File

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office
Eastern Washington Field Office
1103 East Montgomery Drive
Spokane Valley, Washington 99206

In Reply Refer To:
13410-2010-F-0126

July 21, 2011

Mr. Kurt Ingeman
Environmental Protection Specialist
Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Subject: Asotin County Wildlife Area Funding of Wildlife Management Activities, Asotin, County, Washington

Dear Mr. Ingeman:

This letter transmits the U.S. Fish and Wildlife Service's Biological Opinion (Opinion) based on our review of the proposed Asotin Creek Wildlife Area Funding of Wildlife Management Activities located in Asotin County, Washington and its effects on Spalding's catchfly (*Silene spaldingii*), in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your June 29, 2010, request for formal consultation was received in this office on July 1, 2010.

The Service concurs that the Project is not likely to adversely affect the gray wolf (*Canis lupus),* bull trout (*Salvelinus confluentus*) and designated critical habitat for the bull trout. Effects to the Ute ladies' tresses and Canada lynx are not anticipated, as addressed in the introduction section of the biological opinion.

This Opinion is based on information provided in the June 29, 2010, Biological Assessment, and other sources of information. A complete record of this consultation is on file at the Eastern Washington Field Office in Spokane, Washington.

TAKE PRIDE IN AMERICA

If you have any questions regarding this biological opinion, please contact Carrie Cordova of my staff at 509-893-8022.

Sincerely,

Mark G. Miller

for Ken S. Berg, Manager
Washington Fish and Wildlife Office

Enclosure

cc: Nancy Weintraub, BPA
Mickey Carter, BPA
Bob Dice, WDFW
USFWS, Lacey (Grettenberger)

Endangered Species Act - Section 7 Consultation

BIOLOGICAL OPINION

for the

Asotin Creek Wildlife Area Funding of Wildlife Management Activities

Asotin County, Washington

U.S. Fish and Wildlife Service Reference:
13410-2010-F-0126

Agency: Bonneville Power Administration
Portland, Oregon

Consultation Conducted by: U.S. Fish and Wildlife Service
Eastern Washington Fish and Wildlife Office
Spokane Valley, Washington

Mark D. Miller
for Ken S. Berg, Manger
Washington Fish and Wildlife Office

7-21-11
Date

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LIST OF ACROYNMS AND ABBREVIATIONS

Act	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)
ACWB	Asotin County Weed Board
BCCDC	British Columbia Conservation Data Center
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
FCRPS	Federal Columbia River Power System
HIP BO	Habitat Improvement Program Biological Opinion
IPCC	Intergovernmental Panel on Climate Change
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PCE	Primary Consistent Elements
TNC	The Nature Conservancy
USFS	United States Forest Service
USGS	United States Geological Survey
SCCP	Spill Containment and Control Plan
WCA	Washington Cattleman's Association
WDFW	Washington Department of Fish and Wildlife
WNHP	Washington Natural Heritage Program
WSU	Washington State University

INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed Asotin Creek Wildlife Area Funding of Wildlife Management Activities (Project) by Bonneville Power Administration (BPA) located in Asotin County, Washington and its effects on Spalding's catchfly (*Silene spaldingii)*, in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your June 29, 2010, request for formal consultation was received in this office on July 1, 2010.

In the Biological Assessment (BA) the Corps determined that the proposed project would have no effect on Canada lynx and Ute ladies'-tresses. Under the section 7 regulations (50 CFR 402.14), Federal agencies are required to determine whether there is an effect to listed species or critical habitat. Should the action agency determine that there is no effect to listed species or critical habitat, there is no requirement for Service concurrence, nor do the regulations provide the Service with the authority to concur with that determination. The determination that there will be no effect to listed species rests with the action agency, and no consultation with the Service is required. Therefore, the Canada lynx and Ute ladies'-tresses are not further addressed in this Opinion.

CONSULTATION HISTORY

November 24, 2009: By letter on this date, the BPA requested informal consultation with the Service for gray wolf, bull trout, designated bull trout critical habitat, and Spalding's catchfly, pursuant to section 7 of the Endangered Species Act (Act) for the project.

Discussions occurred with Service biologists and the BPA during this time.

May 21, 2010: By e-mail on this date, the Service informed the BPA that there would be potential adverse effects to Spalding's catchfly from the Project and requested the BPA request formal consultation for effects to the Spalding's catchfly from the proposed Project.

June 29, 2010: By letter on this date, the BPA requested formal consultation for the Project.

June 17, 2010: The Service acknowledged receipt of the BPA's request for formal consultation and receipt of a complete initiation package, therefore, formal consultation was initiated by the Service on this date.

CONCURRENCES

Gray Wolf (Canis lupus)

Wolves are wide-ranging carnivores that may pass through the project area. Individual gray wolves have been confirmed south of Asotin County in the Blue Mountains, but currently no wolves are known to occur near the project area. There are no records of wolf sightings within 10 miles of the Smoothing Iron (Upper Schlee), Bickford, or Lower Schlee units of the Asotin

Creek Wildlife Area in the Washington Wildlife Heritage Database (WDFW 2008). There are currently no known denning or rendezvous sites near the project area.

The amount of forested cover in the Asotin Creek Wildlife area is scant and it is unlikely that wolves would den here or use it for rendezvous sites. Routine maintenance of the existing buildings and fences on the wildlife units would not affect wolves, as they would avoid these areas and fence design would not hinder the movement of wolves. Restoration and maintenance of the agricultural fields would possibly benefit wolves by expanding habitat for them and their prey species.

Herbicide treatments in the project area are targeted to the noxious weed locations and are hand controlled with no widespread broadcast or aerial application involved. The minimum amounts needed to control noxious weeds will be used. If and when wolves use the wildlife area, they would most likely not spend enough time in the areas being treated for noxious weeds to have significant long-term exposure to the herbicides.

While there is a possibility of transient gray wolves to be directly affected by project activities, increased noise and human activity, as well as herbicide application during project implementation, effects to the gray wolf are anticipated to be unlikely and therefore discountable based on low populations of gray wolves within the Asotin Wildlife Management Unit and immediately adjacent to the action area.

Bull Trout (*Salvelinus confluentus)* and Designated Critical Habitat for the Bull Trout

The headwaters of Asotin Creek originate in the Blue Mountains and flow east into the Snake River at Asotin, WA. Its primary tributaries consist of Pintler, George, Charley, South Fork Asotin, North Fork Asotin, Lick, Middle Branch North Fork Asotin, and South Fork of North Fork Asotin creeks. Bull trout have been documented in Charley, George, North Fork, Middle Branch, and South Fork of North Fork Asotin Creeks. Based on geographic distribution, these are considered to be distinct wild stocks of fluvial and resident bull trout. Adfluvial bull trout were probably present in the lower three miles of Asotin Creek prior to human settlement of the lower Asotin Creek valley and the resulting water diversions and withdrawals; there is a remote possibility that they may still be present in the lower sections.

George Creek from the confluence with Asotin Creek upstream 34.6 km (21.5 mi) to its headwaters at Seven Sisters Spring provides foraging habitat and potential spawning and rearing habitat. George Creek is the largest tributary to Asotin Creek. The Draft Recovery Plan for the Bull Trout identified George Creek as essential because it contains habitat which may currently support bull trout, or could support bull trout populations to aid in attainment of recovery plan goals (USFWS 2002). One bull trout was found in George Creek in surveys done by the U.S. Forest Service (USFS) in 1993 (USFS 1993b). Stream habitat conditions in George Creek above the confluence of Coombs Creek at River Mile 16.2 are good (G. Mendel pers. comm. 2002). Stream canopy cover is good and riparian vegetation is healthy up to the National Forest boundary. However, one-pass electrofishing by WDFW at many sites in upper George Creek upstream of Coombs Creek in the early 2000s did not confirm bull trout presence (WDFW, *in litt.* 2010).

Charley Creek, a large tributary of Asotin Creek, provides feeding, migration, and overwintering (FMO) habitat from its confluence with Asotin Creek upstream 11 km (6.8 mi) to an inlet of a large, unnamed spring near the National Forest boundary. Bull trout have been documented using this lower section of Charley Creek. The drainage was identified in the Draft Recovery Plan (USFWS 2002) as essential because it contains habitat which may currently support bull trout, or could in the future. During habitat and fish surveys in June/July 1993, the USFS observed four bull trout in a total of five pools in a middle reach of Charley Creek (USFS *in litt.* 1993a, 1996a). They observed two additional bull trout in a total of four pools in the upper 6.44 kilometers (4 miles) of Charley Creek. All six bull trout observed were approximately 203 millimeters (8 inches) or less (D. Groat, pers. comm. 2002). Salmonid refuge cover (for age 1+ and older fish) was rated as "good" by the USFS in all reaches totaling 25.76 kilometers (16 miles) of Charley Creek in 1993 (USFS *in litt.* 1993a, 1996b). Bull trout redd surveys were conducted in Charley Creek in 1998, 1999, and 2000, but no spawning activity was observed. Spawning surveys were not performed in Charley Creek prior to 1998. WDFW electrofishing surveys and steelhead trapping over several years in the 1980s and early 1990s did not confirm bull trout presence, except in 1986 (G. Mendel, pers. comm. 2002).

South Fork Asotin Creek from its confluence with North Fork Asotin Creek upstream to its headwaters provides 11.8 km (7.3 mi) of FMO habitat and 11.4 km (7.0 mi) of potential spawning and rearing habitat. Bull trout have been found in South Fork Asotin Creek, but no spawning has been documented; however, the drainage has not been extensively surveyed. Two bull trout were found in lower South Fork Asotin Creek in 2008 during an electrofishing survey (G. Mendel, *in litt.* 2008). These were the first bull trout documented in this stream in a long time, although there have been reports from anglers about catching bull trout in the South Fork in recent years. This stream is critical habitat because it potentially supports a local population, and to recover bull trout in the Asotin Creek Basin, it will be necessary to expand the population beyond the limited area in the North Fork Asotin Creek where spawning is currently known to occur (USFWS 2010b, p. 439). Segments of all these creeks, with the exception of North Fork Asotin Creek, are present in the action area (Figure 1).

The conversion of agricultural fields to native habitat is taking place on the flat uplands in the Smoothing Iron Unit, well removed from bull trout or riparian habitat. Although erosion and sedimentation may result from plowing fields, these will not exceed the normal levels associated with the ongoing farming activities that historically occurred on the land prior to purchase by WDFW. Conversely, the conversion will result in long-term curtailment of the annual plowing, and stabilization of the soils with native grasses and shrubs.

Effects to bull trout could potentially result from ground disturbing activities that can result in erosion and sedimentation in streams, and possible toxicity from exposure to herbicides. It is highly unlikely that building and fence maintenance activities at the Asotin Creek units would affect bull trout. This work involves very little to no ground disturbance and should not increase sedimentation.

The use of herbicides to control noxious weeds presents the highest likelihood of potential effect to bull trout of any of the activities. The BPA has a programmatic biological opinion from the National Marine Fisheries Service (NMFS) for its habitat improvement programs and effects on listed salmon and steelhead - the Habitat Improvement Program Biological Opinion (HIP BO)

(NMFS 2008, see Appendix A). This consultation described toxicity and other effects of herbicide use in upland and riparian areas on listed steelhead and salmon. Since bull trout are also salmonids, BPA believes that the potential effects to bull trout are similar to the effects evaluated for salmon and steelhead, however, these will not be adverse to bull trout as bull trout presence is low in the action area and all herbicide use funded by BPA is required to conform to the conservation measures and terms and conditions imposed by the HIP BO. The herbicides approved for use under this Opinion were selected based on characteristics that would minimize impacts to salmonids, including low toxicity, relatively low persistence in the environment, and lower incidence of migration into streams. Buffers for herbicide application near riparian areas will be strictly observed. WDFW complies with all conservation measures and terms and conditions of the HIP BO in using herbicides on the Asotin Creek wildlife units. By adhering to these measures, the likelihood of herbicides reaching streams in significant concentrations will be very low. No use of the streams in the Smoothing Iron, Bickford, or Lower Schlee units in the action area by bull trout is shown on the Streamnet database maps (Streamnet 2009); however, concentrations of the target weeds occur in Warner Gulch which is the path of flood water from the eroded Pasture 1 of Smoothing Iron. Drainage and possible sediment from the application area enters the South Fork of Asotin Creek. Implementation of conservation measures for this activity are expected to reduce effects to bull trout, therefore, effects to bull trout from these activities are expected to be insignificant.

The action area contains designated critical habitat for bull trout in George Creek, Charley Creek, North Fork Asotin Creek and South Fork Asotin Creek. George Creek provides bull trout foraging habitat and potential spawning and rearing habitat and is the largest tributary to Asotin Creek. Charley Creek provides foraging, migration and overwintering (FMO) habitat. North Fork Asotin Creek is the only creek where bull trout spawning has been confirmed, and provides FMO habitat below the confluence of the South Fork of the North Fork Asotin Creek, outside the action area. South Fork Asotin Creek provides FMO habitat and potential spawning and rearing. These are expected to continue in this capacity for bull trout.

There are two Primary Constituent Elements (PCE's) that could be affected with project activities.

PCE 4: In spawning and rearing areas, substrate of sufficient amount, size and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.

Disking activities would occur in the Smoothing Iron (Upper Schlee) Unit which contains portions of South Fork Asotin Creek. However, only the flat upland fields would be restored and large buffers exist between ground-disturbing activities and riparian areas. It is unlikely, therefore, that the proposed actions would result in a significant increase of fine sediment or embeddedness in designated bull trout critical habitat. Additionally, ongoing farming activities have occurred historically in the action area prior to its purchase by WDFW and the proposed actions would not increase the background levels of sedimentation. Rather, conversion of agricultural fields to native vegetation would eliminate the need for annual ground disturbance,

decreasing sedimentation into streams over the long-term. Effects to this element from project activities are expected to be discountable.

PCE 8: Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.

As noted above, the herbicide properties and terms of use minimize the likelihood of significant stream contamination. No-spray buffers are observed around all water courses, including those of George Creek, Charley Creek, South Fork Asotin Creek, Warner Gulch, and their tributaries. Further, the herbicides used display relatively low environmental persistence and are unlikely to migrate into streams from upland application; therefore, effects to this element are expected to be insignificant.

Summary

Based on the information provided in the BA, the Service concurs with the BPA's determination that the proposed Project "may affect, but is not likely to adversely affect" the gray wolf, bull trout and designated bull trout critical habitat.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Washington Department of Fish and Wildlife (WDFW) with funding from the Bonneville Power Administration (BPA) proposes to conduct management activities to improve fish and wildlife habitat at the Asotin Creek Wildlife Area in Asotin County, Washington. The Smoothing Iron (Upper Schlee), Lower Schlee, and Bickford units lie within the context of the Asotin Creek Wildlife Area.

The activities funded by BPA and implemented by WDFW include the following:

- Routine maintenance of buildings associated with the Schlee Ranch that are being used by WDFW
- Maintenance and replacement of boundary stock fences
- Agricultural field restoration and maintenance
- Control of noxious weeds

These actions are ongoing, except that the agricultural field restoration will eventually be reduced to minor maintenance and control of noxious weeds once the native plants are established. Detailed descriptions of each action follow.

Building maintenance:

There are eleven structures on the Smoothing Iron Unit associated with the former ranch, and a hay shed on the Bickford Unit that require ongoing routine maintenance. This includes winterizing the water systems to protect them from freeze damage, repairing storm damage to roofs and buildings, maintaining doors on the shops and house, and controlling vegetation around the structures to prevent fire danger. Vegetation is controlled by mowing and herbicide use. All activities occur within the existing building and ranch footprints and disturbed areas that would not provide habitat for any listed species. The ranch is historic and was evaluated as being eligible for the National Register of Historic Places. No new construction or ground disturbance is anticipated.

Fence maintenance and repair:

Approximately 10 miles of the existing boundary stock fence and internal fences are walked each year in each of the three units to check for damaged or down sections and are repaired as needed to exclude trespass livestock. Downed sections of fence are repaired and set back in place; broken wires are mended; rusty and defective barbed wire is replaced; and rotting or damaged rock jacks and wooden and metal poles are replaced as needed. Light pickup trucks and 4-wheel all-terrain vehicles are used to transport materials when needed.

houndstongue (*Cynoglossum officinale* L.), dalmation toadflax *(Linaria dalmatica)*, rush skeletonweed *(Chondrilla juncea)*, and leafy spurge *(Euphorbia esula)*.

The BPA has agreed to use only 2, 4-D amine, Curtail (chloropyralid), Milestone (aminopyralid) and imazapyr in the Smoothing Iron Unit around Spalding's catchfly locations during the first year of the activities covered under this consultation. Proposed herbicide application forms will be submitted to the Service annually prior to conducting herbicide treatments in the Smoothing Iron Unit. The WDFW and the Service will review these forms to determine the appropriateness of the application of these herbicides, based on the prior year's use and updated information regarding herbicide use in Spalding's catchfly habitat, and discuss if alterations are necessary for the treatments proposed for that year.

All herbicide use funded by BPA is required to conform to the conservation measures and terms and conditions imposed by the (HIP BO), as described above. See Appendix A for a description of these measures. Annual reporting is a requirement of the HIP BO and the BPA will also provide these reports to the Service.

CONSERVATION MEASURES

The HIP BO measures (Appendix A) were developed to protect listed salmonid species from impacts due to herbicide use. In addition to these measures, BPA and WDFW proposed the following conservation measures to protect the listed plant Spalding's catchfly.

- Surveys were conducted in summer 2010 by students from Washington State University. Surveys will continue to be conducted for Spalding's catchfly in all suitable habitats where herbicides are to be used, except in drought years. During subsequent field seasons, surveys will be conducted to locate and monitor the status of Spalding's catchfly populations. BPA has included funding in WDFW's contract to cover these surveys and Washington State University (WSU) technicians will be hired to do these surveys in the summer.

- In the vicinity of known Spalding's catchfly populations, herbicide applications will be limited to the March 1 through May 31 time period, when Spalding's catchfly is dormant and first emerging. Timing will be as early as feasible to obtain effectiveness of the herbicide on the target species while minimizing risk of a mature Spalding's catchfly plant receiving errant chemical drift. In areas away from Spalding's catchfly populations, application may continue until November 15.

- No herbicide application will be conducted within ten feet of known Spalding's catchfly locations; within this buffer, noxious weeds will be pulled by hand only.

- Only the non-persistent herbicide 2,4D amine will be used between the 10 ft. and 50 ft. buffer around Spalding's catchfly populations.

- Areas containing Spalding's catchfly populations and individual plants will be flagged prior to treatments. The 2009 survey data will be used to help delineate the 50 ft. buffer

Agricultural field restoration and maintenance:

The former owner has decided to no longer farm nearly 600 acres of agricultural fields on the Smoothing Iron Unit. These fields, located on the flat upland ridge tops, were being sharecropped by Mr. Schlee since the land transfer, but high fuel costs, escalating input costs, and difficulty in maintaining access to the ridge tops with large equipment have made farming these fields uneconomical.

WDFW began converting these fields from wheat stubble to a seed bed in spring of 2008 with the application of Roundup (glyphosate) herbicide to prevent cheatgrass and other weeds from germinating and setting seed. They began disking and cultivating the fields soon after the herbicide was applied. In fall of 2008 they began seeding 475 acres of the fields to native grasses. The new grass will require maintenance to ensure establishment for the next several years. It will be mowed and/or herbicide will be applied to control emerging broadleaf weeds in the spring and summer.

The remaining 125 acres will be seeded to a forage crop that will be highly attractive to deer and elk with the objective of retaining big game on Smoothing Iron Ridge. The forage crop acres are divided into two areas in the vicinity of the ranch buildings in Warner Gulch. Approximately 75 acres are on the south ridge and 75 acres are on the north ridge. Crops such as winter wheat, forage turnips, canola, and others will be seeded into these areas annually. Funding will come from BPA, sharecroppers, and state dollars.

Noxious weed control:

All three units require ongoing noxious weed control. Infestations of noxious weeds are prioritized and treated by means of spraying with herbicide, mowing, or hand pulling. The use of biocontrol agents may be considered in the future. Weed concentrations are prioritized for treatment as follows:

1. "A" list weed species as defined by the Asotin County Weed Board (ACWB)
2. critical wildlife habitats or plant communities
3. riparian cover types
4. trails/access sites/roads
5. neighboring boundaries

All other weeds are treated as funds and opportunity allow. Cooperative control projects are continually sought with the ACWB, neighboring landowners, and other cooperating government agencies. Herbicides are applied though the use of backpack sprayers, ATV mounted boom sprayers, and a pickup mounted tank with hand gun sprayers. 2,4-D (amine formulation only), Milestone (aminopyralid), glyphosate, Curtail (chlopyralid), Tordon 22k (picloram), imazapyr, dicamba, and metsulfuron methyl herbicides have been or may be used to control noxious weeds such as scotch thistle (*Onopordum acanthium*), yellow starthistle (*Centaurea solstitialis)* Mediterranean sage (*Salvia aethiopis*)(class A), sulfur cinquefoil (*Potentilla recta),*

mentioned above as accurately as possible.

- Applications will be limited to non-windy site conditions when there is the lowest likelihood of drift (wind speeds of less than 5 mph).

- Herbicide will be sprayed directly on the noxious weeds by backpack sprayer using a nozzle dispenser held by hand within the 50 ft. buffer zone around Spalding's catchfly populations. A shield on the end of the wand will be used to further control and direct the application. In the vicinity of the ten-foot, no-spray buffer, application will be downwind and directed away from Spalding's catchfly plants.

- Drop size of the application will be as large as feasible.

- The herbicide application will be conducted by a Washington State-certified applicator. Herbicide applicators will be trained to recognize Spalding's catchfly and observe the ten-foot buffer and other conservation measures. The work will be supervised by the Wildlife Area manager who will assure all protection measures are understood and carried out correctly.

- Herbicide application will be monitored to observe whether spray methods are implemented as prescribed. Absorbent paper cards will be placed on areas marked for spray avoidance to evaluate whether these areas receive herbicide drift. If cards absorb blue dye indicating chemical drift, herbicide application methods will be adjusted by increasing application distance from these areas, adjustment of spray shields, and/or adjusting droplet size.

- Ground disturbance will be minimized in Spalding's catchfly areas to protect dormant plants and pollinator habitat.

Finally, the issue of impacts to non-listed species, particularly ground-nesting birds, was raised during the consultation by the Service. To address this issue, WDFW and BPA have added the following conservation measure:

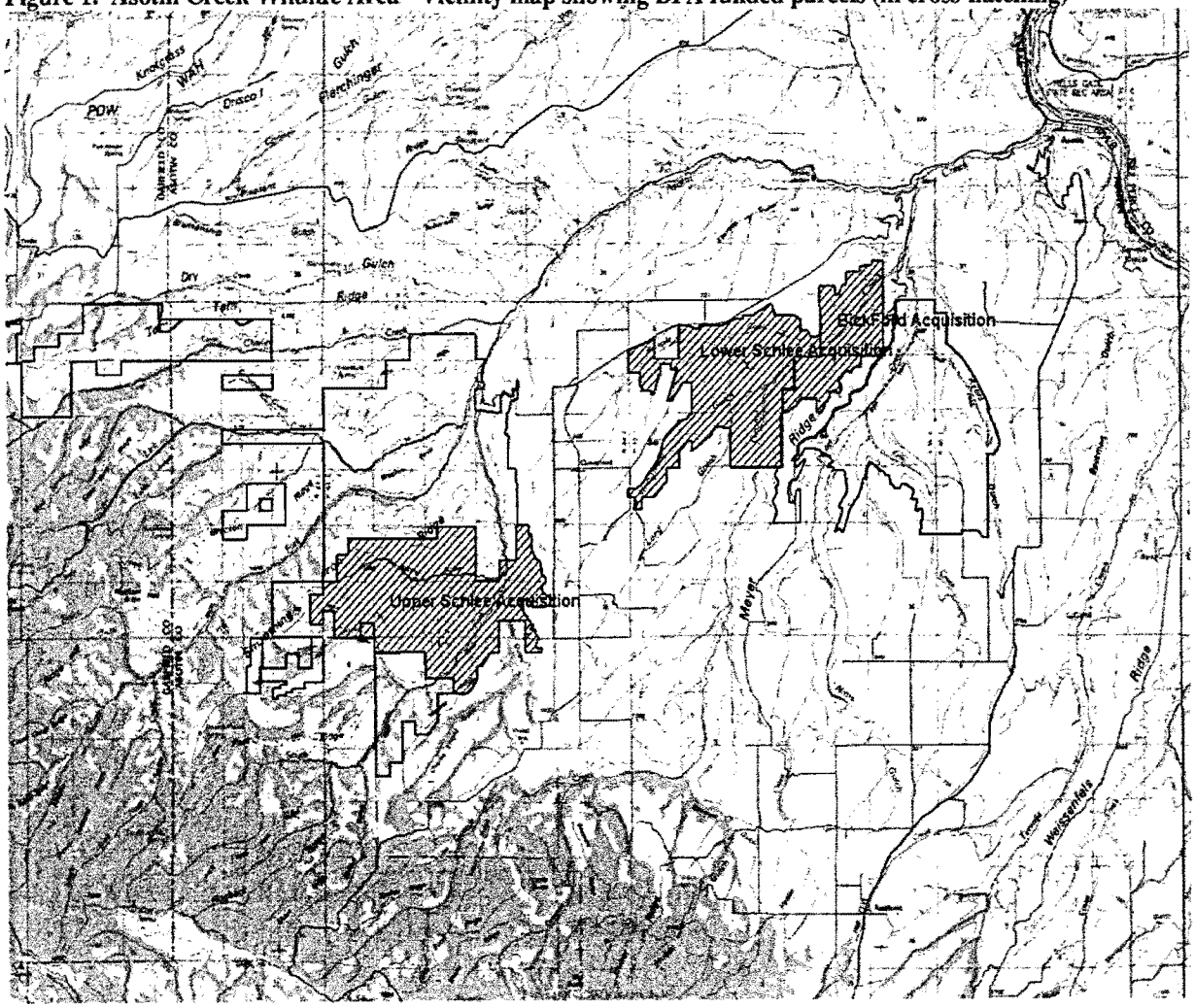
- During herbicide application, the applicator will be on the lookout for any ground nesting birds or other wildlife, and will immediately cease spraying and leave the vicinity if any are found.

ACTION AREA

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.2). In delineating the action area, we evaluated the farthest-reaching physical, chemical, and biotic effects of the action on the environment.

The action area is based on the geographic extent of all potential project impacts to the environment. The action area is the area that includes the Smoothing Iron (Upper Schlee), Lower Schlee, and Bickford acquisitions (Figure 1). The South Fork Asotin Creek is also included in the action area due to the concentrations of target weeds occurring in Warner Gulch, which is the path of flood water from the eroded Pasture 1 of Smoothing Iron. Drainage and sediment from the application area enters the South Fork of Asotin Creek. Due to the localized nature of the proposed activities, it is highly unlikely that effects will occur outside of these areas.

Figure 1. Asotin Creek Wildlife Area - Vicinity map showing BPA funded parcels (in cross hatching)



ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATION

In accordance with policy and regulation, the jeopardy analysis in this Opinion relies on four components: (1) the Status of the Species, which evaluates the Spalding's catchfly range-wide

condition, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the Spalding's catchfly in the action area, the factors responsible for that condition, and the role of the action area in the Spalding's catchfly's survival and recovery; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the Spalding's catchfly; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the Spalding's catchfly.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the Spalding's catchfly's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the Spalding's catchfly in the wild.

The jeopardy analysis in this Opinion emphasizes consideration of the range-wide survival and recovery needs of the Spalding's catchfly and the role of the action area in the survival and recovery of the Spalding's catchfly. It is within this context that we evaluate the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF THE SPECIES FOR THE SPALDING'S CATCHFLY (*Silene spaldingii*)

Listing History

Spalding's catchfly was listed as a threatened species under the Endangered Species Act on October 10, 2001 (USFWS 2001). The recovery plan for Spalding's catchfly was published on September 6, 2007 (USFWS 2007).

Species Description and Taxonomy

Spalding's catchfly is a member of the pink or carnation family, the Caryophyllaceae. It was first collected by Henry Spalding around 1846 near the Clearwater River in Idaho (Oliphant 1934, pp. 98-99) and later described by Sereno Watson in 1875, based on the Spalding material (Watson 1875, p. 344). The species has no other scientific synonyms nor has its taxonomy been questioned. Common names include Spalding's catchfly and Spalding's campion. Spalding's catchfly overlaps in range and is somewhat similar in appearance with several other species in the genus: *S. scouleri* (Scouler's catchfly), *S. douglasii* (Douglas' catchfly) *S. csereii* (Balkan catchfly), *S. oregana* (Oregon catchfly) and *S. scaposa scaposa* var. *scaposa* (scapose silene) (Schassberger 1988, pp. 6,10; Youtie 1990, p. 2; Lichthardt 1997, pp. 2-3).

Spalding's catchfly is an herbaceous perennial, emerging in spring and dying back to below ground level in the fall. Plants range from 20 to 61 centimeters (8 to 24 inches) in height, occasionally up to 76 centimeters (30 inches). There is generally one distinctively yellow-green stem per plant, but sometimes there may be multiple stems. Each stem bears 4 to 7 (up to 12 or more) pairs of leaves that are 5 to 8 centimeters (2 to 3 inches) in length, and has swollen nodes where the leaves are attached to the stem. All green portions of the plant (leaves, stems, calyx [defined below]) are covered in dense sticky hairs that frequently trap dust and insects, hence the

common name "catchfly." The plant has a persistent caudex (underground stem tissue) atop a long taproot (1 meter [3 feet] or longer in length). The long taproot makes transplanting the species difficult at best, and perhaps impossible. Typically Spalding's catchfly blooms from mid-July through August, but it can bloom into September.

Three to 20 (sometimes over 100) flowers are horizontally positioned near the top of the plant in a branched arrangement (inflorescence). Flowers are approximately 1.5 centimeter (0.6 inch) long; however, the majority of the flower petal is enclosed within a leaf-like tube, the calyx, which resembles green material elsewhere on the plant and has 10 veins running from the flower mouth to the base of the flower. The visible portion of the five flower petals is small (2 millimeters [0.08 inch]), cream-colored, and extends only slightly beyond the calyx. Attached to the visible flower petals (blades) are four to six very small (0.5 millimeter [0.02 inch]) appendages, the same color as the blades. The flowers are perfect (having both male and female parts). Each fertilized flower matures vertically and becomes a many-seeded (up to 150 seeds) cup-like fruit capsule. Fruits mature from August until September and one stem may have both, flowers and mature fruit capsules at the same time. Seeds are small (2 millimeters [0.08 inch]), wrinkled, flattened, winged, and light brown when mature. The above plant description is adapted from Schassberger (1988, pp. 5-6); Gamon (1991, p. 22); Lesica and Heidel (1996, pp. 2-3); Lichthardt (1997, p. 2); and Hill and Gray (2004a, pp. 5-6).

Life History and Ecology

At the end of the first five years of a demography study, 72 percent of Spalding's catchfly plants remained alive (Lesica 1997, p. 355), suggesting that individuals may regularly reach an age of at least 15 to 20 years. However, it is hypothesized some individuals may live up to 30 years of age or longer. Seedlings generally sprout in spring, form rosettes the first year, and occasionally flower the second year (Lesica 1995, p. 6), but generally flowering does not occur until during or after the third season (Lesica 1997, p. 348). Adult plants emerge in spring, usually May, as either a stemmed plant, a rosette, or occasionally as a plant with both rosette(s) and stem(s) (Hill and Weddell 2003, p. 1). Stemmed plants may remain vegetative or may become reproductive in July or August. Plants senesce or wither in fall (September or October), reappearing the next spring (Hill and Gray 2004a, p. 44).

A demographic study in Montana found Spalding's catchfly exhibits prolonged or summer dormancy (Lesica and Steele 1994, p. 210; Lesica 1997, p. 349); that is; plants can remain below the ground, without leaves, for up to six years when conditions are unfavorable (Lesica and Crone 2007a, p. 10). In one study plants were found to exhibit prolonged dormancy for one year 76 percent of the time and for two years 16 percent of the time (Lesica and Crone 2007a, p. 10). Another demographic study in Idaho across five years (2002 to 2006) found only 21 of 150 plants had dormant periods, 20 plants were dormant for one year, and one plant was dormant for two years (J. Hill, ICDC, *in litt.* 2007a, p. 2).

The Montana study concluded that prolonged dormancy increases Spalding's catchfly's fitness and may be a way to obtain below-ground resources that limit the production of flowers or fruits (Lesica and Crone 2007a, p. 11). This increased fitness in dormant plants was assumed since dormant plants had similar survival and growth, and were more likely to flower the following year compared to vegetative plants, resulting in a greater reproductive value associated with the

dormant state (Lesica and Crone 2007a, pp. 1, 10, 11). Discriminant function analysis showed that prolonged dormancy was dependent on both external (precipitation) and internal (life history stage) factors; that is, prolonged dormancy was associated with the plant having flowered the previous year and following high summer (July through September) precipitation and lower fall (October) precipitation the previous year (Lesica and Crone 2007a, pp. 1, 2, 10, and 11). In contrast, two demographic studies in the Canyon Grasslands of Idaho found equal numbers of vegetative and reproductive plants become dormant the following year; and after dormancy two to three times more individuals emerge as vegetative plants than as reproductive plants (results from Lichthardt and Gray 2003; Gray and Lichthardt 2004; Hill and Gray 2005a; and summarized in Gray and Hill 2006, Appendix 1).

A demographic study in the Canyon Grasslands of Idaho conducted for five years on Spalding's catchfly (2002 to 2006) (Hill and Weddell 2003; Hill and Gray 2004b; Hill and Gray 2005b; Hill 2006; J. Hill, *in litt.* 2007a) included two monitoring periods during each growing season, once early in the season soon after emergence (early June) and once late in the season at flowering time (early August). Most monitoring that has occurred for Spalding's catchfly has taken place only once, later in the season when individuals are flowering. Annual censuses at early sampling showed large proportions of the plants above ground were rosette plants (averaging 34 percent), the remainder were stemmed individuals. Annual censuses at the later sampling revealed large proportions of both stemmed and rosette plants had disappeared (39 percent). The majority of the plants that had disappeared (77 percent) were rosette plants. The authors performed demographic analyses on both early and late data sets to determine how demographic parameters would have differed. Monitoring only at flowering time would have resulted in an under-representation of the rosette plant stage class, under-representation of the total plants present, over-representation of dormancy and the duration of dormancy, and erroneous recruitment determinations (J. Hill, *in litt.* 2007a, p. 2). Another demographic study in the Canyon Grasslands of Idaho is showing similar results (Lichthardt and Gray 2003; Gray and Lichthardt 2004; Hill and Gray 2005a; Gray and Hill 2006). The demographic study in Montana found only a 10 percent difference between early and late monitoring (Lesica 2005, p. 1).

Prolonged dormancy of Spalding's catchfly can make population estimates and monitoring difficult. In one demography study in Montana, dormancy varied from a yearly low of 11 percent of individuals dormant to a high of 74 percent (Lesica 1997, p. 351). Long-term monitoring is necessary to accurately assess population trends of Spalding's catchfly. Due to this ability to go dormant, population estimates of Spalding's catchfly, if based on visible plants, will always be lower than the actual population size (P. Lesica, private consultant, *in litt.* 2003, pp.1-2).

Seed dispersal studies have not yet been conducted on Spalding's catchfly. However, the capsules of Spalding's catchfly serve as an open cup from which seeds are likely carried by the wind, jostled out by passing wildlife, or tossed when plants are knocked over. Seeds are small, flat, and somewhat winged. Plant height and seed characteristics suggest that short-distance wind dispersal may be common. In addition, the sticky nature of the plant makes it possible for portions of the plant to break off and stick to the fur of passing animals. This method of seed dispersal is probably infrequent but may provide an opportunity for more long distance dispersal. No studies have investigated how long Spalding's catchfly seeds may remain dormant in the soil before they lose their viability or if they survive passage through the digestive tract of herbivores. A recent study on the closely related *S. douglasii* found high initial seed germination

but that seed viability declines to about 20 percent after seven to eight years (Lofflin and Kephart 2005, p. 1695).

Two laboratory studies have looked at seed germination for Spalding's catchfly (Lesica 1988a, 1993; A. Raven, Berry Botanic Garden, *in litt.* 2004). Both studies found an increase in germination after cold stratification (a period of chilling), suggesting germination occurs predominantly in the spring. However, results from a 4-week cold stratification period (Lesica 1988a, pp. 1-2, 1993, p. 198; 1997, p. 348) indicate some germination could occur in fall when shorter chilling periods would occur. Lesica's (1988a, p. 1) study found 5 percent germination after 35 days without cold stratification and 60 to 70 percent germination after a 30-day cold stratification. An 8-week versus a 4-week cold stratification period greatly enhanced germination (Lesica 1993, pp. 197-198). Preliminary results from the Berry Botanic Garden in Portland, Oregon, found the highest germination (86 percent) with an 8-week cold stratification treatment followed by growth in a germination chamber with alternating periods of time at temperatures of 10 and 20 degrees Celsius (50 and 68 Fahrenheit; thought to mimic night and day time temperature fluctuations) (A. Raven, *in litt.* 2004, p. 1).

In a demography study in Montana, Lesica (1997, p. 355) found that significant recruitment (germination and seedling survival) of Spalding's catchfly occurred in only 2 of 7 years, indicating recruitment is a rare and sporadic event. A continuation of this study found significant recruitment in 3 of 13 years (Lesica and Crone 2007a, Figure 1). After germination, Lesica (1988a, p. 1) in Montana found seedlings began to grow immediately in small pots, continued growing for 2 months, remained green for another month, turned brown and went dormant for a month and a half, and then developed new leaves. It is hypothesized the initial growth would reflect early spring growth within native habitats, the dormant period would occur during the hot, dry summer, and regrowth would reflect fall growth (Lesica 1988a, p. 1). Another greenhouse study did not find the same dormant period: after germination seedlings grew for over a year and began bolting 13 months later (Hill *et al.* 2001, p. 8; Hill and Gray 2004a, p. 48).

Measuring new recruits (seedlings) of Spalding's catchfly within native habitats can be problematic. Adult plants can produce rosettes that are similar to those of seedlings. Various characteristics have been used to distinguish adult rosettes from seedling rosettes, including: seedling rosettes with a conspicuous lack of stem material between leaves (Lesica 1997, p. 349; Hill and Weddell 2003, pp. 7-8; Hill and Gray 2004b, p. 48; Lesica 2005, p. 1) although this characteristic does not appear reliable (Hill and Weddell 2003, pp. 7-8), seedling rosettes with hairless leaves (Hill and Gray 2000, p. 6; Hill and Weddell 2003, p. 8), seedling leaves with hairs only along the edges (Hill and Gray 2004b, p. 48), nearly hairless seedling rosettes (P. Lesica, *in litt.* 2006, p. 2), seedling rosette leaves not being opposite or equal sized as they are in adult rosettes (P. Lesica, *in litt* 2006, p. 2), and leaf size (Hill and Weddell 2003, p. 8). None of these techniques are definitive and persons performing monitoring for the species should be aware of this constraint. A demographic study in Idaho has concluded no diagnostic anatomical features could be identified to distinguish seedling rosette plants from older rosette plants and therefore made the distinction based on long-term monitoring. A rosette plant that appeared at a location where no plant had occurred in the previous 3 years was considered a seedling (J. Hill, *in litt.* 2007a, p. 1).

Spalding's catchfly reproduces only by seed, with no means of vegetative reproduction (spread by vegetative growth) (Lesica 1993, p. 194). The species is partially self-compatible, meaning the pollen is capable of fertilizing the female reproductive structures on the same plant. Flowers of *Spalding's catchfly* contain both male (stamen) and female (pistil) parts. However, the male parts mature, shed pollen, and wither prior to the female parts of the same flower becoming receptive (Lesica 1988b, p. 2). This reduces the chances of self-pollination within an individual flower, but still allows for pollination between different flowers on the same plant.

Using mesh bags to exclude pollinators, Lesica (1993, pp. 195-200) found significant decreases in fruit development, the number of seeds produced per fruit, germination after both a 4- and 8-week cold stratification period, seedling survival, and juvenile growth. Low pollinator visitation rates and a pollinator shifting more readily from Spalding's catchfly to another plant species (lower pollinator constancy) were both correlated with reduced fruit set in Spalding's catchfly (Lesica and Heidel 1996, p. 9). Lesica and Heidel (1996, p. 9) found pollinator constancy and visitation rates were lower at sites where large displays of flowers competed for the primary pollinator, the bumblebee *Bombus fervidus*. Observational data at Garden Creek found *B. fervidus* switching from Spalding's catchfly to *Hypericum perforatum* (St. Johnswort), suggesting that *H. perforatum* will compete with Spalding's catchfly for pollinator services (Lesica and Heidel 1996, p. 8 and 11). Collectively these studies suggest that Spalding's catchfly reproduces best when outcrossing occurs, pollinators are essential in maintaining the fitness of Spalding's catchfly, adjacent invasive nonnative plants may negatively affect reproduction, and pollinators must consistently visit Spalding's catchfly.

Pollinators were observed for over 30 hours, both during the day as well as the night, at each of five Spalding's catchfly populations across the range of the species, one in Idaho, one in Montana, one in Oregon, and two in Washington (Lesica and Heidel 1996, p. 5). The populations selected occurred in relatively intact habitat with at least 100 plants in a population. Across populations, the bumblebee *Bombus fervidus* accounted for over 83 percent of all visitations (Lesica and Heidel 1996, p. 7). Other pollinators included solitary bees from the Halictidae family (*Lasioglossum ovaliceps*, *Halictus tripartitus*, *Dienoplus rugulosis*, *Lasioglossum* spp.), one wasp visit, and a minor contribution from a night-pollinating moth species in Oregon (Lesica and Heidel 1996, p. 7).

Bombus fervidus is known from southern Canada and most of the United States, except the extreme south (Thorp *et al.* 1983, p. 27). The species is common within grasslands but rare in wooded foothills, and tends to build its nests either on or just below the surface of the ground, generally within the first 0.3 meters (1 foot) of soil (Hobbs 1966, p. 34). The queen emerges from hibernation in spring and establishes a seasonal colony that can contain over 200 individuals by fall (Hobbs 1966, p. 37). In California, the queen flies from early April to late October, workers from early May to late October, and males from early July to early October (Thorp *et al.* 1983, p. 27). *Bombus* species are generally less faithful to a particular plant species than honey bees (*Apis* spp.) within a foraging trip and do not specialize on pollination of any one species or group of plant species; in other words, they utilize a wide range of plant species for nourishment (Stephen *et al.* 1969, p. 118).

The distance that pollinators can travel is significant to plants because pollen transfer and seed dispersal are the only mechanisms for genetic exchange. In general pollinators will focus on

small areas where floral resources are abundant; however, occasional longer distance pollination will occur, albeit infrequently. No research has been conducted on flight distances of *Bombus fervidus*, but one study documented that bees fly 1 kilometer (0.6 mile) or less (Steffan-Dewenter and Tscharntke 1999, pp. 434-435). In another study, the bumblebee *Bombus terrestris* did not fly more than a distance of 621 meters (2,037 feet) (Osborne *et al.* 1999, pp. 524-526). Another bumblebee-pollinated plant species, *Scabiosa columbaria* (dove pincushions), experienced decreased pollen flow at a patch isolation distance of 25 meters (82 feet), and little to no pollen transfer when patches were isolated by 200 meters (656 feet) (Velterop 2000, p. 65).

In contrast, another study found that displaced *Bombus terrestris* species were able to return to their nests from distances over 9 kilometers (5.6 miles) (Goulson and Stout 2001, p. 108). One study found that *B. terrestris* workers were recaptured while foraging on super-abundant resources at distances of 1.75 kilometers (1.1 miles) from the nest (Walther-Hellwig and Frankl 2000, p. 303). One study that looked at genetics of fragmented populations of the rare plant

Scutellaria montana (large-flowered skullcap) hypothesized a maximum distance over which pollen dispersal rates were high enough to counteract genetic drift at 8 kilometers (5 miles), and higher levels of selfing due to an absence of pollinators at only 2 kilometers (1.2 miles) (Cruzan 2001, p. 1578). These studies suggest variability in the distances over which pollen transfer may occur. Spalding's catchfly populations are generally small and therefore do not represent "superabundant" resources. We expect that most pollen exchange will be rare for distances over 1.6 kilometers (1 mile). This is one of the rationales we used when grouping Spalding's catchfly sites within 1.6 kilometers (1 mile) of one another as populations. Recently the Washington Natural Heritage Program increased its separation distances of element occurrence records from 1 to 2 kilometers (0.6 to 1.2 miles) based on further research into pollinator flying distances (J. Holt, *in litt.* 2006).

Baldwin and Brunsfeld (1995) did a preliminary genetic analysis of Spalding's catchfly. Leaf samples were taken from five sites, one in Idaho, one in Montana, one in Oregon, and two in Washington. Samples were collected during a year with low precipitation when many plants remained dormant and consequently sample sizes were small. All sites where material was collected were known to have at least 200 individuals in good years. This study (Baldwin and Brunsfeld 1995, p. 4) found that genetic diversity of Spalding's catchfly was comparable to that of other rare *Silene* (*S. regia* [Dolan 1994, pp. 968-970] and *S. hawaiiensis* [Westerbergh and Saura 1994, pp. 1489-1492]). The only exception was that the Dancing Prairie site in Montana had lowered genetic diversity. This finding is consistent with the results of Lesica and Heidel (1996, p. 7), who reported lower pollinator visitation rates and a higher incidence of fruit abortion at the Dancing Prairie site. Baldwin and Brunsfeld (1995, pp. 2-3) also suggested that genetic diversity varies across the species' range, indicating that sites throughout the range of Spalding's catchfly need to be protected in order to preserve the full array of genetic variability within the species.

Habitat and Ecosystem Characteristics

Spalding's catchfly occurs at elevations between 365 to 1,615 meters (1,200 to 5,300 feet) (ONHP 2006; ICDC 2007; MNHP 2007; WNHP 2007; summarized in USFWS 2007). In general summers are hot and dry, while winters are cool to cold and moist across the range of Spalding's

catchfly (Western Regional Climate Center 2003, pp. 2, 6, 10, 17); anywhere from 45 to 65 percent of the precipitation occurs during the winter months (Daubenmire 1942, p. 59). A drought period occurs in mid and late summer when precipitation is minimal and temperatures are high (Tisdale 1983, p. 230). Consequently, most of the vegetation types do not grow in summer, but can remain active during the winter months when moisture is more readily available. The majority of growth, however, occurs in spring (Daubenmire 1970, p. 6). Spalding's catchfly is different than typical vegetation; it grows during the summer drought when the majority of the surrounding vegetation is dormant.

Annual precipitation ranges from 254 millimeters (10 inches) near Odessa, Washington, to 610 millimeters (24 inches) near Moscow, Idaho (Western Regional Climate Center 2003, pp. 1-2, 13-14). Mean annual temperature ranges from a low of 6 degrees Celsius (43 degrees Fahrenheit) at Enterprise, Oregon, to 13 degrees Celsius (55 degrees Fahrenheit) at Wawawai, Washington (Hill and Gray 2004a, p. 34). Average temperatures can vary significantly from winter to summer and from day to night. These are general climatic parameters; variations across the range of Spalding's catchfly can be dramatic and are heavily influenced by elevation, geography, and topography (Hill and Gray 2004a, p. 34-35).

Spalding's catchfly is generally found in deep loamy soils (fertile soils composed of organic material, clay, sand, and silt) and in more mesic, moist sites such as northern slopes, swales, or other small landscape features (Hill and Gray 2004a, pp. 23-24). These mesic sites are highly productive, with total plant cover and forage dry weight sometimes three times greater than drier, more shallowly soiled bluebunch wheatgrass (*Pseudoroegneria spicata*) communities (Johnson and Simon 1987, p. 9). Soils in the tri-state (Idaho, Oregon, and Washington) area are loess (wind-dispersed) and ash (from volcanic eruptions) influenced (Tisdale 1986b, pp. 1-2; Johnson and Simon 1987, pp. 8-9), while soils in Montana are more glacially influenced (Schassberger 1988, p. 48). Spalding's catchfly is found on a wide range of slopes, from flat areas to slopes as great as 70 percent. Most occurrences are found on grades ranging from 20 to 40 percent slope (Hill and Gray 2004a, p. 24), although this may be an artifact of where intact habitat has not been converted to other uses.

Spalding's catchfly is found primarily within the more mesic grasslands of the Pacific Northwest Bunchgrass association/type, extending from Washington and Oregon into parts of Montana and into adjacent British Columbia, and Alberta, Canada (Tisdale 1983, p. 223). This area has mistakenly, at times, been broadly described as the "Palouse Prairie" or the Palouse region (Tisdale 1983, p. 223; Lichthardt and Moseley 1997, p. 1; U.S. Fish and Wildlife Service 2001, p. 51598). The term "Palouse Grasslands" is used in the recovery plan to delineate a much narrower area than that covered by the Pacific Northwest Bunchgrass Grasslands. Pacific Northwest bunchgrasses where Spalding's catchfly is found are characterized by either *Festuca idahoensis* (Idaho fescue) or by both *F. idahoensis* and *Pseudoroegneria spicata* (bluebunch wheatgrass) in Idaho, Oregon, and Washington; and with *F. idahoensis* sometimes co- or subdominant with *F. scabrella* (rough fescue) in Montana (Tisdale 1983, p. 225). The summer drought across Spalding's catchfly's range prevents tree species from establishing in most Spalding's catchfly habitats and results in a climax grassland community (Daubenmire 1968, pp. 432, 437-438). Exceptions include the Dancing Prairie in Montana and Turnbull National Wildlife Refuge in Washington. At the Dancing Prairie site it is thought that tree establishment is

probably prevented by a combination of summer drought, competition with grasses, and wildfire (P. Lesica, *in litt.* 2007, p. 1).

Primary grassland habitat types within the Pacific Northwest bunchgrass grasslands include: 1) *Festuca idahoensis – Symphoricarpos albus* (snowberry); 2) *Festuca idahoensis – Rosa* spp. (rose); 3) *Festuca idahoensis – Koeleria cristata* (prairie junegrass); 4) *Pseudoroegneria spicata – Festuca idahoensis* or *Festuca idahoensis – Pseudoroegneria spicata*; and 5) *Festuca scabrella* (Daubenmire 1970, pp. iii-iv; Mueggler and Stewart 1980, p. 5; Tisdale 1986b, pp. 16-18; Johnson and Simon 1987, pp. 29-31). Primary shrub habitats include: 1) *Artemisia tridentata* (big sagebrush) – *Festuca idahoensis*; and 2) *Artemisia tripartita* (three-tip sagebrush) – *Festuca idahoensis*. Primary forest habitat types include: 1) *Pinus ponderosa* (ponderosa pine) – *Festuca idahoensis*; and 2) *Pinus ponderosa – Symphoricarpos albus*. In 2004, 73 percent of known Spalding's catchfly occurrences were within grassland habitat types, 20 percent within shrubsteppe habitat types, and 7 percent within forest habitat types (summarized by Hill and Gray 2004a, p. 37). The recent discovery of several new sites in the shrub-steppe of the Canyon Grasslands significantly increases the number of plants and sites in this habitat type. Some of the most difficult nonnative invasive plants to control in Spalding's catchfly habitat include *Cardaria draba* (whitetop), *Centaurea maculosa* (spotted knapweed), *Centaurea solstitialis* (yellow starthistle), *Chondrilla juncea* (rush skeletonweed), *Euphorbia esula* (leafy spurge), *Hypericum perforatum* (St. Johnswort), *Linaria dalmatica* (Dalmatian toadflax), *Poa pratensis* (Kentucky bluegrass), and *Potentilla recta* (sulfur cinquefoil).

The occupied habitat of Spalding's catchfly has been split into five physiographic regions that are characterized by distinctive physical features. These regions are distinctive from one another in climate, plant composition, historical fire frequencies, and soil characteristics. These differences are significant in that they may translate into differences in life histories, habitat trends, consequences of fire suppression, and types of weed control as they apply to conservation of Spalding's catchfly. The five physiographic regions utilized in this recovery plan are:

1. the **Blue Mountain Basins** in northeastern Oregon;

2. the **Canyon Grasslands** along the Snake, Salmon, Clearwater, Grande Ronde, and Imnaha Rivers in Idaho, Oregon, and Washington;

3. the **Channeled Scablands** of east-central Washington;

4. the **Intermontane Valleys** of northwestern Montana; and

5. the **Palouse Grasslands** in southeastern Washington and adjacent westcentral Idaho.

These regions were delineated by taking the physiographic regions from Hill and Gray (2004a, Figure 3a) and relating the regions to the more widely used Level IV Ecoregions for each state (U.S. Environmental Protection Agency 2004, p. 1). The only Spalding's catchfly populations that did not fit well into the regions characterized were those on Clear Lake Ridge in Oregon and those at Lost Trail National Wildlife Refuge in Montana. The Clear Lake Ridge populations will be included with the Blue Mountain Basins here instead of the Canyon Grasslands, and the Lost Trail populations are included within Montana's Intermontane Valleys.

The Blue Mountain Basins were once contiguous Pacific Northwest Bunchgrass Grasslands. Today much of the Wallowa Valley has been converted into residential or urban areas surrounded by agricultural and grazing lands. Soils are composed of deep loess similar to the Palouse Grasslands or glacial till soils such as those at the head of Wallowa Lake.

Spalding's catchfly ranges from 1,130 meters (3,700 feet) to 1,555 meters (5,100 feet) within the Blue Mountain Basins, specifically the Wallowa Valley (ONHP 2006, pp. 10, 14). The basin abuts habitat characterized as Canyon Grasslands, with no clear demarcation between the two regions. In the Blue Mountain Basins, Spalding's catchfly is often found along slopes of low broad ridges and ridgebrows, some with biscuit and swale topography (Hill and Gray 2004a, p. 25). Within the Wallowa Valley, habitat is highly dissected by urban and agricultural lands. A large Spalding's catchfly population (over 500 individuals) occurs at the end of Wallowa Lake. This population is the largest occurring on private land, other than land owned by The Nature Conservancy (TNC), and is threatened by urban development.

Of the five physiographic regions where Spalding's catchfly is found, the habitat of the Canyon Grasslands is the most intact, largely because the canyon walls are steep and do not lend themselves to agricultural or urban developments.

The Canyon Grasslands range widely in elevation, as evidenced by the presence of Hells Canyon, the deepest canyon in the United States at a depth of 2,400 meters (7,900 feet) (Alt and Hyndman 1989, p. 193). The dramatic range in elevation within the Canyon Grasslands results in marked variations in the climate and vegetation. Soils within the Canyon Grasslands range from solid bedrock cliffs to deep loess and ash deposits (Alt and Hyndman 1989, p. 175).

Within the Canyon Grasslands, Spalding's catchfly is found at the lowest and highest elevations rangewide from 365 to 1,615 meters (1,200 to 5,300 feet) (ICDC 2007; summarized in USFWS 2007), generally on northerly slopes that support more mesic *Festuca idahoensis* communities. At higher elevations (over approximately 1,525 meters [5,000 feet]) in the Canyon Grasslands the northern slopes are inhabited by tree species and Spalding's catchfly is found on southern slopes where bunchgrass communities reside. Because of their steep topography, the Canyon Grasslands are the most under-surveyed area for Spalding's catchfly, and also represent the area where large populations of Spalding's catchfly may be most easily conserved because they are more removed from human influence.

The Channeled Scablands are similar to the Palouse Grasslands with an underlying basalt layer covered by deep deposits of loess and ash, forming long undulating dune-like plains of rich soils; except that massive flooding, associated with bursting ice dams in the last ice age 12,000 to 16,000 years ago, has scoured portions of the area (Mueller and Mueller 1997, p. 29). This scouring has created a network of various habitats (loess islands surrounded by flood channels) that is far less consistent than the deep soil deposits of the Palouse Grasslands. Soils vary from basalt bedrock outcroppings to fertile loess and ash deposits to flood deposits (Daubenmire 1970, p. 6). An interesting landscape feature of the Channeled Scablands is referred to as "biscuit and swale" topography, commonly used to describe small biscuit-like loess mounds that are 1 meter deep by 5 meters in diameter (3 feet deep by 15 feet in diameter) and are regularly dispersed over

scablands or bare tracts of basalt outcrops (Daubenmire 1970, pp. 6-7). Like the Palouse Grasslands, the large loess islands that remain in the Channeled Scablands are fertile and consequently have been largely converted to agriculture. The forested portion of the Channeled Scablands is a mosaic of forest / non-forest, and Spalding's catchfly plants occur in the non-forested microsites.

Spalding's catchfly is reported to be primarily associated with relict flood channels within the Channeled Scablands. More specifically, Spalding's catchfly is generally found on northern facing slopes below talus or rock outcroppings, gentle northern slopes just above valley floors, or on the northern sides of biscuits (B. Benner, *in litt.* 1993, pp. 1-5). The species is found at elevations from 472 to 747 meters (1,550 to 2,450 feet) within the Channeled Scablands. Since we lack earlier botanical surveys, we do not know how much Spalding's catchfly may have formerly occurred within the loess islands between channels. However, its affinity for deep soils elsewhere indicates that habitat conversion has most likely reduced the number of plants found on these loess islands.

The Intermontane Valleys of northwestern Montana were glaciated more heavily than any other part of Montana. The valleys have been shaped by glacial activity associated with the continental ice sheet and the formation of Glacial Lake Missoula during the last ice age (Alt and Hyndman 1986, pp. 50-54). Topography in this region is characterized as "kettle and moraine." Kettles are steep-sided hollows without surface drainage and moraines are earth and stone deposits; both are formed by glacial flows.

Spalding's catchfly populations within Montana are disjunct (separated by well over 160 kilometers [100 miles]) from Spalding's catchfly sites elsewhere. Plants have only been found near Eureka on the Tobacco Plains, in the Niarada and Flathead Lake area, and, most recently, on the Lost Trail National Wildlife Refuge. The species is found in small isolated grasslands within Intermontane Valleys at elevations from 820 to 1,150 meters (2,700 to 3,800 feet), demonstrated by the recent discoveries at the Lost Trail National Wildlife Refuge.

The Palouse Grasslands are extremely fertile and may comprise the world's best wheat land (Alt and Hyndman 1989, p. 190). An underlying basalt layer is covered with deep deposits of loess and ash, forming long undulating dune-like plains of rich soils. These soil deposits can reach depths of 105 to 140 meters (350 to 450 feet), although generally less (Mueller and Mueller 1997, p. 25), and have high moisture-holding capacity and water infiltration rates (Johnson and Simon 1987, p. 8). Occasionally tall granitic hills ("steptoes") protrude above the undulating dunes. Beginning in 1880, the Palouse Grasslands have undergone a dramatic conversion to farm lands; it is estimated that today only 0.1 percent of the grasslands remain in a natural state (Noss *et al.* 1995, p. 2). The remains of the Palouse Grasslands include small remnants in rocky areas or at field corners (Daubenmire 1970, p. 1; Tisdale 1986a, p. 206). The Camas Prairie in Idaho between the Clearwater and Salmon Rivers is included with the Palouse Grasslands here because soil properties and land conversions are similar; however, the Camas Prairie is generally higher in elevation and cooler and moister than other portions of the Palouse Grasslands (Ertter and Moseley 1992, p. 62; Lichthardt and Moseley 1997, p. 5).

Spalding's catchfly within the Palouse Grasslands is restricted to small fragmented populations ("eyebrows," field corners, cemeteries, rocky areas, and steptoes) on private lands, and in larger

remnant habitats such as research lands owned by Washington State University. Elevations occupied by Spalding's catchfly within the Palouse Grasslands range from 700 to 1,340 meters (2,300 to 4,400 feet). Of all the places where Spalding's catchfly resides, those in the Palouse Grasslands are the most threatened, and care is needed to maintain occupied sites and representative genetic material from these sites.

Rangewide suitable habitat for Spalding's catchfly would include all flat, east facing, northern facing, and even southern facing (at higher elevations) slopes between 365 to 1,615 meters (1,200 to 5,300 feet) in elevation within *Festuca idahoensis* and *Festuca scabrella* communities that are associated with Pacific Northwest bunchgrasses, sagebrush-steppe, and open pine forests. However, even within what is presently understood to be suitable habitat, Spalding's catchfly is quite infrequent (rare). If another habitat parameter was identified that would help to narrow the definition of suitable habitat for this species, field searches could become more focused. At present it appears that there are tracts of suitable habitat for Spalding's catchfly on private and public lands within the Canyon Grasslands, Channeled Scablands, and the Blue Mountain Basins. Identifying a mechanism to help facilitate searches on these lands may identify other large populations where conservation efforts could occur. There is little remaining habitat within the Palouse Grasslands, limiting the possibilities of finding significant new Spalding's catchfly populations. Within the Intermontane Valleys there are large areas of apparently suitable habitat, but much of it has been searched, and it is thought that new discoveries of populations with over 1,000 individuals are unlikely (P. Lesica, *in litt.* 2006, p. 2).

Population Trends and Distribution

Within the United States, Spalding's catchfly is known from four counties in Idaho (Idaho, Latah, Lewis, and Nez Perce), four counties in Montana (Flathead, Lake, Lincoln, and Sanders), one county in Oregon (Wallowa), and five counties in Washington (Adams, Asotin, Lincoln, Spokane, and Whitman) (Mincemoyer 2005; ONHP 2006; ICDC 2007; MNHP 2007; WNHP] 2007; summarized in USFWS 2007). Two element occurrence records of Spalding's catchfly are known in British Columbia, Canada, both are within 1.6 kilometers (1 mile) of plants in Montana (British Columbia Conservation Data Center [BCCDC] 2007), therefore we consider these plants to be within one single population.

The distribution and habitat of Spalding's catchfly are primarily restricted to mesic slopes, flats or depressions in grassland, sagebrush-steppe, or open pine forest vegetation dominated by native perennial grasses such as *Festuca idahoensis* (Idaho fescue) or *F. scabrella* (rough fescue). Within its range, Spalding's catchfly occurs within five physiographic (physical geographic) regions: the Palouse Grasslands in west-central Idaho and southeastern Washington; the Channeled Scablands in eastern Washington; the Blue Mountain Basins in northeastern Oregon; the Canyon Grasslands of the Snake River and its tributaries in Idaho, Oregon, and Washington; and the Intermontane Valleys of northwestern Montana.

When Spalding's catchfly was initially listed in 2001, it was known from 98 separate element occurrence records or 58 populations if the element occurrence records within 1.6 kilometers (1 mile) of one another are grouped together. Nine of these 58 populations were located within the Blue Mountain Basins (excluding 1 extirpated population), 5 from the Canyon Grasslands, 21 from the Channeled Scablands (excluding 2 extirpated populations and 2 with poor location

records), and 16 within the Palouse Grasslands (excluding 1 extirpated population and 3 with poor location records), and 7 in the Intermontane Valleys (excluding 1 historical population and 1 with poor location records) (USFWS 2004, p. 3). When examined by state or province there were 7 populations in Idaho, 6.5 in Montana, 9 in Oregon, 35 in Washington, and 0.5 in British Columbia, Canada (USFWS 2004, p. 1). Some 16,500 individual plants were estimated at the time of listing, although given the problems associated with counting plants due to prolonged dormancy this number should not be viewed as definitive.

Since Spalding's catchfly was listed in 2001, increased survey efforts in suitable habitat have resulted in the identification of 39 new populations. As of the date of the recovery plan (USFWS 2007), there were 110 extant element occurrences in the United States and an additional 6 sites that are not yet designated as element occurrences of Spalding's catchfly in 99 populations: 14 in the Blue Mountain Basins, 22 in the Canyon Grasslands, 35 in the Channeled Scablands, 11 in the Intermontane Valleys, and 17 in the Palouse Grasslands. When examined by state or province, there are 22 populations in Idaho, 10 in Montana, 17 in Oregon, 49 in Washington, and one in British Columbia, Canada (Mincemoyer 2005; ONHP 2006; BCCDC 2007; ICDC 2007; MNHP 2007; WNHP 2007; summarized in USFWS 2007). The number of individual plants in each population ranges from one to several thousand. Several new sites within the Canyon Grasslands have expanded our knowledge of the range of the species by 50 miles from those locations known in 2001. New occurrences are likely a result of increased survey effort, not an increase in actual plant distribution or vigor. The estimated number of plants in 2007 (USFWS 2007) is approximately 28,750 individuals in the United States, although this number includes only above ground plants in any given year and therefore is an underestimation of the actual numbers of Spalding's catchfly. Current numbers are not available at this time.

It is expected that more populations of Spalding's catchfly will be found in the future as survey efforts increase. To date, survey effort has been lower on privately owned lands than on publicly managed lands. Yet even with this lower survey effort, over half the known sites and estimated plant numbers occur on privately owned lands. Thirty-two of the known populations of Spalding's catchfly (32 percent) occur on lands that are entirely in private ownership, with an additional 18 populations (18 percent) in partial private ownership (Mincemoyer 2005; ONHP 2006; ICDC 2007; MNHP 2007; WNHP 2007; summarized in USFWS 2007). The participation of private landowners, including organizations such as The Nature Conservancy, will therefore be vital in the recovery of this species.

There are only 10 populations of Spalding's catchfly that may be considered relatively large, each with over 500 individuals (Mincemoyer 2005; ONHP 2006; ICDC 2007; MNHP 2007; WNHP 2007; summarized in USFWS 2007). The largest population with over 10,000 plants is at The Nature Conservancy's Dancing Prairie Preserve in Montana, followed by Garden Creek, Idaho, (managed by The Nature Conservancy and the Bureau of Land Management) with approximately 4,000 plants. The other eight large populations range from 500 plants at Coal Creek, Washington, to some 2,385 individuals at Crow Creek on the Wallowa-Whitman National Forest in Oregon. Approximately 78 percent of the total known individuals of Spalding's catchfly are found within these few large populations. Of the 99 known Spalding's catchfly populations, two-thirds (66 populations, or 67 percent) are small populations, each made up of fewer than 100 individuals (Mincemoyer 2005; ONHP 2006; ICDC 2007; MNHP 2007; WNHP 2007; summarized in USFWS 2007). Much of the remaining habitat occupied by Spalding's

catchfly is fragmented by roads, agricultural fields, and other developments. When small populations with few individuals are isolated and genetic exchange is not possible, they become vulnerable to the loss of genetic variation and, ultimately, the loss of the population itself (USFWS 2007).

It is not known how many Spalding's catchfly individuals and how much habitat may have been lost to human related activities during the last 150 years since European settlement of this region. Historical documentation indicates the species was seldom collected (Hitchcock and Maguire 1947, p. 1), but because most land conversions within the plant's historical range took place before botanical surveys had been done, we may never know how extensive or numerous Spalding's catchfly once was. Instead, we assume that the loss and alteration of large portions of suitable habitat have translated to a decline in population numbers. For example, the Palouse Prairie region (referred to in the recovery plan as the Palouse Grasslands), centered around Pullman, Washington, and Moscow, Idaho, underwent a rapid and extensive conversion to agricultural lands around 1880 prior to significant botanical surveys of the area. It is estimated that more than 99 percent of the original Palouse Prairie and 47 percent of the Channeled Scablands habitat has been lost (Noss et al. 1995, p. 58), with obvious ramifications for Spalding's catchfly. Other areas such as the Canyon Grasslands have undergone a less dramatic land-use conversion, but have been and continue to be affected by adverse livestock grazing and trampling, and nonnative plant invasions.

Four population extirpations or probable extirpations have been documented since tracking of Spalding's catchfly began in the early 1980's, with an additional three populations that are assigned element occurrence rankings of F in Natural Heritage Program datasets, indicating subsequent surveys by qualified botanists have failed to find Spalding's catchfly individuals (Schassberger 1988, p. 26; Gamon 1991, pp. 11-13; ONHP 2006; ICDC 2007; MNHP 2007; WNHP 2007; J. Holt, WNHP, *in litt.* 2007; summarized in USFWS 2007). At least three other sites that formerly supported the species have been documented as having no plants present at the last visit (J. Holt, *in litt.* 2007). Populations are not necessarily considered extirpated, however, if sites are revisited and Spalding's catchfly is not found, because plants at these sites may be exhibiting prolonged dormancy. Subsequent visits are needed to confirm extirpations at these sites.

Because of its prolonged dormancy, monitoring Spalding's catchfly to track trends requires long term data sets. The only area where monitoring has occurred for a long enough time period to begin detecting trends is at the Dancing Prairie in Montana where the plant has been monitored in 1991, 1992, 1993, 1994, 1995, 1996, 2003, 2004, 2005, and 2006 (Lesica 2005, p. 2; Lesica and Crone 2007b, Table 1). The mean density of Spalding's catchfly over this time period shows a statistically significant downward trend. The authors suggest this may be a true downward trend, the trend may be linked to a drought in the latter half of the 10 year period, or the trend may actually be an increase in prolonged dormancy since 1991-1996 (Lesica 2005, pp. 2-3).

Threats

The threats to Spalding's catchfly are addressed below in accordance with the five factor threat analysis under section 4(a) (1) of the Endangered Species Act.

The present or threatened destruction, modification, or curtailment of its habitat or range.

The distribution and habitat of Spalding's catchfly are limited. This species is primarily restricted to slopes, flats, or swales (marshy lands) in mesic grasslands or steppe vegetation of the Palouse region in southeastern Washington, northwestern Montana, and adjacent portions of Idaho and Oregon. One site is located in British Columbia, Canada, directly adjoining a Montana population. In Idaho, Palouse habitat is confined to a narrow band along the western edge of central and north-central Idaho, centering on Latah County (Tisdale 1986a; Ertter and Moseley 1992). The Palouse prairie is extensively cultivated, with few remnants of native habitat (Tisdale 1986a). Large-scale ecological changes have occurred in the Palouse region over the past several decades. More than 98 percent of the original Palouse prairie habitat has been lost or modified by agricultural conversion, grazing, invasion of non-native species, altered fire regimes, and urbanization (Noss *et al.* 1995). This loss of habitat has resulted in the decline of numerous sensitive plant species including Spalding's catchfly (Tisdale 1961). Although historical data on Spalding's catchfly distribution and population size are incomplete, this species was likely much more widespread in the past, based on the former distribution on suitable Palouse habitat.

Invasion by non-native plant species, herbicide application, and/or grazing (including trampling and consumption of plants) threaten virtually all of the remaining populations of this species, including those present in areas administered by the Bureau of Land Management (BLM) and U.S. Forest Service (Forest Service) (Biodiversity Legal Foundation *et al.* 1995; Lichthardt 1997; MNHP 1998; ONHP 1998; WNHP 1998).

Non-native plant species are considered to be a major threat at nearly all sites supporting Spalding's catchfly. Threats to Spalding's catchfly posed by nonnative plant species include competition for water, nutrients, and light, in addition to competition for pollinators (Lesica and Heidel 1996). Non-native plant species such as St.John's-wort (*Hypericum perforatum*), yellow starthistle (*Centaurea solstitialis*), leafy spurge (*Euphorbia esula*), teasel (*Dipsacus sylvestris*), Canada thistle (*Cirsium arvense*), sulfur cinquefoil (*Potentilla recta*), Russian knapweed (*Acroptilon repens*), Scotch thistle (*Onopordium acanthium*), and cheatgrass (*Bromus tectorum*) threaten Spalding's catchfly in Idaho, Oregon, Montana, and Washington (Lesica and Heidel 1996; Lichthardt 1997; MNHP 1998; ONHP 1998; WNHP 1998; J.Hill , *in litt.* 1999).

Some of these non-native species can invade and displace native plant communities in a relatively short period of time. For example, at The Nature Conservancy's Garden Creek Preserve, which contains the largest Spalding's catchfly population in Idaho (Idaho Conservation Data Center 1998), yellow starthistle spread from approximately 60 hectares (ha) (150 acres (ac)) in 1987 to 1,200 ha (3,000 ac) in 1998 (J. Hill, *in litt.* 1999). Another site containing Spalding's catchfly in Idaho (Lawyer's Creek) was apparently extirpated by highway construction in 1990 and the invasion of yellow starthistle.

Yellow starthistle is found in the vicinity of all Spalding's catchfly populations in Idaho (Lichthardt 1997). This aggressive exotic can form almost complete monocultures, invading and outcompeting native species. Even small areas that experience soil disturbance are almost immediately colonized by yellow starthistle or other non-native winter annuals (Lichthardt

1997). Seeds of yellow starthistle can remain dormant in the soil for 10 years (Callihan and Miller 1997), making effective control of this aggressive weed extremely difficult.

Russian knapweed spreads readily by reproducing vegetatively, as well as by seed. Once established, knapweed forms single-species stands by producing chemicals that inhibit the survival of competing plant species, known as allelopathy (U.S. Geological Survey 1999). Knapweed has been noted to displace Spalding's catchfly plants in Montana. At this site, the number of Spalding's catchfly plants declined from 30 in 1983 to 11 in 1990, due to the invasion of knapweed (MNHP 1998). Noxious weeds also threaten the largest Spalding's catchfly populations in Montana (Biodiversity Legal Foundation et al. 1995; Brian Martin, The Nature Conservancy, *in litt.* 1998), Oregon (Jimmy Kagan, Oregon Natural Heritage Program, pers. comm. 1998), and Washington (Scott Riley, Umatilla National Forest, pers. comm. 1999). Spalding's catchfly and other native plants are generally unable to grow or successfully reproduce in areas dominated by yellow starthistle and knapweed.

Spalding's catchfly habitat is threatened by herbicide drift. Most remaining Spalding's catchfly populations are adjacent to agricultural fields, which are often treated with herbicides to control weeds. Even Spalding's catchfly sites that are not located immediately adjacent to agricultural areas may be vulnerable to herbicide use due to the presence of weeds (Jerry Hustafa, Wallowa-Whitman National Forest, pers. comm. 1999). Herbicide overspray threatens populations in Idaho (Lichthardt 1997; J. Hill, *in litt.* 1999), Oregon (J. Hustafa, pers. comm. 1999, J. Kagan pers comm. 1998), and Washington (WNHP 1998). The population of Spalding's catchfly at one site in Idaho (Lewis County) decreased by more than 80 percent in the past 11 years, apparently due to weed invasion, herbicide spraying, and development (Lichthardt 1997). One of the two largest Spalding's catchfly sites in Washington (on the Umatilla National Forest, Pomeroy Ranger District) is threatened by herbicide spraying to control weeds (S. Riley, pers. comm. 1999). A recent aerial herbicide spraying incident in Idaho County, Idaho, impacted the threatened plant species, MacFarlane's four-o'clock (*Mirabilis macfarlanei*). Approximately 2,000 *M. mcfarlanei* plants on Federal and private land were accidentally sprayed during treatment for nearby target weed species (C. Johnson, *in litt.* 1997). This species occurs in similar habitats as Spalding's catchfly. At least two Spalding's catchfly sites in Idaho (Nez Perce County) are particularly vulnerable to herbicide drift because of their close proximity to cropland (Lichthardt 1997).

In addition to direct consumption of plants, grazing animals can also affect Spalding's catchfly by trampling and changing the community composition by fostering the invasion of non-native species. Impacts from trampling by native ungulates and domestic livestock have been observed at Spalding's catchfly sites in Washington (Gamon 1991; WNHP 1998). Grazing can indirectly affect Spalding's catchfly habitat by altering the species composition (Gamon 1991; Lichthardt 1997). If grazing is heavy enough to adversely affect native species or allow weed invasion, Spalding's catchfly will likely disappear from sites (B. Benner, *in litt.* 1993). Biennial and nonnative annual plants, adapted to disturbance, have a competitive advantage over Spalding's catchfly because of the soil disturbance associated with grazing (B. Benner, *in litt.* 1993).

Most populations (52 percent) of Spalding's catchfly occur on privately owned property and are, therefore, threatened by changes in land use practices, including certain livestock grazing

practices, agricultural developments, and urbanization. For example, active housing development threatens to eliminate Spalding's catchfly habitat near Redbird Ridge in Idaho (Lichthardt 1997). Over the past 3 years, residential development immediately adjoining land owned by The Nature Conservancy (TNC), which has the largest Spalding's catchfly population in Montana, has destroyed potential habitat, increased the likelihood of uncontrolled, competing noxious weeds, and reduced management options such as controlled burning on the preserve. Continued development in this area is expected (B. Martin, *in litt.* 1998).

Habitat for Spalding's catchfly on private land near Wallowa Lake in eastern Oregon, which supports the largest site in Oregon, may be threatened by development because of its proximity to existing recreational facilities and residences. Other Spalding's catchfly sites on private land in Idaho, Montana, and Washington may also be threatened by development.

Overutilization for commercial, scientific, or educational purposes.

The plant is not a source for human food, nor is it currently of commercial horticulture interest. Therefore, overutilization is not considered to be a threat to this species at the present time.

However, simply listing a species can precipitate commercial or scientific interest, both legal and illegal, which can threaten the species through unauthorized and uncontrolled collection for scientific and/or commercial purposes. The listing of species as threatened or endangered publicizes their rarity and may make them more susceptible to collection by researchers or curiosity seekers. Some of the populations of Spalding's catchfly are small enough that even limited collection pressure could have adverse impacts on their reproductive or genetic viability.

Disease or predation.

Grazing or browsing of Spalding's catchfly inflorescences by livestock and native herbivores has been observed and is considered a significant threat to the species (Kagan 1989; Lesica 1993; Heidel 1995; B. Benner, *in litt.* 1999). While grazing or browsing of Spalding's catchfly by native herbivores likely occurred historically, the effects of grazing or browsing become even more important as population sizes decrease. Rodent activity is also considered a significant factor affecting the persistence of Spalding's catchfly at several sites in eastern Washington (B. Benner, *in litt.* 1999). For example, numerous Spalding's catchfly plants were marked with stakes and metal tags as part of a monitoring study on land managed by the BLM in Washington. On a site visit, the BLM botanist discovered that many of these plants were either broken off or missing completely and likely consumed by rodents, as evidenced by rodent burrowing activity in the area (B. Benner, *in litt.* 1999). Since Spalding's catchfly reproduces only by seed (Lesica 1992), grazing, browsing, or trampling directly affects reproduction of this species when flowers or seeds are removed or damaged. Insect predation on flowers and fruits is also a threat for this species (Kagan 1989; Gamon 1991; B. Benner, *in litt.* 1999). Such predation likely results in reduced reproductive success for Spalding's catchfly (Heidel 1995). For example, at one of the two largest Spalding's catchfly populations in Washington on land managed by the Forest Service, insect consumption of seeds has been consistently observed by biologists monitoring the plants. This consumption results in empty capsules with no seeds, thereby limiting sexual reproduction of affected Spalding's catchfly plants (S. Riley, pers. comm. 1999). Similarly, in

Oregon, a high percentage of Spalding's catchfly seed heads were destroyed by a seed weevil (Kagan1989). Insect damage to foliage of Spalding's catchfly plants has also been noted (Lichthardt 1997).

Inadequacy of existing regulatory mechanisms.

Spalding's catchfly is listed as endangered by the State of Oregon (Oregon Department of Agriculture). However, the State Endangered Species Act does not provide protection for species on private land. Therefore, under State law, any plant protection is at the discretion of the landowner. Spalding's catchfly is on the Washington Natural Heritage Program's list of threatened species (Gamon 1991), but this designation offers no statutory protection (Ted Thomas, Service, *in litt.* 2005). In addition, although State natural heritage programs in Idaho and Montana consider Spalding's catchfly to be rare and imperiled these States have no endangered species legislation that protects threatened or endangered plants. The majority of Spalding's catchfly habitat occurs on private land, which is not adequately protected by existing regulatory mechanisms.

In Canada, Spalding's catchfly is listed on the British Columbia, Ministry of Environment, Lands and Park's Red List. The Red List includes indigenous species or subspecies (taxa) that are either extirpated, endangered, threatened, or candidates for such status. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. In British Columbia, Spalding's catchfly is classified as S1 (critically imperiled) and is Red-listed by the B.C. Conservation Data Centre. In Canada, Spalding's catchfly is listed as Endangered under the Species at Risk Act (SARA) (BCCDC 2008, p 14).

Spalding's catchfly is considered a sensitive species by the BLM and the Forest Service. Both of these agencies have laws and regulations that address the need to protect sensitive, candidate, and federally listed species (e.g., the Federal Land Policy and Management Act and the National Forest Management Act). Monitoring of some (but not all) Spalding's catchfly populations on Federal lands has already been initiated. Also, the BLM in eastern Washington has acquired several private land parcels that contain Spalding's catchfly habitat. However, these actions have not eliminated all of the threats to this species. For example, the effects of activities such as livestock grazing have not been evaluated for all Spalding's catchfly sites managed by the Forest Service and BLM. In addition, numerous sites on Federal lands are threatened by exotic weeds, herbicide spraying, and habitat succession through fire suppression.

One Spalding's catchfly population in eastern Washington occurs on the U.S. Department of Defense Fairchild Air Force Base (Base), and the Base asked the WNHP to visit the area in 1999 to assess its habitat and ground-disturbing activities that would affect this species. This population contains fewer than 15 plants (at the time of the recovery plan) in an isolated fragment of native habitat, and the area has been used for military training (WNHP 1998). Two populations occur on lands owned by TNC. This organization protects the habitat and natural communities on lands that it owns. TNC will protect Spalding's catchfly on its lands and actively manage the habitat to improve conditions for this species, such as controlling livestock grazing.

Other natural or manmade factors affecting its continued existence.

Competition with other species for a limited number of pollinators (e.g., bumblebees (*Bombus fervidus*)) has the potential to adversely affect both fecundity and individual fitness in Spalding's catchfly (Lesica and Heidel 1996). Competition for pollinators occurs primarily at Spalding's catchfly sites with large populations of other flowering plants, and the competition can adversely affect the survival of these small populations of Spalding's catchfly. For example, the non-native flowering plant St. John's-wort competes for pollinators where this plant occurs with Spalding's catchfly in Idaho (Lesica and Heidel 1996; J. Hill, *in litt.* 1999). Reduced pollinator activity is associated with poor reproductive success of Spalding's catchfly, particularly in small populations (Lesica 1993; Lesica and Heidel 1996). Agricultural fields do not provide suitable habitat for pollinators of Spalding's catchfly, which requires pollination by insects for maximum seed set and population viability (Lesica and Heidel 1996). Populations of Spalding's catchfly that occupy small areas surrounded by land that does not support bumblebee colonies (e.g., crop lands) are not likely to persist over the long term, and the presence of pollinators is considered to be critical for the persistence of Spalding's catchfly (Lesica 1993; Lesica and Heidel 1996). In addition to agricultural conversion and pesticides, pollinators are vulnerable to herbicide application, domestic livestock grazing, and fire (Gamon 1991; Lesica 1993).

Climatic fluctuations can adversely affect this species and may contribute to the extirpation of small populations. For example, a population of Spalding's catchfly at Wild Horse Island (Montana) declined from approximately 250 to 10 plants, due primarily to drought conditions in the late 1980's (Lesica 1988c; Heidel 1995). Such reductions in population size are often exacerbated by other factors including pollinator competition and poor reproductive success. Habitat changes associated with fire suppression threaten this species, even at sites on public lands and those with some protective status (e.g., managed by TNC). Fire suppression can result in an overall decline in suitable habitat conditions for Spalding's catchfly by facilitating encroachment by woody vegetation and other plant species and contributing to a build-up in the litter or duff layer. Competition from woody plants is frequently considered to reduce fecundity or recruitment of native prairie species (Menges 1995). In areas where fire regimes have been altered or excluded, shrubs and trees can encroach on grassland habitats that support Spalding's catchfly and inhibit seed germination. For example, Spalding's catchfly in the Kramer Palouse Biological Study Area in Washington declined from 147 to 10 individuals during the period from 1981 to 1994, apparently due to encroachment by the non-native yellow starthistle and woody vegetation (Heidel 1995).

Prescribed fire may have a positive effect on Spalding's catchfly by removing litter and creating suitable sites for recruitment (Lesica 1992). Recruitment of Spalding's catchfly at study sites in Montana was enhanced following prescribed fire (Lesica 1992). However, the effects of fire will vary at different sites within the range of this species due to factors such as fuel moisture content, species composition, and season and intensity of burning (Lesica 1997).

Most populations of Spalding's catchfly are restricted to small, remnant patches of native habitat (Gamon 1991; Lichthardt 1997; S. Riley, pers. comm. 1999). When the number of populations of a species of the population size is reduced, the remnant populations (or portions of populations) have a higher probability of extinction from random events. Small populations are

vulnerable to even relatively minor disturbances such as fire, herbicide drift, and weed invasions, which could result in the loss of Spalding's catchfly populations (Gamon 1991).

Small populations of *Silene regia*, a rare prairie species native to the Midwest, have low seed germination presumably due to reduced pollinator visitation and other factors (Menges 1995). Small fragments of habitat that contain Spalding's catchfly may not be large enough to support viable populations of pollinators (Lesica 1993). Small populations are vulnerable to natural and manmade disturbances and may lose a large amount of genetic variability because of genetic drift (loss of genetic variability that takes place as a result of chance), reducing their long-term viability. Many Spalding's catchfly populations are isolated from other populations by large distances, and the majority of the populations occur at scattered localities separated by habitat that is not suitable for this species, such as agricultural fields. Extinction appears to be imminent for at least two Spalding's catchfly populations in Idaho due to their small size and habitat degradation (Lichthardt 1997). One of these populations consists of four individuals, and the other population has only one Spalding's catchfly plant. With these very small population sizes, even if the habitat was completely undisturbed, these populations would not be considered viable.

Most of the remaining sites that support Spalding's catchfly are small and fragmented, and existing sites are vulnerable to impacts from factors including grazing, trampling, herbicide use, and non-native vegetation, in addition to urban and agricultural development. The majority of this species (52 percent) occurs on private land with little or no protection. Only one-third (33 percent) of Spalding's catchfly populations occur on Federal land (managed primarily by the BLM and Forest Service) and may, therefore, be afforded some level of protection. As previously described, only 6 Spalding's catchfly populations (12 percent) contain more than 500 plants, and even these relatively large populations (which occur on private and Federal land) are variously threatened by the above factors.

Climate Change

Climate change and potential effects to Spalding's catchfly are discussed in the environmental baseline section.

Recovery Measures Implemented

Conservation measures have included inventory and monitoring, demographic studies, invasive nonnative plant control and the additional measures listed below. Ongoing conservation efforts include research, Palouse Grassland conservation actions, invasive nonnative plant control, and land acquisition. Monitoring efforts continue, meanwhile, the Spalding's catchfly technical team is working towards developing a standardized monitoring protocol. Inventory and monitoring efforts, demographic studies, seed storage efforts, management plans, and other recovery actions are described in the recovery plan (USFWS 2007).

Invasive Nonnative Plant Control Efforts

At the Craig Mountain Wildlife Management Area in Idaho spraying for *Centaurea solstitialis* (yellow starthistle) with 2,4-D and Tordon has occurred during the last 10 years, with approximately 20 to 220 hectares (50 to 550 acres) being treated each year. *Centaurea solstitialis* biocontrol agents have been released and monitored for the last 10 years. Approximately 4 hectares (10 acres) of *Onopordum acanthium* (Scotch thistle) have been treated for the last 15 years. Other invasive nonnative plants being treated include *Crupina vulgaris* (common crupina) and *Linaria* (toadflax). These spraying activities are expected to continue into the future. Known populations of Spalding's catchfly are not sprayed; however, until 2004, surveys for Spalding's catchfly were not conducted prior to spraying (J. White, pers.comm. 2003, p. 1).

Cooperative Weed Management Areas and County Weed Boards that work to control invasive nonnative plants have been established across much of Spalding's catchfly's range. For example, the Tri-State Weed Management Area, established by the Bureau of Land Management in 1996, encompasses 101,170 hectares (250,000 acres) on the Idaho, Oregon, and Washington borders. The intent of this Cooperative Weed Management Area is to bring together Federal State, County, Tribal, and private organizations to control invasive nonnative plants, primarily *Centaurea solstitialis*, and educate the public about the threat invasive nonnative plants pose. The Tri-State Weed Management Area treated over 1,010 hectares (2,500 acres) of invasive nonnative plants in 2003, surveyed over 5,670 hectares (14,000 acres), and informed over 950 individuals about the dangers invasive nonnative plants pose (L. Danly, USBLM, *in litt.* 2004).

The Nature Conservancy's Dancing Prairie Preserve in Montana has been the site of a research project looking at the effects of herbicides and fire on control of sulfur cinquefoil (*Potentilla recta*) (Lesica and Martin 2003). Annual and sometimes biannual spot-spraying from a backpack or ATV (all-terrain vehicle) of sulfur cinquefoil, St. Johnswort (*Hypericum perforatum*), meadow hawkweed (*Hieracium pretense*), and spotted knapweed (*Centaurea maculosa*) has occurred for the last 9 years (P. Lesica, *in litt.* 2003, p. 3). Biocontrol agents were released on St. Johnswort in the late 1990s. Invasive nonnative plant control efforts are expected to continue into the future (M. Mantas, *in litt.* 2007, p. 2). A 2-year Integrated Pest Management Plan was prepared for the Dancing Prairie Preserve in 2006 and will be revisited after the next inventory in 2008 (M. Mantas, *in litt.* 2007, p. 2). Control of sulfur cinquefoil is occurring adjacent to Spalding's catchfly populations at The Nature Conservancy's Zumwalt Preserve in Oregon (R. Taylor, *in litt.* 2004, p. 1).

Invasive nonnative plant control is an ongoing activity on most Federal lands. Because Spalding's catchfly is a threatened species under the Endangered Species Act, Federal agencies are required to consider Spalding's catchfly in developing guidelines for all invasive nonnative plant control activities within the plant's range. The Bureau of Land Management in Spokane first surveys suitable habitat and does not treat invasive nonnative plants near Spalding's catchfly (USBLM 2002a, pp. 5-8). The Bureau of Land Management's Vale District in Oregon limits aerial herbicide treatment of invasive nonnative plants to distances greater than 152 meters (500 feet), broadcast spraying would be done no closer than 8 meters (25 feet), directed hand spraying no closer than 3 meters (10 feet), and by wicking applications only, if necessary, if within 3 meters (10 feet) of Spalding's catchfly (USFWS, *in litt.* 2002, pp. 7-13). The Bureau of Land Management's Cottonwood Field Office in Idaho has all plants flagged within 30 meters (100

feet) of Spalding's catchfly and stipulates no boom spraying within 15 meters (50 feet) of Spalding's catchfly, hand spraying/wick/wipe applications only at a distance from 1.5 to 15 meters (5 to 50 feet), wipe or wick spraying from 1 to 1.5 meters (3 to 5 feet), and manual control only within 1 meter (3 feet). Picloram may not be used within 15 meters (50 feet) of Spalding's catchfly (USFWS, *in litt.* 2003, pp. 5-7). Invasive nonnative plant control and management specific to Spalding's catchfly has occurred at Craig Mountain, Idaho, on Bureau of Land Management land. General mapping of invasive nonnative plants at all Spalding's catchfly locales, specific mapping of *Centaurea solstitialis* patches at seven of these locales, and manual control of *Centaurea solstitialis* and planting of native seed in disturbed areas at two of these locales has been done for 4 years at Garden Creek Ranch (Hill and Gray 2000, pp. 1, 4; Hill *et al.* 2001, pp. 1, 3-4; Hill and Fuchs 2002, pp. 2-3; 2003, pp. 1-2). The Bureau of Land Management's Cottonwood Field Office in Idaho has released biocontrol insects for *Centaurea solstitialis* at Spalding's catchfly sites on Craig Mountain (Danly 1999).

Other control measures have included the release of biological invasive nonnative plant control agents for *Cirsium arvense* (Canada thistle), *Centaurea diffusa* (diffuse knapweed), and *Centaurea maculosa* (spotted knapweed) in 1996 at Fairchild Air Force Base in Washington (Rush and Gamon 1999, p. 7; Caplow 2001, p. 9). A limited amount of invasive nonnative plant control has also occurred at the Chief Joseph Gravesite monument near Joseph, Oregon and an Integrated Pest Management plan has been established for the site (T. Nitz, U.S. National Park Service, pers. comm. 2004, p. 1).

Annual grasses exist near Spalding's catchfly sites at Crow Creek on the Wallowa-Whitman National Forest in Oregon where grazing practices are being altered to improve range condition. One *Centaurea solstitialis* patch, located on private land, is within 0.8 kilometer (0.5 mile) of one Spalding's catchfly site at Crow Creek and has been treated for 5 years by U.S. Forest Service personnel (J. Hustafa, pers. comm. 1999, p. 1). *Centaurea maculosa* is being treated along the road to the above Spalding's catchfly site (J. Hustafa, *in litt.* 2004b, p. 2). The Joseph Creek population managed by the Nez Perce Tribe does not have significant noxious weed issues. The bunchgrass community is nearly pristine with very limited amounts of *Bromus tectorum* (cheatgrass) present. A small *Crupina vulgaris* population exists within 0.4 kilometer (0.25 mile) of the site and will continue to be hand pulled by tribal staff. No domestic livestock grazing is currently allowed at this site (R. Miles, *in litt.* 2006, p. 3).

Summary of Conservation Needs

The long-lived nature of Spalding's catchfly, in conjunction with sporadic and rare recruitment, delayed maturity, cryptic rosettes that may disappear before monitoring, prolonged dormancy, and difficulties identifying seedlings, make it challenging to measure changes in numbers of individuals of this species. For plants exhibiting prolonged dormancy, population trend monitoring needs to occur for 3 or more consecutive years every 5 to 20 years to adequately assess trends at a given site (Lesica and Steele 1994). Although population trend and demographic monitoring is occurring at a number of sites, long-term monitoring of this kind has occurred at only one Spalding's catchfly site, the Dancing Prairie Preserve in Montana. Monitoring efforts to date have not used consistent methodologies so comparisons of key life history parameters across the range of the species are difficult. However, the Spalding's catchfly

technical team is working on one methodology for all monitoring efforts to address this inconsistency.

Ground disturbing activities including fires, adverse livestock grazing and trampling, and off-road vehicle use impact Spalding's catchfly the most during the flowering and seeding period (late July to September) and during seedling and shoot emergence in early spring.

Small, isolated populations relegated to remnant fragments of native habitat pose a problem as their viability into the future is questionable. Spalding's catchfly requires grasslands dominated by native vegetation, with adequate numbers of pollinators available and other Spalding's catchfly populations close enough (within 1.6 kilometers [1 mile]) to provide for pollen exchange and enhance gene flow and genetic variability.

Recovery Goals

The goal of the recovery program is to recover Spalding's catchfly to the point where it can be delisted, *i.e.,* to remove the species from threatened status. The primary objectives to meet this goal are to reduce or eliminate the threats to the species, and protect and maintain multiple reproducing, self-sustaining populations distributed across each of the five distinct physiographic regions where it resides sufficient to ensure the long-term persistence of the species. Within each of these regions we have identified key conservation areas to focus conservation efforts at larger populations. A key conservation area possesses the following qualities:

- Composed of intact habitat (not fragmented), preferably 40 acres (16 hectares) in size or greater
- Native plants comprise at least 80 percent of the canopy cover of the vegetation community
- Adjacent habitat sufficient to support pollinating insects
- Habitat is of the quality and quantity necessary to support at least 500 reproducing individuals of Spalding's catchfly

The protection and management of these key conservation areas, or areas that have the potential to serve as key conservation areas, forms the foundation of the recovery strategy for Spalding's catchfly. When possible, these key conservation areas should be surrounded by 300 acres of habitat that is intact or can be restored to eventually support Spalding's catchfly.

To achieve the goal and objective as listed in the recovery plan, the Spalding's catchfly recovery team defined the primary objectives to meet and therefore lead to Spalding's catchfly being considered for down listing. To ensure these threats are adequately being addressed, monitoring and research are required to evaluate management actions. Monitoring for invasion of exotic plants into native communities is also an important step toward protecting the population. Increases in exotic annuals may indicate a trend in the integrity of the community. Yearly monitoring of plant vigor characteristics would provide more concrete evidence for relationships to community composition. In addition, long-term monitoring of patterns in population,

community, and vigor characteristics could help us understand the ecology of populations of Spalding's catchfly (Clark 2010).

Additional needs include surveys to identify other Spalding's catchfly populations in need of protection or management, outreach to inform the public about the species so they may assist in conservation, and seed banks to protect the species from catastrophic losses (USFWS 2007).

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

The proposed action occurs south of the city of Asotin, on the Asotin Creek Wildlife Area created in 1962 on WDFW lands. Through a number of purchases and leases, the managed area has grown from 2,468 acres to 26,000 acres in fee ownership and 6,000 acres leased from Washington Department of Natural Resources. BPA and Rocky Mountain Elk foundation funded the purchase of the 8,500 acre Schlee Ranch by WDFW, which was incorporated into the wildlife area. The ranch is divided into two parcels - the Smoothing Iron Unit and the Lower Schlee and Bickford units. BPA's funding of the purchase and operations and maintenance activities is partial mitigation for the loss of wildlife habitat caused by the construction and operation of the Federal Columbia River Power System as required under the Northwest Power Act.

The Lower Schlee/Bickford units are comprised of steep canyons and predominately a shrub/steppe habitat type. The area was traditionally used for livestock production and dryland farming. The land has several problems associated with that type of long-term management – mainly noxious weed invasion and degraded riparian management zones. Noxious weeds are typically controlled by chemical measures and application is difficult in the steep terrain.

The Smoothing Iron Unit is also comprised of steep canyons, with agricultural fields on top of the ridges. Steep canyons with timbered north-facing slopes are common, while south-facing slopes are usually a shrub/steppe habitat type. Noxious weed invasion, boundary fence issues, and facility maintenance are the main issues associated with the Smoothing Iron Unit.

Since the publication of the Recovery Plan in 2007, ten new Spalding's catchfly populations have been discovered: 2 populations in the Blue Mountain Basins; 5 populations in the Canyon Grasslands; 2 populations in the Channeled Scablands' and 1 population in the Palouse Grasslands. Only one (the Asotin Wildlife Management Area) of the new populations has more than 50 individuals and could be considered a "key conservation area" as defined in the Plan. This site lies within the Canyon Grasslands physiographic region (USFWS 2009). Of the 99 known Spalding's catchfly populations, two-thirds (66 populations, or 67 percent) are small populations, each made up of fewer than 100 individuals (USFWS 2007), so the Smoothing Iron population of approximately 6,000 individual plants is significant.

Plant surveys were performed on the Smoothing Iron Unit in the fall of 2008. Over 700 Spalding's catchfly plants were found on the Smoothing Iron Unit in canyon grassland habitat. The Bickford/Lower Schlee units were not surveyed at that time. A previous survey by SEE Botanical Consulting (SEE 2005) of both the Smoothing Iron and the Bickford/Lower Schlee (also called the Rockpile) units did not identify any Spalding's catchfly; however they did not survey the area where the plants were found in 2008. The Bickford/Lower Schlee units were surveyed again in August 2009 and no Spalding's catchfly was found (Clark 2010, BPA 2010).

Additional surveys were completed in summer and fall of 2009 by Washington State University (WSU) personnel. A total of 5,977 plants were identified, almost all of which were located in the Smoothing Iron Unit on the north facing slope of Warner Gulch in pastures 2-5. Surveys were conducted in 2010; however, those data are not yet available (B. Dice *in litt.* 2010).

The large population of Spalding's catchfly at the Smoothing Iron Unit is an indication of the high quality native grassland and shrubland that occupied the area. The presence of exotic plants in the area represents a potential threat, and managing weed infestations should be of highest priority for protecting the Spalding's catchfly population.

Results from one year of data are useful, but results could vary in the future due to yearly variation in growing conditions. Growing conditions in 2009 were considered favorable.

In, 2005, the Washington Cattlemen's Association (WCA) and WDFW signed a Memorandum of Understanding designed to develop several pilot grazing projects on WDFW lands to determine if benefits to fish and wildlife and/or WDFW land management can be derived from controlled livestock grazing. The Smoothing Iron Unit was being grazed as part of the pilot project. Washington State University (WSU) was contracted to assist WDFW in research and application of the most current science. The research being conducted by WSU was to provide an independent scientific basis for monitoring grazing management and ensuring that WDFW's desired ecological conditions are met and consistent with WDFW mandates, policies and land management goals. Additionally, WDFW was conducting vegetation utilization monitoring with assistance from WSU. However, this project was suspended in the spring of 2010 due to the pilot grazing project being discontinued. Since, only one year of data was collected, this is not sufficient to provide evidence to draw any conclusions about grazing and Spalding's catchfly in the Asotin Wildlife Area.

EFFECTS OF THE ACTION

Effects to Spalding's catchfly from project activities could occur from ground-disturbing activities and toxicity from exposure to herbicides, and include potential effects to pollinators.

It is highly unlikely that building maintenance activities would affect the Spalding's catchfly. None of the populations were found near any of the outbuildings, and there is not suitable habitat present near them. Fence repair and maintenance activities could affect individual Spalding's catchfly plants by trampling, as the WDFW staff access the fences by foot, ATV, or pickup truck. However, it is highly unlikely that ATVs or pickup trucks would be used in Spalding's catchfly habitat, since it is very steep. No long-term ground disturbance is anticipated unless the plants are found immediately adjacent to where a fence post would have to be replaced. WDFW

staff will be trained to recognize and avoid Spalding's catchfly plants, known locations, and areas of high probability of their presence when replacing fence posts. Should a Spalding's catchfly plant be found in the spot where an old fencepost needs to be replaced, the old fencepost will be left and a new one will be installed far away from the Spalding's catchfly plants so that it will still be a functioning fence post. Effects from building maintenance, fence repair and fence maintenance activities are expected to be insignificant, due to most work occurring outside likely habitat and due to the actions taken above to mitigate for Spalding's catchfly presence.

The agricultural field restoration work will result in ground disturbance, but only in fields on the flat ridgetops that have been cultivated for many years. Any Spalding's catchfly populations that were once present there are most likely extirpated. However, by reseeding native species in these agricultural fields it is possible that these former Palouse prairie habitats, within the Canyon Grassland physiographic region, could be restored and could again become suitable habitat for Spalding's catchfly. This restoration activity will result in discountable short-term effects to Spalding's catchfly, and potentially beneficial long-term effects.

The activity most likely to affect Spalding's catchfly is noxious weed control using herbicides. Nonnative plant invasions have been identified by numerous individuals working with Spalding's catchfly as one, if not the largest, of the threats facing the species and its habitat (USFWS 2007, p. 27). The annual invasive grasses are most commonly represented by *Bromus japonicus* (Japanese brome), *Bromus secalinus* (cheat), *Bromus tectorum* (cheatgrass), and *Ventenata dubia* (ventenata). Non-native annual bromes (*Bromus japonicus*, *Bromus brizaeformis* and *Bromus tectorum*) were widespread among the bunchgrasses. Patches of *Onopordum acanthium* (Scotch thistle), *Potentilla recta* (sulfur cinquefoil) and *Cirsium arvense* (Canada thistle) were scattered. *Taeniatherum caput-medusae* (medusahead) is established on a lower slope of Pasture 3 in the Smoothing Iron Unit. *Sisymbrium altissimum* (Jim Hill mustard) is common in *Bromus tectorum* and *Bromus japonicus* patches. *Poa pratensis* (Kentucky bluegrass) is present in swales and draws. The CRP pasture on the plateau above Pasture 3 is planted to *Bromus inermis* (smooth brome), which has spread to the native grasslands (BPA 2010).

Rhizomatous invasive nonnative plants, because of their deep and extensive root systems, are the most difficult invasive nonnative plants to remove from Spalding's catchfly habitat, often requiring persistent herbicides for control. Persistent herbicides, such as picloram products, remain in the soil longer where they may be transported and affect non-target plant species, such as Spalding's catchfly. Co-occurring rhizomatous species being controlled in the Asotin Creek wildlife units include rush skeletonweed (*Chondrilla juncea*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), and Dalmation toadflax (*Linaria dalmatica*).

The dormancy of Spalding's catchfly is of concern regarding herbicide use in the plants' habitat, given the potential for the occurrence of dormant Spalding's catchfly plants outside the population boundaries and the potential effects to these dormant plants from herbicide application activities outside the 10 foot buffer. After discussions with several botanists who have been monitoring the plant, there is differing information regarding this. Lesica (*in litt.* 2011) found that in any given year dormant (or undetectable) plants will be mixed in with plants that are apparent. If the boundaries of a population are mapped in a year when detectability is relatively good, it should not be necessary to worry about having very many undectectable plants

outside that boundary. Studies done by Hill (*in litt.* 2011) found that during several years of mapping Spalding's catchfly clusters/subpopulations (a group of plants separated by 30 feet from another group of plants) the size of the clusters remained fairly constant with considerable appearingly suitable but unoccupied habitat between them. In the 3- 4 years of this mapping effort, only one plant was found between two clusters.

During BLM inventories, in areas where there is a cluster of plants, there could be a gap with no plants although the habitat appears to be "suitable". As the inventory continued along the slope, individual Spalding's catchfly plants or pairs of plants were found distributed along a slope some distance from the population (B. Benner *in litt.* 2011).

While the purpose of the noxious weed control is to promote healthy native habitats and reduce the threats from invasives to native plant populations, if herbicides are applied to or near Spalding's catchfly plants while they are actively growing, the herbicides may weaken or kill them. Herbicide spraying effects on Spalding's catchfly have not been researched, although it is reasonable to assume broad spectrum herbicides such as glyphosate, picloram, and 2,4-D, that kill most herbaceous perennials when directly applied will also kill Spalding's catchfly (USFWS 2007).

Pollinators for the plant are also vulnerable to plant herbicide applications, and potential impacts to pollinators must also be considered (Gamon 1991, pp. 60-82). In Spalding's catchfly populations the absence of pollinators could cause a significant reduction in recruitment if pollinators were severely limited (Lesica 1993, pp. 193, 199-200). The use of buffers for herbicide applications around Spalding's catchfly populations will help to reduce effects to pollinators in these areas.

The conservation measures listed in the description of the proposed action section of the Opinion for noxious weed control will mitigate most of the negative effects of this activity on Spalding's catchfly. Limiting herbicide use to the March 1 through May 31 time period in the vicinity of Spalding's catchfly populations will lessen the effects, since some plants will be dormant or just emerging. WDFW does need to apply the herbicides during this approved time period for maximum efficiency on the target species. They will implement a 10-foot no-spray buffer around any known Spalding's catchfly populations and drift control measures to prevent the herbicides from coming into direct contact with emerging Spalding's catchfly plants. Within this 10 ft. buffer, noxious weeds will be pulled by hand only. Only the non-persistent and non-residual herbicide 2, 4-D amine will be applied outside 10 feet and within 50 feet of existing known Spalding's catchfly plants. Outside of this 50 foot buffer aminopyralid (Milestone) may be used.

Growing conditions for Spalding's catchfly were considered favorable in 2009, therefore we expect that population boundaries in the Smoothing Iron Unit were relatively accurate for those populations that year. In determining buffers for herbicide treatment in the action area, we expect the delineation of the boundaries from the 2009 study to serve as an accurate representation of the population at the Asotin WMA. After review of the information regarding plants occurring outside the population boundaries, we feel that the 50 foot buffer around Spalding's catchfly populations will be sufficient for herbicide activities and to decrease the likelihood of dormant plants being weakened or killed by the herbicides. These boundaries may

change as surveys continue for the Asotin Spalding's catchfly population and participating agencies will revisit this annually to determine if actions need to be taken to change the delineation of areas that receive herbicide treatment. These area boundaries will be flagged with the potential that flagged areas may change as population boundaries and individual plant locations fluctuate annually.

Use of herbicides related to controlling noxious weeds outside the 50 ft. buffer around Spalding's catchfly populations will be limited to further protect the known populations from accidental spray or drift. However, even with avoidance measures, there is a small possibility that Spalding's catchfly plants could accidentally be exposed to herbicides. Conservation measures, careful selection of appropriate herbicides, buffer zones and timing of applications for herbicide use in the Spalding's catchfly areas are expected to minimize this exposure.

Since the invasive nonnative species have been documented as growing right next to the Spalding's catchfly populations in some cases, it will be beneficial to the Spalding's catchfly to control these species in the long term, as long as the Spalding's catchfly plants are protected from direct spray and drift. Based on the experience with *C. solstitialis* in Idaho, described above, it is thought that the threat posed by rapid encroachment of the invasive species is much higher than the threat from potential loss of a small number of plants with the use of the herbicides in the manner proposed. Therefore, the proposed action will result in long term beneficial effects.

In summary, ground-disturbing activities and toxicity from exposure to herbicides have the potential to adversely affect Spalding's catchfly individual plants. This is due to the possibility that Spalding's catchfly plants could be trampled and/or be exposed to herbicides, and pollinators may also be negatively affected with these activities. Almost all of the population is distributed within the Smoothing Iron Unit on the northern slope of Warner Gulch and the project has the potential to adversely affect low numbers of Spalding's catchfly individuals out of a population of 5,977. These effects would most likely be limited to any plants within the 50 ft. buffer adhered to for herbicide use as there is low likelihood that individual plants would occur outside this buffer zone. The implementation of all conservation measures will decrease the chances that there will be mortality to any of the Spalding's catchfly plants within the Smoothing Iron Unit.

Effects due to Interrelated and Interdependent Actions

Interrelated and interdependent actions are actions that would not occur but for the proposed action, and that have effects on listed species. There are no interrelated and interdependent actions expected from the proposed project.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future federal actions that are unrelated to the proposed action are not considered here because they require separate consultation pursuant to section 7 of the ESA.

Since the area is a WDFW managed wildlife area, there is no threat from development or other private actions, and there are no active management activities planned in the action area in the near future.

Climate Change

Global climate change, and the related warming of global climate, have been well documented (Bates 2008, ISAB 2007, WWF 2003). Evidence of global climate change/warming includes widespread increases in average air and ocean temperatures and accelerated melting of glaciers, and rising sea level. Given the increasing certainty that climate change is occurring and is accelerating (Bates 2008, Battin et al. 2007), we can no longer assume that climate conditions in the future will resemble those in the past.

Patterns consistent with changes in climate have already been observed in the range of many species and in a wide range of environmental trends (ISAB 2007, Hari et al. 2006, Rieman et al. 2007). In the northern hemisphere, the duration of ice cover over lakes and rivers has decreased by almost 20 days since the mid-1800's (WWF 2003). The range of many species has shifted poleward and elevationally upward.

In the Pacific Northwest, most models project warmer air temperatures and increases in winter precipitation and decreases in summer precipitation. Warmer temperatures will lead to more precipitation falling as rain rather than snow.

Invasive, nonnative species will respond to climate change, and their responses will have ecological and economic implications (Hellman et. al, 2008, p. 535). Many invasive plants have broad climatic tolerances and large geographic ranges in addition to their increased adaptability to changing habitat conditions, and these characteristics may affect their responses to climate change. Climate change may have an impact on invasion of nonnative species due to their increased adaptability to changing habitat conditions. Many native plants may be limited by seed dispersal rates, competition with these existing nonnative species, and barriers to dispersal (Lawler and Mathias, 2007, p. 19).

Recent phenological changes have been observed in many different ecological systems. Spring events, for example, have been occurring 2.3 days earlier per decade over the last century. Plants are flowering and fruiting earlier, birds are laying eggs earlier, and some amphibians are mating earlier (Lawler 2009, p. 80). Phenological changes such as advances in flowering date have the potential to create mismatches between pollinators and plants. Species that are directly linked to a specific other species may be at higher risk from impacts of these types of phenological changes than species that have more general resource requirements (Lawler and Mathias 2007, p. 19). In addition, changes in phenology have the potential to decouple interdependent ecological events, resulting in changes in species interactions, community composition, and ecosystem functioning (Lawler 2009, p. 80).

It is not certain what climate change means for the Spalding's catchfly. Organisms adapt to disturbances such as historical fire regimes (fire frequency, intensity, and seasonality) with which they have evolved. If climate change indeed affects the frequency and magnitude of

wildfires, especially in warmer, drier areas such as are found on the eastside of the Cascade Mountains, the increased frequency of fire is likely to facilitate additional invasions by cheatgrass and other nonnative annuals, that may outcompete Spalding's catchfly, and could contribute to increased fuel for larger and more intense fires ((Lawler and Mathias, 2007, p. 18). Thus, under current climate-change projections, we anticipate future climatic conditions will favor further invasion by cheatgrass and other nonnatives (USFWS 2010a).

The consequences of climate change, if current projections are realized, are therefore likely to exacerbate the existing primary threats - changing wildfire regime leading to an increase in invasive nonnative plants, particularly cheatgrass, to Spalding's catchfly conservation. Because the Intergovernmental Panel on Climate Change (IPCC) projects changes to the global climate system in the twentyfirst century will likely be greater than those observed in the twentieth century (IPCC 2007, p. 45), we anticipate that these effects will continue and likely increase into the future. Due to the uncertainty associated with climate change projections, we did not consider climate change in and of itself to represent a significant rangewide threat to the Spalding's catchfly in our listing decision. However, we acknowledge that climate change will likely play a potentially important supporting role in intensifying the most significant current threats to the species in the foreseeable future. The severity and scope of the primary threats of changing wildfire regime and invasive nonnative plants to the Spalding's catchfly are likely to be magnified, depending on the realized outcome of climate change. Habitat conservation and restoration efforts are likely to be further complicated by these climatic changes. Additional conservation measures may be needed to mitigate the effects of habitat degradation that are aggravated by climate change (USFWS 2010a).

Climatic fluctuations can adversely affect Spalding's catchfly and may contribute to the extirpation of small populations. These fluctuations could have effects to small populations that are vulnerable to even relatively minor disturbances. These small populations may therefore, lose a large amount of genetic variability because of genetic drift, reducing their long-term viability (USFWS 2001, p. 51604).

There is still a great deal of uncertainty associated with predictions relative to the timing, location, and magnitude of future climate change. It is also likely that the intensity of effects will vary by region (ISAB 2007) although the scale of that variation may exceed that of States.

CONCLUSION

After reviewing the current status of the Spalding's catchfly, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's Biological Opinion that the survival and recovery of the Spalding's catchfly at the scale of the local population, the physiographic zone populations, or the species will not be jeopardized by the BPA's Asotin Creek Wildlife Area Funding of Wildlife Management Activities (Project), as described in the BA. No critical habitat has been designated for this species, therefore none will be affected.

The Service concludes that direct and indirect effects to the Spalding's catchfly would be limited to effects from ground-disturbing activities and toxicity from exposure to herbicides, with minimal effects to insect pollinator populations from herbicide application associated with

project activities. The effects of the proposed action on the Spalding's catchfly will occur at a localized level within the Asotin Creek Wildlife Area. The Service expects that the numbers, distribution, and reproduction of the Spalding's catchfly in the action area, and for the species rangewide in southeastern Washington, will not be significantly changed as a result of this proposed action.

The Service reached this no-jeopardy determination because:

- The proposed action minimizes direct and indirect impacts to all known Spalding's catchfly populations in the action area due to implementation of the following conservation measures:
    - the appropriate selection and use of herbicides being applied around Spalding's catchfly populations
    - appropriate timing for these activities, and
    - minimizing ground disturbance from project activities.
- Due to implementation of buffers, the proposed action avoids, to the extent possible, adverse impacts to Spalding's catchfly and its habitat within the action area on WDFW lands.
- Spalding's catchfly plants in known populations are unlikely to be directly affected. This is due to the fact that the population was surveyed in 2009, which was a good production year for the plant, and buffers will be appropriately flagged to avoid this.
- Beneficial effects to Spalding's catchfly from treatment of noxious weeds. The Smoothing Iron Unit has approximately 6,000 individual plants, and maintaining this large population will contribute to recovery.
- Annual monitoring will occur to adjust buffer areas as appropriate.
- Effects to the Smoothing Iron population are small, and will not impact distribution, numbers, and reproduction of the Spalding catchfly local population, the physiographic zone populations, or the species as a whole.

The conservation measures being implemented by the BPA and WDFW in conjunction with the proposed action considered in this document are either specific measures designed to reduce impacts to the species and its habitat at the local level, or general measures designed to improve the ecological condition of native Spalding's catchfly habitat at a landscape scale. The specific measures include management actions to reduce impacts to the Spalding's catchfly populations from project activities, particularly from herbicide application. The specific conservation measures described above are intended to reduce the amount or extent of impacts on the local population and the species as a whole, although these localized adverse effects are not completely eliminated.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that section 9 of the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The following recommendations are measures that the Service would like BPA to implement:

1. Exercise section 7(a)(1) of the Act to maintain or enhance plant communities in a manner compatible with the needs of the Spalding's catchfly, which includes maintaining a functional ecosystem, minimizing ground disturbance in Spalding's catchfly habitats, and providing native forb cover to maintain or enhance insect pollinator populations.

In addition, the Service would like WDFW to implement the following conservation recommendations:

1. Implement all conservation measures identified for herbicide use on the Asotin Creek Wildlife Area and continue to implement these measures for the Spalding's catchfly, regardless of future listing status, to ensure continued species conservation and population expansion over time.

2. Conduct monitoring and reporting to determine degree of conservation measure effectiveness. Some of the methods proposed in this project should be evaluated to adaptively manage impacts of this project, as well as inform future projects.

3. Conduct surveys in cooperation with the Service, WSU, and other parties to determine Spalding's catchfly locations and densities in potential habitat, both in and outside of the action area.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request for formal consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX A

Herbicides will be applied in liquid or granular form using wand or boom sprayers mounted on or towed by trucks, backpack equipment containing a pressurized container with an agitation device, injection, hand wicking cut surfaces, and ground application of granular formulas. Herbicides will be mixed with water as a carrier (no petroleum-based carriers will be used) and may also contain a variety of additives (see adjuvant paragraph below) to promote saturation and adherence, to stabilize, or to enhance chemical reactions. Aerial treatment is not proposed to be covered under this consultation, nor is treatment of aquatic weeds except for knotweed (Polygonum cuspidatum).

BPA could potentially use the following herbicides for vegetation management:

- 2,4-D Amine Formulations.
- Aminopyralid
- Chlorsulfuron
- Clethodim
- Clopyralid
- Dicamba (Banvel formulation only)
- Glyphosate (Glyphosate is analyzed as two distinct factory-formulated types. The first type (I) is glyphosate factory-formulated without an identified surfactant. The second type (II) is glyphosate factory-formulated with an identified or implied surfactant. The reason for this is due to the increased aquatic toxicity resulting from the surfactant formulation. See BA Appendix D for a listing of Glyphosate product brands, selective characteristics, and types.)
- Imazapic
- Imazapyr
- Metsulfuron methyl
- Picloram
- Sethoxydim
- Sulfometuron methyl
- Triclopyr (Only Triclopyr TEA, or the acid formulation labeled as Garlon 3A/Tahoe 3A, would be used under this consultation.)
- Herbicide Mixes (Combinations of herbicides may be used where several species of noxious weeds occur together, where the herbicides affect weeds differently, or where herbicide resistance is occurring. Chemical treatment can also be used in conjunction with, or preceding, non-chemical weed control treatments, depending on weed species composition, infestation level, and environmental setting. No more than three herbicides will be used in a mixture.

The BPA would use various adjuvants in conjunction with chemical herbicides. Spray additives can be included in formulated herbicides, or can be added to the spray mixture to improve the effectiveness of the spray solution. Adjuvants are classified by their uses rather than their chemistry, although chemical properties determine their suitability for use with different herbicides. Adjuvants include surfactants, antifoaming agents, compatibility agents, crop oil or

crop oil concentrates, activators, drift retardants, and marker colorants/dyes. Adjuvants BPA would use under this consultation are listed in Table 2.

Dyes will be added to herbicides to identify areas that have been sprayed, to warn the general public, to regulate application rates, reduce drift, and reduce risk of spraying non-target species. The dyes proposed for use with herbicides are water-soluble, break down in sunlight and wash away easily with water.

Surfactants are specialized additives, formulated to improve the emulsifying, spreading, sticking, and absorbing properties of herbicides to aid in uptake by the target plant. The type of surfactant used depends on the target plant, the selected herbicide, and environmental condition. Drift is primarily a function of droplet size and wind. Droplets with diameters of 100 microns (0.1 mm) or less contribute the bulk of the drift off site from the treated fields. Drift control adjuvants increase the viscosity and the tensile strength of water and decrease the proportion of smaller drops in a spray system. They will also increase the average drop size, resulting in fewer drops per square inch of leaf surface, but the rate of deposit of pesticide in pounds per acre remains the same.

Liquid or granular forms of herbicides would be applied either with machinery or by hand. Mechanized application would be done with vehicle-mounted (pick-up, 4-wheeler, or tractor) fixed-booms, or spray guns. Hand application methods to be used are: (1) Spot-spraying with hand-held spray nozzles attached to either a tank-mounted on a vehicle or a backpack system; (2) hand-spreading granular formulations; and (3) wicking, wiping, dripping, painting, or injecting target weeds.

Table 1. Adjuvants to chemical herbicides proposed for use by BPA

Adjuvant Type	Trade Name	Labeled Mixing Rates per Gallon of Application Mix	General Geographic Application Areas	Aquatic Level of Concern
Colorants	Dynamark□ U.V. (red)	0.1 fl oz	Riparian	Low (Food Grade)
	Dynamark□ U.V. (yel)	0.1 fl oz	Riparian	Low (Food Grade)
	Dynamark□ U.V. (blu)	0.5 fl oz	Upland	Moderate (Non-Crop Use)
	Hi-Light□ (blu)	0.5 fl oz	UpLand	Moderate (Non-Crop Use)
Surfactants	Activator 90□	0.16 – 0.64 fl oz	Upland	Moderate
	Agri-Dex□	0.16 – 0.48 fl oz	Riparian	Low
	Entry II□	0.16 – 0.64 fl oz	Upland	High
	Hasten□	0.16 – 0.48 fl oz	Riparian	Low
	LI 700□	0.16 – 0.48 fl oz	Riparian	Moderate
	R-11□	0.16 – 1.28 fl oz	Riparian	Moderate
	Super Spread MSO□	0.16 – 0.32 fl oz	Riparian	Low
	Syl-Tac□	0.16 – 0.48 fl oz	Upland	Moderate
	Generic POEA	Pre-formulated	Upland	High
Drift Retardants	41-A□	0.03 – 0.06 fl oz	Riparian	Low
	Valid□	0.16 fl oz	Upland	Moderate

Minimization Measures **(NMFS 2008)**

79. General Herbicide Conservations Measures. The measures listed below are for terrestrial application of chemicals only, and are designed to prevent chemicals from entering any surface waters. Applicators will only use the herbicides and adjuvants as proposed in this document as follows:

    a. BPA will use the following factors to determine whether to use herbicides instead of or in combination with other types of vegetation control method(s), and when and how often they will be applied: (1) Toxicity of the herbicide(s), (2) physical growth characteristics of target weeds (rhizomatous vs. tap-rooted, *etc.*), (3) seed longevity and germination, (4) infestation size, (5) relationship of the site to other infestations, (6) relationship of the site to listed and/or proposed species, (7) distance to surface water, (8) accessibility to site for equipment, (9) type and amount of use of the area by people, (10) effectiveness of treatment on the target weed, and (11) cost.

    b. In riparian zones, a site vegetation rehabilitation plan must be prepared if areas larger than ¼ acre (10,890 sq. ft.) are treated with a non-selective herbicide per year per project area.

    c. In riparian zones, broadcast application of non-selective herbicides (glyphosate 1and imazapyr) is limited to 5 acres (217,800 sq. ft.) per year per project area.

    d. Product label directions will be followed as required by the Federal Insecticide, Fungicide, and Rodenticide Act, including "mandatory" statements (such as registered uses, maximum use rates, application restrictions, worker safety standards, restricted entry intervals, environmental hazards, weather restrictions, and equipment cleaning).

    e. The most recent product label "precautionary" statements such as environmental hazards, physical or chemical hazards, soil and climate application restrictions, wildlife warnings, and threatened and endangered species warnings will be followed.

    f. Herbicides will be applied only by a licensed applicator (valid for the state where the work is located) and only in accordance with EPA labeling or the restrictions identified in the HIP consultation, whichever are more restrictive. Applicators will use the herbicide specifically targeted for a particular weed species that will cause the least impact to non-target vegetation.

    g. Applicators will keep records of each application, the active ingredient, formulation, application rate, date, time, location, etc. Records will be available to state and Federal inspectors, and will be supplied to applicable regulatory agencies and land managers as requested.

h. Applicators will also supply application information to BPA for the annual NMFS reporting and monitoring requirements described in the Reporting, Monitoring, Evaluation, and Adaptive Management portion of this section.

i. Applicators will never leave herbicides or equipment unattended in unrestricted access.

j. Only the minimum area necessary for the control of noxious weeds will be treated.

k. Before application, applicators will thoroughly review the site to identify and mark, if necessary, the buffer requirements.

l. Applicators will observe restricted entry intervals specified by the herbicide label.

m. No 2,4-D ester formulations of any kind will be used.

n. Only glyphosate that is factory-formulated without a surfactant will be used within 100 feet of any surface waters.

o. Tank mixing of surfactants or other additives to glyphosate without factory formulated surfactants for use within 100 feet of any surface waters will be in strict accordance with all requirements in this activity category.

p. Only triclopyr TEA (acid) (Garlon 3A/Tahoe 3A) formulations of triclopyr will be used. No triclopyr BEE (ester) (Garlon 4) formulations of any kind will be used.

q. Only surfactants listed in Table 2 will be used for any project within the buffer specified in the following minimization measures, only surfactants registered and approved for aquatic use as shown on Table 2 will used within 15 feet of any surface waters.

r. No carrier other than water will be used for tank mixing.

s. No application to submerged aquatic vegetation with any herbicide is included in this consultation.

t. No aquatic application of chemicals is covered by this consultation except for treating emergent knotweed as follows:

i. The only application methods for emergent knotweed are stem injection, wicking or wiping, and hand-held spray bottle application of glyphosate.

ii. Applicators will be familiar with proper glyphosate stem injection methodology prior to treatment.

iii. Only aquatic labeled glyphosate formulations will be used. The formulation can be up to 100% concentration for the stem injection method. The formulation will be diluted to 50% or less active ingredient when applied directly to fresh stem cuts using wicking or wiping, and up to the percentage allowed by label instructions when applied to foliage using low pressure hand-held spot spray applicators.

iv. Larger emergent knotweed can be treated with glyphosate by stem injection, and smaller emergent knotweed by wicking/wiping and spot spray with hand-held sprayers. Wicking or wiping and hand-held spray bottle application of glyphosate is allowed to emergent knotweed plants less than 4 to 5 feet tall, and usually smaller.

v. Emergent plants with actively growing stems greater than 0.75 inches in diameter will be treated by stem injection.

vi. Most knotweed patches are expected to have overland access. However, some sites may be reached only by water travel, either by wading or inflatable raft (or kayak). The following measures will be used to reduce the risk of a spill during water transport:

(1) No more than 2.5 gallons of glyphosate will be transported per person or raft, and typically it will be one gallon or less.

(2) Glyphosate will be carried in 1 gallon or smaller plastic containers. The containers will be wrapped in plastic bags and then sealed in a dry-bag. If transported by raft, the dry-bag will be secured to the watercraft.

80. Drift and Leach Reduction Minimization measures.

a. Applicators will use drift reduction agents, as appropriate and as identified in this document, to reduce the drift hazard when applying herbicides as broadcast or localized foliar treatments.

b. Colorants will be used to the extent practicable to ensure proper coverage and targeting.

c. Herbicides/adjuvants with a groundwater or surface water label advisory will not be used within 100 feet of any surface water.

d. For basal bark/stem and stump applications, applicators will directly spray the root collar area, sides of the stump, and/or the outer portion of the cut surface, including the cambium, until thoroughly wet, but not to the point of runoff, in order to avoid or minimize deposition to surrounding surfaces. A marker colorant/dye is recommended to establish coverage and prevent plant runoff.

e. Treatment will be delayed if precipitation is forecasted to occur within 24 hours, except for pellet application.

f. Table 5 identifies minimization measures the BPA's weather and wind speed restrictions (to be used in the absence of more stringent label instructions and restrictions). During application, applicators will monitor weather conditions hourly at sites where spray methods are being used.

81. Herbicide Mixing Minimization measures.

a. Applicators will prepare spray mixtures in accordance with the label's instructions and will not exceed the amount of herbicide per acre specified on the label.

b. Applicators will perform mixing at suitable locations with respect to buffer zones and recommended buffer widths.

c. Except as indicated by Tables 3, 4, and 5, applicators will mix and load herbicides at least 100 feet from any surface waters and only in locations where accidental spills cannot flow into waters or contaminate groundwater.

d. No more than three different herbicides may be mixed for any one application.

82. Spills and Misapplication Minimization measures.

a. Applicators will conduct regular testing on field calibration and calculations to prevent gross application errors.

b. The applicator will develop a Spill Containment and Control Plan (SCCP) prior to herbicide application. The plan will contain notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on site, proposed methods for disposal of spilled materials, and employee training for spill containment. All individuals involved, including any contracted applicators, will be instructed on the plan.

c. In addition to an applicator's SCCP, applicators will report spills and misapplications to EPA in accordance with the BPA's Government Agency Plan (GAP) (See Appendix E of BA). Applicators will report spills and misapplications and will clean up according to Federal and applicable state laws and regulations. At a minimum, applicators will:

i. Notify BPA within 24 hours of any spill or misapplication.
ii. Contain the spill or leak, or halt misapplication.
iii. Isolate the area and request help as appropriate.
iv. As soon as possible, notify the owner of the land and any other potentially affected parties.
v. Clean up the spill.

vi. Clean up equipment and vehicles.

vii. Dispose of cleanup materials properly.

viii. Follow up with appropriate cleanup documentation.

d. Upon notification of a spill or misapplication by an applicator, BPA will immediately notify the nearest NMFS field office and provide copies of all subsequent relevant information generated from the event.

83. Herbicide Handling Minimization measures.

a. During transportation, applicators will secure herbicide containers to prevent movement within the vehicle or loss from the vehicle during the operation of the vehicle.

b. When spray equipment is not being used, applicators will ensure that all valves and tank covers are closed during any movement of the vehicle.

c. Applicators will firmly secure any portable tanks used for herbicide application to the frame of the vehicles.

84. Storage of Herbicides, Containers, and Equipment Minimization measures.

a. Applicators will follow label requirements for storage.

b. Storage of herbicides will be in strict compliance with the relevant regulations of the state in which the herbicides are being stored.

c. Applicators will inspect storage areas frequently for leakage and clean up spill areas immediately.

d. Applicators will store only minimum amounts of chemicals at field and temporary locations, and will order out no more chemicals than necessary.

e. Applicators will dispose of unwanted or unusable products promptly and correctly.

f. In temporary storage locations, such as the field, applicators will store all chemicals in buildings or vehicles that can be locked and no closer than 300 feet from any surface water.

85. Herbicide Disposal Minimization measures.

a. Applicators will use water-soluble packaging (WSP) when available, to eliminate the need for container disposal.

b. Applicators will not burn paper and carton-type containers unless stated as permissible on the label.

c. Applicators will dispose of containers or cartons in one of three ways:

i. Triple rinse containers of liquid herbicides before disposal. The rinse solution will be poured into the mix-tank and used for treatment. Each rinse solution will be equal to at least 10% of the container volume. Dispose of the empty containers as non-contaminated waste, at any legal landfill dump.

ii. Use a rinsing nozzle (instead of triple rinsing). A rinsing nozzle has a sharp point that can puncture a plastic or metal empty herbicide container and flush the container's contents into the mix tank.

iii. Recycle returnable "mini-bulk" type containers to the distributor for refill.

d. Applicators will observe the applicable buffers when washing or rinsing spray tanks near waters.

e. Applicators will dispose of unwanted or unusable herbicide products as contaminated waste at an approved waste facility.

f. Applicators will dispose of contaminated materials (including contaminated soil) resulting from cleanup procedures according to EPA directives.

g. Applicators will place any contaminated materials to be transported in watertight containers.

86. Herbicide Reporting.

a. Herbicide use will follow the same approval process as other activities under the HIP BO, with the submittal of the Proposed Herbicide Use Table (Appendix A in the BA) to BPA or entering it into the NMFS CIRS once that system is functional. BPA environmental staff will review the table and send the project sponsor an approval letter. If herbicide use is the only activity proposed under the HIP BO, submittal of a Form 1, found in Appendix A of the BA, is not required, but some form of entry into the NMFS CIRS will be required once it is available.

b. Actual herbicide use will be reported by the project sponsors with the submittal of the Actual Herbicide Use Table (Appendix A in the BA) to BPA or entering it into the NMFS CIRS once the system is available. If herbicide use is the only activity proposed under the HIP BO, submittal of a 120-day implementation report is not required, but some form of entry into the NOAA database will be required once it is functional.

87. Herbicide Adaptive Management.

a. The BPA habitat improvement program is a long-term endeavor that includes control of noxious weeds, removal of unwanted vegetation, and revegetation where and when practicable. However, because there are areas of scientific and management uncertainty, management actions may require refinement or change over time as data from specific effectiveness monitoring is analyzed. With the likely development of new control methods and technology, changes in existing treatments or use of new noxious weed treatments and/or vegetation restoration methods may be authorized and warranted. Any changes to the proposed action, as described in the BA, would be analyzed for impacts to listed/proposed species and critical habitat, and consultation would be reinitiated as appropriate.