

**FIELD SURVEYS FOR *SILENE SPALDINGII*
(SPALDING'S CATCHFLY) IN IDAHO, 2001**

by

**Juanita Lichthardt
and
Karen Gray
Conservation Data Center**

May 2002

**Idaho Department of Fish and Game
Natural Resource Policy Bureau
600 South Walnut, P.O. Box 25
Boise, Idaho 83707**



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

ABSTRACT

Silene spaldingii (Spalding's silene, Spalding's catchfly) is a plant species endemic to the bunchgrass grasslands of the inland Pacific Northwest, large portions of which have been eliminated by cultivation. In 2001, *S. spaldingii* was listed as threatened by the U.S. Fish and Wildlife Service (USFWS). The discovery of *S. spaldingii* in the Snake River Canyon in 1993 meant that there were large areas of potential habitat, on public lands, where targeted surveys had not been done. This report updates general information on *S. spaldingii* and documents the results of surveys conducted in July of 2001. We recorded four new occurrences of *S. spaldingii*, two of them in the Snake River Canyon on land managed by Idaho Department of Fish and Game (IDFG), and two on private lands in the Lawyer Creek tributary of the Clearwater River (Camas Prairie). Two known sites were also revisited. Updated element occurrence records (EORs) from the Idaho Conservation Data Center's Biological and Conservation Database (BCD) are appended to this report to provide details on each population. Community composition at five *S. spaldingii* sites is tabled. Nine sites are recommended as conservation priorities. For tracking purposes, we recommend that occurrences in the Snake River Canyon be reorganized into subpopulations of an extensive metapopulation.

TABLE OF CONTENTS

	Page
ABSTRACT.....	i
TABLE OF CONTENTS.....	ii
LIST OF TABLES.....	iii
LIST OF APPENDICES.....	iii
INTRODUCTION	1
I. SPECIES INFORMATION	
1. Present legal or other formal status.....	1
2. Description.....	2
3. Geographical distribution	3
4. General environment and habitat description	3
5. Population biology	5
6. Current land ownership and management responsibility.....	6
7. Evidence of threats to survival.....	6
II. SURVEYS CONDUCTED IN 2001	
1. Methods	7
2. Results.....	7
III. ASSESSMENT AND RECOMMENDATIONS	
1. General assessment of vigor, trends, and status.....	10
2. Recommendations for listing or status change	11
3. Conservation/recovery recommendations.....	11
LITERATURE CITED	13

TABLE

Table 1. Community composition at five *Silene spaldingii* sites visited in 2001.....8

LIST OF APPENDICES

Appendix 1. Line drawing of *Silene spaldingii*.

Appendix 2. Maps

Map 1. Global distribution of *Silene spaldingii*.

Map 2. Distribution of *Silene spaldingii* in Idaho.

Map 3. Occurrences of *Silene spaldingii* in the Snake River canyon, and other areas surveyed.

Appendix 3. Element occurrence records for *Silene spaldingii* in Idaho.

INTRODUCTION

Silene spaldingii (Spalding's silene or Spalding's catchfly) is a geophytic herb in the family Caryophyllaceae. Its historical range is centered on the Palouse region of southeastern Washington and adjoining Idaho, most of which was put into wheat production by about 1910 (Lichthardt and Moseley 1997). In December of 2001 *Silene spaldingii* was listed as threatened by the U.S. Fish and Wildlife Service (USFWS).

Prior to this survey, there were eight documented occurrences¹ of *Silene spaldingii* in Idaho (Idaho CDC 2001), one of which was historical (not observed since prior to 1980). Most of these are on private land, but the largest one (006; approx. 2000 genets over 3200 acres) is in the Snake River Canyon downstream from the mouth of the Salmon River, on lands managed jointly by the Bureau of Land Management (BLM) and The Nature Conservancy (TNC).

The discovery of *Silene spaldingii* in the Snake River Canyon in 1993 meant there were large areas of potential habitat where targeted surveys had not been done. The Canyon Grasslands (Idaho Natural Heritage Program *et al.* 1986) are comprised of bunchgrass communities similar in composition to Palouse Grasslands, but they occur on topography and soils not conducive to cultivation. This report documents surveys conducted on public lands in the Snake River Canyon in 2001, funded in part by the USFWS under Section 6 of the Endangered Species Act.

This report is organized in three parts: 1) general species information, 2) results of 2001 surveys, and 3) assessment and recommendations. This is not a complete status report on *Silene spaldingii* in Idaho. However, parts I and III are organized as in a status report; selected headings were included and updated where possible. For those headings not included here, see Lichthardt (1997) or Lorain (1991).

I. SPECIES INFORMATION

1. Present legal or other formal status

A. National

- 1. Present designated or proposed legal protection or regulation:** Currently, *Silene spaldingii* is listed as threatened by the USFWS.
- 2. Other current formal status recommendations:** *Silene spaldingii* is ranked G2 (imperiled globally because of extreme rarity or because of some factor(s) making it very vulnerable to extinction throughout its range) by the Natural Heritage/Conservation Data Center network. *S. spaldingii* is listed as "sensitive" by the BLM, Coeur d'Alene District.

¹ An "occurrence" is an observation submitted to the Idaho Conservation Data Center for entry into its global 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.

- 3. Review of past status:** In 1975, *Silene spaldingii* was listed as a candidate endangered species (Federal Register 40(127):27855); it was proposed endangered in 1976 (Federal Register 41(117):24539). In 1980, it was listed as a category 1 candidate (Federal Register 45(242):82537). In 1985 it was changed to a category 2 candidate (Federal Register 50(188):00051). In 1993 it was dropped from the candidate list due to changes in criteria for Federal candidates. In October, 2001 the USFWS listed *S. spaldingii* as threatened (Federal Register 66:51597).

B. State

- 1. Idaho:** *Silene spaldingii* is currently ranked S1 (critically imperiled because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction) by the Idaho Conservation Data Center (CDC; Idaho CDC 2001).
- 2. Other states of occurrence:** *Silene spaldingii* is currently ranked S1 in Montana, Washington, and Oregon.

2. Description

- A. General nontechnical description:** *Silene spaldingii* is an herbaceous perennial, 2-6 dm (8-24) inches tall, typically with one stem, but sometimes several, each bearing four to seven pairs of leaves 6-7 cm long (Appendix 1). The light-green foliage and stem are lightly to more typically densely covered with sticky hairs. The outer, green portion of the flower (calyx) forms a tube ca. 1.3 cm long with ten distinct veins running its length. The flowers are cream-colored and consist of five petals, each with a long, narrow "claw" that is largely concealed by the calyx tube, and a very short (2 mm) "blade," or flared portion at the summit of the claw. Four (sometimes as many as six) short appendages, the same color as the petals, are attached inside, and just below, the blade.
- B. Technical description:** Villous-tomentose and more or less viscid-pubescent perennial from a simple or branched caudex, 2 to 6 dm tall; cauline leaves in four to seven pairs, oblanceolate below to lanceolate above, 6 to 7 cm long, and 0.5 to 4 (5) cm broad, opposite, sessile, and slightly connate. Flowers are several to many in a leafy and usually compact cyme; calyx tubular-campanulate, about 15 mm long at anthesis, becoming more nearly clavate-campanulate in fruit, 10-nerved. The corolla is white, the claw of the petals about 15 mm long, not auriculate above, the blade very short, ovate, about 2 mm long, entire to shallowly emarginate; appendages 4 (5 or 6), ovate-lanceolate, about 0.5 mm long; carpophore about 2 mm long, glabrous; styles 3; capsule one-celled; seeds light brown, about 2 mm long, corrugate-wrinkled and inflated (adapted from Hitchcock, 1964).
- C. Local field characters:** *Silene spaldingii* is most easily confused with a common, sympatric associate, *S. scouleri*. Both have creamy-white elongate flowers and extremely sticky foliage. When flowers are present, the very short (2 mm) petal blades (flared portion of petal) of *S. spaldingii* are diagnostic. In contrast, the petal

blades of *S. scouleri* are 6-7 mm long and deeply lobed. As the petals of *S. scouleri* dry and curl, the blades become less conspicuous and close inspection is required to determine their true length. Vegetatively, the two species can be distinguished, after becoming familiar with both, if the foliage is in good condition. Insect damage to foliage can make the use of vegetative characters difficult. The leaves of *S. scouleri* are strongly reduced upward, the lower much greater than 7.5 cm (3 inches), and long-tapering to a narrowly acute apex. Leaves of *S. spaldingii* are only weakly reduced upwards, the largest less than 7.5 cm long. The lower to middle leaves are broadly lanceolate. Also, *S. scouleri* is rhizomatous and sometimes forms patches.

Silene douglasii also occurs with *S. spaldingii*, but generally has multiple, more slender stems, narrower leaves, and is rarely sticky-pubescent.

3. Geographical distribution

- A. Geographical range:** *Silene spaldingii* occurs in areas once occupied by Pacific Northwest Bunchgrass grasslands (Tisdale 1983) in northeastern Oregon, eastern Washington, and adjoining Idaho; also in northwestern Montana and adjoining British Columbia, Canada (Appendix 2, Map 1).

In Idaho, *S. spaldingii* is known from Idaho, Lewis, and Nez Perce counties (Appendix 2, Map 2); in Montana from Lincoln, Lake, and Flathead counties; in Washington from Whitman, Spokane, and Asotin counties, and in Oregon from Umatilla and Wallowa counties (Schassberger 1988). It is also known from one site in British Columbia, which is part of the Lincoln County, Montana occurrence.

B. Precise occurrences (Idaho)

- 1. Populations currently or recently known extant.** Of 17 Idaho occurrences, 16 are recently (since 1993) known extant, and one (004) is thought to be extirpated. Element occurrence records are included in Appendix 3. Most are roughly equivalent to populations, except 006 which is an extensive metapopulation.
- 2. Populations known or assumed extirpated.** *Silene spaldingii* was last observed at the Lawyer Creek site (004) in 1980 (four plants). The location information was not precise. The probable location of this occurrence was thoroughly searched in July of 2001 and no plants were found. This population is likely extinct.

Silene spaldingii was noted and collected in a grassland stand sampled by Daubenmire in the 1950s (Daubenmire 1970). The location of the site was not precise, but appears to have been plowed. This site was previously identified as EOR 002 and has since been combined with extant occurrence 007.

4. General environment and habitat description

- A. Concise statement of general environment and habitat:** In Idaho, *Silene spaldingii* is associated with good-condition *Festuca idahoensis* (Idaho fescue) grasslands on northerly aspects from 1500 to 4300 ft elevation. Slopes range from gentle to very steep. Shrubs, mainly *Symphoricarpos albus* (common snowberry), *Rosa* spp. (wild rose), and *Crataegus douglasii* (black hawthorn), are often prominent in the community, with *S. spaldingii* primarily occurring in the bunchgrass community rather than shrub thickets. Sites sometimes interfinger into the forest zone. Two distinct ecological types are recognized within the grasslands in this region: the Palouse Grasslands on the rolling uplands, and the Canyon Grasslands in the river breaklands and canyons (Idaho Natural Heritage Program *et al.* 1986). In the Palouse Grasslands *Silene spaldingii* occurs in the *Festuca idahoensis*-*Symphoricarpos albus* and *F. idahoensis*-*Rosa nutkana* habitat types of Daubenmire (1970), and in the Canyon Grasslands the *F. idahoensis*-*Koeleria cristata* and *Symphoricarpos albus*-*Rosa* habitat types of Johnson and Simon (1987). It also

occurs in the *Pinus ponderosa*–*Symphoricarpos albus* (Ponderosa pine–snowberry) habitat type of Cooper *et al.* (1991).

B. Physical characteristics

1. **Physiographic province:** All *Silene spaldingii* sites in Idaho are included in Bailey's Palouse Prairie Province (Bailey 1995).
2. **Physiographic and topographic characteristics:** The Palouse Prairie Province (Bailey 1995) is the easternmost extent of the plateau formed from Columbia River basalt flows, over which aeolian silt deposition has produced a landscape of rolling, asymmetrical hills that rise 20-80 ft. The steeper, north sides of these silt dunes, and rocky areas surrounding steptoes, are the only sites where remnant native vegetation remains because of the intense use of this region for agriculture. Bisecting this rolling upland are deep gorges of the Clearwater and Snake rivers and their tributary canyons. These canyons are characterized by steep slopes, high relief, and exposed basalt bedrock. Since canyon slopes are unsuitable for cultivated agriculture, extensive bunchgrass habitat persists.
3. **Edaphic factors:** Soils of the Palouse Grasslands are Mollisols formed in loess, or in a mixture of loess and basalt. Surface textures are generally loams or silt loams. In the Canyon Grasslands *Silene spaldingii* occurs on moderately deep loamy soil of northerly aspects (Hill and Gray 2000).
4. **Dependence of this taxon on natural disturbance:** It has been speculated that, in the absence of fire, duff accumulation may decrease population size (Kagan 1989, in Lorain 1991; Lesica 1997). Prescribed fire in *Festuca scabrella* (rough fescue) grassland in Montana produced enhanced seedling recruitment and increased population size (Lesica 1999). Lesica speculates that the benefits of fire are removal of litter and creation of safe sites for recruitment. Litter buildup may be a more significant problem in *Festuca scabrella*–dominated grasslands which are more than twice as productive as those dominated by *F. idahoensis* (Mueggler and Stewart 1980).

C. Biological characteristics

1. **Vegetation physiognomy and community structure:** In Idaho, *Silene spaldingii* occurs in bunchgrass communities with a rich forb component. *Festuca idahoensis* (Idaho fescue), *Agropyron spicatum* (bluebunch wheatgrass), or a combination of the two form the dominant cover. Shrubs are a prominent feature of the vegetation, occurring as scattered individuals or colonies. The rhizomatous shrubs *Symphoricarpos albus* (common snowberry) and *Rosa nutkana* (Nootka rose) sometimes occur as scattered individuals, subdominant to the bunchgrasses.
2. **Regional vegetation type:** Kuchler (1964) places this portion of Idaho into the potential vegetation types of Fescue–wheatgrass (*Festuca*–*Agropyron*) and Ponderosa Shrub Forest (*Pinus*). *Silene spaldingii* is associated with both the

Canyon Grasslands and Palouse Grasslands divisions (Idaho Natural Heritage Program *et al.* 1986; The Nature Conservancy *et al.* 1987) of the Pacific Northwest Bunchgrass Grasslands biome (Tisdale 1983).

3. **Frequently associated species:** Based on element occurrence records for Idaho and 2001 plot data, the most common species associates of *Silene spaldingii* are:

Grasses:

Agropyron spicatum

Festuca idahoensis

Koeleria cristata

Shrubs:

Crataegus douglasii

Rosa nutkana

Symphoricarpos albus

Forbs:

Achillea millefolium

Balsamorhiza sagittata

Frasera albicaulis

Geum triflorum

Haplopappus liatrisformis

Heuchera sp.

Lithospermum ruderale

4. **Dominance and frequency:** Idaho populations of *Silene spaldingii* are mostly small and discrete, usually occupying only a small portion of the apparently suitable habitat. With the exception of 006, populations are comprised of 1 to 80 individuals, in areas less than 2 acres in extent. The exception is the Garden Creek Ranch metapopulation (006) which extends over 3,200 acres and contains on the order of 2,000 plants.

Subpopulations are fairly discrete and within subpopulations plants exhibit a highly clumped distribution. Populations can be only approximately censused because plants may remain dormant underground for one to two years (Lesica 1997).

5. **Other endangered species:** Many Idaho populations of *Silene spaldingii* occur within or near populations of *Haplopappus liatrisformis* (Palouse goldenweed), a regional endemic ranked G2/S1 (Idaho CDC 2001). In some cases, the two species intermingle, but *S. spaldingii* appears to be restricted to moister aspects and microsites where shrubs are more prominent and forbs more abundant. Other sensitive species occurring with *Silene spaldingii* include *Calochortus macrocarpus* var. *maculosus* (green-band mariposa lily) and *Calochortus nitidus* (broad-fruit mariposa lily).

5. Population biology

- A. **Phenology:** Seeds germinate mainly in the spring. Rosettes are formed in the first year, and flowers appear any time during or after the second season (Lesica 1991). In Idaho, flowering of *Silene spaldingii* occurs in mid-late summer, peaking during the third and fourth weeks of July. Early vegetative plants have been observed in early May at lower elevations. Fruit and seed maturation occur in August and seed dispersal in late August/early September (Hitchcock 1964). Plants commonly remain dormant, with no above-ground growth for one or more growing seasons (Lesica 1997).

B. Reproductive biology: *Silene spaldingii* is protandrous—the anthers mature and dehisce pollen before the styles extend and stigmas become receptive. Each open flower persists for two to several days, and two or more flowers may be in bloom on the same plants. This system promotes outcrossing while allowing the possibility of selfing (Lesica 1993; Lesica and Heidel 1996). Genetic analyses support the conclusion that outcrossing is the primary breeding system of *Silene spaldingii*, although there is evidence of local, non-random mating (Baldwin and Brunfeldt 1995).

1. Type of reproduction: By seed only.

2. Pollination

Mechanisms: It appears that *Silene spaldingii* is dependent on insects for pollination and that a single species of bumblebee, *Bombus fervidus*, is the only significant pollinator (Lesica and Heidel 1996).

Specific known pollinators: A bumblebee, *Bombus fervidus*, appears to be the only significant pollinator for *Silene spaldingii* throughout its range. Halictine bees have been observed to visit *Silene spaldingii* flowers but are likely to be less efficient pollen vectors than *B. fervidus* because they are much smaller and less hairy (Lesica and Heidel 1996).

Vulnerability of pollinators: *Bombus fervidus* lives near the ground and is susceptible to agricultural chemicals and fire. Visitation rates are reduced by the

presence of other plants in flower. *Hypericum perforatum* (goatweed, common St. John's wort), an exotic weed, can be an important competitor (Lesica and Heidel 1996).

3. Seed biology

Amount and variation of seed production: Plants dependably produce capsules with the potential to bear numerous seeds. Lesica and Heidel (1996) found that pollinator limitation was partially responsible for a reduction in fruit development and mature seeds per fruit. Ovule abortion can also be attributed to genetic load—a common situation in outcrossing species. Hill and Gray (2000) observed empty capsules with insect holes and frass.

6. Current land ownership and management responsibility

General nature of ownership: Ten of the 17 Idaho occurrences of *Silene spaldingii* are on privately owned land. The Garden Creek Ranch occurrence (006) includes private (TNC) and Federal (BLM) lands. Occurrences 014, 015, and 016 are on BLM lands. Occurrences 009 and 010 are on State ownership (Department of Fish and Game).

7. Evidence of threats to survival

A. Present or threatened destruction, modification, or curtailment of habitat or range

1. **Existing threats:** Agricultural and residential development. An example is the Redbird Ridge population (001).

Weeds—remaining native vegetation of the Palouse and Canyon Grasslands is rapidly being invaded by, and converted to, exotic forbs. The most aggressively spreading weed in the habitat of *S. spaldingii* is the exotic winter annual, yellow star-thistle (*Centaurea solstitialis*). Although possibly slower to get a foothold in healthy, native vegetation, this weed appears able to invade and outcompete native species. It is found in the vicinity of all known populations of *S. spaldingii* in Idaho. Other aggressive weeds threatening *S. spaldingii* populations include *Cirsium arvense* (Canada thistle), *Euphorbia esula* (leafy spurge), *Cardaria draba* (whitetop), *Dipsacus sylvestris* (teasel), *Poa pratensis* (Kentucky bluegrass), and *Acroptilon repens* (Russian knapweed).

2. **Potential threats:** Populations on private lands are not protected by any land-use restrictions. Livestock use and agricultural chemicals are potential threats on unprotected sites.

- #### B. Disease, predation, or grazing:
- Grazing by ungulates may significantly decrease reproduction, even in the absence of livestock (Hill and Gray 2000). Caterpillars consume seed.

C. Other: Additionally, *S. spaldingii* appears to suffer from pollination limitations, inbreeding depression, and a large genetic load. These factors are partially responsible for a reduction in plant fitness. Reduced fitness, combined with small population sizes, make the species especially vulnerable to extinction (Lesica 1991, 1993; Lesica and Heidel 1996).

The very close proximity of Upper Hatwai Creek and Genesee South populations (002 and 005) to cropland subjects them to herbicide drift.

II. SURVEYS CONDUCTED IN 2001

1. Methods

Surveys for *Silene spaldingii* were conducted between July 1 and July 19, 2001. Areas to the north and south of known occurrences in the Garden Creek Preserve were surveyed. Northerly aspects were targeted in the survey. The first plants were found on July 16, at which time they were in bud through early fruit. Survey routes on Craig Mountain are shown in Appendix 4. The vicinity of occurrence 004 was also surveyed, where *Silene spaldingii* was last observed in 1980; no plants were found. Occurrence 007 (Cold Spring Creek) was revisited and the EOR updated.

Wherever *Silene spaldingii* was observed, its habitat, or some portion of its habitat, was described by estimating canopy cover of associated species within a 10 x 10 m plot. Rare plant observation forms, including GPS readings, population size, and threats, were submitted to the Idaho CDC for entry.

2. Results

Four new occurrences of *Silene spaldingii* were recorded as a result of this survey. Two of these (009 and 010) are within the Craig Mountain Wildlife Management Area (WMA) in the Snake River Canyon, which is managed by IDFG. These occur within 1 mile of one another, but are separated by Captain John Creek. The other two (012 and 013) are on private lands in the Lawyer Creek drainage. Element occurrence records, with specific population data, can be found in Appendix 3. We also sent EORs and maps to the agencies involved.

Five new occurrences in addition to ours were found during 2001. Three (015, 016, 017) are on BLM parcels within the Craig Mountain WMA, one is on a BLM parcel on the Salmon River (014), and one (011) is on State highway right-of-way. Much additional habitat exists on the west side of Craig Mountain, in the Snake River Canyon, in areas far from roads.

A. Habitat: In the Snake River canyon we found *Silene spaldingii* on northerly aspects between 1,800 and 2,580 ft. It occurs as high as 3,400 ft in the canyon, and elsewhere in Idaho it ranges as high as 4,300 ft and can occur on west and east aspects as well.

B. Associated species: *Silene spaldingii* was found in the *Festuca idahoensis*/*Koeleria cristata* plant association described by Tisdale (1986) and the *Festuca idahoensis*/*Symphoricarpos albus* association of Daubenmire (1970; Table 1). *Festuca idahoensis* is usually the dominant grass, but at Cold Spring Creek *Agropyron spicatum* is dominant. *Agropyron spicatum*, *F. idahoensis*, *Koeleria cristata* (Junegrass), and *Poa secunda* (Sandberg’s bluegrass) are highly constant in these habitat types. There is a rich forb component with the most constant species being *Geum triflorum* (prairie smoke) and *Lithospermum ruderale* (puccoon). *Heuchera* sp. and *Frasera albicaulis* each occurred in four out of the five plots and may have some habitat indicator value. The moss *Tortula ruralis* occurred at all sites—*Brachythecium albicans* and *Homalothecium* sp. at four. Scattered shrubs are prominent elements of the communities, but the only consistently occurring species is *Symphoricarpos albus*. Many annual plants were gone by the time of the survey and the small perennial grasses *Poa secunda* and *Koeleria cristata* were fairly inconspicuous.

Table 1. Community composition at five *Silene spaldingii* sites visited in 2001. Values are canopy cover classes¹ in 10 x 10 m plots.

	Madden Creek	Captain John Creek	Lawyer Creek	Ferdinand Trestle	Cold Spring Creek
Plot #	1	2	3	4	5
EOR #	009	010	013	012	007
Slope	32°	26°	16°	20°	22°
Aspect	330°	10°	360°	300°	E
Elevation (ft)	2500	1880	3540	3580	3800
Plant Association ²	Feid- Kocr	Feid- Ronu	Feid- Kocr	Feid- Kocr	Feid- Syal
SHRUBS					
<i>Amelanchier alnifolia</i>		1			
<i>Crataegus douglasii</i>					1
<i>Holodiscus discolor</i>	OP	1			
<i>Rosa</i> sp.				3	
<i>Rosa nutkana</i>		10			3
<i>Symphoricarpos albus</i>	3	3	OP	3	10
ANNUAL GRASSES					
<i>Bromus brizaeformis</i>	1	1			
<i>Bromus japonicus</i>	3	3	1	1	3
<i>Bromus tectorum</i>					3

<i>Ventenata dubia</i>	3		1		
PERENNIAL GRASSES					
<i>Agropyron spicatum</i>	20	3	70	3	70
<i>Bromus carinatus</i>					1
<i>Festuca idahoensis</i>	20	40	30	20	3
<i>Koeleria cristata</i>	3	1	1	3	1
<i>Poa pratensis</i>		1	OP		3
<i>Poa secunda</i>	3		1	1	OP
FORBS/FERNS					
<i>Achillea millefolium</i>	1	1	1		1
<i>Agoseris glauca</i> var. <i>agrestis</i>			1		
<i>Anaphalis margaritacea</i>			1		
<i>Arenaria serpyllifolia</i>	1	1			
<i>Arnica sororia</i>	1		3		
<i>Balsamorhiza sagittata</i>	1	3	OP		
<i>Besseyia rubra</i>	1	1	1	1	
<i>Brodiaea douglasii</i>	1				
<i>Calochortus macrocarpus</i>	OP				
<i>Calochortus nitidus</i>			1		
<i>Carduus acanthoides</i>				1	1
<i>Castilleja</i> sp.	3	1			
<i>Centaurea solstitialis</i>		OP			
<i>Cerastium arvense</i>		1			
<i>Cirsium vulgare</i>					1
<i>Collomia linearis</i>			1		1
<i>Crepis</i> sp.			1		
<i>Dianthus armeria</i>				1	
<i>Dodecatheon</i> sp.	1				
<i>Epilobium angustifolium</i>					1
<i>Epilobium paniculatum</i>				1	1
<i>Erigeron corymbosus</i>	1		1	1	
<i>Erigeron speciosus</i>				1	OP
<i>Eriogonum heracleoides</i>					1
<i>Fragaria virginiana</i>					1
<i>Frasera albicaulis</i>		1	1	1	1
<i>Gaillardia aristata</i>	OP			1	1
<i>Galium aparine</i>					1
<i>Galium boreale</i>					1
<i>Geranium viscosissimum</i>				1	3
<i>Geum triflorum</i>	1	3	30	20	10
<i>Habenaria elegans</i>			1		
<i>Haplopappus liatrifolius</i>	1	1			OP
<i>Heuchera</i> sp.	1	1	1	3	
<i>Hieracium albertinum</i>	1	1		1	3

<i>Hypericum perforatum</i>	1	1		1	M
<i>Iris missouriensis</i>				3	1
<i>Linanthastrum nuttallii</i>					3
<i>Lithophragma parviflora</i>	1				
<i>Lithospermum ruderale</i>	OP	1	1	3	1
<i>Lupinus arbustus</i>	1	1	1		
<i>Lupinus leucophyllus</i>				3	
<i>Lupinus sericeus</i>	3	OP			
<i>Microsteris gracilis</i>			1		
<i>Penstemon attenuatus</i>					3
<i>Penstemon glandulosus</i>	OP	1			
<i>Perideridia gairdneri</i>		1	1	1	
<i>Phlox colubrina</i>	OP				
<i>Polygonum douglasii</i>	1				
<i>Potentilla glandulosa</i>					3
<i>Potentilla gracilis</i>			3		3
<i>Selaginella wallacei</i>	1				
<i>Senecio integerrimus</i>	1	1	1		
<i>Sidalcea oregana</i>				1	3
<i>Silene spaldingii</i>	1	1	1	1	1
<i>Solidago missouriensis</i>	1	1		3	OP
<i>Tragopogon dubius</i>	1	1		1	1
<i>Trifolium plumosum</i>				1	
<i>Valeriana edulis</i>					3
<i>Verbascum thapsis</i>					3
<i>Veronica arvensis</i>					1
<i>Vicia tetrasperma</i>	1			1	
<i>Vicia villosa</i>	1				
<i>Woodsia oregana</i>	1				
<i>Zigadenus venenosus</i>			OP	1	
MOSESSES					
<i>Brachythecium albicans</i>	1		10	1	M
<i>Homalothecium (aeneum?)</i>	3	3	10	1	
<i>Tortula ruralis</i>	3	3	30	40	70
Moss, acrocarpous	1	1			
LICHENS					
<i>Cladonia</i>	3	1			
<i>Peltigera</i>	1	1		1	
OTHER					
Bare Soil	1	1	1	3	1
Gravel	0	1	0	1	0
Rock	1	3	0	1	0
Litter	M	M	1	M	1

¹ <1% (1), 1-5% (3), 5-15 (10), 15-25 (20), 25-35 (30), 35-45 (40), 45-55 (50), 55-65 (60), 65-75 (70), 75-85 (80), 85-95 (90), 95-100 (100); OP = outside plot; M = present, no data.

² *Festuca idahoensis*–*Symphoricarpos albus* (Idaho fescue–snowberry) and *Festuca idahoensis*–*Rosa nutkana* (Idaho fescue–Nootka rose) after Daubenmire (1970); *Festuca idahoensis*–*Koeleria cristata* (Idaho fescue–Junegrass) after Tisdale (1986).

C. Weeds: Goatweed (*Hypericum perforatum*) occurred with low cover in four plots. This weed has been shown to compete with *S. spaldingii* for pollinators. Winter-annual grasses were common at 1-10% cover. At Cold Spring Creek (007) a large colony of *Carduus acanthoides* (acanthus thistle) had developed since 1996.

III. ASSESSMENT AND RECOMMENDATIONS

1. General assessment of vigor, trends, and status

Fifteen occurrences of *Silene spaldingii* have been verified extant in Idaho since 1995. One occurrence (006) is a metapopulation of approximately 2,000 genets over a 3,500-acre area (Idaho CDC 2001; Hill and Gray 2000). The other 14 consist of 1 to 80 individuals within areas of less than 2 acres. Only the occurrences in the Snake River Canyon (006, 008, 009, 010, 015, 016, and 017) are associated with extensive areas of apparently suitable habitat. It may be more appropriate to consider these as subpopulations of an extensive metapopulation.

Populations outside the Snake River Canyon are limited to small, isolated remnants of native grassland, threatened by weed invasion, herbicide spraying, land development, grazing, pollinator limitation, and inbreeding depression. One of these sites (007) apparently saw a population decrease of approximately 60 percent over 11 years. Occurrences 005 (Upper Hatwai Creek), 011 (Highway 95 south of Genesee), and 012 (Ferdinand Trestle) cannot be considered viable due to the small population size and habitat extent.

2. Recommendations for listing or status change

A. Recommendation to U.S. Fish and Wildlife Service: Evidence from Idaho supports the listing of *Silene spaldingii* as threatened. This recommendation is based on the low number of populations extant, the limited amount of habitat associated with many populations, an ongoing loss of habitat, and imminent threats to many remaining populations, including grazing, weeds, pollinator limitation, and inbreeding depression.

The Idaho side of the Snake River Canyon contains a metapopulation that is vital to survival of the species. Occurrences that make up this metapopulation need to be tracked in a more consistent way, and in a way that is meaningful to biologists and administrators charged with preserving the species.

B. Other status recommendations.

State (Idaho): A rank of S1 is still appropriate.

3. Conservation/recovery recommendations

A. General conservation recommendations

- 1. Recommendations regarding present or anticipated activities:** Extinction appears imminent for the Redbird Ridge (001), Upper Hatwai Creek (005), and Ferdinand Trestle (012) populations due to their small size and habitat degradation. In the interest of germ plasm conservation, seed should be collected from these populations and placed in long-term storage, in anticipation of their imminent demise.

- 2. Areas recommended for protection:** Lichthardt (1997) recommended seven Idaho sites for protection. We recommend dropping 001 and 005 from her list and adding Snake River canyon populations found in 2001. This results in the following list of priority sites for conservation:

 - 002 Genesee South
 - 003 Ferdinand Butte
 - 006 Garden Creek Ranch
 - 007 Cold Spring Creek
 - 009 Captain John Creek
 - 010 Madden Creek
 - 015 Camp Creek
 - 016 Billy Creek–South
 - 017 Billy Creek–North

- 3. Habitat management recommendations:** Habitats should be managed to reduce impacts from man-caused disturbances that may destroy habitat, reduce population size, or extirpate populations. Monitoring or removal of aggressive, exotic species may be required.

B. Monitoring activities and further studies

Where landowner cooperation can be obtained, priority 1 sites (003, 006, 007, 008) should be monitored for weed invasion; physical weed removal should be used if necessary to protect the habitat.

Quantitative monitoring should be established in populations within the Craig Mountain WMA to complement that currently ongoing at Garden Creek Ranch.

Most of the *Silene spaldingii* populations in Idaho are tracked as a single occurrence (006). We recommend that this occurrence be tracked as at least seven subpopulations, and that the other six occurrences associated with Craig Mountain conservation lands (008, 009, 010, 015, 016, and 017) be submerged in 006 as additional subpopulations.

LITERATURE CITED

- Bailey, R.G., compiler. 1995. Description of the ecoregions of the United States. 2nd edition. Miscellaneous Publication 1391. USDA, Forest Service, Washington, D.C. 108 p. with separate map.
- Baldwin, C. T., and S. J. Brunsfeld. 1995. Preliminary genetic analysis of *Silene spaldingii* (Spalding's catchfly), a candidate threatened species. Wildland Plant Ecogenetics Cooperative, University of Idaho, in cooperation with Montana Natural Heritage Program. Not paged.
- Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1991. Forest habitat types of Northern Idaho: a second approximation. USDA Forest Service, Intermountain Research Station General Technical Report INT-236. 135 p.
- Daubenmire, R.F. 1970. Steppe vegetation of Washington. Technical Bulletin 62. Washington Agricultural Experiment Station, Washington State University, Pullman, WA. 89 p. plus appendices.
- Hill, J. and K. Gray. 2000. Conservation of Spalding's catchfly (*Silene spaldingii*) in the Lower Corral Creek study area Garden Creek Ranch Craig Mountain, Idaho. The Nature Conservancy. 17 p. plus appendices.
- Hitchcock, C.L. 1964. *Silene*. Page 594 in: Vascular plants of the Pacific Northwest. Part 2, by C.L. Hitchcock, A. Cronquist, M. Ownbey, and J.W. Thompson. University of Washington Press, Seattle.
- Idaho CDC. 2001. Idaho Conservation Data Center, Biological and Conservation Data System. Idaho Department of Fish and Game, Boise. Database.
- Idaho Natural Heritage Program, Oregon Natural Heritage Data Base, and Washington Natural Heritage Program. 1986. Final report, Phase I, 1986 National Natural Landmarks Program, Pacific Northwest Region, National Park Service. Unpublished report on file at the Conservation Data Center, Idaho Department of Fish and Game, Boise, ID. 48 p.
- Johnson, C.G., and S.A. Simon. 1987. Plant associations of the Wallowa-Snake Province, Wallowa-Whitman, National Forest. R6-ECOL-TP-86. USDA Forest Service, Wallowa-Whitman National Forest, Baker City, OR. 399 p. plus appendices.
- Kagan, J. 1989. Draft species management guide for *Silene spaldingii*. Oregon Natural Heritage Data Base, Portland, OR. 10 p.
- Kuchler, A.W. 1964. Potential natural vegetation of the conterminous United States. Spec. Bull. No. 36. American Geographical Society, N.Y.

- Lesica, P. 1991. Inbreeding depression and the importance of pollinators to the threatened plant, *Silene spaldingii* (Caryophyllaceae). Report prepared for The Nature Conservancy, Montana Field Office, Helena, MT.
- Lesica, P. 1993. Loss of fitness resulting from pollinator exclusion in *Silene spaldingii* (Caryophyllaceae). *Madrono* 40(4):193-201.
- Lesica, P. 1997. Demography of the endangered plant, *Silene spaldingii* (Caryophyllaceae) in northwest Montana. *Madrono* 44(4):347-358.
- Lesica, P. 1999. Effects of fire on the demography of the endangered geophytic herb *Silene spaldingii* (Caryophyllaceae). *Am. J. Bot.* 86:996-1002.
- Lesica, P. and B. Heidel. 1996. Pollination biology of *Silene spaldingii*. Unpublished report for The Nature Conservancy, Montana Field Office, Helena, Montana. 16 p.
- Lichthardt, J. 1997. Revised report on the conservation status of *Silene spaldingii* in Idaho. Report prepared for the Idaho Department of Parks and Recreation under Section 6 funding from the U.S. Fish and Wildlife Service, Region 1. On file at: Idaho Department of Fish and Game, Conservation Data Center, Boise. 21 p. plus appendices.
- Lichthardt, J. and R.K. Moseley. 1997. Status and conservation of the Palouse Grassland in Idaho. Unpublished report to the U.S. Fish and Wildlife Service, on file at: Idaho Department of Fish and Game, Conservation Data Center, Boise. 28 p. plus appendices.
- Lorain, C.C. 1991. Report on the conservation status of *Silene spaldingii* in Idaho. Report prepared for the Idaho Department of Parks and Recreation under Section 6 funding from the U.S. Fish and Wildlife Service, Region 1. On file at: Idaho Department of Fish and Game, Conservation Data Center, Boise. 29 p. plus appendices.
- Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of Western Montana. USDA Forest Service, Intermountain Forest and Range Experiment Station. General Technical Report INT-66. 154 p.
- Schassberger, L.A. 1988. Report on the conservation status of *Silene spaldingii*, a candidate threatened species. Unpublished report on file at: the Montana Natural Heritage Program, Helena. 68 p. plus appendices.
- The Nature Conservancy, Idaho Natural Heritage Program, and Oregon Natural Heritage Database. 1987. Final report, Phase I, 1987 National Natural Landmark Project, Pacific Northwest Region, National Park Service. Unpublished report on file at the Conservation Data Center, Idaho Department of Fish and Game, Boise, ID. 47 p.
- Tisdale, E.W. 1983. Grasslands of western North America: The Pacific Northwest Bunchgrass. Pages 223-245 in *Grassland ecology and classification symposium proceedings*, A.C. Nicholson, A. McLean, and T.E. Baker, editors, Ministry of Forest, Province of British Columbia, Victoria, BC.

Tisdale, E.W. 1986. Canyon grasslands and associated shrublands of west-central Idaho and adjacent areas. University of Idaho, Forest, Wildlife and Range Experiment Station. Bulletin No. 40. 42 p.

-- APPENDICES NOT AVAILABLE ON WEB --