicinity.

² So-called because filling of the reservoir has left a distinct, east-west running point of land south of Freeman Creek.

Results: As a result of our survey, one new occurrence of *Aster jessicae* was recorded (068) and 11 occurrences revisited and updated, in most cases expanding their extent. The new occurrence is on an isolated parcel of BLM ownership at Harper’s Bend in the Clearwater River Canyon (Appendix 1, Map 1). An additional, small population was found at Dworshak Reservoir, near Merry’s Bay (Appendix 1, Map 2), and was added to EOR 042. *Aster jessicae* was not found in the Lolo Creek ACEC, although it does occur in that vicinity (Appendix 1, Map 3). Occurrences primarily on public land now include:

- Army Corps of Engineers (Dworshak Reservoir): Freeman Creek Peninsula (065), Little Bay (066), and West of Dent (067).
- Bureau of Land Management: Harper’s Bend (068).

These occurrences are significant in that there is surrounding, unoccupied habitat, and they are under public ownership.

The “West of Dent” population apparently consists of only one cluster, possibly a single genet. The population at Freeman Creek Peninsula is at least 10 acres in extent with several subpopulations consisting of numerous genets. At Little Bay, *Aster jessicae* is scarce, but there appears to be extensive suitable habitat. Complete EORs for these sites, with population information, can be obtained from the Idaho Department of Fish and Game, Conservation Data Center in Boise.

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 isolation and disturbance would affect population vigor and demographics, we sought to represent different site types with monitoring plots. Our objective was to measure changes in demographic variables over time as an indication of population vigor and growth, at sites differing in disturbance level.

Methods:

We selected four populations for monitoring, which differ in degree of isolation, extent of habitat, and threats. Accessibility was also a consideration in site selection. Monitoring sites (subpopulations) are described briefly below:

Gold Hill—Plot 1 is on a short, forested slope at a drainage head. Although a large remnant by *Aster jessicae* standards, adjoining areas have been either cultivated, grazed, or logged. This site is part of a large, discontinuous metapopulation in the upper Potlatch River drainage (EOR 023).

Fraser Cemetery—Plot 2 is in a small, forested “island” adjoining a cemetery on one side and surrounded on others by access roads. It is located at the edge of the rolling upland above the Lolo Creek watershed.

Freeman Creek Peninsula (FCP) and Little Bay—On ACOE ownership, these populations represent the most natural (i.e., unfragmented) conditions and 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 (3) was established at FCP and two (plots 4 and 5) at Little Bay. Little Bay South, with only two genets, was thought to be a good location for monitoring because of public ownership and relatively intact habitat.

At Freeman Creek Peninsula there exists extensive, undisturbed habitat for *Aster jessicae*. The habitat is south-facing and very patchy, with large grassy openings and outcrops. *Aster jessicae* is found in and near clumps of shrubs with scattered trees. The monitored population occurs at the edge of a patch of young forest, extending into the adjoining bunchgrass community.

Easily measured population parameters were needed that would indicate the size and reproductive output of the population. We used:

- Number of stems, as an indicator of vegetative reproduction.
- Number of flowering stems, as an indicator of reproductive output.
- Number of groups of stems as an indicator of population size.

At each site, a circular, 11-m radius (approximately 0.1 ac) 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. One-tenth acre is a standard size used 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 contagious group of plants at most sites. Most of the subpopulations sampled were isolated by roads, fields, or other unsuitable habitat.

From the centerpost, we measured distance (m) and azimuth (degrees) to the center of each cluster of *Aster jessicae* stems. A back-azimuth was actually taken from the plant to the post, to avoid interference from the steel post. The compass was set to a declination of 19° E. Stems generally grow in loose clusters which may represent single, or a few genets. 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. At the scale we were mapping (1 cm: 1 m) it was impractical to separate stems less than 2 dm apart. Because our objective is to compare the same population over time, we saw no reason to restrict monitoring to the plants within the plot. Plants that were part of the same subpopulation, but outside the plot, were also mapped.

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 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 used. 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. A 11-m radius (approximately 0.1 ac) was used where the community would accommodate this. At Fraser Cemetery, Little Bay North, and Little Bay South, a 6-m radius was used (113 sq. m), making 1 sq. m approximately 1 percent. Within the plot, canopy cover classes were estimated by species. Habitat type, slope, and aspect were recorded.

All plot locations were recorded using a GPS unit set at NAD 27. Locations were mapped on USGS 7.5' quads (Appendix 1, Maps 4-7), 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. The largest number of genets, by our estimate, was found at Freeman Creek Peninsula (FCP); however, the Gold Hill population had a much higher number of stems, in only 13 clusters. FCP and Little Bay South are characterized by high proportions of vegetative stems. The size of the subpopulation (Table 1) is the area of the smallest rectangle that can encompass all plants.

Tables showing distances, azimuths to each cluster and to trees, as well as demographic data for each cluster, can be found in Appendix 4. Photos of plots 1, 2, and 3 are appended to copies of this report to the USFWS and Idaho CDC (Appendix 6).

Table 1. Baseline demographic data from four *Aster jessicae* monitoring sites.

Site (plot no.)	No. of clusters	Total no. of stems	Flower-ing stems	Vegeta-tive stems	Grazed stems	Area (sq. m)
Gold Hill (1)	13	314	*	*	86	703
Fraser Cemetery (2)	7	28	13	15	0	13
Freeman Creek (3)	41	132	8	124	45	217
Little Bay North (4)	6	25	13	12	0	11
Little Bay South (5)	2	15	1	14	1	24
Totals	69	514	35	164	132	

* At Gold Hill plants were in bud or vegetative, but reproductive status was not recorded.

Community composition at the five monitoring 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) type. Seral stage varies from mid- to late-seral. The following species occurred with 80 percent or higher constancy:

Trees	<i>Pinus ponderosa</i> <i>Pseudotsuga menziesii</i>	Forbs	<i>Achillea millefolium</i> <i>Fragaria vesca</i>
Shrubs	<i>Amelanchier alnifolia</i> <i>Holodiscus discolor</i> <i>Spiraea betulifolia</i> <i>Symphoricarpos albus</i>	Mosses	<i>Lithospermum ruderale</i> <i>Perideridia gairdneri</i> <i>Potentilla gracilis</i> <i>Brachythecium albicans</i> <i>Rhytidiadelphus triquetrus</i>

Although not commonly appearing in plots, *Helianthella uniflora* (little sunflower) was observed to be a very common element of *Aster jessicae* habitat.

Structure and composition of the vegetation varied as follows:

Gold Hill: An isolated stand of medium (10-17" dbh) Ponderosa pine (*Pinus ponderosa*/*Physocarpus malvaceus* habitat type).

Fraser Cemetery: A small, isolated stand of mostly pole-sized Douglas-fir with a shrub understory.

Freeman Creek Peninsula: Widely scattered Ponderosa pine of a variety of size classes, interspersed with bunchgrass (*Festuca idahoensis*–*Agropyron spicatum*) balds.

Little Bay North: A small fragment of late-seral Douglas-fir/tall shrub.

Little Bay South: High cover of mature Douglas-fir and Ponderosa pine with an understory of *Holodiscus discolor* (ocean spray).

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.
- 4) Monitoring—Monitoring plots should be revisited yearly for three years and every three years thereafter.
- 5) Further survey should be done on the west side of Dworshak Reservoir, south of Freeman Creek.

Management

The ACOE should carefully monitor stands in which *Aster jessicae* occurs, and no management should be used which may be in conflict with viability of the populations. Prescribed fire is being considered as a management tool in the Dworshak Project Area. It is important to avoid both direct and indirect impacts to the habitat. We believe that the following would be detrimental to *Aster jessicae*:

- 1) Complete loss of tree canopy.
- 2) Creation of a dense shrub cover.
- 3) Reduction in bunchgrass cover, which would provide openings for weed invasion.

It is possible that in closed stands or higher canopy cover situations (e.g., Little Bay South) habitat might be improved through careful thinning.

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MOST APPENDICES NOT AVAILABLE ON WEB

Appendix 4

Baseline demographic data

Aster jessicae 023					Plot 1
Site: Gold Hill					
Latitude, longitude: 46°39.600N, 116°31.728W (NAD 27)					
Date: 2 Aug. 2001					
<i>Aster jessicae</i> genet	Distance (m)*	Azi- muth **	Total no. of stems	Grazed	Vegetation w/in 1 m
Astjes 1	6.6	1	16	3	Syal, Phma
2	9.8	15	29	11	Syal, Phma, Lodid
3	10	26	9	0	Syal, Rosa, Lodid, Heluni
4	10	172- 190	152	24	Syal, Phma, Rosa, Hodi
5	14.7	310	3	0	Prvi, Syal, Phma
6	17.5	305	22	8	Syal, Prvi
7	19.0	306	9	1	Syal, Rosa
8	19.0	316	12	7	Syal, Crdo, Hodi
9	27.8	347	37	21	Syal, Rosa, Caru, Ciar
10	9.3	352	10	9	Syal, Lodid
11	11.0	163	5	0	Syal, Hodi, Phma
12	11.0	150	10	2	Syal, Phma
Totals			314	86	
Tree/other feature			dbh (in)	Notes	
Pipo	7.6	169			
Stump	10.0	172			
Pipo	5.0	180		Bearing tree to relocate center.	
Stump	9.5	181			
Pipo	7.3	186			
Pipo	7.0	231	10		
Pipo	9.5	265	13	Less than 2 ft apart	
Pipo	9.9	270	12		
Pipo	15.2	293			
Pipo	11.5	305	17	Directly downslope from plot center.	
Pipo	14.8	317	12		
Pipo	13.9	323	17		
Pipo	21.5	327	12		
Pipo	18.7	327	16		
Pipo	19.7	333	16	Edge of logged/unlogged	
Pipo	15.5	361	15	Edge of logged/unlogged	

* Distances were measured from the center rebar stake to the center of a clump of *Aster jessicae*, or the inside face of the tree. Stems were either in bud or vegetative.

**21° east declination used.

Aster jessicae 041	Plot 2
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Site: Fraser Cemetery						
Date: 15 Aug. 2001						
Aster plant/ Tree/other feature	Distance (m)*	Azi- muth **	Total no. of stems	Repro- ductive stems	Grazed	Notes
Astjes 1	1.8	102	7	2	0	
2	2.1	49	1	0	0	
3	1.2	39	1	0	0	insect damage
4	1.5	44	2	1	0	
5	5.4	23	1	0	0	in flower early
6	5.1	24	1	0	0	veg.
7	7.0	41	15	10	0	large clump
Total			28	13	0	
Psme (pole)	11.6	356				
Psme (pole)	7.7	3				
Pipo	8.3	84				
Psme (pole)	9.6	128				
E end of fence	13.1	132				
Pipo	9.5	136				
Psme (pole)	7.2	139				
Psme (pole)	7.1	145				
Pipo (med)	5.0	154				
Pipo (med)	7.8	161				
Centerpost of fence	7.3	199				
Psme (pole)	6.2	200				
Psme (pole)	6.7	212				
Psme (pole)	5.8	224				
Psme (pole)	9.4	237				
Psme (pole)	12.2	241				
W end fence	15.5	254				
Psme (pole+)	10.5	278				
Psme (pole)	10.1	301				

* A wooden fence runs along the north side of the cemetery. The *Aster jessicae* population is in the pines on the north side of the fence. All trees north of the fence were documented. Distance was measured from the center rebar stake to the inside face of the tree. Unless noted otherwise, stems are either in bud or vegetative.

**19° east declination used.

Aster jessicae 065						Plot 3
Site: Freeman Ck. Peninsula (Dworshak Reservoir)						
Coordinates: 46°33.700'N, 116°16.690'W (+/-5.8 m; NAD27)						
Date: 20 Aug. 01						
Aster	Distance	Azimuth	No. of	Repro-	Grazed	Notes

plant/ Tree	(m)*	**	stems	ductive stems		
Astjes 1	6.6	36	3	0	0	
2	7.3	37	5	0	0	
3	6.8	41	2	0	1	
4	0.7	62	2	0	0	
Pipo (med)	2.65	65				
5	0.4	96	6	0	0	
6	7.9	102	4	0	0	
7	1.5	116	5	0	2	
8	3.0	119	2	0	0	
Pipo (pole)	8.8	144				8 in. dbh
9	3.0	145	1	0	1	
10	2.6	168	2	0	0	
11	3.1	169	1	0	(2)	
12	2.9	171	1	0	0	
13	2.5	188	1	0	0	
Pipo (med)	3.3	197				16 in. dbh
14	1.1	197	3	0	2	
15	1.7	199	3	0	0	
16	2.4-2.8	199-203	9	0	0	
17	1.9	226	3	0	0	
18	2.9	226	1	0	0	
19	1.6	232	4	0	4	
20	1.2	192	3	0	1	
21	2.5	181	1	1	0	in bud
22	3.1	248	3	0	0	
23	4.6	250	5	0	2	
24	5.3	259	6	0	3	scattered
25	5.3	261	4	0	0	
26	3.4	255	1	0	0	
27&28	6.3	261-262	2	1	1	1 puny
29	5.2	266	1	1	0	
30	5.6-6.0	274	19	2	15	1 m wide clump in Amelanchier
31	4.6	269	3	0	2	
32	2.7	296	1	0	0	In Prunus emarginata
33	4.9	334	1	0	0	
34	4.4	305	1	0	1	
35	10.5	345	2	2	0	
36	10.8-11.2	288	6	0	5	
37	7.2	211	2	0	1	
38	6.8	212	2	0	0	
39	7.5	213	1	0	1	
40	7.5	216	7	0	2	

41	6.2	220	2	2	0	
Pipo (large)	30+	86	Btwn. centerpost and plants in saddle.			
Totals			132	9	45	

* Distance was measured from the center rebar stake to the center of a clump of *Aster jessicae*, or the inside face of the tree.

** 21° east declination used.

Aster jessicae 066 Plot 4						
Site: Little Bay north (Dworshak Reservoir)						
Coordinates: 46°35.00' N, 116°14.858' W (NAD27)						
Date: 21 Aug. 2001						
<i>Aster jessicae</i> genet	Distance (m)*	Azi-muth**	Total no. of stems	Repro-ductive stems	Grazed	Notes
Astjes 1	1.1	255	9	6	0	
2	2.0	251	2	0	0	
3	2.25	267	7	2	0	
4	1.5	295	3	2	0	
5	3.3	287	2	2	0	
6	5.8	252	2	1	0	
Totals			25	13	0	
Trees			Notes			
Psme	9.5	314	15-inch dbh; bearing tree			
Psme	9.2	334	bearing tree			
Psme	6.2	349	bearing tree; scarred at base.			
Psme	4.4	110	Pole			
Psme	6.25	105	Pole			
Pipo	10.5	111	Large			
Psme	6.15	115	Large			
Psme	10.4	149	Large			

** Distances were measured from the center rebar stake to the center of a clump of *Aster jessicae*, or the inside face of the tree.

**21° east declination used.

Aster jessicae 066 Plot 5						
Site: Little Bay South (Dworshak Reservoir)						
Coordinates: 46°34.821' N, 116°14.699' W (NAD27)						
Date: 21 Aug. 2001						
<i>Aster jessicae</i> genet	Distance (paces)*	Azi-muth**	Total no. of stems	Repro-ductive stems	Grazed	Notes
Astjes 1	2	257	5	1	0	

Astjes 2	8	292	10	1	1	
Trees			dbh (in.)	Notes		
Psme	16	246	18			
Psme	9	280	22			
Pipo	7	296	14			
Psme	10	191		Forked Psme - 8 and 14"		

* Distances were paced from plot center (a 8-9 inch Doug-fir) to the center of a clump of *Aster jessicae*, or the tree, because no measuring tape was available.

**21° east declination used.