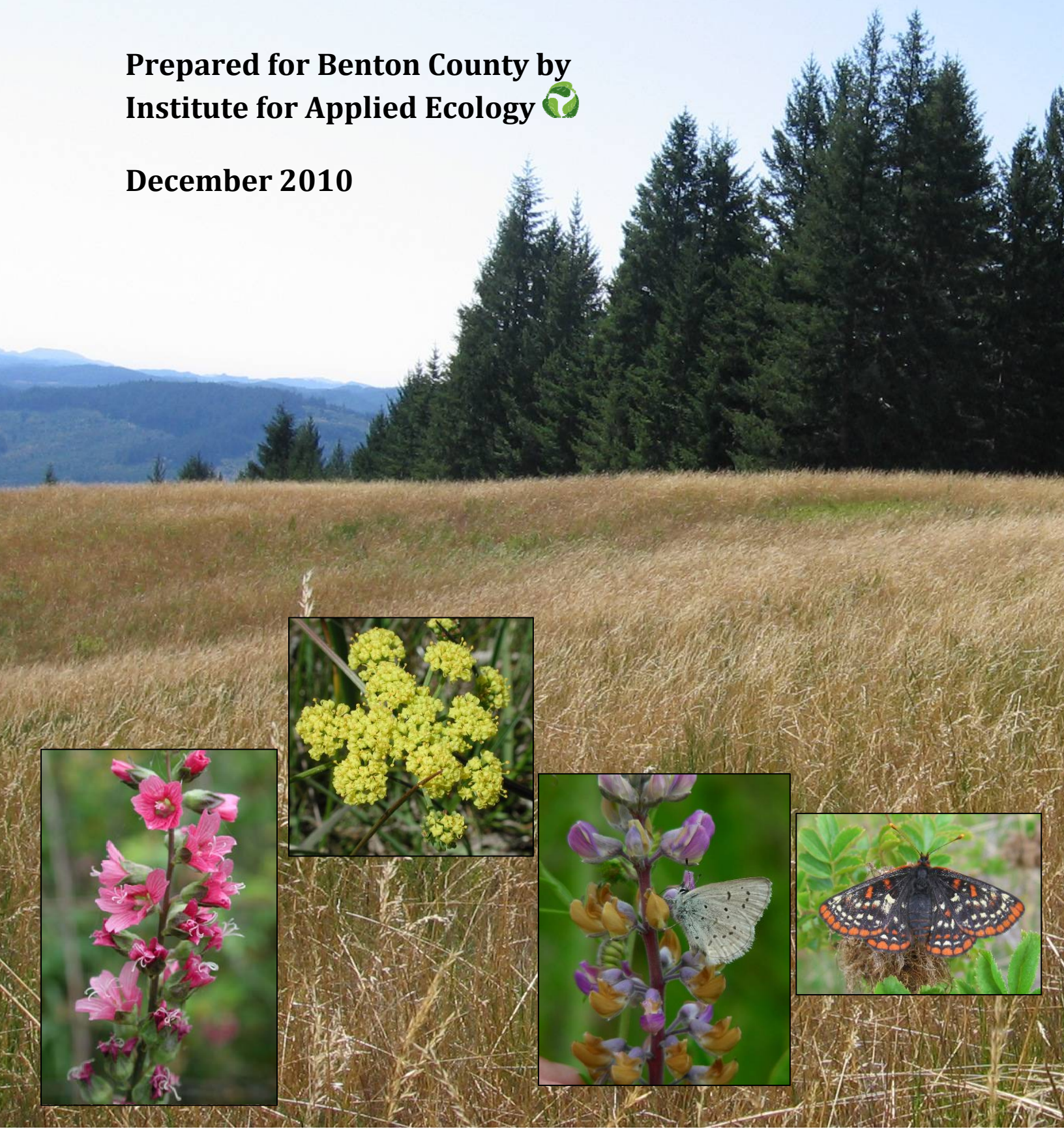


BENTON COUNTY NATURAL AREAS AND PARKS PRAIRIE MANAGEMENT PLANS

Prepared for Benton County by
Institute for Applied Ecology 

December 2010



This document was prepared for Benton County by
Carolyn A. Menke and Thomas N. Kaye
at
the Institute for Applied Ecology

The Institute for Applied Ecology is a non profit 501(c)(3) organization whose mission is to conserve native species and habitats through restoration, research, and education.



P.O. Box 2855
Corvallis, OR 97339-2855
(541)753-3099
www.appliedeco.org

Front Cover Photos:

Background: Beazell Memorial Forest, George McAdams

Left to Right:

Nelson's checkermallow, Tom Kaye

Bradshaw's lomatium, Tom Kaye

Fender's blue butterfly and Kincaid's lupine, Tom Kaye

Taylor's checkerspot, George McAdams

All other photos by IAE unless otherwise noted.

Suggested Citation:

Benton County, Oregon, 2010. Benton County Natural Areas and Parks Prairie Management Plans. Benton County Natural Areas and Parks Department, Corvallis, Oregon.

TABLE OF CONTENTS

Chapter 1: Background, Monitoring and Adaptive Management.....	5
1.1 Introduction	6
1.2 Rare and Sensitive Species.....	7
1.3 Monitoring and Adaptive Management.....	16
Chapter 2: Beazell Memorial Forest Prairie Management Plan	23
2.1 Introduction	24
2.2 Background Information	25
2.3 Overview of Habitats and Species.....	25
2.4 Issues of Concern	30
2.5 Habitat Management Units	30
2.6 Site Uses	39
2.7 Schedule	41
Chapter 3: Fitton Green Natural Area Prairie Management Plan.....	42
3.1 Introduction	43
3.2 Background Information	44
3.3 Overview of Habitats and Species.....	45
3.4 Habitat Management Units	50
3.5 Site Uses	54
3.6 Schedule	56
Chapter 4: Fort Hoskins Historic Park Prairie Management Plan.....	57
4.1 Introduction	58
4.2 Background Information	58
4.3 Overview of Habitats and Species.....	59
4.4 Habitat Management Units	63
4.5 Site Uses	66
4.6 Schedule	68
Chapter 5: Jackson-Frazier Wetland Prairie Management Plan	69
5.1 Introduction	70
5.2 Background Information	71
5.3 Overview of Habitats and Species.....	72
5.4 Habitat Management Units	77
5.5 Site Uses	81
5.6 Schedule	82
Chapter 6: Crisp-Liddell Property Management Plan.....	83
6.1 Introduction	84
6.2 Background Information	85
6.3 Overview of Habitats and Species.....	85
6.4 Habitat Management	89
6.5 Site Uses	91
6.6 Schedule	93
Chapter 7: Percy-Schoener Conservation Easement Management Plan.....	94
7.1 Introduction	95
7.2 Background Information	96

7.3	Overview of Habitats and Species.....	96
7.4	Habitat Management Units	99
7.5	Site Uses	105
7.6	Schedule	107
Chapter 8: Overall Schedule.....		108
8.1	Restoration Planning.....	109
8.2	Multi-Site Schedule	110
References		112
Appendix A: HCP Monitoring Data Summary Form		115
Appendix B: Management Log Template		119

LIST OF FIGURES

Figure 1.1	Bradshaw’s lomatium.....	7
Figure 1.2	Fender’s blue butterfly on Kincaid’s lupine.....	8
Figure 1.4	Kincaid’s lupine.....	11
Figure 1.5	Nelson’s checkermallow.....	12
Figure 1.6	Taylor’s checkerspot butterfly.....	13
Figure 1.7	Willamette daisy.....	15
Figure 1.3	Golden paintbrush in a reintroduction plot at the Finely National Wildlife Refuge.....	16
Figure 2.1	Meadows at Beazell Memorial Forest.....	26
Figure 2.2	Soils at Beazell Memorial Forest.....	27
Figure 2.3	Pre-European settlement vegetation at Beazell Memorial Forest.....	28
Figure 3.1	Location of Fitton Green Natural Area.....	44
Figure 3.2	Management units at Fitton Green Natural Area.....	46
Figure 3.3	Soils at Fitton Green Natural Area.....	47
Figure 3.4	Pre-European settlement vegetation at Fitton Green Natural Area.....	48
Figure 4.1	Location of Fort Hoskins Historic Park.....	59
Figure 4.2	Management units at Fort Hoskins. Unit A (Grass), has been divided into Areas #1-5.....	60
Figure 4.3	Soils at Fort Hoskins.....	61
Figure 4.4	Pre-European settlement vegetation at Fort Hoskins.....	62
Figure 5.1	Location of Jackson-Frazier Wetland near Corvallis, Oregon.....	71
Figure 5.2	Management units at Jackson-Frazier Wetland.....	72
Figure 5.3	Soils at Jackson-Frazier Wetland.....	73
Figure 5.4	Pre-Euro-American settlement vegetation at Jackson-Frazier Wetland.....	74
Figure 5.5	Sensitive species locations, both wild and augmented populations, at Jackson-Frazier Wetland.....	75
Figure 6.1	Soils at the Crisp-Liddell Property.....	86
Figure 6.2	Pre-European settlement vegetation at the Crisp-Liddell Property.....	87
Figure 7.1	Management Zones at the Percy-Schoener Easement.....	96
Figure 7.2	Soils at the Percy-Schoener Easement.....	97
Figure 7.3	Pre-European settlement vegetation at the Percy-Schoener Easement.....	98

LIST OF TABLES

Table 1.1 Plant species identified as nectar sources for Fender’s blue butterfly.....	8
Table 1.2 Taylor's Checkerspot Abundance - Benton County, Oregon.	13
Table 1.3 Taylor’s checkerspot nectar plants known in Oregon.	13
Table 1.4 General habitat restoration/enhancement schedule for Taylor’s checkerspot butterfly.....	15
Table 1.5 Approximate monitoring season for target species.....	17
Table 1.6 Adaptive management monitoring thresholds for the HCP.	21
Table 2.1 Sensitive species present or with potential habitat at the site.....	29
Table 2.2 Status of species introductions at Beazell Memorial Forest as of November 2010.	30
Table 3.1 Habitat polygons and management units at Fitton Green Natural Area.....	45
Table 3.2 Sensitive species present or with potential habitat at the site.....	49
Table 3.3 Status of species introductions in the southern meadow at Fitton Green Natural Area as of December, 2009.....	49
Table 4.1 Sensitive species present or with potential habitat at the site.....	63
Table 5.1 Status of species augmentations at Jackson-Frazier Wetland as of August 2009.....	76
Table 8.1 Restoration checklist.	109

CHAPTER 1: BACKGROUND, MONITORING AND ADAPTIVE MANAGEMENT



Fort Hoskins Historic Park, Photo by George McAdams

1.1 Introduction

The Benton County Natural Areas and Parks Department manages prairie habitats within four parks and natural areas (Bezell Memorial Forest, Fitton Green Natural Area, Fort Hoskins Historic Park and Jackson-Frazier Wetland), and two newly acquired sites referred to as the Benton County Fender's Blue Butterfly Conservation Areas¹. Collectively, these properties support a diversity of prairie animals and plants, and are home to many rare species. These species include threatened and endangered plants such as Bradshaw's lomatium, Kincaid's lupine, Nelson's checkermallow and Willamette daisy. Bezell Memorial Forest supports one of only two Taylor's checkerspot populations in the state of Oregon. The Fender's Blue Butterfly Conservation areas support one of the largest known Fender's blue populations.

In 2010, Benton County completed the Prairie Species Habitat Conservation Plan (HCP) to achieve long term viability of seven rare species populations that is compatible with essential public services, public land management and home, farm and forest construction (Benton County 2010). This effort was completed by the County and several Cooperators in response to federal and state laws that protect species listed as threatened or endangered, including butterfly and plant species occurring in Benton County prairie habitats (Fender's blue butterfly, Taylor's checkerspot butterfly, Kincaid's lupine, Nelson's checkermallow, Willamette daisy, Bradshaw's lomatium, and Peacock larkspur). The HCP identifies several Prairie Conservation Areas within Benton County that are under various public and conservation organization ownerships. These lands will be managed specifically for prairie habitat and rare species conservation. In some cases (e.g., the Fender's Blue Butterfly Conservation Areas) habitat restoration, enhancement and management will contribute to mitigation requirements of the HCP, and offset impacts to rare species that occur elsewhere in Benton County. The development of the HCP also included the creation of a *Prairie Conservation Strategy*, a local guide to rare species and habitat conservation actions that are linked to goals in the Recovery Plan for Western Oregon and Southwestern Washington Prairies (USFWS 2010) and the Oregon Conservation Strategy (ODFW 2006).

Purpose of these Management Plans

This document contains separate management plans for individual parks and natural areas and the Butterfly Conservation Areas. Each plan sets specific targets and a process to reach and document them, and all have the overall goal of protecting and enhancing prairie habitat quality and diversity, and the viability protected species populations. Specifically, these plans are intended to result in habitat and population enhancements required to fulfill the County's mitigation commitments to the US Fish and Wildlife Service (USFWS) and the Oregon Department of Agriculture (ODA) under the County's Prairie Species HCP. These management plans describe a monitoring protocol to track the success of habitat restoration, enhancement and management that is required under the HCP. These plans should be reviewed and updated every ten years as needed.

¹ As these plans go to print, acquisitions are not completed.

These management plans will:

- Identify desired future conditions and describe a sequence of actions to reach those conditions.
- Develop a planning system for scheduling and efficiently carrying out management actions at prairie sites managed by Benton County.
- Develop a system to document management actions, monitor the results and track management outcomes.

1.2 Rare and Sensitive Species

Bradshaw's Lomatium

Bradshaw's lomatium (*Lomatium bradshawii*) is a perennial plant in the carrot family (Apiaceae). Plants are low growing and have highly dissected leaves and yellow flowers in umbrella-shaped clusters. Bradshaw's lomatium flowers in April and May and sheds its seeds in late May and June. Habitat for this species includes wetland prairies dominated by tufted hairgrass and sedges. Prescribed fires are an effective tool to manage habitat for this species and increase its populations (Pendergrass et al. 1999, Kaye et al. 2001).



Figure 1.1 Bradshaw's lomatium.

Bradshaw's lomatium was listed under the federal Endangered Species Act as endangered in 1988 (USFWS 1988). The species is also listed as endangered by the state of Oregon. Most known occurrences of this species are in southern Washington and the Willamette Valley of Oregon. A recovery plan has been adopted for this and other listed prairie species (USFWS 1993a, USFWS 2010). Seven naturally occurring sites of lomatium are known in Benton County, totaling over 1,500 plants. One population is split between City of Corvallis and County ownerships at Jackson-Frazier Wetland, two occur at Finley National Wildlife Refuge, and the remaining four occur on private lands. About 20 lomatium plants have been planted on County land at Jackson-Frazier Wetland to augment the wild population there, and sufficient habitat exists at the site for further population enhancement.

Fender's blue butterfly

Fender's blue butterfly (*Icaricia icarioides fenderi*) was listed as an endangered species under the federal Endangered Species Act in 2000 (USFWS 2000) primarily because of its extreme rarity due to prairie habitat loss and fragmentation. Fender's blue was thought to

be extinct from about 1940 until the late 1980's, when biologists discovered a few remaining populations on prairie remnants in the Willamette Valley (USFWS 2000). Fender's blue butterfly is currently found in five counties in Oregon: Lane, Linn, Benton, Yamhill and Polk. USFWS has adopted a recovery plan for Fender's blue butterfly and several other native prairie species (USFWS 2010).



Figure 1.2 Fender's blue butterfly on Kincaid's lupine.

Two critical elements of Fender's blue butterfly habitat are larval host plants and nectar plant species (Figure 1.2; Table 1.1). Kincaid's lupine is the primary larval host plant for Fender's blue butterfly, and is listed as threatened. Alternate host plants include sickle-keeled lupine (*Lupinus albicaulis*) and spur lupine (*Lupinus arbustus*) (Wilson et al. 1997). Adult butterflies lay their eggs on lupine leaves in May and June, and larvae hatch a few weeks later. The larvae feed for a few weeks, and then go into diapause on the soil near the base of the plant until the following February or March. Emerging larvae then feed on young lupine leaves and inflorescences (Wilson et al. 1997). The larvae grow and develop, pupate, and emerge as butterflies in early May.

Table 1.1 Plant species identified as nectar sources for Fender's blue butterfly.

Species	Common Name	US Nativity
<i>Allium acuminatum</i>	Narrow leaf onion	Native
<i>Allium amplexans</i>	Tapertip onion	Native
<i>Calochortus tolmiei</i>	Tolmie's mariposa lily	Native
<i>Camassia quamash</i>	Small camas	Native
<i>Camassia leichtlinii</i>	Tall camas	Native
<i>Cryptantha intermedia</i>	Clearwater cryptantha	Native
<i>Eriophyllum lanatum</i>	Oregon sunshine	Native
<i>Geranium oregonum</i>	Oregon geranium	Native
<i>Iris tenax</i>	Toughleaf iris	Native
<i>Lomatium triternatum</i>	Nine-leaf lomatium	Native
<i>Plectritis congesta</i>	Seablush	Native
<i>Sidalcea campestris</i>	Meadow checkermallow	Native
<i>Sidalcea virgata</i>	Dwarf checkermallow	Native
<i>Vicia americana</i>	American vetch	Native
<i>Linum bienne</i>	Pale flax	Introduced
<i>Linum perenne</i>	Blue flax	Introduced
<i>Vicia cracca</i>	Bird vetch	Introduced
<i>Vicia hirsuta</i>	Tiny vetch	Introduced
<i>Vicia sativa</i>	Garden vetch	Introduced

Best Management Practices for Fender's Blue Butterfly

The following Best Management Practices include those recommended by the USFWS for use in areas with Fender's blue butterfly and other endangered species of the Willamette Valley in the Programmatic Formal Consultation on Western Oregon Prairie Restoration (USFWS 2008), as well as those described in the Benton County Prairie Species Habitat Conservation Plan (Benton County 2010). These practices will be incorporated into management actions.

Mowing

In areas with host plants (Kincaid's lupine) or nectar species for Fender's blue butterfly (Table 1.1), mowing shall be completed to reduce competition from introduced perennial grasses and shrubs, and will occur under the following limitations:

- Mowing within should be avoided during the flight season (May 1 – June 15), unless it is completed with a buffer of ≥ 8 meters maintained between the mower and any Kincaid's lupine. Mowing of nectar species should be avoided during the flight season.
- After the flight season and before Kincaid's lupine senescence (usually June 15–July 15, but may vary), tractor mowing may occur no closer than 2 meters from the nearest Kincaid's lupine plant.
- Mowing may be conducted throughout the site after Kincaid's lupine has senescence and before lupine re-emerge the following spring (generally August 15 – March 1).
- Tractor decks will be set at a minimum of 15 cm above ground to reduce impacts to Fender's blue butterfly larvae.

Prescribed Fire

The area burned in any given year at each site will be determined yearly based on individual site conditions and population sizes.

- Appropriate barriers will be used to contain burns such as perimeter mowing, wet lines with hose lays, disk lines, foam or other retardants.
- Fire retardant chemicals will be used sparingly near listed and/or covered plant species and will follow labeled restrictions and state regulations or guidelines for use near water.
- Fire management vehicles will be restricted to areas of dry soil.
- No more than one third of the occupied Fender's blue butterfly habitat will be burned in any one year.
- The center of the burn unit must be within 100 meters of unburned occupied habitat.
- Butterfly habitat for larvae (Kincaid's lupine patches) adjacent to the burn unit may be additionally protected with a fire barrier, where appropriate.
- USFWS has set a limit to the total area of occupied Fender's blue habitat throughout the species geographic range that may be burned in any single year (USFWS 2008). This limit is 1,000 acres. Therefore, prior to prescribed burns, USFWS will be consulted to determine if the area proposed for burning is compatible with regional habitat management activities.

Chemical Treatment

Chemical treatments shall usually be used after non-chemical methods have been exhausted or been proven ineffective through application or previous research. Chemical treatments may be used to control aggressive exotic species for which manual control has not proven successful. Even in the event of their use, chemical treatments will be used sparingly as they may have a lethal effect on non-target native species and butterfly larvae.

- Any herbicide used will be part of an Integrated Pest Management Plan.
- All listed and/or covered species will be closely monitored following herbicide application to identify any immediate adverse effects.
- Herbicides will be applied by a licensed applicator, using appropriate equipment and best management practices.
- Exposure of non-targeted species to herbicides, especially covered species, associated with drift, leaching to groundwater, and surface runoff will be avoided or minimized.
- Chemical treatments will follow labeled restrictions, including limitations for use near water.

Controlling Herbicide Drift

The following procedures will be used to control herbicide drift:

- Non-spray application methods, such as wide on techniques, will be used when feasible.
- The lowest effective nozzle pressure and minimum effective nozzle height recommended by the nozzle manufacturer will be used.
- Droplet size shall be at least 500 microns.
- Spraying will not occur where winds exceed the wind limits specified by the manufacturer and in no event shall winds exceed 11 kilometers per hour.
- Spraying shall occur when temperatures are below 30° C (85° F).
- Drift retardant adjuvants may only be used for boom spray applications and must be non-toxic.
- Dyes may be used for applications to ensure complete and uniform application and to observe the amount of drift.

Herbicide Restrictions for Use near Fender's blue butterfly

Research to date indicates that Fender's blue larvae are not damaged by some herbicides such as glyphosate, imazapic, and fluzifop under field application conditions when herbicides are applied in September-November (Clark et al. 2004). This may be because the larvae are buried in leaf litter and shielded from direct contact with these herbicides. Research by Russell and Schultz (2010) suggests some types of grass specific herbicides that are applied in spring (e.g., sethoxydim and fluzifop-p-butyl) may reduce survival of cabbage whites (*Pieris rapae*), but effects to another species of blue butterfly (*Icaricia icarioides blackmorei*) were less apparent.

- For non-tested herbicides or those for which effects to butterflies are unclear,, broad scale application will be limited to a portion of the occupied habitat (areas with Kincaid's lupine that may host larvae) during the season when larvae are buried under leaf litter.

Biological Control

Currently there are no biological controls for invasive species of concern. If in the future such controls become available, Benton County will work with the USFWS or appropriate state agency, to develop a plan for use of these control methods. Any biological control method used will be part of an Integrated Pest Management Plan.

Kincaid's Lupine

Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii* = *Lupinus oregonus*; Figure 1.3) is a long-lived perennial with palmately compound leaves and unbranched stems. The species produces unbranched inflorescences of pale purple to tan flowers and reproduces by seed and vegetative spread. Flowers are visible in May -June and require insects for pollination and seed production. Seed production is variable. Lupine foliar cover correlates with lupine abundance and has been adopted as the standard metric for lupine abundance (USFWS 2010). Kincaid's lupine is the host plant for the endangered Fender's blue butterfly.



Figure 1.3 Kincaid's lupine.

Kincaid's lupine is listed as threatened under the federal and state Endangered Species Acts (USFWS 2000). A recovery plan for Kincaid's lupine, Fender's blue butterfly and several other native prairie species was released in 2010 (USFWS 2010). In Benton County, the lupine primarily occurs in the Philomath, Greasy Creek, Soap Creek, Wren and Kings Valley areas. Small scattered populations are also found on roadside rights-of-way, on City of Corvallis property, and at Oregon Department of Fish and Wildlife's E.E. Wilson Wildlife Area.

Nelson's Checkermallow

Nelson's checkermallow (*Sidalcea nelsoniana*; Figure 1.4) is a perennial plant in the mallow family (Malvaceae). Its pinkish-purplish flowers are clustered at the end of tall stems that appear from mid-June to mid-July. Nelson's checkermallow reproduces both by seeds that typically mature in August, and also by vegetative rhizomes. This species typically occurs in wet prairies of the Willamette Valley and Coast Range. Nelson's checkermallow is primarily found in native prairies remnants, wetlands, ash swales, along the edges of

woodlands and riparian areas, in small clearings and edges with fairly open canopies, and along roadsides and fencerows (Gisler 2004; Glad et al. 1994; Wilson 2004; Bartels & Wilson 2003).



Figure 1.4 Nelson's checkermallow.

The checkermallow was listed as threatened under the federal ESA in 1993 (USFWS 1993b). The species is also listed as threatened by the state of Oregon. An updated recovery plan for this and other listed prairie species was adopted in 2010 (USFWS 2010). The species can be found from southern Benton County northward through the central and western Willamette Valley and into Cowlitz and Lewis Counties, Washington. Over 30% of the known Nelson's checkermallow plants in Benton County are found on roadsides. Large populations are found at ODFW's E.E. Wilson Wildlife Area and Finley National Wildlife Refuge. Smaller populations are distributed across Jackson-Frazier Wetland and Oregon State University properties. A native weevil frequently feeds on the developing seeds of this and other related checkermallow species, consuming up to 90% of the seeds at any given population (Gisler 2004).

Taylor's Checkerspot Butterfly

Taylor's checkerspot butterfly (*Euphydryas editha taylori*; Figure 1.5) was classified as a candidate for Endangered Species Act protection in 2001 (USFWS 2001). While Taylor's checkerspot is believed to have been common in the Willamette Valley-Puget Trough in the early 1900s, it has declined drastically with loss of native upland prairie habitat, and is currently known to survive in only 13 populations range-wide (Oregon, Washington and British Columbia). Two populations are currently known in Oregon and both have substantial documented annual variation in population size (Table 1.2). Taylor's checkerspot was thought to be extinct in Oregon until discovered by Andrew Warren in Benton County in 1999 in the Bonneville Power Administration (BPA) Power line corridor near Fitton Green Natural Area. A second population of Taylor's in Oregon was discovered at Beazell Memorial Forest in 2004 by Dana Ross. The most significant threat to this species appears to be habitat loss and degradation.

The life cycle of Taylor's checkerspot lasts approximately one year. The name "checkerspot" comes from the checkered pattern of orange, white, and black on the upper and lower surface of the wings. Adult butterflies appear in April and May to mate and lay

eggs (Pyle 1989). They are one of the first butterflies to appear in the spring, but individuals only live for a few days to weeks. Larvae emerge and feed on host plants until mid-June to early August, then enter diapause through February. During diapause no feeding, growth or development occurs. Larvae emerge the following spring to mature, pupate and finally emerge as butterflies.

Table 1.2 Taylor's Checkerspot Abundance - Benton County, Oregon.

	2003	2004	2005	2006	2007	2008	2009	2010
Bezell		500	484	150	422	615	756	849
Fitton Green Complex¹	750	1104	1221	300	650	765	1078	991

¹Includes Bonneville Power Administration power line corridor and several private properties. (Ross 2005-2010).

Suitable habitat for Taylor's checkerspot must have host plants for the butterfly's larvae and nectar plants for the adults. In Oregon, their preferred host plant is a non-native weed, English plantain (*Plantago lanceolata*), although historically they may have used native paintbrushes (*Castilleja* spp.) (Stinson 2005). Golden paintbrush, an endangered species extirpated in Oregon may have been a host plant for Taylor's checkerspot. Nectar species are listed in Table 1.3.



Figure 1.5 Taylor's checkerspot butterfly.

Table 1.3 Taylor's checkerspot nectar plants known in Oregon.

Species	Common Name	US Nativity	Apparent Preference ¹
<i>Calochortus tolmiei</i>	Tolmie's mariposa lily	Native	High
<i>Eriophyllum lanatum</i>	Oregon sunshine	Native	High
<i>Fragaria virginiana</i>	Wild strawberry	Native	High
<i>Linanthus bicolor</i>	Bi-colored flax flower	Native	²
<i>Lomatium utriculatum</i>	Common lomatium	Native	High
<i>Malus</i> sp.	Apple	Introduced	²
<i>Plectritis congesta</i>	Seablush	Native	High
<i>Ranunculus occidentalis</i>	Western buttercup	Native	Low
<i>Rubus ursinus</i>	Trailing blackberry	Native	Low
<i>Taraxacum officinale</i>	Dandelion	Introduced	Low

¹Duncan Thomas, unpublished data 2007. ²Not included in preference study.

Best Management Practices for Taylor's Checkerspot

Taylor's checkerspot is a critically imperiled species, necessitating particular care and caution during management and restoration of its habitat. In particular, management at Beazell should avoid negative impacts to Taylor's checkerspot individuals and their habitat, unless there are carefully calculated management actions that are needed to achieve long term benefit. Adhering to the following guidelines developed by Dana Ross for the Benton County Prairie Species HCP (Benton County 2010) should minimize negative impacts to Taylor's checkerspot and its habitat:

- Annually define and mark breeding habitat:
 - Establish a 5 to 10 meter buffer around known Taylor's checkerspot butterfly breeding areas within which management activity and any travel or trampling should be minimized. The perimeter of this area should be clearly marked (flagged) and should also be recorded with a handheld GPS unit (to better assess changes in breeding habitat availability over time).
- Time management activities to avoid flight period:
 - Disturbance to the breeding habitat should be reduced to the extent possible during the flight period (generally April to May).
 - Habitat management activities should be scheduled and conducted according to the timing guidelines presented in Table 1.4.
- Mow within the following guidelines:
 - One-half of the entire (non-breeding core) area may be mowed per year unless additional mowing is deemed necessary to maintain the appropriate low vegetation profile.
 - A mower with low psi and a large rotary deck should be used, and blade height set to a minimum 15 cm so blades rarely gouge the ground and to minimize impacts to low stature native prairie species and Taylor's checkerspot butterfly larvae, if present.
 - Flail mowers will generally not be used.
 - Line trimmers may be used in occupied habitat in early spring, when necessary.
 - Mowed vegetation, including cut branches from trees and shrubs and excessive cut grass, should be removed from butterfly habitat whenever possible. Litter may be left in place if it is shown to naturally degrade or be dispersed over the winter by natural events within the first post-treatment year.
 - Mowers with rubber tracks or high floatation tires that exert less than 4 psi should be utilized when possible.
- Burn within the following guidelines:
 - Must be conducted with extreme caution when any Taylor's checkerspot butterfly life stage is active or vulnerable to its application anywhere on site.
 - It is recommended that no more than 1/3 of a site be burned during a given year when Taylor's checkerspot is present.
- Use herbicide as necessary within the following guidelines:
 - Must be conducted with extreme caution when any Taylor's checkerspot life stage is active and/or vulnerable to its application anywhere on site.

- No broadcast spraying of herbicides when butterfly or larvae are active – (January 15th – August 31st). Spot-spraying of weeds that does not impact butterfly behavior, larvae, nectar or host species, can occur at any time.
- Targeted application of herbicides is preferred over broadcast applications.
- Utilize lowest residual, least toxic herbicide that gives desired control.

Table 1.4 General habitat restoration/enhancement schedule for Taylor’s checkerspot butterfly.

MANAGEMENT ACTIVITY	Taylor’s checkerspot butterfly	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	MOW	PRESENT	o	o	o	o	o	o	o	o	X	X	X
ABSENT		MAY OCCUR AT ANY TIME											
BURN	PRESENT	o	o	o	o	o	o	o	o	X	X	X	X
	ABSENT	MAY OCCUR AT ANY TIME											
HERBICIDE	PRESENT	o	o	o	o	o	o	o	o	X	X	X	X
	ABSENT	MAY OCCUR AT ANY TIME											
HAND PULLING	PRESENT	X	o	o	o	o	o	o	o	X	X	X	X
	ABSENT	MAY OCCUR AT ANY TIME											
CUTTING TREES/SHRUBS	PRESENT	X	o	o	o	o	o	o	o	X	X	X	X
	ABSENT	MAY OCCUR AT ANY TIME											

X= Optimal time for activity; o = activity should not occur during this timeframe.

Willamette Daisy



Willamette daisy (*Erigeron decumbens*; Figure 1.6) is a small perennial plant in the sunflower family (Asteraceae). It has pale blue-lavender, daisy-like flower heads the size of a quarter that may fade to white late in the season. The grass-like, gray-green leaves are clustered at the plant base. Flowers appear from June to July then produce seeds in July and August.

Willamette daisy is listed as endangered under the federal and state Endangered Species Acts. An updated recovery plan for Willamette daisy and several other native prairie species was adopted in 2010 (USFWS 2010). The daisy is currently found only in the Willamette River Basin, and is primarily known from sites in

Figure 1.6 Willamette daisy.

Benton, Lane, Linn, Marion and Polk Counties. Three populations are known in Benton County. Willamette daisy occurs in both wetland prairie and upland prairie or oak savanna, preferring sites with very little shrub cover. It often occurs with tufted hairgrass (*Deschampsia caespitosa*), Roemer's fescue (*Festuca roemerii*), California oatgrass (*Danthonia californica*), rush (*Juncus*) species, and a diversity of wildflowers.

Golden Paintbrush



Figure 1.7 Golden paintbrush in a reintroduction plot at the Finely National Wildlife Refuge.

Golden paintbrush (*Castilleja levisecta*; Figure 1.7) is a perennial plant in the Scrophulariaceae family. It is listed as threatened by the US Fish and Wildlife Service. The species once occupied prairies and grasslands throughout the Puget Trough and Willamette Valley. It may have been a native host species for the rare Taylor's checkerspot butterfly, one of the target species of this plan. All remaining populations of the paintbrush occur in Washington and British Columbia; the species is considered to be extirpated in Oregon (USFWS 2000). Population reintroduction and development of propagation methods are high priority actions to help recover this species.

1.3 Monitoring and Adaptive Management

The monitoring program at the Fender's Blue Butterfly Conservation Areas, Bezell, Fitton Green, Jackson-Frazier and Fort Hoskins² will follow the monitoring framework set forth in the Benton County Prairie Species HCP (Benton County 2010). Monitoring will be critical to track the status of rare species and evaluate the success of habitat restoration to desired future conditions.

² As of 2010, there are no rare species populations established at Fort Hoskins; a single Taylor's checkerspot has been seen on one occasion, and a small number of Kincaid's lupine and Willamette daisies have been planted in a research project. HCP monitoring will take effect at Fort Hoskins if and when a population of > 20 individuals are established there.

Monitoring will:

- Track progress of management and restoration work.
- Document and track populations of rare plant and butterfly species, both wild populations and any introduced populations.
- Detect changes in habitat quality and function (including plant community composition) over time.
- Determine whether and what management actions are necessary.
- Measure the success of restoration activities (i.e., evaluate effects of mowing, burning and herbicide application, etc.)
- Provide early detection of invasive plants and animals
- Detect woody plant encroachment and litter/thatch build up in prairie areas
- Provide feedback for adaptive management

Monitoring Frequency, Timing & Duration

The first year of monitoring data, along with data from any prior surveys, will serve as a baseline inventory. Re-sampling (monitoring) will then occur at a minimum of every three years. If significant management activities (e.g., prescribed fire) are implemented, monitoring may be conducted at a greater frequency (e.g., to collect pre-and post-treatment data) if needed to supply data for adaptive management, then return to regular three year monitoring cycles. Multiple monitoring sessions may be required to catch the target species in their peak growing/reproductive season. Timing for each species may vary by 1-3 weeks per year with weather conditions (Table 1.5).

Monitoring will occur for the duration of habitat restoration, enhancement and management activities taking place at a given site. In the case of mitigation, monitoring will take place until the mitigation requirement is fulfilled and documented as needed (See Benton County HCP- Benton County 2010). If implementation of habitat restoration, enhancement, or management activities cease, monitoring will be conducted for a minimum of two monitoring cycles (six years) after cessation of the activities, as long as no adaptive management thresholds have been triggered. If an adaptive management threshold is triggered, monitoring will be required until the problem has been addressed.

A sample HCP Effectiveness Monitoring Data Summary form is included in Appendix A.

Table 1.5 Approximate monitoring season for target species.

Species	Metric	Monitoring Season	April	May	June	July
Bradshaw's lomatium	Plants \geq 10cm apart	April 1-May 31				
Fender's blue butterfly	Butterflies or host & nectar plant cover	May 1 - June 15				

Species	Metric	Monitoring Season	April		May		June		July	
Kincaid's lupine	Foliar cover	May 15-June 15								
Nelson's checkermallow	Plants \geq 30cm apart	June 15- July 15								
Taylor's checkerspot	Butterflies or host & nectar plant cover	April 15-May 15								
Willamette daisy	Plants \geq 10cm apart	June 1-July 15								

Target Species Monitoring Methods

Species/habitat abundance will be assessed through:

- Counting individuals (Willamette daisy, Bradshaw's lomatium, Nelson's checkermallow), or measuring cover of Kincaid's lupine, using the descriptions in Table 1.5 to differentiate individuals. Where necessary, sites will be divided with a grid. The grid will be marked with permanent or GPS markers as needed. This will allow tracking of population trends within specific areas of the population and site.
- Measuring the quantity of butterfly habitat, including foliar cover of host plants and cover by nectar species within sections of a grid. In the case of sampling English plantain abundance, sub-sampling at randomized cells within the grid may be appropriate. The grid will be marked with permanent or GPS markers as needed. This will allow tracking of population trends within specific areas of the population and site.
- Completing actual butterfly surveys as described below, with the caveat that these numbers are extremely variable from year-to-year, and fluctuations may be due to multiple conditions outside the control of the County, including weather.

Taylor's Checkerspot Survey Methods

Population estimates for Taylor's checkerspot butterfly are made from modified Pollard counts – a walking tally of all butterflies within a 5 meter radius of the observer along permanent transects. The same transects should be used for consistency in the data for year-to-year comparisons. Counts are conducted between 10am and 4pm when weather conditions (sunny, warm) stimulate adult activity. Target intervals for population estimates are 5-7 days once adults are present, with subjective adjustments made by the observer as deemed reasonable due to local conditions. Each site is visited a minimum of three times to capture early, peak and late-flying individuals. In a typical year, an adult's lifespan is assumed to be less than 14 days.

The Taylor's checkerspot population near Fitton Green serves as an indicator for adult checkerspot activity within Benton County as a whole. Visits there to determine the onset of adult activity begin in early April and continue at weekly intervals until checkerspots are observed and formal fieldwork started.

When possible, each population estimate in the Fitton Green area includes a maximum of 3 counts along each of three transects which are then averaged for that site and date. This number is then multiplied by a variable (number) to account for the entire population at that location. Counts at Bezell require visits to five separate areas and needs more time to complete, so only single transect count is made there. This methodology provided a conservative estimate of adults for each site. Also, this method is subject to revision based on direction from the USFWS, better understanding of the butterfly's biology (e.g., improved estimates of lifespan), and shared experiences of managers in Washington and British Columbia.

Fender's Blue Butterfly Survey Methods

The survey methods for Fender's blue butterfly are being standardized by lepidopterists and the US Fish and Wildlife Service. If surveys are to be conducted, up to date methods to conduct population estimates should be obtained from the USFWS, to ensure that the methods are consistent with those used throughout the species' range.

Prairie Habitat Condition Monitoring Methods

Prairie habitat condition monitoring will include measurements of the following variables in the prairie habitats with the HCP species:

- Shrub and tree encroachment into prairie habitats;
- Invasive species;
- Disturbance (anthropogenic and natural);
- Thatch and plant litter accumulation; and
- Plant community composition.

Shrub and Tree Encroachment into Prairie Habitat

The first round of monitoring at a site (baseline monitoring) will include mapping of prairie areas by delineating prairie boundaries. When appropriate, individual trees and shrubs (identified to species) or patches of trees and shrubs will be mapped using a combination of sketch maps, aerial photos, photo points, and GPS. Potential function of trees and shrubs should be evaluated when they occur in Taylor's checkerspot habitat- they may provide important perching sites or wind protection for the butterfly.

Invasive Species

During baseline monitoring, established and satellite populations (isolated patches of one to a few individuals) of invasive plant species will be identified and mapped. Methods will include using a combination of sketch maps, aerial photos, photo points, and GPS. Occurrences of invasive animals will be noted and areas of damage caused by these species will be mapped.

Any "A" or "B" Noxious Weeds, following Oregon Department of Agriculture's classification (e.g., ODA 2009) will be identified and mapped. "A" classified weeds are weeds of known economic importance not known to occur in Oregon, or occur in small enough infestations to make eradication/containment possible. "B" classified weeds are weeds of economic importance which are regionally abundant, but which may have limited distribution in

some counties (<http://www.oregon.gov/ODA/PLANT/WEEDS/>). New problem species may be added to the groups as they are identified in Oregon and the project sites. Problem species may also be re-classified as their status changes. Group A and B classified weeds will be addressed specifically through adaptive management.

Disturbance

Signs of man-made disturbance will be evaluated during habitat assessments at all sites, especially those with known use by the public. Any signs of new or existing trails or parts of trails with use by horses, mountain bikes, or hikers, will be mapped and tracked using a combination of sketch maps, aerial photos, photo points, and GPS during each monitoring cycle. Trampling off any established trail will be noted. Changes in surrounding land use will also be noted and described.

Plant Community Composition and Thatch/Litter Accumulation

Measurement of plant community composition and thatch and litter accumulation will involve fine scale habitat sampling using randomly placed 5 meter by 5 meter plots to sample plant community attributes. The number of plots is determined by the size of the site, the proportion of the site occupied by rare species, and the heterogeneity of the site. Within each plot, the following variables will be estimated:

- Percentage cover of each vascular plant species present; and
- Percentage cover of plant litter, moss, gravel/rock, and bare soil.

Adaptive Management

Adaptive management is a process allowing resource managers to adjust their actions to reflect new information or changing conditions in order to reach a goal. Adaptive management will allow Benton County to minimize the uncertainty associated with gaps in scientific information or knowledge of the biological requirements of the species. Additionally, adaptive management will allow the County to make changes in how they manage habitat where there is uncertainty about the effects of habitat restoration and enhancement techniques, such as mowing or prescribed burning, or the optimum methods for applying such treatments.

The objective of monitoring for purposes of adaptive management is to determine how the target species are responding to habitat restoration, enhancement and management work. Declines in rare species may be due to management and non-management activities, or changes in habitat conditions. Through monitoring, managers may detect changes in habitat conditions (e.g., increasing invasive species populations) prior to a resulting decline in species populations. Thresholds of population trends and habitat quality are set forth in Table 1.6; if thresholds are crossed, adaptive management actions will be triggered.

Taylor's Checkerspot Butterfly or Fender's Blue Butterfly

If host or nectar plant abundance (as measured by cover) decreases by $\geq 30\%$ at any single monitoring event it will trigger Benton County to meet with species experts from the USFWS within 90 days to discuss any necessary changes in habitat management at the site. If host plant or nectar plant abundance (as measured by cover) decreases by $\geq 30\%$ over

two consecutive three year monitoring cycles, it will trigger Benton County to cease activities and meet with USFWS to discuss changes in habitat management at the site.

Plant Species

If rare plant abundance decreases by $\geq 30\%$ at any single monitoring event it will trigger Benton County to meet with USFWS and/or ODA within 90 days to discuss any necessary changes in habitat management at the site. If abundance of a target plant species decreases by $\geq 30\%$ over two consecutive three year monitoring cycles, it will trigger Benton County to cease activities and meet with USFWS and/or ODA within 60 days to discuss changes in habitat management at the site.

Habitat Condition

If any of the habitat condition thresholds (Table 1.6) are triggered, Benton County will take the necessary actions to adjust management and/or make an immediate response (e.g., in the case of new populations of new invasive species), in coordination with USFWS and ODA.

Table 1.6 Adaptive management monitoring thresholds for the HCP.

Condition	Threshold	Adaptive Management Response
HCP Covered Species -Rare Plant /Butterfly Abundance	Plant population size or butterfly habitat abundance decreases by $\geq 30\%$ in any single monitoring cycle.	Meet with USFWS and/or ODA within 90 days to discuss any necessary changes in habitat management at the site.
	Plant population size or butterfly habitat abundance decreases by $\geq 30\%$ over two or more monitoring cycles.	Cease the habitat restoration, enhancement or management activity and meet with USFWS and/or ODA to discuss changes in habitat management at the site.
Tree and Shrub Encroachment	Meadow decreases in size by $\geq 30\%$	If decreases are due to tree or shrub encroachment, evaluate and elevate control of such encroachment.
Invasive species: Group A	New population discovered.	Immediate eradication efforts will be undertaken. Work will be coordinated with USFWS/ODA when invasive species population is adjacent to or overlapping with Covered Species. Additional monitoring will take place the first growing season following treatment.
	$>30\%$ increase in abundance of any Group A species at the site.	Current containment efforts will be evaluated and elevated upon review by and recommendations of USFWS/ODA.
Invasive species: Group B	New population discovered.	Immediate eradication efforts will be undertaken. Work will be coordinated with USFWS/ODA when invasive species population is adjacent to or overlapping with Covered Species. Additional monitoring will take place the first growing season following treatment.
	$>30\%$ increase in abundance of any Group B species at the site.	Current containment efforts will be evaluated and elevated upon review by and recommendations of USFWS/ODA.

Condition	Threshold	Adaptive Management Response
Natural Disturbance	Rodent ground disturbance over $\geq 30\%$ of the site.	Confer with USFWS and ODA for recommended actions.
	$\geq 30\%$ of covered plants at a site grazed by mammals.	
	Significant windfall, erosion or change in hydrology detected.	
Anthropogenic Disturbance	Any signs of new or existing trails or parts of trails with use by horses, mountain bikes, or hikers.	Evaluate management of public use, and revise outreach (including interpretive signs) as needed.
Plant Community Composition	Native species cover decreases by $\geq 30\%$, exotic species cover increases by $\geq 30\%$, or woody species cover increases by $\geq 15\%$.	Evaluate site management, including mowing and prescribed fire frequency/timing with USFWS/ODA.
Plant litter/thatch accumulation	Plant litter/thatch cover increases by $\geq 30\%$.	Evaluate site management, including mowing and prescribed fire frequency and timing with USFWS/ODA.

Management Log

Keeping careful records of management actions will assist with long-term management of the site. A management log to track management actions implemented on site and monitoring data collected at the property will provide a single repository for this information and make tracking actions, as well as evaluating the success of management treatments, more efficient. This log should contain:

- Dates and objectives of management treatments.
- Maps and descriptions of treatment locations.
- Information on species seeded or planted at the site, including date, number, type, and source of plant materials.
- Dates and results of monitoring, with evaluation of treatment effects or planting success.
- Include treatment extent, activity cost, funding source (s), track % of funds from Federal sources and other sources.

A sample Management Log template is included in Appendix B.

CHAPTER 2: BEAZELL MEMORIAL FOREST PRAIRIE MANAGEMENT PLAN



Photo by George McAdams

2.1 Introduction

Site Vision

Bezell Memorial Forest supports a magnificent network of upland prairies (“meadows”) that support a critical population of the imperiled Taylor’s checkerspot butterfly in addition to a diversity of native plant species. This Management Plan is based on a vision for the site that emphasizes sustainable habitat management and seeks to ensure long term stability for the butterflies at the site, while also creating habitat for other rare species.

Meadows at Bezell will be managed to remain in an open state with minimal shrub and tree cover and high native species diversity. Meadows will include key habitat components to support Taylor’s checkerspot, in addition to other rare species, such as the threatened Kincaid’s lupine, endangered Willamette daisy and endangered Fender’s blue butterfly. Rare species conservation will be linked to goals in the Recovery Plan for Western Oregon and Southwestern Washington Prairies (USFWS 2010). A strategy to reach conservation targets is described in the Prairie Conservation Strategy of the Benton County Prairie Species HCP. The site will be managed for ecosystem health, education and acceptable levels of public access through recreation, planned tours, volunteer and school restoration activities, and research projects by local scientists and students.

Management Goals for Bezell Memorial Forest Meadows

Overall management goals for the meadows at Bezell include the following:

- 1) Maintain and restore prairie and oak habitats.
- 2) Control invasive species.
- 3) Expand abundance of at risk prairie species.

HCP Mitigation Needs

One of the purposes of the HCP is to forecast unavoidable impacts to rare species and identify restoration (mitigation) work to offset such impacts. The precise amount of restoration work required for mitigation may vary with the timing and pace of impacts and mitigation work (see Chapter 6 of the HCP for more information). Mitigation work that is completed prior to impacts is typically favored and receives a lower mitigation burden.

The HCP identifies potential impacts to Taylor’s checkerspot butterfly habitat that may occur as a result of emergency response activities (e.g., fire-fighting, vehicle accidents, hazardous materials spill cleanup, emergency vehicle response) within Bezell Memorial Forest. To offset these impacts and fulfill its mitigation obligations to the USFWS, the County must increase the amount of Taylor’s checkerspot habitat by 172 square meters (0.4 acres). Work may include augmentation of native nectar species, some augmentation of English plantain where it is limiting, control of aggressive introduced species and habitat management to maintain the low vegetation structure preferred by Taylor’s checkerspot.

The HCP also identifies impacts that may occur to Kincaid’s lupine along County roads in areas with and without likely Fender’s blue butterfly use. To fulfill its mitigation requirements for lupine outside butterfly habitat, the County must establish 23 square meters of Kincaid’s lupine at one of several sites, including Beazell. This may occur through seeding or planting lupine plugs.

2.2 Background Information

Site Location and Context

Beazell Memorial Forest is a 586 acre property located in Kings Valley near the northern border of Benton County, Oregon. Beazell is surrounded entirely by private lands. The majority of neighboring acreage is under management for timber production.

Brief Historic Context

Beazell was bequeathed to Benton County in 2000 by Fred Beazell as a memorial for his late wife, Delores. He entrusted the site to the stewardship of the county to manage for recreation, education, and ecosystem health (ITS Management, Inc. 2001). Mr. Beazell had owned the property since the 1960’s. Under county ownership, the site has been used as a demonstration forest and open space area, with progressive ecosystem management practices used to protect, conserve, and restore the natural, scenic, outdoor recreation, and wildlife values. Beazell is open to the public, and has restrooms, drinking water, hiking trails, and picnicking facilities. Revenue generated from sustainable silvicultural practices is used to manage the property (ITS Management, Inc. 2001). Revenue to support management is also generated from the rental of this newly restored historic barn, the Beazell Forest Education Center, at Beazell, which is a popular venue for weddings and events.

2.3 Overview of Habitats and Species

Beazell is primarily composed of Douglas-fir dominated mixed conifer forest, but also has seven meadow areas containing upland prairie and oak savanna habitat (Figure 2.1). The five largest meadows are located in the upper elevations of Beazell, on steep slopes with south to southwest aspects. Two smaller meadows are lower elevation and relatively flat.

Management Units

Each meadow will be discussed in this plan as a separate management unit (Figure 2.1).

- Beazell Residence Complex
- Bird Loop Meadows
- North Meadow
- Middle Meadow
- Summit Meadow
- South Meadow

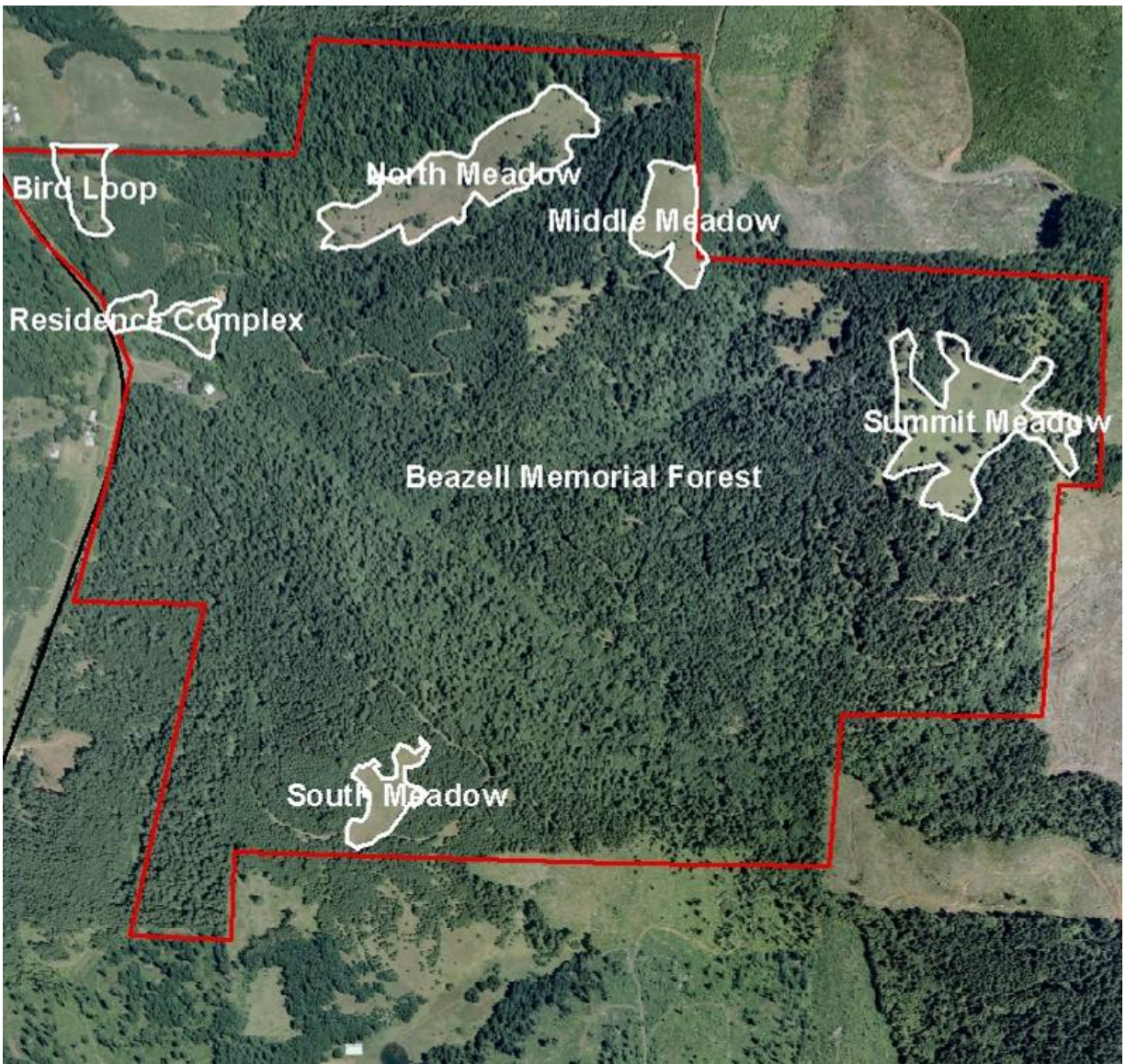


Figure 2.1 Meadows at Beazell Memorial Forest.

Soil Types and Distributions

Beazell includes a variety of soils (Figure 2.2). The North, Middle and Summit Meadows all include the thin and cobbly or gravelly loams and silty clay loams in the Witzel-Ritner complex, ranging from 12-60% slopes. The North Meadow also includes soils in the Price-MacDunn-Ritner complex, which are somewhat deeper silty clay loams, but often still gravelly. The Bird Loop and Beazell Residence Complex Meadows include the Dixonville-Gellatly-Witham and Dixonville-Gellatly complex soils, which are deeper silty clay loams. The South Meadow is entirely composed of Dixonville-Gellatly soils.

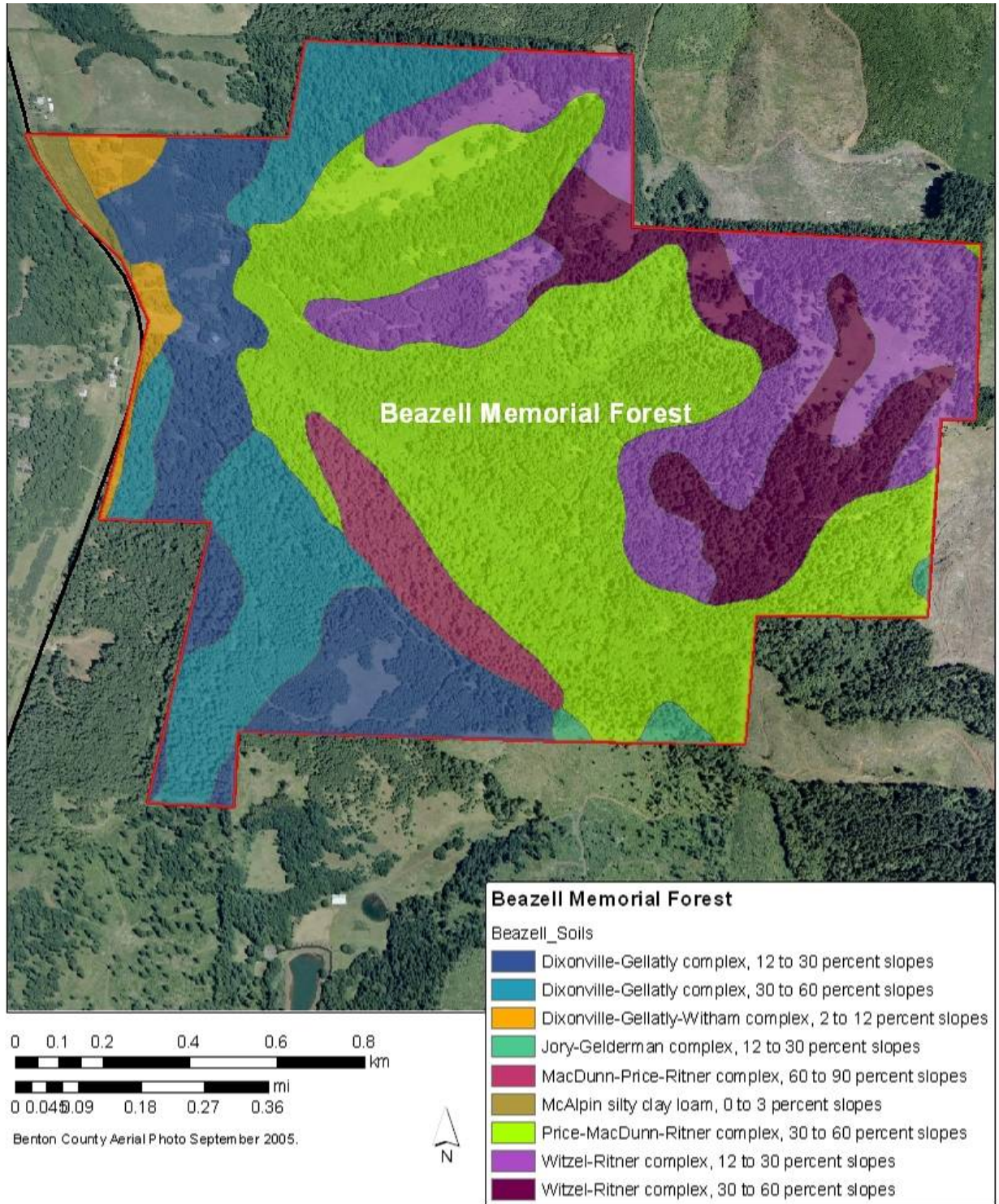


Figure 2.2 Soils at Bezell Memorial Forest.

Historic Vegetation

From 1851 to 1865, the General Land Office surveyed the Willamette Valley in preparation for Euro-American settlement. The surveyors' notes detailed the vegetation, soils, and topography encountered as they crossed the landscape. The Nature Conservancy has used this information to reconstruct the historic vegetation patterns of the Willamette Valley (Christy et al. 2005). This mapping suggests Beazell was composed of broad bands of upland prairie and Douglas-fir-oak plant communities, with a small area of oak savanna and a small area of Douglas-fir at that time (Figure 2.3).

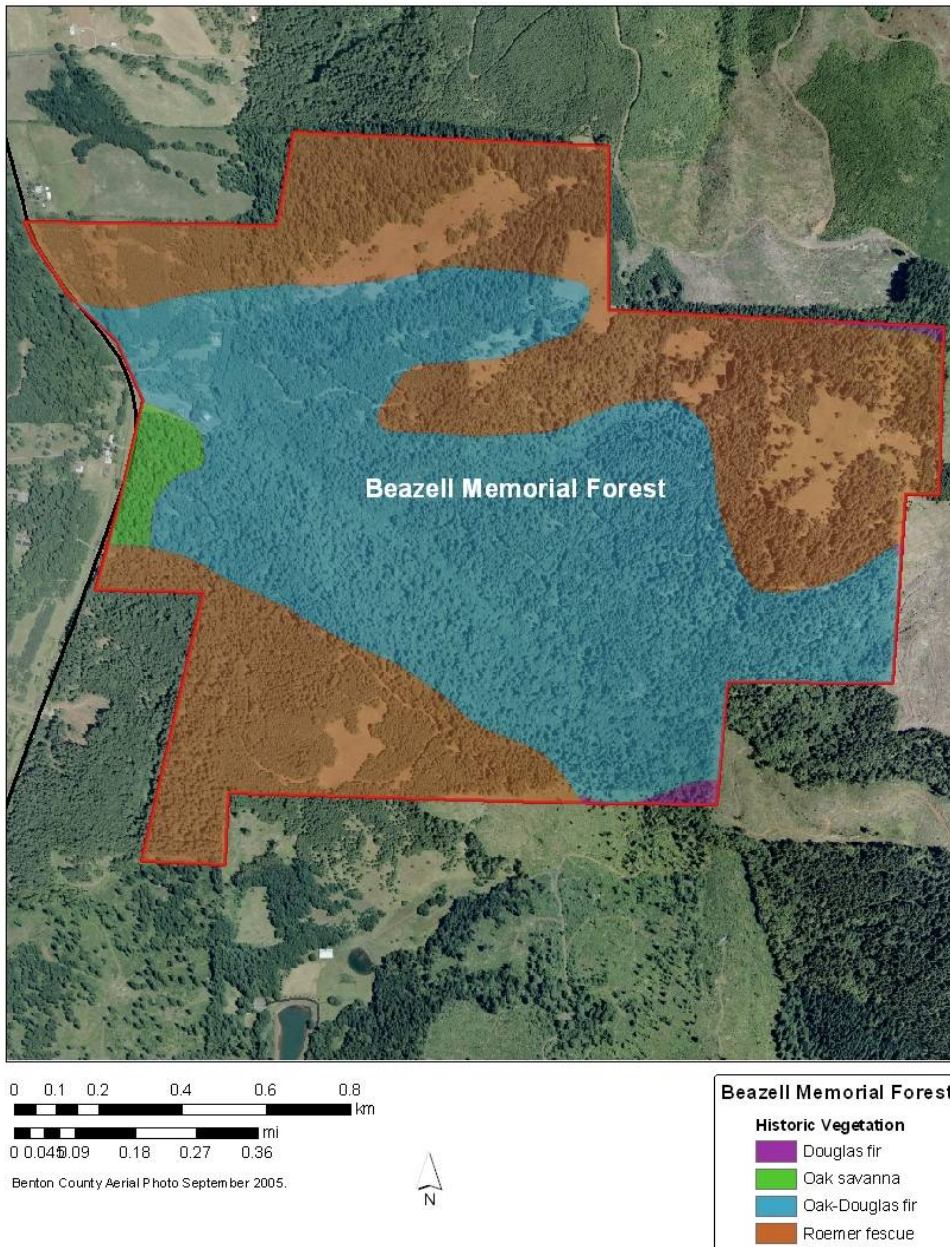


Figure 2.3 Pre-European settlement vegetation at Bezell Memorial Forest.

Sensitive Species

Taylor's checkerspot butterfly (*Euphydryas editha taylori*; Figure 1.5) is present at Beazell Memorial Forest in most of the meadows (Ross 2007). Other sensitive species present at the site or for which suitable habitat is present are listed in Table 2.1. Habitat restoration at this site may improve habitat for each of these species and create opportunities for recovering these species. Although each species may not be listed in the objectives for each habitat unit, opportunities for their conservation should be incorporated as possible and appropriate.

Table 2.1 Sensitive species present or with potential habitat at the site.

Species	Status at site
Fender's blue butterfly	Habitat present
Taylor's checkerspot butterfly	Present
Kincaid's lupine	Reintroduced
Willamette daisy	Reintroduced
Golden paintbrush	Reintroduced
Shaggy horkelia	Habitat present
Thin-leaved peavine	Present
Peacock larkspur	Habitat present

Sensitive Species Introductions

Kincaid's Lupine

Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*; Figure 1.3) has been introduced via transplants and direct seeding into the Bird Loop, North, and Middle Meadows at Beazell (Table 2.2). Areas where Kincaid's lupine was introduced at Beazell (Table 2.2) were surveyed by Dana Ross, a consulting Lepidopterist, in May 2007, and no Fender's blue were observed (Ross 2007). However, as the lupines mature and expand, the likelihood of butterfly occupancy increases.

Willamette Daisy

In fall of 2009, Willamette daisy (*Erigeron decumbens*; Figure 1.6) seed was broadcast into the Bird loop, North, Middle and South Meadows of Beazell.

Golden Paintbrush

Golden paintbrush (*Castilleja levisecta*; Figure 1.7) was seeded into the North Meadow in fall of 2010.

Table 2.2 Status of species introductions at Beazell Memorial Forest as of November 2010.

Species	Date	Location	# Seeds	# Transplants	# Established*
Kincaid's lupine	11/1/2006	Bird Loop	1000		271
	4/19/2007	Bird Loop		213	20
	4/29/2009	Bird Loop		81	
	11/4/2009	Middle	~30,000 (1 lb)		
	10/19/2010	North	~12,500 (1/4 lb)		
Willamette daisy	11/4/2009	Bird Loop, North, Middle, South	75 grams		
Golden paintbrush	10/19/2010	North	40 grams		

2.4 Issues of Concern

False Brome

False brome (*Brachypodium sylvaticum*), is an extremely invasive perennial grass. This species is widespread within Beazell and in surrounding habitats. Controlling false brome and minimizing its spread into high-value meadows at Beazell will require regular treatments and monitoring. Elimination is not likely. All management activities must take care not to spread this species within Beazell, or spread this species from Beazell to other areas in the County.

The most effective treatment known currently is to mow in the summer (July) then treat with glyphosate and a pre-emergent in the Fall (glyphosate (2%) plus oryzalin at 3.3% with a non-ionic or MSO/silicon blend surfactant at 0.5%).

Taylor's Checkerspot

The Beazell Taylor's checkerspot population is critical- it is one of only two in Oregon. Management at Beazell should avoid negative impacts to Taylor's checkerspot individuals and their habitat, unless there are carefully calculated management actions that are needed to achieve long term benefit. Guidelines presented in Chapter 1 to safely work in Taylor's habitat will be followed.

2.5 Habitat Management Units

Habitat units defined for Beazell are listed below. This section describes the rare species present or potentially present for each unit, in addition to recent management actions,

desired future condition, and habitat management goals, objectives and tasks. Many of the habitat management recommendations for Taylor's checkerspot were developed by Dana Ross as part of the Benton County Prairie Species HCP (Benton County 2010) management guidelines for the species.

Bird Loop Meadows

Rare Species and Habitats

Kincaid's lupine and Willamette daisy have been planted in this unit. Habitat is a patchy mosaic of oaks of variable age and size and grassy meadows with a mix of native and non-native species.

Recent Management Actions

Work in this unit has included annual fall mowing, removal of blackberry, Douglas-fir and Scotch broom.

Desired Future Conditions

These meadows should be maintained and restored to provide an example of upland prairie habitat, with unique prairie species and diversity of native grasses and forbs. In the long-term, these meadows could be provide stepping stone habitat for Fender's blue butterfly to help movement from the Wren/Cardwell Hill population center to northern Benton County or Polk County, if additional habitats were secured and restored to achieve a network.

Habitat Management Goals, Objectives and Tasks

Goal 1: Establish and expand rare species populations

Objective 1: Increase available habitat for Fender's blue butterfly.

- Obtain plant materials for Kincaid's lupine and nectar species.
- Plant Kincaid's lupine by seed (fall) or transplanting plugs (spring).
- Plant nectar species through seeding in the fall or transplanting plugs in the spring.
- Monitor to evaluate establishment.

Objective 2: Establish Willamette daisy population.

- Obtain plant materials.
- Plant by seed (fall) or transplanting plugs (spring).
- Monitor to evaluate establishment.

Goal 2: Maintain oak savanna characteristics.

Objective 1: Remove encroaching Douglas-fir

- Girdle or cut encroaching trees as needed.

Objective 2: Maintain shrub cover at < 25%

- Mow or burn every 2 years.

Goal 3: Control invasive species

Objective 1: Survey and map invasive species each May.

Objective 2: Manage false brome.

- Manually remove small patches as reasonable.
- Mow in June to prevent seed production (mowing earlier may result in re-sprouting, and mowing later may simply spread false brome).
- Treat with chemical herbicide in the fall, e.g., glyphosate 2 % gal + oryzalin @ 3.3% + non-ionic or MSO/silicon blend surfactant 0.5%.
- Monitor to determine follow-up treatment needs.

Objective 3: Control Scotch broom.

- Hand or mechanically pull in winter where feasible.
- Mow in early spring before seeds are produced, then treat regrowth in the fall or following spring with tryclopypyr/aminopyralid combination.
- Monitor to determine follow-up treatment needs.

Objective 4: Control Armenian Blackberry.

- Mow in mid-summer (July), and allow for re-growth. Treat with tryclopypyr amine or ester in the fall.
- Monitor to determine follow-up treatment needs.

North Meadow

Rare Species and Habitats

Taylor's checkerspot butterflies primarily use an acre or two of the flatter, summit portion of this relatively steep meadow, an area with a small amount of remnant prairie plant species within an otherwise highly degraded area dominated by tall grasses and non-native plants (Scotch broom, rose, blackberry, thistle, false brome). Bracken fern and snowberry are also present. The larval host plant, English plantain, is scarce and has been decreasing in abundance over the past several years. Nectar species, including strawberry, are in relatively low abundance and may also be disappearing from the site. The habitat is threatened by spread of invasive or aggressive non-native plants (tall fescue or orchard grass, rose, Scotch broom, thistle) as well as bracken fern and encroachment by shrubs (i.e., snowberry) and trees (i.e., Douglas-fir) into the meadow.

Willamette daisy and golden paintbrush were seeded into the meadow in fall 2009 and 2010, respectively.

Recent Management Actions

Numerous Douglas-fir that were encroaching into the meadow have been removed or girdled. Willamette daisy and plecritis were seeded in November 2009.

This site has been regularly mowed since 2008. In 2010 approximately one acre was weed wiped with herbicide to control tall grass in spring prior to seed set, then burned in fall, treated with glyphosate two weeks after the burn and planted with Willamette daisy, Kincaid's lupine, and a diversity of prairie species (10,000 strawberry plants, mariposa lily, rosy plecritis, Oregon sunshine, English plantain, buttercup and Roemer's fescue). This

area was also treated for Scotch broom and false brome. Similar treatments were applied in the North Meadow Annex, though only 2000 strawberry plants were planted.

Desired Future Conditions

Stable upland prairie meadow with a minimum of invasive species, sufficient host plants and a diversity of nectar species for Taylor's checkerspot butterfly and viable populations of other sensitive species.

Management goals, objectives and tasks

Goal 1: Enhance existing meadow habitat for Taylor's checkerspot, Kincaid's lupine and Willamette daisy.

Objective 1: Control Scotch broom.

- Remove Scotch broom by hand pulling (only method for core Taylor's area) or cutting, mowing or herbicide spray.
- Remove all hand pulled plant material from the meadow environment.
- Monitor to determine follow-up treatment needs.

Objective 2: Reduce cover of invasive/tall grass and bracken fern component.

- Burn and herbicide or mow, as appropriate and compatible with Taylor's checkerspot. Do not impact core breeding areas.
- Conduct a grid search at least every 2 years for false brome.

Objective 3: Augment larval host and nectar plant populations within the meadow.

- Obtain plant materials from local sources.
- Add plants through seeding or transplanting in fall.
- Monitor to determine establishment.

Goal 2: Reclaim the degraded "North Meadow Annex" and enhance for Taylor's checkerspot.

Objective 1: Control existing vegetation.

- Mow and burn in the fall.
- Treat with glyphosate in the fall.
- Monitor to determine follow-up treatment needs.

Objective 2: Add native prairie species.

- Obtain plant materials from local sources.
- Seed or transplant Roemer's fescue, rosy plectritis, English plantain, mariposa lily, buttercup, Oregon sunshine and, strawberry plants.
- Monitor to determine establishment.

Goal 3: Control tree encroachment into meadow.

Objective 1: Define a meadow perimeter and control tree encroachment into that perimeter.

- Flag perimeter and GPS.
- Girdle or remove trees as needed
- Create habitat piles in forest understory.

- Seed bare areas in fall with Roemer’s fescue.

Goal 4: Establish and expand rare plant populations.

Objective 1: Establish Kincaid’s lupine population.

- Obtain plant materials for Kincaid’s lupine.
- Plant Kincaid’s lupine by seed or transplanting plugs in the spring or fall.
- Monitor to evaluate establishment.

Objective 2: Establish Willamette daisy population.

- Obtain plant materials.
- Plant by seed or transplanting plugs in the fall.
- Monitor to evaluate establishment.

Objective 3: Establish other sensitive species as appropriate.

Middle Meadow

Rare Species and Habitats

Taylor’s checkerspot butterflies prefer the least degraded portions of the site – the southern third westward sloping (in the lee of prevailing winds) areas of this meadow. Those areas contain the most remnant prairie habitat and include some plantain and low stature vegetation. In 2007, tall grasses dominated the entire meadow and very little plantain was present. Invasive shrubs (hawthorn, rose and scotch broom) and encroaching Douglas-fir are present. The meadow lacks larval host plants and adult nectar sources for Taylor’s checkerspot. Tall grasses (tall fescue and orchard grass), invasive plants (hawthorn, rose, Scotch broom), and tree encroachment (Douglas-fir) at the southern end are threats to this meadow.

Willamette daisy and Kincaid’s lupine were seeded into the meadow in November 2009.

Recent Management Actions

Meadow was mowed in late September/early October of 2009, then burned in early October. Meadow was then broadcast sprayed with glyphosate at the beginning of November. Soon after, Willamette daisy, plantain, plectritis and Roemer’s fescue, and Kincaid’s lupine were planted. In the first two weeks of December, 6,000 strawberry plants were planted in variable density plots.

In 2010 2000 strawberry plants were planted, and numerous forb species were seeded: mariposa lily, rosy plectritis, Oregon sunshine, and buttercup. Roemer’s fescue was planted in tree clearings.

Desired Future Conditions

Meadow will support Kincaid’s lupine and Willamette daisy, with a minimum of invasive shrubs, sufficient host plants and a diversity of nectar species for Taylor’s checkerspot butterfly.

Management goals, objectives and tasks

Goal 1. Enable the natural re-colonization by Taylor's checkerspot butterfly from adjacent source populations.

Objective 1: Augment host and nectar species within the meadow in areas of recent Taylor's checkerspot use.

- Obtain plant materials from local sources.
- Add host and nectar plants through seeding (fall) or transplanting (spring).
- Monitor to evaluate establishment.

Objective 2: Work to reduce cover by tall stature grasses.

- Burn or mow in fall every other year following best management practices for Taylor's checkerspot.
- Spray w/broadleaf grass herbicide or wipe w/ glyphosate prior to seed set if unoccupied.

Objective 3: Monitor for the presence and establishment of Taylor's checkerspot.

- Map areas of butterfly use.

Goal 2: Establish and expand rare plant populations in higher quality or restored areas of the meadow.

Objective 1: Establish Kincaid's lupine population.

- Obtain plant materials for Kincaid's lupine.
- Plant Kincaid's lupine by seed or transplanting plugs in the fall or spring.
- Monitor to evaluate establishment.

Objective 2: Establish Willamette daisy population.

- Obtain plant materials.
- Plant by seed or transplanting plugs.

Objective 3: Establish other sensitive species as appropriate.

Summit Meadow

Rare Species and Habitats

This unit supports a relatively large and stable Taylor's population, primarily in the upper half to two thirds of the meadow. Reproduction is concentrated in low stature vegetation that hosts some plantain. About two acres of previously overlooked habitat on the southeast portion of the site were recently discovered to support moderate numbers of Taylor's checkerspot (2008). A small area along the summit ridge is heavily used by Taylor's checkerspot adults for nectaring. A large portion of the meadow contains tall grasses and there are sizeable patches of snowberry. Prairie plant species are present, but have not been well assessed. Typical nectar species such as strawberry are not abundant, and adults have been observed feeding at flowers of both Western buttercup and a dandelion species – two rarely used resources.

Recent Management Actions

The contiguous ridge area at the southern periphery has been opened up recently to reclaim oak savanna. This recent work adds 1-2 acres of potential Taylor's checkerspot habitat. The unoccupied central area has been mowed annually beginning in 2008. False brome was treated with herbicide in 2010.

Desired Future Conditions

Stable upland prairie meadow with a minimum of invasive shrubs, sufficient host plants and a diversity of nectar species for Taylor's checkerspot butterfly.

Management Goals, Objectives and Tasks

Goal 1: Support a larger population of Taylor's checkerspot through regularly enhancing small pockets of habitat

Objective 1: Work to reduce cover by tall stature grasses.

- Burn or mow in fall every other year.
- Spray small sections with glyphosate in the fall prior to seeding natives.

Objective 2: Augment plantain, strawberry, and other nectar species within the meadow, concentrating on expanding the small areas where they currently exist.

- Obtain plant materials from local sources.
- Seed (fall) or transplant (spring) host and nectar species.
- Monitor to determine establishment.

Objective 3: Control invasives.

- Spray for false brome in the fall with glyphosate and pre-emergent

Goal 2: Maintain oak savanna characteristics

Objective 1: Remove encroaching Douglas-fir trees.

- Girdle or cut encroaching trees every four years.

Objective 2: Maintain shrub cover at < 25%.

- Mow or burn in the fall every 2 years.

Goal 3: Establish and expand rare plant populations in higher quality or restored areas of the meadow.

Objective 1: Establish Kincaid's lupine population.

- Obtain plant materials for Kincaid's lupine.
- Plant Kincaid's lupine by seed or transplanting plugs in the fall or spring.
- Monitor to evaluate establishment.

Objective 2: Establish Willamette daisy population.

- Obtain plant materials.
- Plant by seed or transplanting plugs.

Objective 3: Establish other sensitive species as appropriate.

South Meadow

Rare Species and Habitats

This meadow hosts the majority of the Beazell Taylor's checkerspot population. It consists of reclaimed prairie/meadow within conifer forest. Taylor's checkerspot use is heaviest within the sloping portion of the site where plantain and strawberry densities are greatest and where tall grasses are least prevalent. The flatter portions of the upper and lower meadow support Taylor's checkerspot, but in much smaller numbers than the sloped area. Plantain and strawberry are less abundant on the upper and lower flats. Bare soil patches occur on the sloped portion. Small rose shrubs are present throughout and are heavily utilized as perch sites for adults. While the sloped portion of the meadow hosts a few hundred butterflies at present, trailing blackberry, tall grasses and numerous small rose bushes, as well as encroaching Douglas-fir trees, are all potential threats to the site as a whole. A primary access trail (old road) runs across the lower portion of the site. An unofficial (deer) trail bisects the meadow from top to bottom. Pedestrian use of this trail could cause Taylor's checkerspot mortality. Signage and an alternative trail route has limited threat.

Willamette daisy was seeded into the meadow in November 2009.

Recent Management Actions

Willamette daisy and rosy plectritis were seeded in November 2009. Approximately 30% of trailing blackberry was hand removed on occupied slope in August 2009. Mowing began at upper and lower flats in 2008. In 2010 the upper and lower slope were wiped with glyphosate for tall grass. Plantings in 2010 included: Upper flat area– 2000 strawberry, Roemer's fescue, Oregon sunshine, rosy plectritis, buttercup, mariposa lily; Mid slope – Oregon sunshine, rosy plectritis.

Desired Future Conditions

Restored conditions in the south meadow will support an increasing population of Taylor's checkerspot and a population of Willamette daisies.

Goals, Objectives and Tasks

Goal 1: Encourage expansion of Taylor's checkerspot population by increasing the availability of high quality habitat for the species.

Objective 1: Enhance the upper and lower ends of the meadow.

- Remove trailing blackberry from the midslope area with minimal trampling or use of herbicides.
- Maintain existing rose plants in the two to four foot tall range as long as they continue to be used by the butterflies for the perching and do not negatively affect other components of habitat quality.
- Weed wipe with herbicide on north and south ends of the meadow.
- Seed with native grasses and forbs in the fall.
- Rotational mow or burn every other year.

Objective 2: Identify meadow edges where site enlargement could be conducted for the greatest benefit.

- Remove perimeter trees.
- Mow and treat with herbicide as needed to control existing vegetation.
- Plant prairie species via seeds or transplants.

Objective 3: Discourage pedestrian use of the unsanctioned trail that bisects middle of meadow.

- Post signage and information as needed.

Goal 2: Establish and expand rare plant populations, taking advantage of restored areas for Taylor's checkerspot.

Objective 1: Establish Willamette daisy population.

- Obtain plant materials.
- Plant daisies by seed (fall) or transplanting plugs (spring).
- Monitor to determine establishment.

Bezell Residence Meadow Complex

Rare Species and Habitats

A few Taylor's checkerspot appear annually to nectar on the abundant strawberry flowers. Plantain is also plentiful, although the extent, if any, to which the site is used by females for egg laying is unknown.

Recent Management Actions

Annual fall mowing has occurred to control tall grasses. In fall 2010, a large amount of fir and cedar were removed from the oak overstory.

Desired Future Conditions

Oak savanna area with minimum of tall grasses, weedy plant species and shrubs. Abundant host and nectar species are present for Taylor's checkerspot.

Management Goals, Objectives and Tasks

Goal 1: Maintain and enhance prairie habitat for Taylor's checkerspot butterfly.

Objective 1: Retain short stature vegetation and to encourage strawberry and plantain.

- Mow annually in the fall.

Objective 2: Maintain the open structure of the meadow by minimizing tree and shrub encroachment.

- Monitor encroaching trees and shrubs, with removal every few years.

Objective 3: Maintain host plant and nectar plant abundance through regular augmentation.

- Obtain plant materials from local sources.
- Plant host and nectar plants via seeds (fall) or transplants (spring).

- Monitor to determine establishment.

Objective 4: If possible, enhance connectivity to other Taylor’s populations at Beazell.

- Investigate potential to connect this meadow to the Bird Loop or North Meadow.

Objective 5: Refrain from using site as a parking area.

- Post additional signage as needed.
- Identify and use other parking areas as needed.

Goal 2: Maintain and enhance oak savanna structure

Objective 1: Release oaks as needed.

- Remove Douglas-fir that overtop oaks.
- Thin oaks to maintain open oak savanna structure.

Goal 3: Establish and expand rare plant populations in higher quality or restored areas of the meadow.

Objective 1: Establish Kincaid’s lupine population.

- Obtain plant materials for Kincaid’s lupine.
- Plant Kincaid’s lupine by seed or transplanting plugs in the fall or spring.
- Monitor to evaluate establishment.

Objective 2: Establish Willamette daisy population.

- Obtain plant materials.
- Plant by seed or transplanting plugs.

Objective 3: Establish other sensitive species as appropriate.

2.6 Site Uses

Research

In general, research at the site may be permitted as long as it does not result in long-term negative impacts to species or habitats. Occasional research involving species or habitat manipulations that may have short term impacts to species or habitats may be allowed if approved under consultation with the Parks Advisory Board and the USFWS, as appropriate.

As Beazell represents one of the two populations of Taylor’s checkerspot persisting in Oregon, it is a critical site for research into the species’ basic biology and habitat needs. At the same time, research must be carefully evaluated and planned so as not to risk the stability of the population.

Research needs at Beazell include, but are not limited to:

- Exploring the potential to attract Fender’s blue butterfly populations.
- Evaluating the response of false brome to butterfly-friendly weed control.

- Gaining a greater understanding of Taylor’s checkerspot movement and dispersal, including investigating its movement through and between the occupied and unoccupied meadows at Beazell.
- Exploring potential Taylor’s checkerspot habitat on adjoining lands, with permission, to better understand the species’ dispersal and behavior.
- Evaluating plant community dynamics to understand utilization preferences by Taylor’s.
- Comparing monitoring methods for documenting habitat responses to restoration activities.

Recreation

Passive recreation that does not result in impacts to habitat shall be encouraged at Beazell. Trails may be closed when active restoration is underway, or during sensitive stages of Taylor’s checkerspot’s life cycle. In general, the northern half of Beazell (North, Middle and Summit Meadows), will have extremely restricted recreational access because of the extreme importance of these meadows for the persistence of Taylor’s checkerspot at Beazell.

Education

Beazell has been used as an outdoor classroom for students from various schools in Benton County. This activity is encouraged, and continued restoration/enhancement work could provide additional opportunities for outdoor education about prairie ecosystems.

2.7 Schedule

	Year 1	Year 2	Year 3	Year 4	Year 5
January-February	Review management activities with lepidopterist and botanist				
March-April		Plant native forbs/nectar & sensitive plants		Plant native forbs/nectar & sensitive plants	
May-June	Survey and map invasive species.				
	Weed control				
	HCP Monitoring (Baseline)			HCP Monitoring	
	Monitor planting establishment as needed				
July-August	Obtain plant materials for fall or upcoming spring plantings				
September-October	Burn or mow, then seed native grasses forbs/nectar and sensitive plants		Burn or mow, then seed native grasses forbs/nectar and sensitive plants		Burn or mow, then seed native grasses forbs/nectar and sensitive plants
	Weed control				
As appropriate	Tree removal/thin	Manual/ mechanical Scotch broom removal		Tree removal/thin	Manual/ mechanical Scotch broom removal

CHAPTER 3: FITTON GREEN NATURAL AREA PRAIRIE MANAGEMENT PLAN



Photo by George McAdams

3.1 Introduction

Site Vision

Benton County's vision for Fitton Green Natural Area is a remarkable representation of the natural and cultural landscape of the foothills of the Coast Range and the Marys River watershed, with outstanding opportunities for environmental stewardship, education and research, and public enjoyment and appreciation. Fitton Green will enhance the community livability of the Corvallis-Philomath area. The site will become a prototype for public open space management in Oregon, applying progressive ecosystem management practices to protect, conserve, and restore the natural, scenic, outdoor recreation, and wildlife values of the site, while minimizing potential impacts to adjacent landowners and neighbors.

Emphasis for the management of Fitton Green will be placed on restoring the oak savanna and Douglas-fir/oak forest ecosystems through sustainable forest management, as well as accommodating passive day use recreation such as hiking, wildlife viewing, and scenic enjoyment. The site will provide environmental education and research opportunities. Habitat restoration and enhancement at the site will complement the goals of the Benton County HCP Prairie Conservation Strategy, and contribute to the recovery (down-listing or delisting) of rare and sensitive species of Benton County.

Management Goals for Fitton Green Natural Area Prairies

This management plan highlights the importance of the prairie areas at Fitton Green to several rare species of plants and butterflies found only in the Willamette Valley. Many other more common plant and animal species will also benefit over time. The long term targets for habitat restoration and enhancement will be best achieved through stepwise and incremental restoration of habitats.

- 1) Stabilize the northern meadow of Fitton Green and restore resources for Fender's blue and Taylor's checkerspot butterfly.
- 2) Establish a functioning string of stepping stone habitat for Fender's blue butterfly and Taylor's checkerspot butterfly that helps butterflies disperse from the Bonneville Power Administration power line corridor down to the Southern Meadow of Fitton Green.
- 3) Maintain and enhance high quality native upland prairie habitats in the southern meadow with a focus on nectar and host species for Fender's blue butterfly and Taylor's checkerspot butterfly.
- 4) Establish populations of rare plant species in the southern meadow.

HCP Mitigation Needs

One of the purposes of the HCP is to forecast unavoidable impacts to rare species and identify restoration (mitigation) work to offset such impacts. The precise amount of restoration work required for mitigation may vary with the timing and pace of impacts and

mitigation work (see Chapter 6 of the HCP for more information). Mitigation work that is completed prior to impacts is typically favored and receives a lower mitigation burden.

The HCP identifies impacts that may occur to Kincaid’s lupine along County roads both in areas with and without likely Fender’s blue butterfly use. To fulfill its mitigation requirements for Kincaid’s lupine outside butterfly habitat, the County must establish 23 square meters of the lupine at one of several sites, including Fitton Green. This may occur through direct seeding or transplanting young lupine plants (plugs). The lupine introduction work proposed here, both in stepping stones and in the southern meadow can contribute to this mitigation requirement.

3.2 Background Information

Site Location and Context

Fitton Green Natural Area is a 308 acre property located west of Corvallis and north of Philomath, Oregon (Figure 3.1). It is surrounded entirely by private lands. While there are some smaller parcels to the east, most lots surrounding the natural area are greater than 40 acres in size, including timber lands to the north.

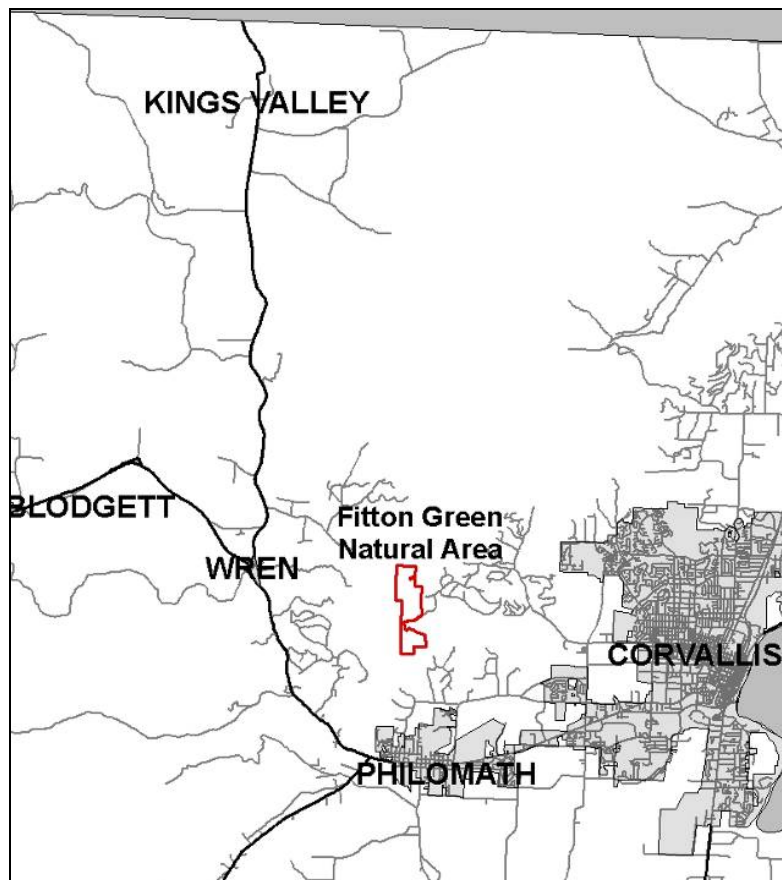


Figure 3.1 Location of Fitton Green Natural Area.

Brief Historic Context

The first 85 acres of Fitton Green were acquired by Benton County to preserve the aesthetic beauty of the prominent hillside meadows for present and future residents of central Benton County. In 1995 the Greenbelt Land Trust purchased and donated an additional 183 acres, and in 1998, the Greens Fund financed the acquisition of another 40 acres. The site now consists of 308 acres. Approximately 140 acres of the natural area (northern meadow) is covered by a conservation easement held by the Greenbelt Land Trust. The site is named after Elsie Fitton Ross (Fitton is her maiden name), who, along with her husband, Charles Ross, and in partnership with the early beginnings of the Greenbelt Land Trust, helped fund the acquisition of the site. Fitton Green has been open to the public since the fall of 2003.

3.3 Overview of Habitats and Species

General

Fitton Green includes two upland prairie areas embedded within hardwood and conifer forest. The southern end of the natural area supports high quality upland prairie within an approximately 38 acre meadow (Southern Meadow). Numerous native species, including Roemer's fescue (*Festuca roemerii*), Lemmon's needle grass (*Achnatherum lemmonii*), and Oregon sunshine (*Eriophyllum lanatum*) are present. The northern end of Fitton Green includes a smaller, roughly 10 acre meadow (Northern Meadow) degraded by conifer and shrub encroachment, and with substantial amounts of the highly invasive grass, false brome.

Management Units

Fitton Green has been divided into polygons for each habitat type (Trout Mountain, in prep). For the purposes of prairie management, this plan will group the polygons into larger habitat management units (Figure 3.2, Table 3.1), including Conifer, Conifer/hardwood, Grass, and Hardwood.

Table 3.1 Habitat polygons and management units at Fitton Green Natural Area.

Management Unit	Habitat Polygon	Acres	Habitat Description
A: Conifer	3	7.9	Conifer, 36-55 yrs
	4	8.7	Conifer, 36-55 yrs
	5	3	Conifer, 36-55 yrs
	6	8.4	Conifer, 36-55 yrs
B: Conifer/hardwood	8	12.9	Conifer/hardwood
	12	57.1	Oak/young conifer
	13	23.2	Oak/conifer
	14	33.2	Conifer/hardwood
	15	63.4	Oak/young conifer
C: Grass	1	10.9	Grass

Management Unit	Habitat Polygon	Acres	Habitat Description
	2	37.9	Grass
D: Hardwood	7	26.9	Hardwood
	11	9.1	Hardwood

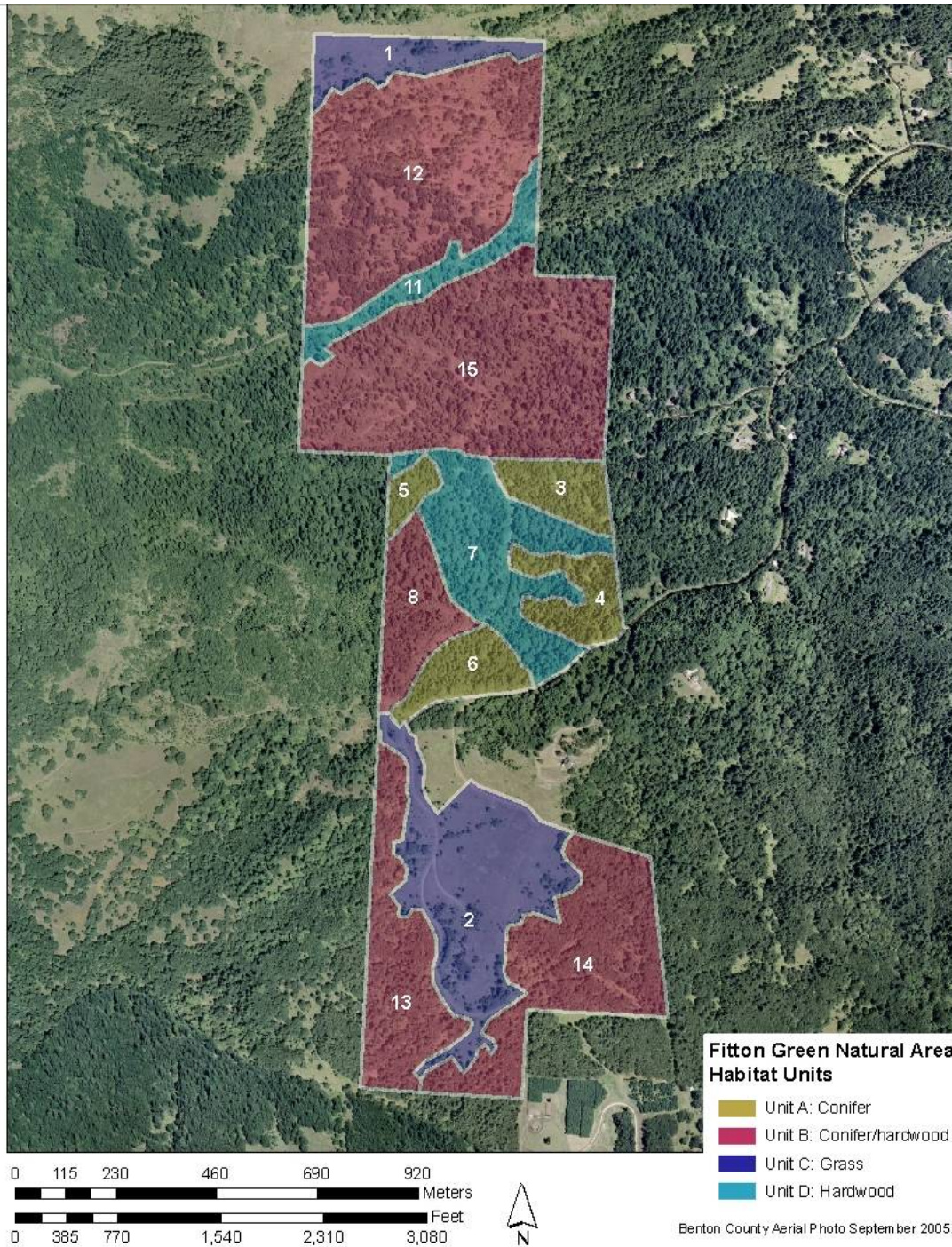


Figure 3.2 Management units at Fitton Green Natural Area.

Soil Types and Distribution

Fitton Green includes a diversity of soil types, but soils in both the northern and southern meadow areas are primarily of the Dixonville-Gellatly complex, at 12-60 percent slopes (Figure 3.3). These soils are medium depth and well drained silty clay loams.

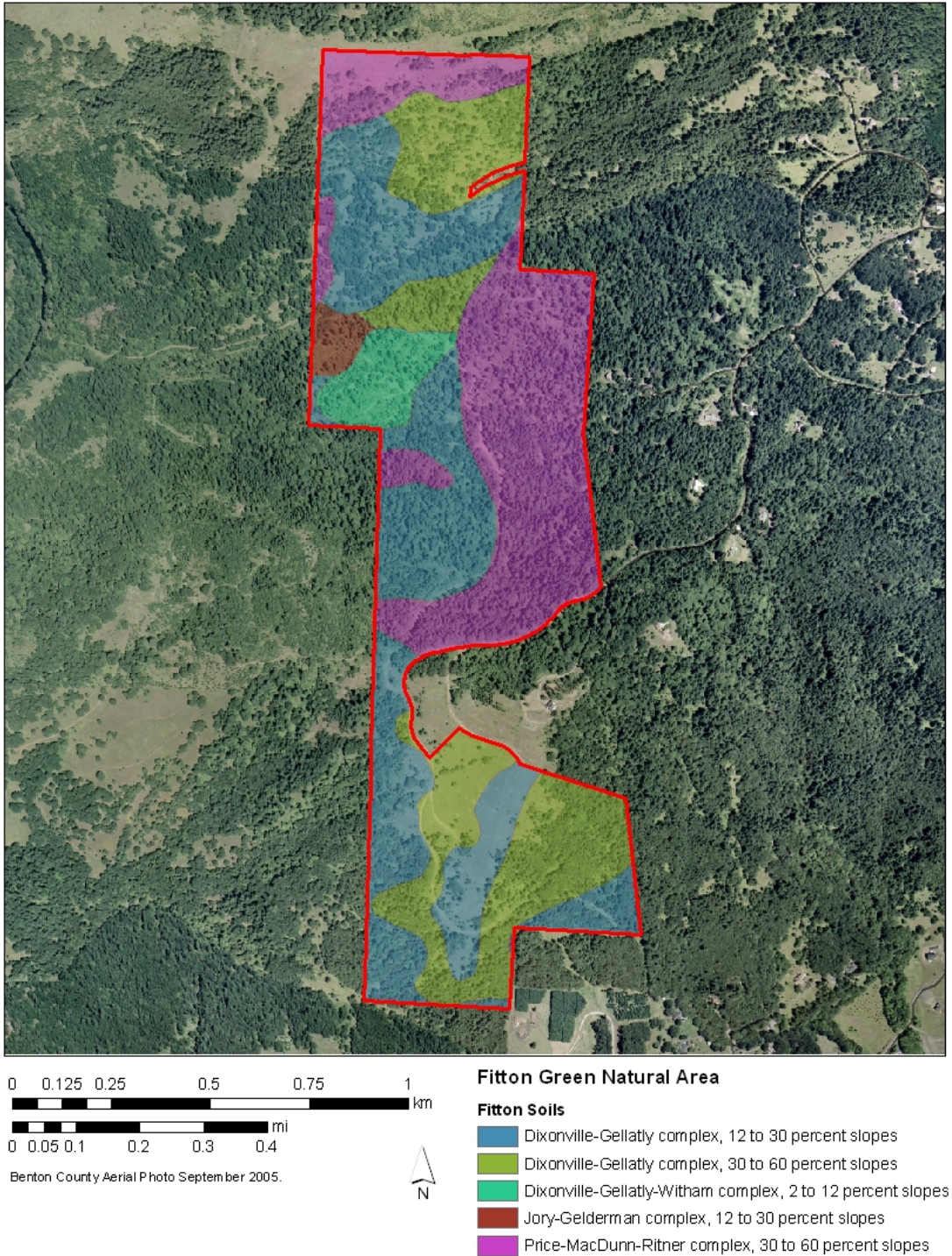


Figure 3.3 Soils at Fitton Green Natural Area.

Historic Vegetation

From 1851 to 1865, the General Land Office surveyed the Willamette Valley in preparation for Euro-American settlement. The surveyors' notes detailed the vegetation, soils, and topography encountered as they crossed the landscape. The Nature Conservancy has used this information to reconstruct the historic vegetation patterns of the Willamette Valley (Christy et al. 2005). This mapping shows that Fitton Green had broad bands of upland prairie across the northern and southern ends (where the meadows exist today), surrounded by oak savanna and Douglas-fir-oak habitats (Figure 3.4).

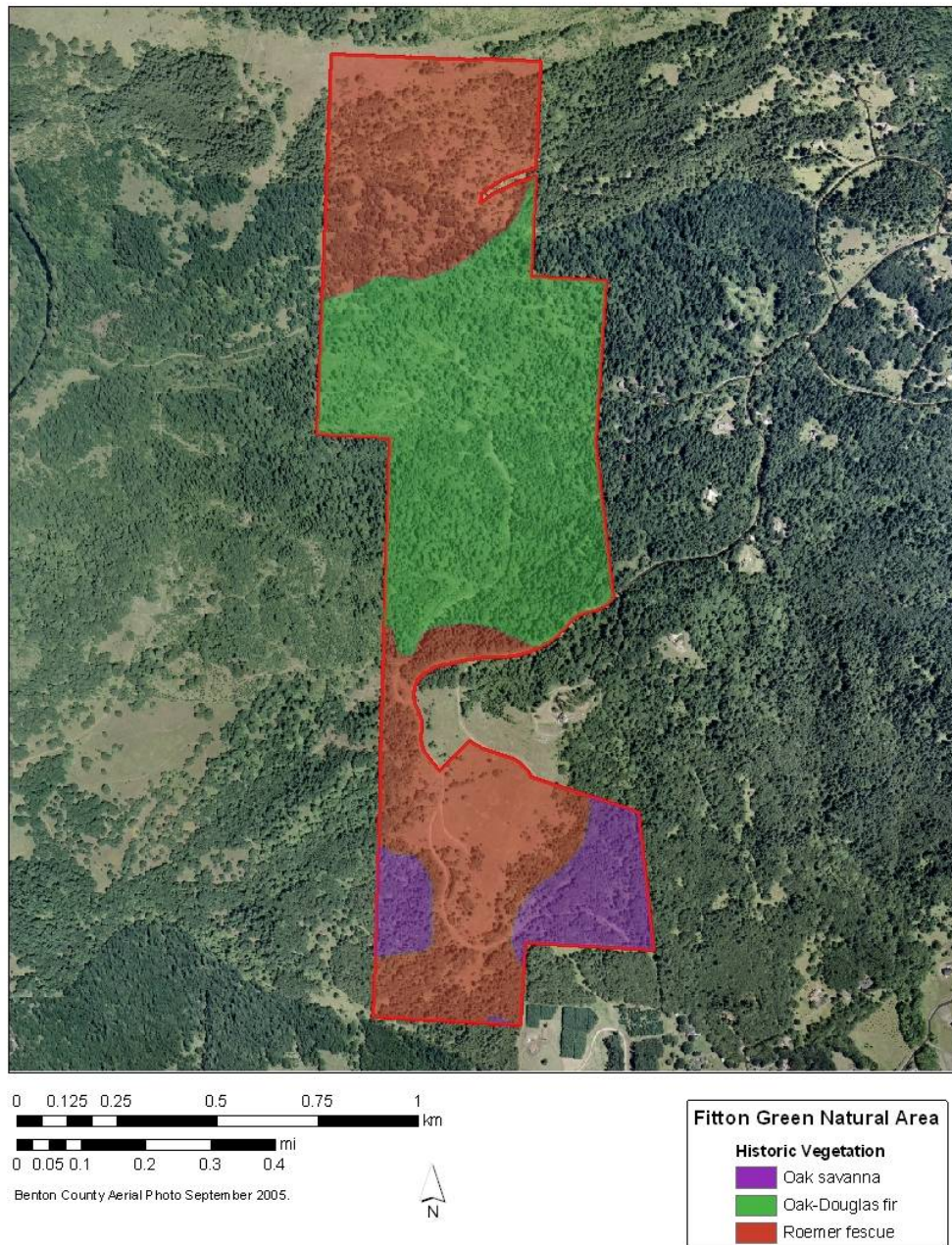


Figure 3.4 Pre-European settlement vegetation at Fitton Green Natural Area.

Sensitive Species

A single Taylor’s checkerspot butterfly (*Euphydryas editha taylori*) was observed at the Southern Meadow of Fitton Green in 2007 (Ross 2007). The butterfly has not been reported at the site again since the 2007 sighting. While the species is not abundant at the site, individuals evidently are capable of dispersing to the southern meadow, either from the BPA power line corridor to the north, or from an unknown site nearby on private land.

Other sensitive species present at the site or for which suitable habitat is present are listed in Table 3.2. Habitat restoration at this site may improve habitat for each of these species and create opportunities for recovering these species. Although each species may not be listed in the objectives for each habitat unit, opportunities for their conservation should be incorporated as possible and appropriate.

Table 3.2 Sensitive species present or with potential habitat at the site.

Species	Status at site
Fender’s blue butterfly	Habitat present
Taylor’s checkerspot butterfly	Habitat present
Kincaid’s lupine	Reintroduced
Willamette daisy	Habitat present
Golden paintbrush	Habitat present
Shaggy horkelia	Habitat present
Thin-leaved peavine	Habitat present
Peacock larkspur	Habitat present

Species Introductions

Kincaid’s lupine (*Lupinus sulphureus* ssp. *kincaidii*), a host plant for the endangered Fender’s blue butterfly, has been introduced to the Southern Meadow at Fitton Green (Table 2.2). The native species dominated areas of the Southern Meadow likely possesses suitable habitat for the endangered Willamette daisy (*Erigeron decumbens*), and may be a potential site for golden paintbrush (*Castilleja levisecta*), a species currently extirpated from Oregon but with a few populations in prairies of Washington and British Columbia.

Table 3.3 Status of species introductions in the southern meadow at Fitton Green Natural Area as of December, 2009.

Species	Date	Location	# Seeds	# Transplants	# Established*
Kincaid's lupine	11/1/2006	Southern Meadow	500		130
	4/1/2007	Southern Meadow		139	43
	11/2/2007	Southern Meadow	5400		918

Species	Date	Location	# Seeds	# Transplants	# Established*
	1/15/2009	Southern Meadow	3400		
	4/21/2009	Southern Meadow		130	
	9/30/2009	Southern Meadow	~7,500 (1/4 lb of seeds)		
	11/1/2009	Southern Meadow	5000		

3.4 Habitat Management Units

Northern Meadow – Polygon 1 (10.9 acres)

Rare Species and Habitats

While this area does not contain core breeding areas for Taylor’s, it is within the BPA power line corridor, which supports a core Taylor’s checkerspot population. It is adjacent to areas heavily used by Taylor’s on adjacent private property.

The Northern Meadow is less than 2.5 km from the Cardwell Hill Fender’s blue butterfly/Kincaid’s lupine population area (part of which is also in the BPA corridor). The Cardwell Hill area is likely the largest known concentration of the lupine and butterfly in Benton County and possibly range wide. Though the typical maximum dispersal distance for Fender’s blue butterfly is 2 km, there may be undiscovered patches of habitat on connecting private land, making dispersal from Cardwell Hill to the north end of Fitton Green possible for the butterflies.

Recent Management Actions

In 2009, work was performed to expand natural openings along the north/south road for stepping stones for butterfly dispersal.

Desired Future Conditions

Open oak savanna habitat that allows butterfly travel and provides a stepping stone of habitat for butterflies (both Fender’s and Taylor’s) that will help them move from the BPA power line corridor down to the Southern Meadow of Fitton Green.

Habitat Management Goals, Objectives and Tasks

Goal 1: Develop and maintain open oak savanna habitat with resources for Fender’s blue and Taylor’s checkerspot butterflies.

Objective 1: Maintain open oak savanna structure

- Remove firs before they overtop oaks.
- Mow or burn every 2 years.

Objective 2: Provide necessary resources for Fender’s blue and Taylor’s checkerspot.

- Obtain the necessary plant materials.
- Plant host and nectar species for Fender’s blue.
- Plant host and nectar species for Taylor’s checkerspot.
- Monitor to determine planting success.

Objective 3: Manage false brome.

- Manually remove small patches as reasonable.
- Mow in June to prevent seed production (mowing earlier may result in re-sprouting, and mowing later may simply spread false brome).
- Treat with chemical herbicide in the fall, e.g., glyphosate 2 % gal + oryzalin @ 3.3% + non-ionic or MSO/silicon blend surfactant 0.5%.
- Monoculture stands can be sprayed in spring prior to seed set with a fall planting of native grass/forbs.
- Monitor to determine follow-up treatment needs.

Objective 4: Control Scotch broom.

- Hand or mechanically pull in winter where feasible.
- Mow in early spring before seeds are produced, then treat regrowth in the fall or following spring with tryclopyr/aminopyralid combination.
- Monitor to determine follow-up treatment needs.

Objective 5: Control Armenian Blackberry.

- Mow in mid-summer (July), and allow for re-growth. Treat with tryclopyr amine or ester in the fall.
- Monitor to determine follow-up treatment needs.

Butterfly Habitat Corridor–Polygons 3-8, 11, 12, 15 (189.5 acres)

Rare Species and Habitats

No rare species present at this time.

This set of polygons is composed of a mix of oak, young and mature conifer and hardwoods.

Recent Management Actions

No recent relevant work.

Desired Future Conditions

This area includes a functioning network of stepping stone habitat for butterflies (both Fender’s blue and Taylor’s checkerspot), that helps butterflies move from the BPA power line corridor down to the Southern Meadow of Fitton Green.

Habitat Management Goals, Objectives and Tasks

Goal 1: Develop and maintain butterfly stepping stones between the Northern and Southern Meadows of Fitton Green.

Objective 1: Select locations for a north to south corridor of patches “stepping stones” of butterfly habitat.

- Map a location for the approximately 2 km long corridor using existing clearings and roads when possible.
- Pinpoint locations along the corridor for stepping stone habitat patches. Stepping stones will be roughly 1/8 acre in size, and will be separated by less than 0.5 km and are typically about 0.25 km apart.

Objective 2: Restore stepping stones of habitat to open oak savanna structure that permit easy butterfly travel.

- Remove or girdle Douglas-fir.
- Thin oaks to 2-3 trees per acre.
- Mow every 2 years to reduce shrub cover.

Objective 3: Within stepping stones, provide necessary resources for Fender's blue and Taylor's checkerspot.

- Plant host and nectar species for Fender's blue.
- Plant host and nectar species for Taylor's checkerspot.
- Control weeds around plantings.
- Control tall grass species and plant short stature native bunch grasses (i.e., Roemer's fescue).

Objective 4: Manage false brome within stepping stones.

- Manually remove small patches as reasonable.
- Mow in June to prevent seed production (mowing earlier may result in re-sprouting, and mowing later may simply spread false brome).
- Treat with chemical herbicide in the fall, e.g., glyphosate 2 % gal + oryzalin @ 3.3% + non-ionic or MSO/silicon blend surfactant 0.5%.
- Monitor to determine follow-up treatment needs.

Objective 5: Control Scotch broom within stepping stones.

- Hand or mechanically pull in winter where feasible.
- Mow in early spring before seeds are produced, then treat regrowth in the fall or following spring with tryclopyr/aminopyralid combination.
- Monitor to determine follow-up treatment needs.

Objective 6: Control Armenian blackberry within stepping stones.

- Mow in mid-summer (July), and allow for re-growth. Treat with tryclopyr amine or ester in the fall.
- Monitor to determine follow-up treatment needs.

Southern Meadow - Polygon 2 (37.9 acres)

Rare Species and Habitats

This large and exposed meadow has patches of extremely high quality native prairie that are dominated by native perennial grasses and include English plantain and strawberry, key species for Taylor's checkerspot. However, because of its exposure, the meadow lacks the prime physical characteristics (shelter, lee of prevailing winds) for the butterfly. The lower portion of the hillside, which likely has the best physical characteristics for Taylor's checkerspot, lacks the desired plant community (short statured grasses with larval host and nectar species) for the species. This unit is largely isolated from the primary Taylor's

checkerspot population in the BPA corridor to the north, but is connected through ridgeline, forest roads and scattered openings.

Kincaid's lupine has been planted in this management unit, and suitable habitat for Willamette daisy is present. If connected through restoration on linking sites, this unit is ideally located to provide a stepping stone of habitat for Fender's blue butterfly from the Wren/Cardwell Hill population center to Greenbelt Land Trust's Lupine Meadows in the Philomath area.

Recent Management Actions

In 2003- 2004 encroaching shrubs and small trees were chemically treated and/or mulched to reduce fuel loads. In fall 2004 and 2008 the 20 acre main prairie between the upper and lower road was burned, then augmented with native grass and forbs. A prescribed burn of prairie openings below lower road/trail occurred in fall 2007. Kincaid's lupine was planted in 2006, 2007, 2008 and 2009 (Table 3.3).

Desired Future Conditions

Prairie supports Willamette daisy, a breeding population of Taylor's checkerspot that is connected to the BPA power line corridor, and includes stepping stone habitat for Fender's blue butterfly, with Kincaid's lupine and native nectar species, and other sensitive species as appropriate.

Habitat Management Goals, Objectives and Tasks

Goal 1: Establish, maintain and enhance habitat for rare species.

Objective 1: Control invasive species.

- Survey and map aggressive and invasive species populations annually.
- Treat with appropriate control methods.
- Monitor to evaluate control.

Objective 2: Promote native grasses and forbs.

- Implement a flexible burn/mow cycle, burning every 4 years with a mow treatment between burns if needed. Once butterflies are present, leave 2/3 of the habitat unburned/unmowed as refugia for butterfly larvae and host/nectar plants.
- Seed with native forbs and grasses following burning/mowing.

Objective 3: Increase available habitat for Taylor's checkerspot butterfly.

- Obtain plant materials for host and nectar species.
- Direct seed or plant plugs.
- Monitor to evaluate establishment.

Objective 4: Increase available habitat for Fender's blue butterfly.

- Obtain plant materials for Kincaid's lupine and nectar species.
- Plant Kincaid's lupine by seed (fall) or transplanting plugs (spring).
- Plant nectar species through seeding or transplanting plugs.
- Monitor to evaluate establishment.

Objective 5: Establish population of rare Willamette Valley species, including Willamette daisy.

- Obtain plant materials.
- Select areas of primarily native vegetation (either naturally existing or restored).
- Direct seed or plant plugs, as appropriate.
- Monitor to evaluate establishment.

Southern Mixed Woodlands - Polygons 13, 14 (56.4 acres)

Rare Species and Habitats

No rare species at this time.

Habitat consists of oak- conifer on the west of the southern meadow, and conifer-hardwood on the east side of the Southern Meadow.

Recent Management Actions

In 2007 false brome was sprayed prior to crews removing firs that were over topping oaks. Volunteers reduced young and medium size fir by cutting or girdling.

Desired Future Conditions

Management unit will support a mosaic of oak woodland, meadow openings and isolated patches of Douglas-fir that do not threaten the value of the oaks.

Habitat management objectives and tasks

Objective 1: Control Douglas-fir expansion to retain oaks and meadow openings.

- Over time, continue to use community volunteers to remove Douglas-fir seedlings and girdle medium size Douglas-fir trees.

3.5 Site Uses

Research

In general, research at the site shall be permitted as long as it does not result in long-term negative impacts on species or habitats. Occasional research involving species or habitat manipulations that may have short term impacts to species or habitats may be allowed if approved under consultation with the Benton County Parks Advisory Board and the US Fish and Wildlife Service, as appropriate.

Research needs at Fitton Green include, but are not limited to:

- Exploring the potential to attract Fender's blue butterfly populations.
- Evaluating the response of false brome to butterfly-friendly weed control.
- Gaining a greater understanding of Taylor's checkerspot's movement and dispersal, including investigating its movement through and between created habitat patches.
- Exploring potential Taylor's checkerspot habitat on adjoining lands, with permission, to better understand the species' dispersal behavior.

- Evaluating plant community dynamics to understand host plant and nectar utilization preferences of Taylor's checkerspot.

Recreation

Passive recreation that does not result in impacts to habitat shall be encouraged at Fitton Green. Trails reaching the Southern Meadow may be closed when active restoration is underway. If Fender's blue or Taylor's checkerspot butterflies come to occupy portions of the site, public access may need to be limited during sensitive stages of the butterflies' life cycles.

Education

The Southern Meadow at Fitton Green has been used as an outdoor classroom for students from various schools in Benton County for many years. This activity is encouraged, and continued restoration/enhancement work could provide additional opportunities for outdoor education about prairie and conifer/hardwood ecosystems.

3.6 Schedule

	Year 1	Year 2	Year 3	Year 4	Year 5
January-February	Review management activities with lepidopterist and botanist				
March-April	Plant native forbs/nectar, LUSUKI and other rare species in meadows and stepping stones		Plant native forbs/nectar, LUSUKI and other rare species in meadows and stepping stones		Plant native forbs/nectar, LUSUKI and other rare species in meadows and stepping stones
May-June	Survey and map invasive species.				
	Weed control				
	HCP Monitoring (Baseline)			HCP Monitoring	
	Monitor planting establishment as needed				
July-August	Obtain plant materials for fall or upcoming spring plantings				
September-October		Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species		Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species	
	Weed control				
As appropriate	Tree removal/thin	Manual/ mechanical Scotch broom removal		Tree removal/thin	Manual/ mechanical Scotch broom removal

LUSUKI= Kincaid's lupine

CHAPTER 4: FORT HOSKINS HISTORIC PARK PRAIRIE MANAGEMENT PLAN



Photo by George McAdams

4.1 Introduction

Site Vision

Fort Hoskins will continue to be a resource and outdoor laboratory for local scientists and habitat managers by providing a site where investigations into habitat restoration methods and outcomes can occur. The park will continue to be relatively free of invasive species infestations, and remain an accessible historic and recreational site for the Benton County community.

Management Goals for Fort Hoskins Historic Park Prairies

Because there are no established rare species populations residing in the prairies at Fort Hoskins, restoration and enhancement at Beazell Memorial Forest, Fitton Green Natural Area, Jackson-Frazier Wetland and the Benton County Fender's Blue Butterfly Conservation Areas are currently a higher priority; these sites either already support rare species or are located adjacent to key rare species populations. Current management goals for the Fort Hoskins are to:

- 1) Maintain open prairie habitats with minimal Douglas-fir encroachment.
- 2) Continue to control invasive species such as Scotch broom and false brome.

In the event that a population of rare prairie plants or Fender's blue butterfly or Taylor's checkerspot butterfly is discovered on nearby property, habitat restoration and enhancement for these species at Fort Hoskins could become a higher priority. Also, if restoration and enhancement work at other County sites is extremely successful and sensitive species populations at those sites become stable and self-sustaining, resources and effort could be shifted to work at Fort Hoskins.

Relationship to Benton County HCP

Due to the current lack of established populations of the HCP Covered Species at Fort Hoskins, the site has little involvement in the HCP process at this time. There are no identified HCP mitigation needs to be fulfilled at Fort Hoskins, and the HCP monitoring process and schedule is not required unless a population of one of the HCP species becomes established in the future.

4.2 Background Information

Site Location and Context

Fort Hoskins Historic Park is a 128 acre property located on the edge of the Coast Range, at the northern end of Benton County near Kings Valley (Figure 4.1). It is surrounded entirely by private pasture or timber lands. The Park offers accessible restrooms, picnicking, educational interpretive displays, and self-guided trails that allow users to access the resource's varied history, vegetation, and views.

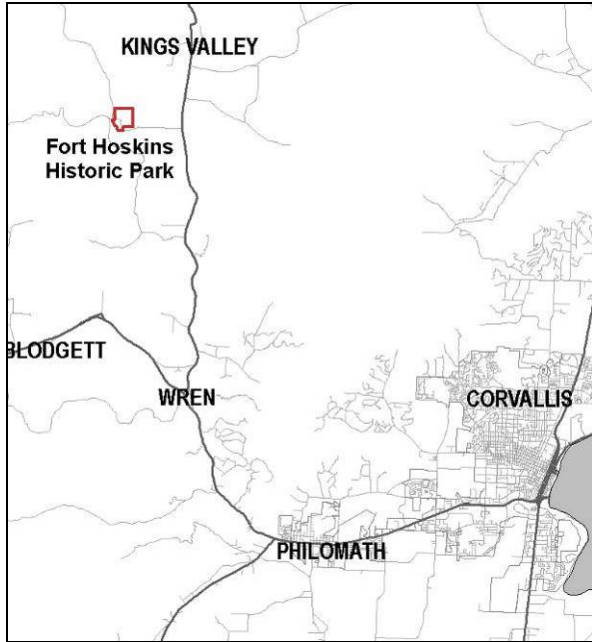


Figure 4.1 Location of Fort Hoskins Historic Park.

Brief Historic Context

The original Fort Hoskins was established in 1856 to protect and monitor the new coastal Indian reservation. It was one of three forts in western Oregon commissioned in the newly established Siletz Indian Reservation. The fort was occupied by US Infantry troops, and later by Oregon, California, and Washington infantry volunteers. The Fort ended its service by providing a valuable Union presence in Oregon during the Civil War, and was decommissioned in 1865. Fort Hoskins was purchased by Benton County in 1991. The development of the Fort Hoskins Historic Park was funded in large part through funds from the Local Government Grant Program and a grant from the Meyer Memorial Trust. The park was opened for public day use in July, 2002.

4.3 Overview of Habitats and Species

General

The vegetation at Fort Hoskins primarily includes young Douglas-fir forest and open grassy areas. Most of the open habitats have been disturbed in the past by logging, grazing or farming, and the majority of vegetation is non-native, though patches of native plants are present.

Management Units

Management units established at Fort Hoskins for forest stewardship planning purposes are displayed in Figure 4.2, and include grass (prairie/meadow), hardwood-conifer, hardwood, and conifer units. The prairie areas on the northwest side of the park (indicated as Areas #1 and #2 in Figure 4.2) are in the most natural condition, and show the greatest promise for restoration and rare plant introductions, if these actions are undertaken in the future.

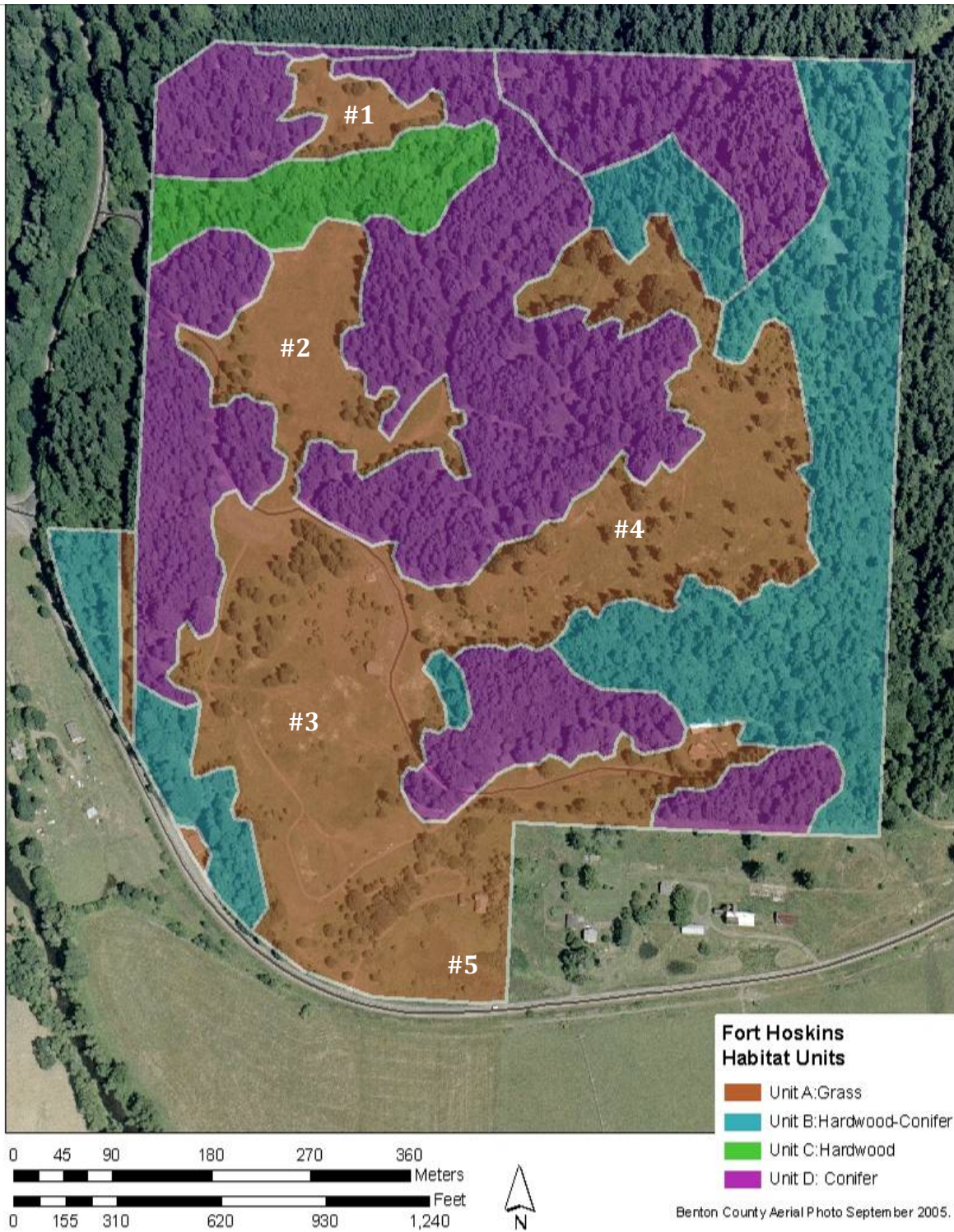


Figure 4.2 Management units at Fort Hoskins. Unit A (Grass), has been divided into Areas #1-5.

Soil Types and Distribution

The site includes primarily Bellpine-Jory Complex soils, with slopes ranging from 12 to 60% (Figure 4.3). These soils are medium depth and well drained silty clay loams. Also present are Jory Silty Clay Loam at 2 to 12% slopes, which are deep, well drained silty clay loams.

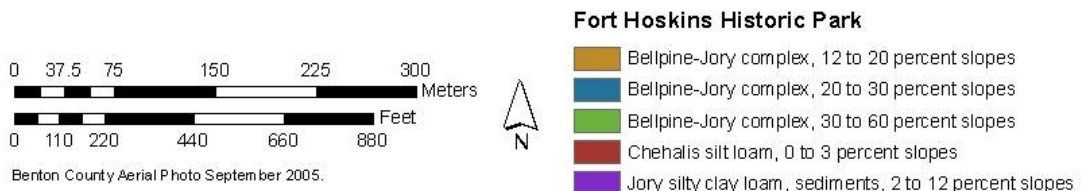
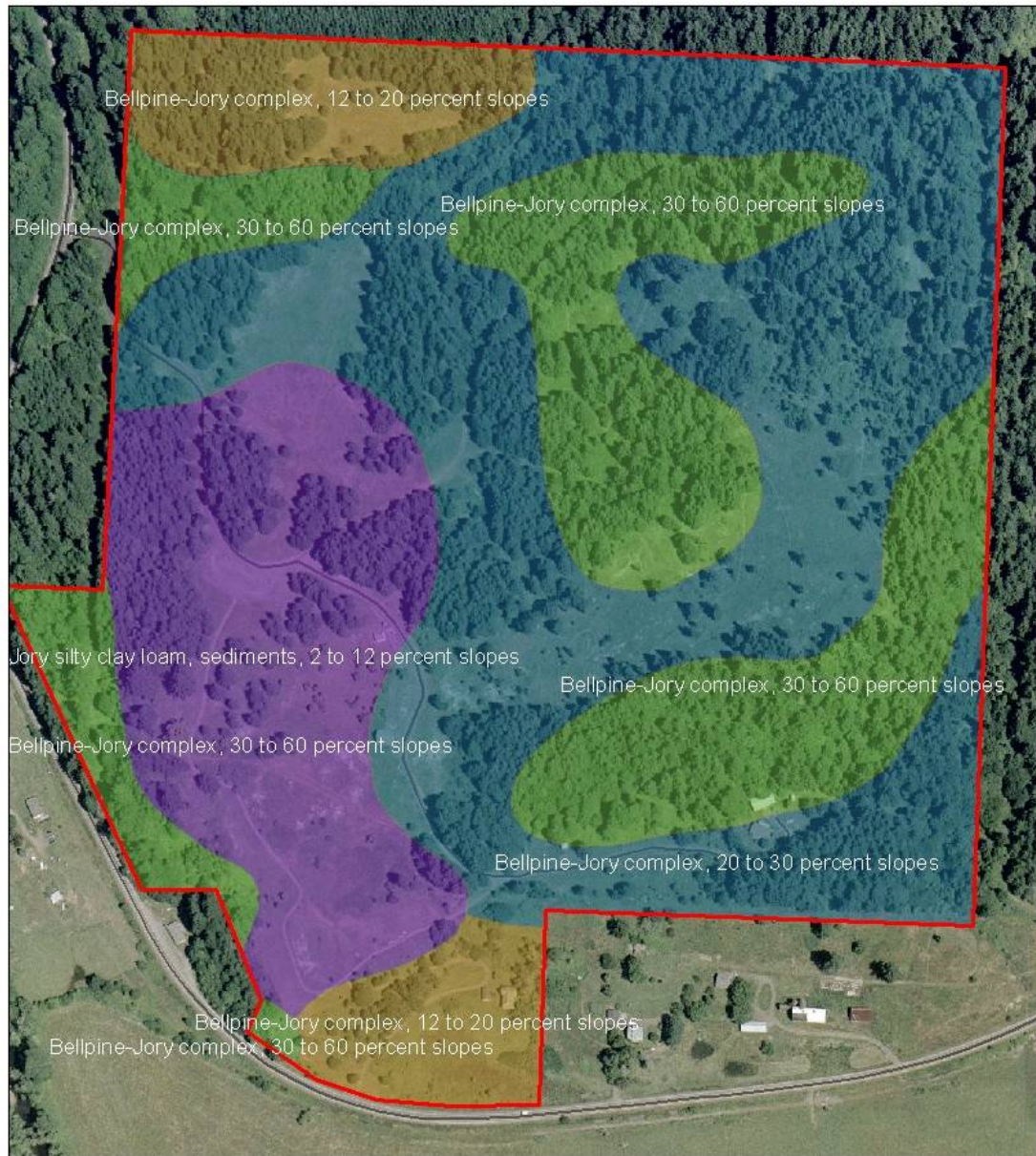


Figure 4.3 Soils at Fort Hoskins.

Historic Vegetation

From 1851 to 1865, the General Land Office surveyed the Willamette Valley in preparation for Euro-American settlement. The surveyors' notes detailed the vegetation, soils, and topography encountered as they crossed the landscape. The Nature Conservancy has used this information to reconstruct the historic vegetation patterns of the Willamette Valley (Christy et al. 2005). This mapping shows that Fort Hoskins was primarily Oak-Douglas-fir forest, with small inclusions of upland prairie at the northern and southern ends (Figure 4.4). A small wet prairie area was located at the southern tip of the park near Hoskins Road.

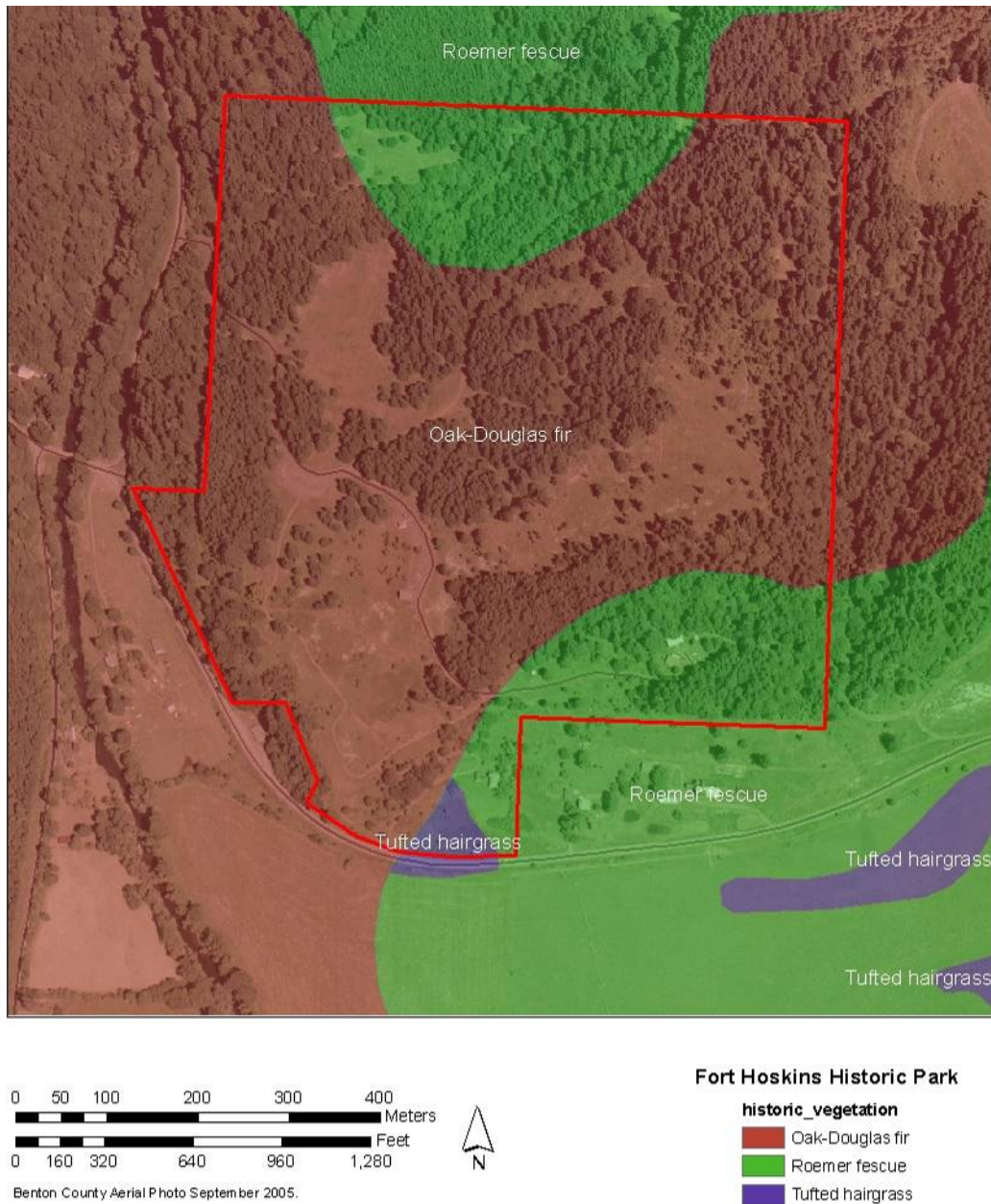


Figure 4.4 Pre-European settlement vegetation at Fort Hoskins.

Sensitive Species

A single male Taylor’s checkerspot butterfly (*Euphydryas editha taylori*) was documented at Fort Hoskins in 2005 (Ross 2005). The source population of that individual remains uncertain, but individuals evidently are capable of dispersing there from other areas. Beazell Memorial Forest is the closest known Taylor’s population, but is still over 3.5 kilometers away. The butterfly was observed on the mowed lawn at the old fort building site in an otherwise open and disturbed area, with relatively abundant plantain and various weedy nectar plants. Based on the structural characteristics of habitats Taylor’s checkerspot is found in within Benton County, the smaller, more sheltered meadow areas within the northwest portion of Fort Hoskins (Unit A: Areas 1 and 2) may show the greatest promise for restoring Taylor’s checkerspot habitat at Fort Hoskins.

Other sensitive species present at the site or for which suitable habitat is present are listed in Table 4.1. Habitat restoration at this site may improve habitat for each of these species and create opportunities for recovering these species. Although each species may not be listed in the objectives for each habitat unit, opportunities for their conservation should be incorporated as possible and appropriate.

Table 4.1 Sensitive species present or with potential habitat at the site.

Species	Status at site
Fender’s blue butterfly	Habitat present
Taylor’s checkerspot butterfly	Habitat Present
Kincaid’s lupine	Reintroduced (establishment unknown)
Willamette daisy	Reintroduced (establishment unknown)
Golden paintbrush	Habitat present
Shaggy horkelia	Habitat present
Thin-leaved peavine	Habitat present
Peacock larkspur	Habitat present
Nelson’s checkermallow	Habitat present (wetland only)

Rare Species Introductions

A small amount of Kincaid’s lupine and Willamette daisy were introduced into the Collins Project restoration plots in management Areas 1 and 2 (Northwest meadows) in 2009 as part of a MS thesis project at Oregon State University; monitoring is preliminary and being completed by the graduate student. Additional species could be introduced at Fort Hoskins, if this site were a restoration priority and adequate site preparation occurred, it could potentially support upland prairie habitat for Kincaid’s lupine or other sensitive prairie (Table 4.1).

4.4 Habitat Management Units

Management discussed in this plan focuses on the prairie portion of the site (Areas 1-5 of Unit A; Figure 4.2).

Areas 1 & 2: Northwest Meadows

Rare Species and Habitats

These two meadows show the greatest promise for prairie restoration and enhancement, should it become a priority at Fort Hoskins. These meadows could potentially support Taylor's checkerspot or Kincaid's lupine and Fender's blue, if the butterflies could be attracted to the site. A small amount of Kincaid's lupine and Willamette daisy were introduced here in 2009.

Recent Management Actions

The more southern of these two meadows has been opened up by removing Douglas-fir. The more northern meadow was used in a long-term prairie restoration research project (Collins Project) and includes prairie restoration test-plots where burns, herbicide treatments and seed additions occurred.

Desired Future Conditions

Open prairie with minimal Douglas-fir encroachment and a minimum of invasive species.

Habitat Management Objectives and Tasks

Objective 1: Maintain open prairie.

- Remove firs as they encroach into the meadows.
- Mow or burn every 4 years.

Objective 2: Control false brome.

- Regularly survey for the presence of this species.
- Manually remove small patches as reasonable.
- Spray with glyphosate or grass specific herbicide in early May depending on quality of site conditions and quantity of plants.
- Mow in June to prevent seed production (mowing earlier may result in re-sprouting, and mowing later may simply spread false brome).
- Treat with chemical herbicide in the fall, e.g., glyphosate 2 % gal + oryzalin @ 3.3% + non-ionic or MSO/silicon blend surfactant 0.5%.
- Monitor to determine follow-up treatment needs.

Objective 3: Control Scotch broom.

- Regularly survey for the presence of this species.
- Hand or mechanically pull in winter where feasible.
- Mow in early spring before seeds are produced, then treat regrowth in the fall or following spring with tryclopyr/aminopyralid combination.
- Monitor to determine follow-up treatment needs.

Objective 4: Control Armenian Blackberry.

- Mow in mid-summer (July), and allow for re-growth. Treat with tryclopyr amine or ester in the fall.
- Monitor to determine follow-up treatment needs.

Areas 3 and 4: Public Use and Research Areas

Rare Species and Habitats

Area 3 is below the road and includes the paved interpretive trail. The grassland is dominated by non-native grasses. Area 4 has had forest cover removed to restore it to prairie, but the vegetation continues to be that of a forest understory, with little prairie vegetation. Area 4 was the subject of native plant restoration research conducted by the US Forest Service. These meadows currently do not support rare or sensitive species. No introductions are planned in these areas.

Recent Management Actions

Polygons 3 and 4 have been burned in the past. Weed control for Scotch broom has also occurred, and these polygons are relatively free of invasive species.

Desired Future Conditions

Open prairie with a minimum of invasive species.

Habitat management objectives and tasks

Objective 1: Maintain open prairie.

- Remove firs as they encroach into the meadows.
- Mow or burn every 4 years. Area 4 is likely not mow-able due to residual stumps; burning may be the best option.

Objective 2: Control false brome.

- Regularly survey for the presence of this species.
- Manually remove small patches as reasonable.
- Spray with glyphosate or grass specific herbicide in early May depending on quality of site conditions and quantity of plants.
- Mow in June to prevent seed production (mowing earlier may result in re-sprouting, and mowing later may simply spread false brome).
- Treat with chemical herbicide in the fall, e.g., glyphosate 2 % gal + oryzalin @ 3.3% + non-ionic or MSO/silicon blend surfactant 0.5%.
- Monitor to determine follow-up treatment needs.

Objective 3: Control Scotch broom.

- Regularly survey for the presence of this species.
- Hand or mechanically pull in winter where feasible.
- Mow in early spring before seeds are produced, then treat regrowth in the fall or following spring with tryclopyr/aminopyralid combination.
- Monitor to determine follow-up treatment needs.

Objective 4: Control Armenian Blackberry.

- Mow in mid-summer (July), and allow for re-growth. Treat with tryclopyr amine or ester in the fall.
- Monitor to determine follow-up treatment needs.

Area 5: Wetland

Rare Species and Habitats

Area 5 is below the road in the southeast corner of the park. The habitat is wet, and includes willows and some native sedges and rushes in addition to introduced species. This area currently does not support rare or sensitive species. No introductions are planned.

Recent Management Actions

Area 5 has had weed control work to remove teasel (*Dipsacus fullonum*).

Desired Future Conditions

This area will consist of open wetland prairie with a minimum of invasive species. Work with US Fish and Wildlife service will determine feasibility of creating a pond in this area as a resource for local wildlife.

Habitat Management Objectives and Tasks

Objective 1: Maintain open habitat.

- Mow or burn every 4 years to keep woody species cover to a minimum.
- Treat as needed to minimize invasive species.

4.5 Site Uses

Research

Fort Hoskins (Unit A, Area 1) was recently a study area for the Collins Project, a long-term, ecoregion-wide study of prairie restoration methods conducted by the Nature Conservancy, Institute for Applied Ecology and numerous partners (Stanley et al. 2010). The objective of the research was to improve management strategies for controlling exotic weeds, particularly perennial grasses, while maintaining or enhancing the abundance and diversity of native plants. The Collins Project began in 2005 and was completed in 2010. Current prairie restoration strategies on other County Park sites use the Collins Project as a model to inform restoration design.

Researchers from the USDA Forest Service have also conducted restoration research at Fort Hoskins (Unit A, Area 4). Two experiments were implemented over time to test different native plant establishment approaches for increasing native plant diversity and abundance (Vance et al. 2006).

In general, research at the site shall be permitted as long as it does not result in long-term negative impacts on habitats. Fort Hoskins is an excellent site for prairie restoration research.

Research opportunities at Fort Hoskins include, but are not limited to:

- Exploring the potential to attract Taylor's checkerspot populations.
- Examining effectiveness of prairie restoration methods.

Recreation

Recreation and interpretive education will continue to be the primary purpose of the southern open meadow area. If Fender's blue or Taylor's checkerspot butterflies come to occupy portions of the site, public access may need to be limited during sensitive stages of the butterflies' life cycle.

Education

Use of Fitton Green as an outdoor classroom for students from various schools is encouraged. Continued restoration/enhancement work could provide additional opportunities for outdoor education about prairie and conifer/hardwood ecosystems.

4.6 Schedule

	Year 1	Year 2	Year 3	Year 4	Year 5
January-February					
March-April					
May-June	Weed control		Weed control		Weed control
	Survey and map invasive species				
July-August					
September-November	Mow or burn			Mow or burn	
	Weed control		Weed control		Weed control
As appropriate	Tree removal/thin as needed		Tree removal/thin as needed		Tree removal/thin as needed
	Manual/mechanical Scotch broom removal				Manual/mechanical Scotch broom removal

CHAPTER 5: JACKSON-FRAZIER WETLAND PRAIRIE MANAGEMENT PLAN



Photo by George McAdams

5.1 Introduction

Site Vision

Benton County's vision for Jackson-Frazier Wetland is a protected and restored natural area with diverse plant and animal communities. It will provide the public with a resource for passive recreational and educational use in addition to offering research opportunities. The wetland will serve as a model for natural area protection, restoration, and management, including research into wetland ecosystems, their components and the application of different management techniques. Preferred public use will consist of nature-oriented activities, including walking, nature study, bird watching, and photography. Opportunities will be available for classroom study and less formal learning about wetland processes, characteristics, functions, and values. Opportunities for volunteers will continue by engaging the community in hands-on management activities. Ecological connectivity will be promoted with the regional landscape, and gains in rare species populations and habitat will be aligned with benchmarks to recover (down-list or de-list) threatened and endangered species.

Management Goals for Jackson-Frazier Wetland

- 1) Maintain and restore habitats.
- 2) Enhance and expand existing populations of Nelson's checkermallow and Bradshaw's lomatium, striving to help these species to recovery (down-listing or de-listing).
- 3) Control invasive species.
- 4) Provide educational and recreational opportunities for local schools and the community.

HCP Mitigation Needs

One of the purposes of the HCP is to forecast unavoidable impacts to rare species and identify restoration (mitigation) work to offset such impacts. The HCP identifies potential impacts that may occur to Nelson's checkermallow along County roads from possible future transportation projects and from emergency response activities (e.g., fire-fighting, vehicle accidents, hazardous materials spill cleanup, emergency vehicle response) both on roadsides and within Jackson-Frazier Wetland. To fulfill its mitigation requirements for Nelson's checkermallow, the County must achieve an increase of approximately 540 checkermallow plants at Jackson-Frazier. This may occur through habitat restoration and enhancement, seeding or planting plugs. The precise number of checkermallow required for mitigation may vary with the timing and pace of impacts and mitigation work (see Chapter 6 of the HCP (Benton County 2010) for more information). Mitigation work that is completed prior to impacts is typically favored and receives a lower mitigation burden.

The HCP also identifies potential impacts to Bradshaw's lomatium that may occur as a result of emergency response activities within Jackson-Frazier and the neighboring City of

Corvallis property (referred to as the Lancaster Property in the HCP). To fulfill its mitigation obligations, the County (in collaboration with the City) must achieve an increase of 20 plants. This may occur through habitat restoration and enhancement, seeding or planting plugs.

5.2 Background Information

Location and Context of Site

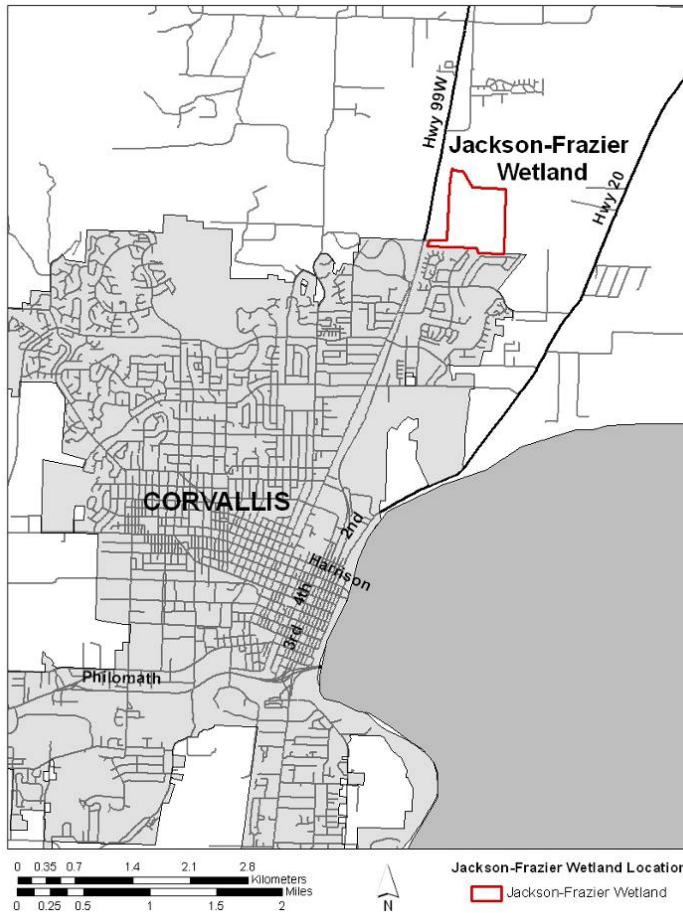


Figure 5.1 Location of Jackson-Frazier Wetland near Corvallis, Oregon.

Jackson-Frazier Wetland is a 144 acre site located immediately north of the Corvallis, Oregon, city limits (Figure 5.1). The site is bordered to the south by a dense housing development, and a small area of City of Corvallis Community Development Department land. The western edge is entirely bordered by City or Greenbelt Land Trust property that is part of the Owens Farm Open Space. These lands are in conservation or farm lease. The large (140 acre) lot to the north is zoned for exclusive farm use and is under private ownership.

Jackson-Frazier Wetland is fed by Jackson and Frazier Creeks, which drain from McDonald State Forest. The wetland retains water until it reaches saturation, and reduces downstream flooding as it filters flows. Jackson-Frazier was judged to be one of the least altered wetlands in the Willamette Valley Ecoregion and is considered a Reference Wetland.

Brief Historic Context

Historical use of Jackson-Frazier has been tracked back to approximately 1850. Activities at the site have included native hay production, waterfowl hunting, and heavy grazing. Part of the wetland was controversially cleared and drained in 1985, without appropriate clearance or permits from the county, state or federal governments. Eventual foreclosure by the owner led to County ownership in 1990 (Frenkel and Reed 2005), and Benton County established the park in 1992 to protect the natural features of the area and provide

educational and research opportunities. Four acres of the site have a conservation easement held by the Greenbelt Land Trust since 2002.

5.3 Overview of Habitats and Species

General

Jackson-Frazier wetland includes multiple habitat types. There are approximately 49 acres of wet prairie habitat, 65 acres of mixed forest-shrub habitat through much of the center of the property, about 3.5 acres of upland habitat along the northwest border, and about 12.5 acres of upland on the southeast corner.

Management Units

The habitat at Jackson-Frazier Wetland can be divided into five different habitat units: Upland, Wetland Prairie, Mixed Forest-Shrub, Recreation and Education, and Upland Reserve.

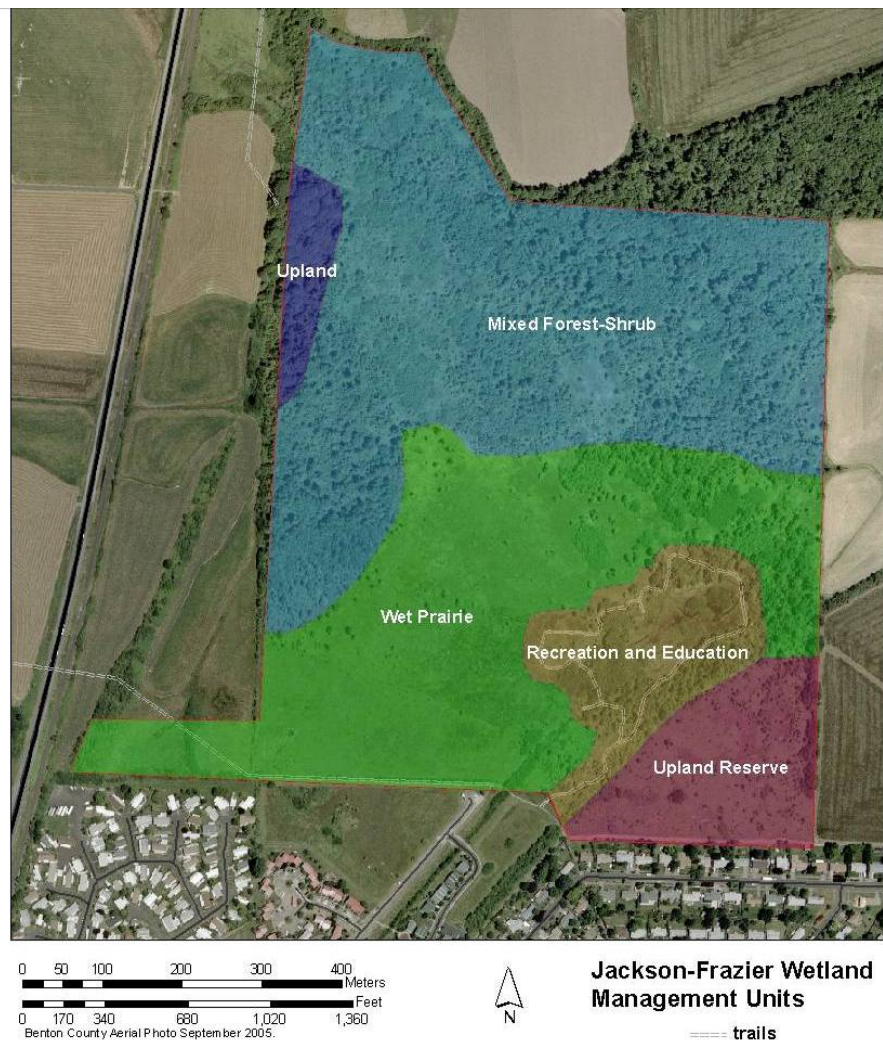


Figure 5.2 Management units at Jackson-Frazier Wetland.

Soil Types and Distribution

The majority of Jackson-Frazier has flooded Bashaw clay soils. These are deep, poorly drained clay soils with frequent ponding and flooding. The upland areas include Woodburn silt loams and Willamette silt loams, deep soils with excellent to moderate drainage. Transitional areas have deep but poorly drained Awbrig or Waldo silty clay loams (Figure 5.3).

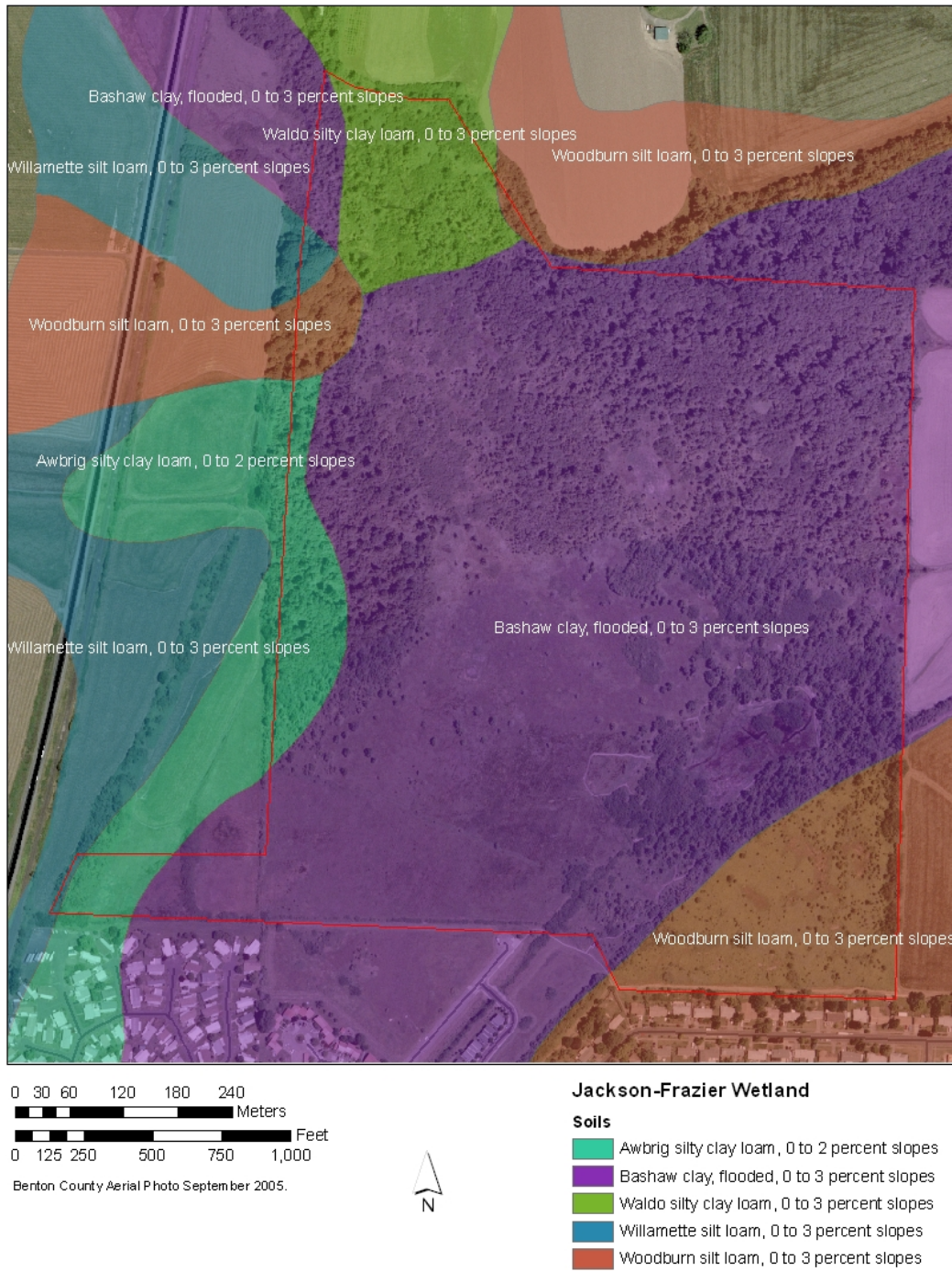


Figure 5.3 Soils at Jackson-Frazier Wetland.

Historic Vegetation

From 1851 to 1865, the General Land Office surveyed the Willamette Valley in preparation for Euro-American settlement. The surveyors' notes detailed the vegetation, soils, and topography encountered as they crossed the landscape. The Nature Conservancy has used this information to reconstruct the historic vegetation patterns of the Willamette Valley (Christy et al. 2005). This mapping suggests that Jackson-Frazier historically included Roemer's fescue upland prairie, tufted hairgrass seasonally wet prairie, emergent wetlands and oak savanna (Figure 5.4).

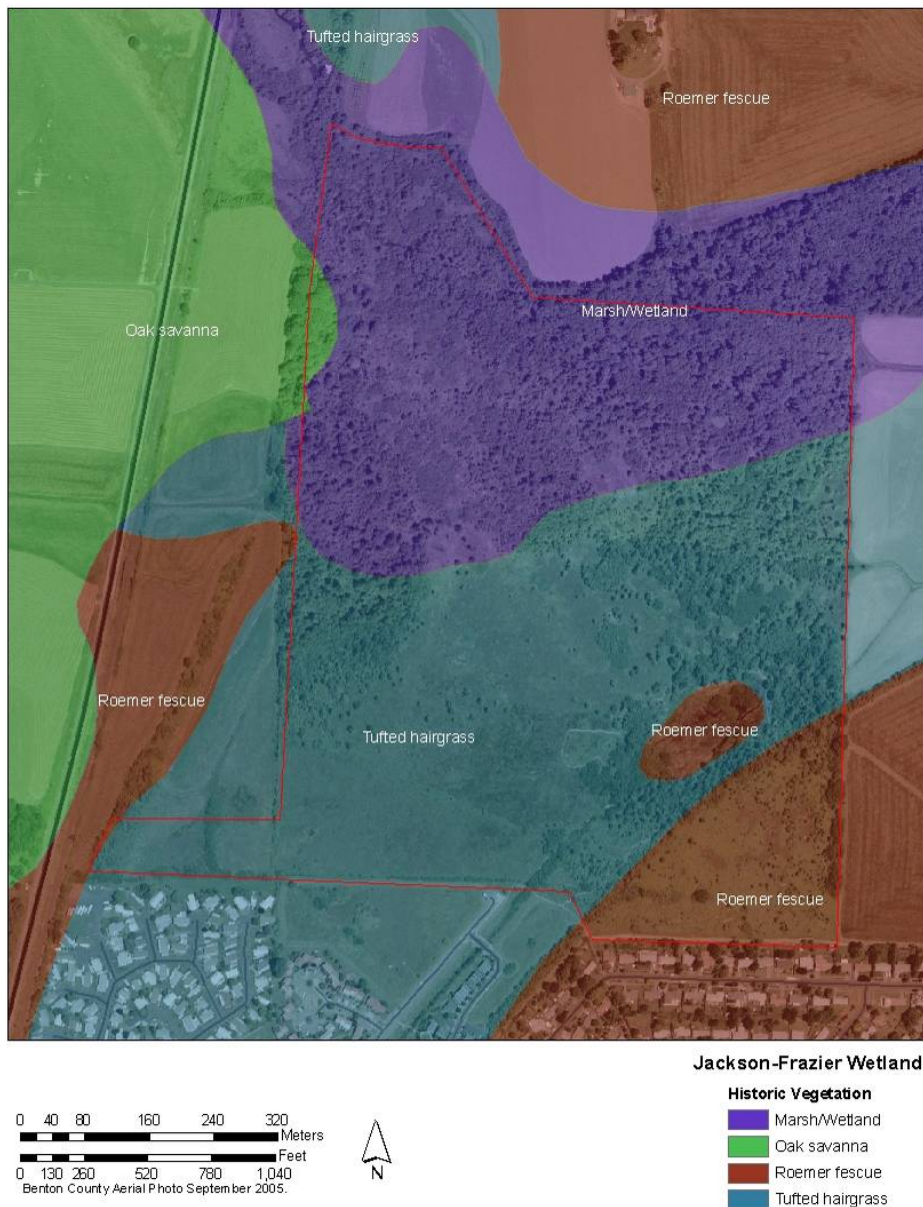


Figure 5.4 Pre-Euro-American settlement vegetation at Jackson-Frazier Wetland.

Sensitive Species

Locations of Bradshaw's lomatium, Kincaid's lupine, Nelson's checkermallow are shown in Figure 5.5.

Bradshaw's Lomatium

Jackson-Frazier has a natural population of Bradshaw's lomatium (*Lomatium bradshawii*), observed to be 475 plants by J. Kagan in 1986, 365 plants by Kaye and Kirkland in 1993, and 23 plants in 2003 (Kaye 2003). 2007 Benton County HCP surveys found a total of 88 plants (Benton County unpublished data).

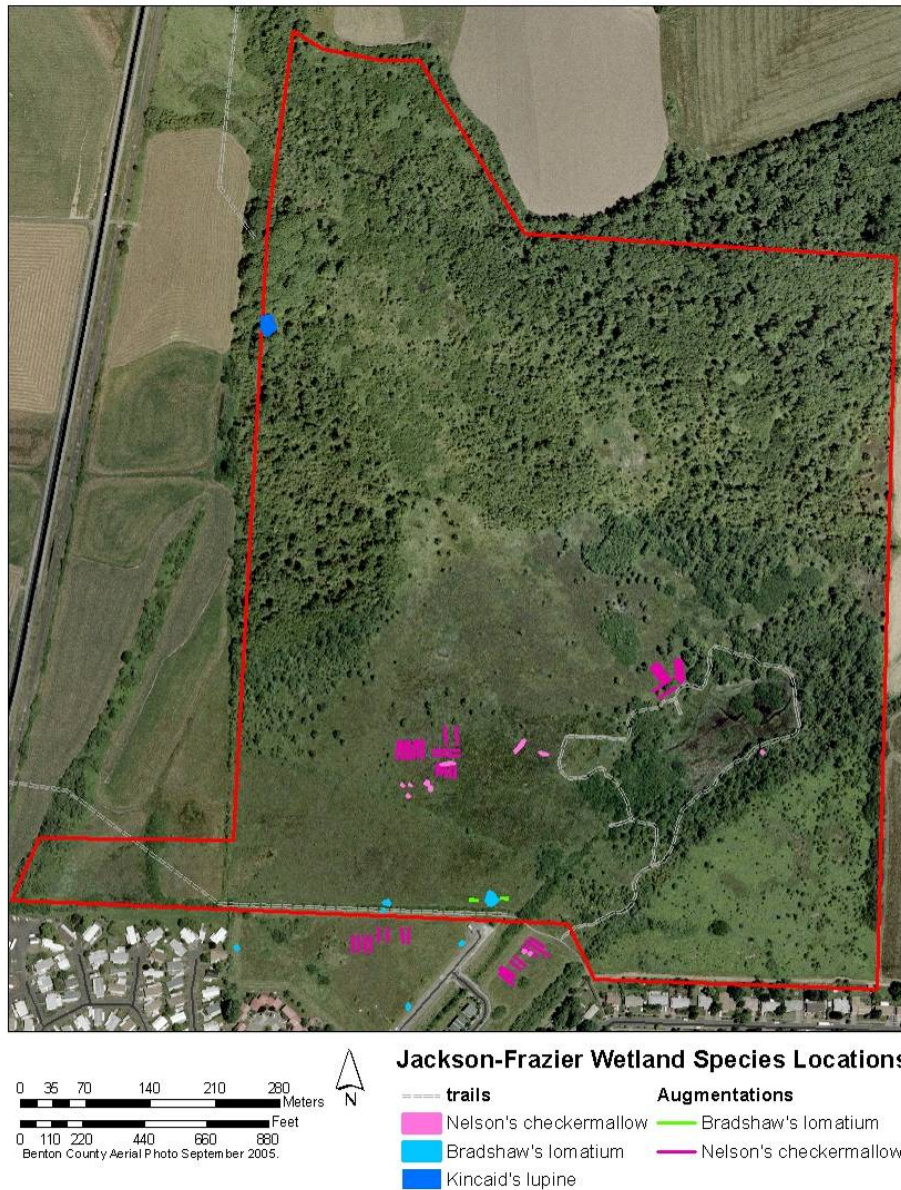


Figure 5.5 Sensitive species locations, both wild and augmented populations, at Jackson-Frazier Wetland.

Kincaid's Lupine

A wild population of Kincaid's lupine of approximately 5 square meters is located in the upland management unit along the western border of Jackson-Frazier. The population is imbedded within a small opening of deciduous woodland. Fender's blue butterfly has not been observed at this Kincaid's site. The population is not robust and the nearest Fender's blue butterfly population is located farther away than the typical butterfly dispersal distance.

Nelson's Checkermallow

Jackson-Frazier has a wild population of Nelson's checkermallow (*Sidalcea nelsoniana*). Surveys in 2003 found 4 Nelson's checkermallow plants (Kaye 2003) and Surveys for the Benton County HCP in 2007 found 53 plants (Benton County unpublished data).

Species Introductions and Augmentations

The Bradshaw's lomatium and Nelson's checkermallow populations at Jackson-Frazier have been augmented (Table 5.1); see map of Jackson-Frazier (Figure 5.5) for locations.

Table 5.1 Status of species augmentations at Jackson-Frazier Wetland as of August 2009.

Species	Date	# Seeds	# Transplants	# Established
Nelson's checkermallow	4/20/2006		7	6
	5/4/2006		19	6
	5/11/2007		92	88
	5/15/2007		167	65
	6/1/2007		34	26
	5/29/2008		134	
	6/3/2008		71	
	5/1/2010		42	
	12/1/2010		580	
Bradshaw's lomatium	4/3/2007		20	9
	2/12/2008	500		17
	5/1/10		37	

Issues of Concern

Reed canarygrass is present throughout Jackson-Frazier Wetland. The most successful control to date has been achieved through cycles of three years of repeated mid-summer mows followed by fall glyphosate treatments.

Management actions in areas with rare species (Lomatium and checkermallow) should adhere to the management protocols in HCP Appendix J: Prairie Habitat Vegetation Management Guidelines, including the following parameters:

Mowing

- Mowing shall occur between August 15-February 28 while listed and/or covered plant species are dormant.
- Tractor mowing should occur when soils are dry enough not to be disturbed by tires/tracks, and the mowing deck must be set a minimum of 15 cm (6 in) above the ground for all covered plants.
- Spring mowing is only allowed where it is necessary to control a weed infestation involving a weed species reproducing mainly by seed (e.g., meadow knapweed), in which case up to ½ of the listed and/or covered plant population may be mowed in an effort to control invasive species seed set.

Prescribed Burning:

- Prescribed burning will occur as needed to restore habitat for Nelson's checkermallow, Bradshaw's lomatium and Kincaid's lupine. As prior research has demonstrated that fire effects are positive or neutral for Bradshaw's lomatium and Kincaid's lupine, 100% of the populations may be burned in any given year. For Nelson's checkermallow, burning will be limited to 50% of the population until research indicates fire effects are positive or neutral.
- Prescribed burning will occur in late summer or early fall after the target species have gone dormant.

Chemical treatments:

In some cases Nelson's checkermallow does not go completely dormant in the fall and winter. Therefore, use of herbicides when this species is present requires additional precautions:

- Plants must be shielded from herbicide drift or overspray with buckets, tree protection tubes, or other suitable material or method of application. Application should be by hand (e.g., backpack sprayer wand) when spraying within 2 m (6 ft) of Nelson's checkermallow plants.
- Exceptions include herbicides that do not harm Nelson's checkermallow (such as grass-specific herbicides) and wipe-on applications that target other species and do not result in drift. These exceptions are noted in Table J.1, HCP Appendix J.

5.4 Habitat Management Units

Recreation and Education Unit

Habitats and Species

This unit includes wet prairie and shrub-swale forest, with a 3,400 ft wooden boardwalk circling through it for public access. The plant community includes some isolated individuals of wild Nelson's checkermallow near the boardwalk. There is reed canarygrass present on the interior of the boardwalk area. Beaver activity is occurring close by as well.

Recent Management Actions

A dense stand of reed canarygrass in the interior boardwalk area was treated in 1995, for three consecutive years; a protocol developed by The Nature Conservancy was used, which called for mowing reed canarygrass in July, and spraying with glyphosate in the fall. Each year thereafter, reed canarygrass was spot sprayed. Some contiguous areas of wild rose were cut to maintain wet prairie openings.

Desired Future Conditions

This unit will persist in its natural condition, with weed control to keep invasive species at bay and preserve the aesthetic beauty as seen from the recreational/interpretive boardwalk. Additional ethnobotanical interpretive station and information will be added.

Habitat Management Objectives and Tasks

Objective 1: Maintain Nelson's checkermallow.

- Remove or girdle tree or shrub species that are shading the checkermallows.
- Mow area to minimize shrub competition in late summer after the checkermallows have set seed.
- Control exotic species competition through hand removal or targeted herbicide application while the checkermallows are dormant.
- Monitor to track checkermallow abundance.
- If the population declines, consider augmenting with seeds or plants grown from seeds collected from other Jackson-Frazier checkermallows.

Objective 2: Control invasive species where they are accessible.

- Conduct annual surveys and mapping in accessible areas of the unit.
- Treat problem species as needed.
- Monitor to evaluate control.

Wet Prairie

Habitats and Species

The habitat in this unit consists of a mix of sedges, sloughgrass, rushes, and shrubs, including sweetbriar rose. Bradshaw's lomatium and the largest patch of wild Nelson's checkermallow at Jackson-Frazier occur in this unit.

Recent Management Actions

Many methods have been attempted to control rose cover in this unit. The current method in use is to complete a unit-wide mow every four years, with repeated annual mowing in areas with heavy rose cover. Limited burning has occurred in areas with Lomatium, but unit-wide burning is unlikely due to the neighboring urban area.

Desired Future Conditions

This unit will be maintained as a diverse wet prairie, with controlled rose cover. Management actions will preserve areas with a diversity of willows for bird habitat and establish more Nelson's checkermallow and Bradshaw's lomatium.

Habitat Management Objectives and Tasks

Objective 1: Enhance wet prairie diversity.

- Mow in late summer (or burn isolated areas, if possible).
- Seed with native forbs in the fall, consider including camas (*Camassia quamash* and *C. leichtlinii*), Oregon sunshine (*Eriophyllum lanatum*), elegant downingia (*Downingia elegans*), mule's ears (*Wyethia angustifolia*) and coyote-thistle (*Eryngium petiolatum*).

Objective 2: Control rose and successional vegetation invasion.

- Mow entire unit every 4 years.
- Mow areas of dense rose cover annually in late summer.
- Continue to test other control methods.

Objective 3: Control reed canarygrass.

- In areas with reed canarygrass, every year for 4 years minimum, mow in mid-summer and treat with glyphosate in the fall.
- Spot spray annually to control isolated patches.
- Monitor to evaluate control.
- Continue to test other control methods.

Objective 4: Enhance and expand the Bradshaw's lomatium population.

- Collect lomatium seed in June, particularly in years when a burn will be conducted. Do not collect more than 15% of seeds produced. Prepare seeds as recommended in HCP Appendix L: Plant materials Collection and Plant Introduction Protocols for later planting or cultivation.
- Conduct late summer or fall prescribed burns between the two patches of Lomatium along the southern border of Jackson-Frazier every 2-3 years. The burn area should include both Lomatium patches and the strip of habitat in between, to create more potential habitat. If possible, coordinate with the City to burn the adjacent habitat on City land as well.
- On non-burn years, mow lomatium areas to reduce competition.
- Direct seed in fall or plant plugs in spring.
- Monitor to evaluate planting success.

Objective 5: Expand Nelson's checkermallow population.

- Annually collect seed in July/August. Do not collect more than 15% of seeds produced so as not to limit natural recruitment at the site.
- Prepare seeds as recommended in HCP Appendix L: Plant materials Collection and Plant Introduction Protocols for later planting or cultivation.
- Direct seed in fall or plant plugs in spring.
- Reduce competition as needed to maintain checkermallow populations.
- Monitor to evaluate planting success.

Mixed Shrub Unit

Rare Species and Habitats

This unit is comprised of dense shrubby vegetation including willow and ash, with patchy reed canarygrass present throughout. No rare species have been located in this unit.

Recent Management Actions

The dense vegetation along inlet corridors makes searches for weeds (e.g., reed canarygrass) and weed control extremely difficult. Trial control treatments were only possible with aggressive vegetation removal.

Desired Future Conditions

This unit will provide valuable wildlife habitat and will remain in its natural state, with minimal reed canarygrass.

Habitat Management Objectives and Tasks

Objective 1: Control reed canarygrass as possible.

- In accessible areas with reed canarygrass, every year for 4 years minimum, mow in mid-summer and treat with glyphosate in the fall.
- Monitor to evaluate control.
- Continue to test other control methods.

Upland Unit

Rare Species and Habitats

Supports diversity of native forbs, including Kincaid's lupine, but is heavily overgrown. The invasive grass false brome is present. Some oaks are present, but primary tree cover is from big leaf maple (*Acer macrophyllum*).

Recent Management Actions

Some clearing has occurred to maintain Kincaid's lupine through otherwise impenetrable vegetation.

Desired Future Conditions

No active restoration is planned for this unit at this time. Maintenance to preserve and access to lupine and the unit will occur. Monitoring and control of false brome occurs annually.

Habitat Management Goals, Objectives and Tasks

Objective 1: Maintain access to Kincaid's lupine.

- Clear access and area immediately around lupine every 3 years.

Upland Prairie Reserve Unit

Rare Species and Habitats

This area is primarily composed of introduced species including tall fescue (*Festuca arundinacea*), with increasing Armenian blackberry (*Rubus armeniacus*) cover. No rare species are present.

No rare species are known in this area at this time, nor are any introductions planned. This area could potentially support rare species in the future if the necessary site preparation were completed.

Recent Management Actions

Unmanaged at this time.

Desired Future Conditions

Maintain current conditions.

Habitat management objectives and tasks

Objective 1: Maintain access.

- Mow accessible areas annually.

5.5 Site Uses

Research

Research at the site shall be encouraged as long as it does not result in long-term negative impacts on species or habitats. Occasional research involving species or habitat manipulations that may have short term impacts to species or habitats may be allowed if approved under consultation with the Parks Advisory Board and the US Fish and Wildlife Service, as appropriate.

Research needs at Jackson-Frazier Wetland include, but are not limited to

- Developing a successful method of reed canarygrass control that does not reduce habitat for other species or aesthetic values.
- Evaluate response of Nelson's checkermallow to fire.

Recreation

The site is open to public use, although foot traffic is limited to the wooden boardwalk winding through the wetland. Continued use for passive recreation, including walking, bird watching, and wildflower viewing, is expected and encouraged.

Education

Jackson-Frazier provides an excellent opportunity for both community and school-based education. Multiple natural and historical interpretive stations are located along the boardwalk. The wetland has been used as an outdoor classroom for Corvallis middle and high school students for many years. In addition to other activities, students have

participated in restoration work to plant Nelson’s checkermallow and Bradshaw’s lomatium.

5.6 Schedule

	Year 1	Year 2	Year 3	Year 4	Year 5
January-February	Review management activities with botanist				
March-April			Plant LOBR & SINE plugs		Plant LOBR & SINE plugs
May-June	Survey and map invasive species.				
	Weed control				
	HCP Monitoring (Baseline)			HCP Monitoring	
	Monitor planting establishment as needed				
		Collect LOBR seeds		Collect LOBR seeds	
July-August	Obtain plant materials for fall or upcoming spring plantings				
	Mow reed canarygrass and rose areas				
	Collect Nelson’s checkermallow seeds				
September-October		Mow wet prairie unit, seed SINE, native forbs		Mow wet prairie unit, seed SINE, native forbs	
	Mow LOBR	Burn LOBR, then seed LOBR and native forbs	Mow LOBR	Burn LOBR, then seed LOBR and native forbs	Mow LOBR
	Weed control				
	Treat reed canarygrass with glyphosate				
As appropriate	Tree removal/thin			Tree removal/thin	

LOBR= Bradshaw’s lomatium
 SINE = Nelson’s checkermallow

CHAPTER 6: CRISP-LIDDELL PROPERTY MANAGEMENT PLAN

A Benton County Fender's Blue Butterfly Conservation Area



6.1 Introduction

Site Vision

This site will add to a network of sites in the region for Fender's blue butterfly and Kincaid's lupine, establishing a critical link between the two other largest protected populations on The Nature Conservancy's Willow Creek Preserve (Lane County) and Baskett Slough National Wildlife Refuge (Polk County). It will complement the populations of these species at the Greenbelt Land Trust's Lupine Meadows in Benton County. This network is essential for the recovery of Kincaid's lupine and Fender's blue butterfly. The site will be managed for acceptable levels of public access for planned tours, educational restoration activities, and research projects by local scientists and students.

Management Goals for Crisp-Liddell Property

- 1) Enhance and augment critical sources of nectar and host plants for Fender's blue butterfly, to sustain the existing population and promote expansion of the population.
- 2) Reduce, to the maximum degree possible, threats to Fender's blue butterfly and Kincaid's lupine populations and associated habitat posed by aggressive introduced plant species.
- 3) Manage the prairie habitat at the site to remain as open prairie, by controlling encroachment of woody shrub species such as hawthorn (*Crataegus monogyna*) and young Douglas-fir (*Pseudotsuga menziesii*).
- 4) As possible, introduce populations of other Willamette Valley sensitive species.

HCP Mitigation Needs

One of the purposes of the HCP is to forecast unavoidable impacts to rare species and identify restoration (mitigation) work to offset such impacts. The precise amount of restoration required for mitigation may vary with the timing and pace of impacts and mitigation work (see Chapter 6 of the HCP for more information). Mitigation work that is completed prior to impacts is typically favored and receives a lower mitigation burden.

Impacts to Fender's blue butterfly and its habitat will be mitigated at the Fender's blue butterfly Conservation Areas, which include the Crisp-Liddell Property and the Percy-Schoener Easement. Such impacts will include those from transportation activities in County right-of-way, public service facility construction and home, and home, farm and forest construction on private lands within butterfly habitat in Benton County. The mitigation will be accomplished by expansion of existing lupine and nectar species populations to achieve a total increase in nectar species cover of 7,729 square meters, and an increase in Kincaid's lupine plant cover of 402 square meters.

6.2 Background Information

Site Location and Context

The property covers 28.3 acres. The majority of this area was recently acquired by Benton County from the Lumos Wine Company's Wren Vineyard, a 106 acre property located in the Cardwell Hill area of Benton County, Oregon. A smaller portion of the property was acquired from the neighboring Liddell property, which is 26 acres in its entirety

The surrounding parcel includes Wren Vineyard, which contains 10.5 acres planted in wine grapes. The vineyard is organically farmed, Food Alliance and Salmon Safe Certified. Food Alliance requires standards for social and environmental responsibility. The vineyards have been audited for safe and fair working conditions, soil and water conservation, pest management, nutrient management, protection of wildlife habitat and other agricultural concerns. The winery has been audited for safe and fair working conditions, conservation of energy and water, waste management, elimination of toxic and hazardous materials, and other facility management concerns. The Salmon Safe certification requires that wine produced is created using healthy practices that keep Pacific Northwest rivers clean enough for native salmon to spawn and thrive. Farms and urban sites earn Salmon-Safe certification after a rigorous assessment that includes on-the-ground inspection by expert independent certifiers. Benton County will adhere, to the maximum extent practicable, to the standards set within the Food Alliance and Salmon Safe Programs during management actions within the property.

Brief Historic Context

Benton County purchased property from both the Crisp and Liddell families in 2011, combining land to create this parcel. The Crisp family originally purchased the property in 1975. At the time of purchase, the "dome" of the prime habitat area was completely unforested; all trees have been naturally recruited. The lower areas of the slope were planted to winter wheat, and the flat bottom (south end) was planted in alfalfa. The Crisps had a few cows (about 5). The surrounding vineyards were planted in 1985-86. The dome area has been untouched (no grazing or other use) since 1982. The eastern ¼ of the property area was purchased by the Liddell family purchased 1996.

6.3 Overview of Habitats and Species

General

The property includes areas of high quality upland prairie with oak savanna components. The plant community includes abundant Kincaid's lupine -*Lupinus sulphureus* ssp. *kincaidii*, the host plant for Fender's blue. Native nectar species for the butterfly are present, including dwarf checkermallow (*Sidalcea virgata*), Oregon sunshine (*Eriophyllum lanatum*), and Oregon iris (*Iris tenax*). The site includes areas of native California oatgrass (*Danthonia californica*) and Roemer's fescue (*Festuca roemerii*) prairie components.

Scattered Oregon white oak (*Quercus garryana*) are located primarily along the ridge of the dome, as are Douglas-fir (*Pseudotsuga menziesii*).

Soil Types and Distributions

Soils include Dixonville-Gellatly-Witham Complex, Dixonville-Gellatly Complex. Both these soils are typically found in hilly landscapes, and are well drained. The former is deep, at greater than 72 inches, while the latter is often less than 20-40 inches deep.

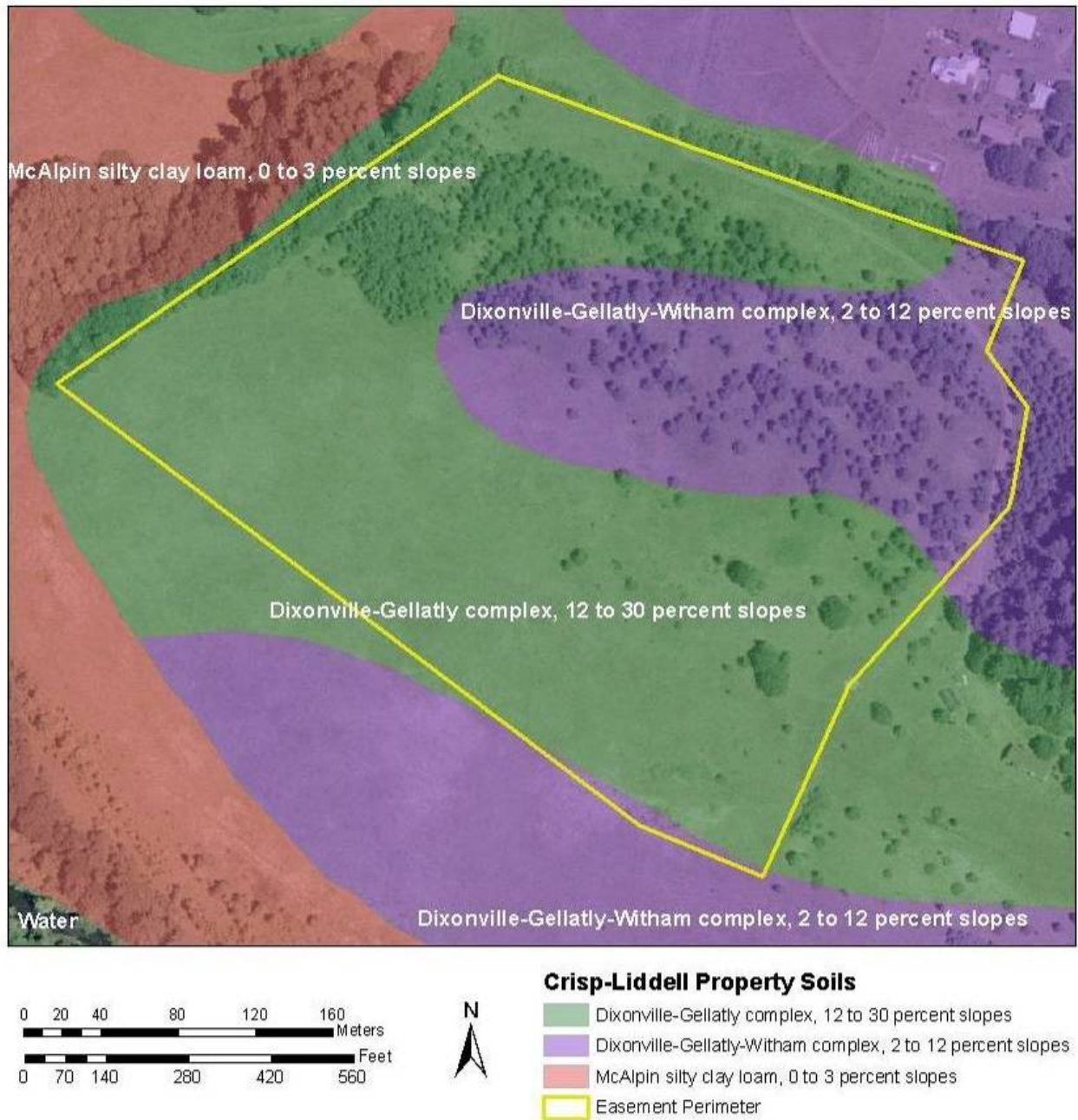


Figure 6.1 Soils at the Crisp-Liddell Property.

Historic Vegetation

From 1851 to 1865, the General Land Office surveyed the Willamette Valley in preparation for Euro-American settlement. The surveyors' notes detailed the vegetation, soils, and topography encountered as they crossed the landscape. The Nature Conservancy has used this information to reconstruct the historic vegetation patterns of the Willamette Valley (Christy et al. 2005). This mapping suggests that the entire Crisp-Liddell property was upland prairie, likely dominated by Roemer's fescue, at that time (Figure 6.2).

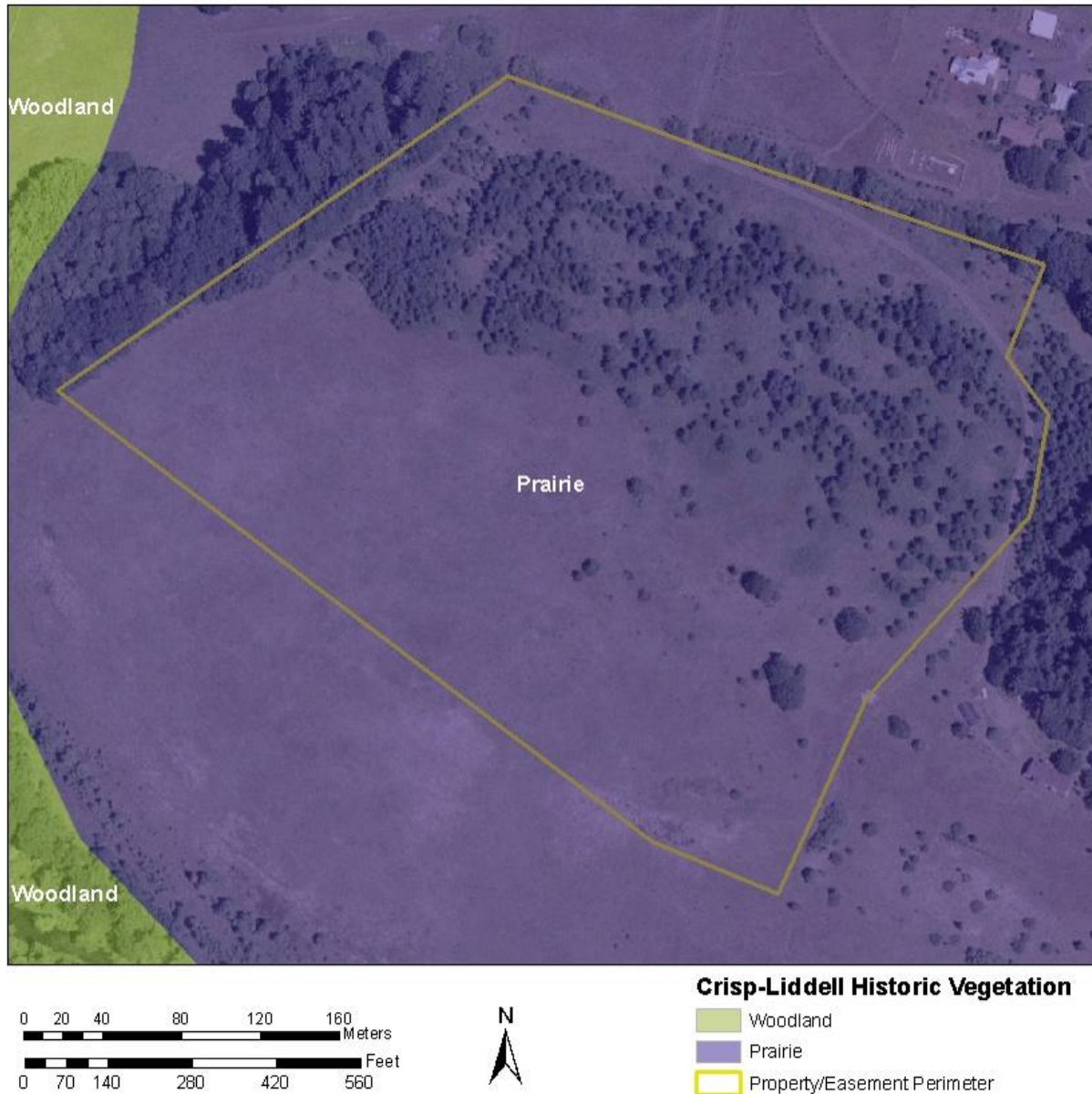


Figure 6.2 Pre-European settlement vegetation at the Crisp-Liddell Property.

Sensitive Species

The easement area supports one of the largest known populations of Fender's blue butterfly, an endangered species, and its host plant, Kincaid's lupine, a threatened species, in Benton County. The site also supports high quality native nectar species that serve as food for the butterfly (Table 1.1).

Sensitive Species Introductions

There have been no sensitive species introductions to date, but the site contains suitable upland prairie habitat for introduction of Willamette daisy (endangered species) and golden paintbrush (endangered, and currently extirpated from Oregon).

Issues of Concern

False brome

False brome (*Brachypodium sylvaticum*), is an extremely invasive perennial grass. This species is widespread within the Cardwell Hill area. Controlling false brome and minimizing its spread into high-value prairie areas will require regular treatments and monitoring. All management activities must take care not to spread this species within the site or to other sites.

The most effective treatment known currently, other than complete removal by hand, is to mow in the summer (July) then treat with glyphosate and a pre-emergent in the Fall (glyphosate (2%) plus oryzalin at 3.3% with a non-ionic or MSO/silicon blend surfactant at 0.5%).

Management Considerations for Salmon Safe and Food Alliance

Work completed by Benton County or its contractors at the Crisp-Liddell property will work to:

- Provide safe and fair working conditions
- Ensure the health and humane treatment of animals
- No use of hormones or non-therapeutic antibiotics
- No genetically modified crops or livestock
- Reduce pesticide use and toxicity, and avoid pesticides defined as high risk by Salmon-Safe (www.salmonsafe.org) or Food Alliance (www.foodalliance.org).
- Protect soil and water quality through riparian area management, water use management, erosion and sediment control, chemical use management, animal management, and biodiversity conservation.
- Protect and enhance wildlife habitat
- Continuously improve management practices

6.4 Habitat Management

Rare Species and Habitats

The easement area includes areas of high quality upland prairie with oak savanna components. The plant community includes abundant Kincaid's lupine -*Lupinus sulphureus* ssp. *kincaidii*, the host plant for Fender's blue. Native nectar species for the butterfly are present, including dwarf checkermallow (*Sidalcea virgata*), Oregon sunshine (*Eriophyllum lanatum*), and Oregon iris (*Iris tenax*).

Recent Management Actions

Extensive work was completed in 2008 and 2009 to remove Douglas-fir that naturally recruited along the dome, and limb-up trees that were retained. A work crew was used in April of 2009 to manually remove Armenian blackberry from the site. In some areas bare soil created during the fir and blackberry removal has been occupied by some non native species, including velvet grass (*Holcus lanatus*), oxeye daisy (*Leucanthemum vulgare*). Much of the Scotch broom at the site has also been removed, but there are still small plants appearing every year. False-brome is present at the site, appearing in small patches that can be manually removed. Meadow knapweed (*Centaurea pratensis*) has not been observed at the site.

Desired Future Conditions

Habitat will be managed for healthy populations of Fender's blue butterfly and native species diversity through upland prairie restoration and enhancement. Management actions may also benefit other rare species that reside in upland prairie habitat (for example Willamette daisy and Golden paintbrush), so long as they are compatible with the Fender's blue butterfly habitat.

Habitat Management Goals, Objectives and Tasks

Goal 1: Enhance and augment critical sources of nectar and host plants for Fender's blue butterfly, to sustain the existing population and promote expansion of the population.

Objective 1: Reduce competition from introduced perennial grasses and shrubs.

- Either burn or mow at least every two years, especially in introduced perennial grass or shrub dominated areas.
- Remove or rake to side the cut material to minimize thatch accumulation (<20% cover), decrease moss at the soil surface and increase the opportunity for seed to soil contact for native forb species.
- If prescribed fire is used, seed with native forbs the fall after the burn to take advantage of "release" in competition and nutrients.
- All burning and mowing activities must be compatible with large populations of Fender's blue, therefore only one third of occupied habitat will be treated annually (USFWS 2008).

Objective 2: Increase native forb nectar species seed availability in grass dominated areas through drilling seeds, broadcasting seeds and using plugs (transplants).

- Use a seed drill to plant larger seeded natives in areas with existing heavy plant cover.
- Use broadcast seeding when conditions or site preparation will allow seed to soil contact.
- Utilize plugs of nectar species as appropriate in areas where establishment by seed proves difficult, such as in areas with dense perennial grasses.

Objective 3: Work to expand areas of Kincaid’s lupine. Especially target the southwest facing side of the dome, and the foot of the dome.

- Use direct seeding of lupine seeds with site preparation.
- Use transplanted plugs of lupine as appropriate.

Objective 4: Take advantage of bare soil areas as opportunities for lupine and nectar species direct seeding.

- Direct seed lupine and nectar species seeds.
- Direct seed quick growing natives, for example Clarkia (*Clarkia amoena*) or madia (*Madia gracilis*) to occupy the space and exclude competitors, and introduce lupine and nectar species later.

Objective 5: Encourage oak savanna habitat to create habitat for additional bird species and generate partial shade to facilitate nectar and host species establishment and persistence through climate change.

- Plant scattered oaks.
- Retain some existing young oaks.

Management Goal 2: Reduce to the maximum degree possible, threats to Fender’s blue butterfly, Kincaid’s lupine and associated habitat posed by aggressive introduced plant species.

Objective 1: Prevent establishment of new invasive species or invasive species that are currently uncommon at the site.

- Annually, use a grid search to locate and manually remove new or uncommon invaders, including false brome, Scotch broom, and meadow knapweed.
- Steam clean all equipment that is brought in to avoid seed transfer.

Objective 2: Control existing invasive or aggressive exotic species.

- Heavy tall oatgrass (*Arrhenatherum elatius*) areas should be annually mowed before the grass flowers (by early June). If herbicide is to be used for tall oatgrass control, spot spray in April (at the “boot” stage) with a grass specific herbicide.
- Armenian blackberry will be dug up to completely remove crowns. If herbicide is used, spot spray in September-October to hit target the maximum leaf area.
- Control bracken fern as possible. This species currently has few successfully tested manual control methods. Repeated mowing or weed-eating at a high level (above lupine and nectar species) may be effective to suppress bracken. If herbicide is used, weed wipe as needed (with attention to Fender’s blue habitat needs).

Objective 3: Manage any currently “bare” areas and any areas where bare or disturbed soil is created by weed control or tree removal to keep native seed pressure and native species propagule availability high.

- Drill Roemer’s fescue in ‘bare” or annual plant species dominated areas in September or October. In dry and cold years, it may be possible to seed Roemer’s in February and March- the species requires 2 weeks chilling prior to germination. This species, or others, may be used to “hold space” for nectar species to be introduced later.
- Older gaps that weren’t well managed may need to “start over”, by disturbing the ground again, and heavily re-seed with native species, including Oregon sunshine. Only the “gap” size that can be intensively managed shall re-started in any given year.
- If herbicides are to be used for weed control in weedy gap areas where other manual removal efforts fail, a soil active variety may be most effective to control the weedy species seedbed.

Management Goal 3: Manage the prairie habitat at the site to remain as open prairie, by controlling encroachment of woody shrub species such as hawthorn (*Crataegus monogyna*) and young Douglas-fir (*Pseudotsuga menziesii*).

Objective 1: Control woody shrub species.

- Either burn or mow at least every two years, especially in introduced shrub dominated areas.
- Treat larger shrub stumps with glyphosate or other herbicide as needed if re-sprouting is a problem.

Objective 2: Retain larger Douglas-fir on the dome and managed for timber value, then remove them and do not replant

- Retained trees shall be maintained at a spacing to allow mowing between them.
- Small Douglas-fir that recruit (self-seed) naturally shall be removed, as will firs that are suppressing oaks.
- Proceeds (above costs) of any timber harvested shall be invested in habitat management within the managed area.

Management Goal 4: As possible, introduce populations of other rare Willamette Valley species.

Objective 1: Introduce and establish rare plant populations.

- Introduce populations of Willamette daisy, golden paintbrush, and shaggy horkelia (*Horkelia congesta*).

6.5 Site Uses

Research

Scientific studies at the site should be encouraged but will be limited to those with minimal or no destructive sampling (e.g., removal of large amounts of native vegetation, severe soil

disturbance, alteration of hydrology). The goals of research at the site should include improvement of conditions in native ecosystems. Treatment area sizes should be small enough to limit risks of unexpected, harmful results.

Recreation

The property may be used to encourage appreciation of nature and local habitats, but such use will occur only where and when it will not cause harm to the site. Visitors to the Wren Vineyard currently may walk down an existing road along the west edge of the easement, and this use may continue. Any additional trails will be located around the perimeter of the easement area, in a manner to avoid sensitive species and habitats on the site, and will specifically avoid interior areas of the easement within habitat of Kincaid's lupine and Fender's blue butterfly. Dogs and wildflower picking will be prohibited. Public access to the interior of the easement site will be through supervised tours only. These visits may happen year-round, but access to the dome where Kincaid's lupine and Fender's blue butterfly occur, will be prohibited from the beginning of March through June. In the event that a perimeter trail is established, visitors will be restricted to the trail except during guided events.

Education

Participation of local groups, including schools, watershed councils or conservation organizations in activities at the site will be encouraged. Such groups may visit the site to assist with restoration and management activities and to tour the site as an example of a Willamette Valley ecosystem. In addition, the property can serve as a demonstration site for groups of land managers and members of the public interested in prairie conservation, restoration and management.

6.6 Schedule

	Year 1	Year 2	Year 3	Year 4	Year 5
January-February	Review management activities with lepidopterist and botanist				
March-April		Plant native forbs/nectar, LUSUKI and other rare species		Plant native forbs/nectar, LUSUKI and other rare species	
May-June	Survey and map invasive species.				
	Weed control				
	HCP Monitoring (Baseline)			HCP Monitoring	
	Monitor planting establishment as needed				
July-August	Obtain plant materials for fall or upcoming spring plantings				
	Collect Kincaid's lupine seeds				
September-October	Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species		Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species		Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species
	Weed control				
As appropriate	Tree removal/thin	Manual/ mechanical Scotch broom removal		Tree removal/thin	Manual/ mechanical Scotch broom removal

LUSUKI= Kincaid's lupine

CHAPTER 7: PEARCY-SCHOENER CONSERVATION EASEMENT MANAGEMENT PLAN

A Benton County Fender's Blue Butterfly Conservation Area



7.1 Introduction

Site Vision

The easement will support healthy populations of Fender’s blue butterfly in an upland prairie and oak savanna community with a diverse assemblage of native species. Riparian and ash swale habitats will benefit Nelson’s checkermallow, cutthroat trout, Western gray squirrel and western pond turtle. The site will be a resource for planned tours, educational restoration activities, and research projects by local scientists and students.

Management Goals for the Percy-Schoener Conservation Easement

The management goals for the site include the following:

- 1) Enhance and augment critical sources of native nectar (Table 1.1) and host plants for Fender’s blue butterfly, to sustain the existing population and promote expansion of the population.
- 2) Reduce, to the maximum degree possible, threats to Fender’s blue butterfly, Kincaid’s lupine and associated habitat posed by aggressive introduced plant species.
- 3) Manage the prairie habitat at the site to remain as open prairie, by controlling encroachment of woody shrub species such as hawthorn (*Crataegus monogyna*) and young Douglas-fir (*Pseudotsuga menziesii*).
- 4) As possible, introduce populations of other rare Willamette Valley species.
- 5) Manage the riparian forest to retain current intact conditions and support habitat for species including Western pond turtle, Western gray squirrel and Cutthroat trout, by controlling invasive species and preventing disturbance.

HCP Mitigation Needs

One of the purposes of the HCP is to forecast unavoidable impacts to rare species and identify restoration (mitigation) work to offset such impacts. The precise amount of restoration work required for mitigation may vary with the timing and pace of impacts and mitigation work (see Chapter 6 of the HCP for more information). Mitigation work that is completed prior to impacts is typically favored and receives a lower mitigation burden.

Impacts to Fender’s blue butterfly identified in the HCP will be mitigated at Benton County’s Fender’s Blue Butterfly Conservation Areas, which include the Crisp-Liddell Property and the Percy-Schoener Easement. The impacts to the butterfly habitat (native nectar plants and Kincaid’s lupine) are predicted to result from transportation activities in County right-of-way, public service facility construction and home, and home, farm and forest construction on private lands within butterfly habitat in Benton County. The mitigation will be accomplished by expansion of existing lupine and nectar species populations at these two properties to achieve a total increase in nectar species cover of 7,729 square meters, and an increase in Kincaid’s lupine cover of 402 square meters.

7.2 Background Information

Site Location and Context

The easement area, located in the Cardwell Hill area of Benton County, Oregon, includes a total of 26.6 acres. The site is bordered by the Marys River to the north, and bisected by Winter Creek, a small stream that flows most of the year. Elevation at the site ranges from 390' near the Marys River to 440' on two small knolls, the primary topographic features of the site.

Brief Historic Context

The current owners, Bill Percy and Amy Schoener, purchased the site in 1998. They have completed extensive weed control, particularly for Scotch broom, at the site. The site has been enrolled in a Wildlife Habitat Conservation and Management Plan with Benton County and Oregon Department of Fish and Wildlife, and also has participated in the Partners for Fish and Wildlife Program with the US Fish and Wildlife Service.

7.3 Overview of Habitats and Species

Management Units

Units at the site include Zone A: Upland Prairie-Open Oak Savanna, 16.1 acres; Zone B: Wet prairie/Riparian, 9.4 acres; and Zone C: Oak Savanna Grove, 1.1 acres (Figure 7.1).

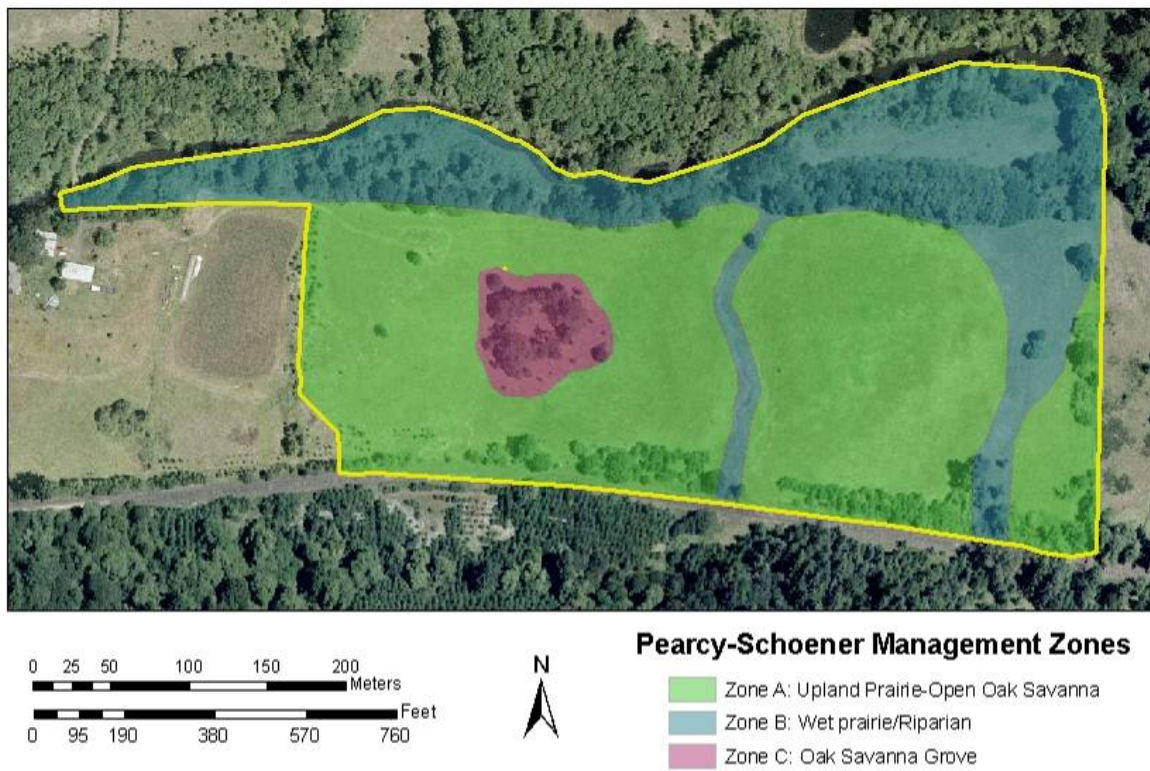


Figure 7.1 Management Zones at the Percy-Schoener Easement.

Increases in the quantity of Fender’s blue butterfly habitat (though expansion of Kincaid’s lupine and nectar species) in Zones A and C are eligible for mitigation. Management of the wet prairie and riparian habitats in Zone B, which are not habitat for Fender’s blue, will be for conservation purposes only.

Soil Types and Distributions

Soils within the easement area include McAlpin silty clay loam and Jory silty clay loams (Figure 7.2). The McAlpin soil is moderately deep and is moderately well drained, and is typically found in floodplains at flat to low (less than 3%) slopes. The Jory soil is deep, well drained, and is typically found in hilly landscapes, with 2-12% slopes and basalt bedrock.

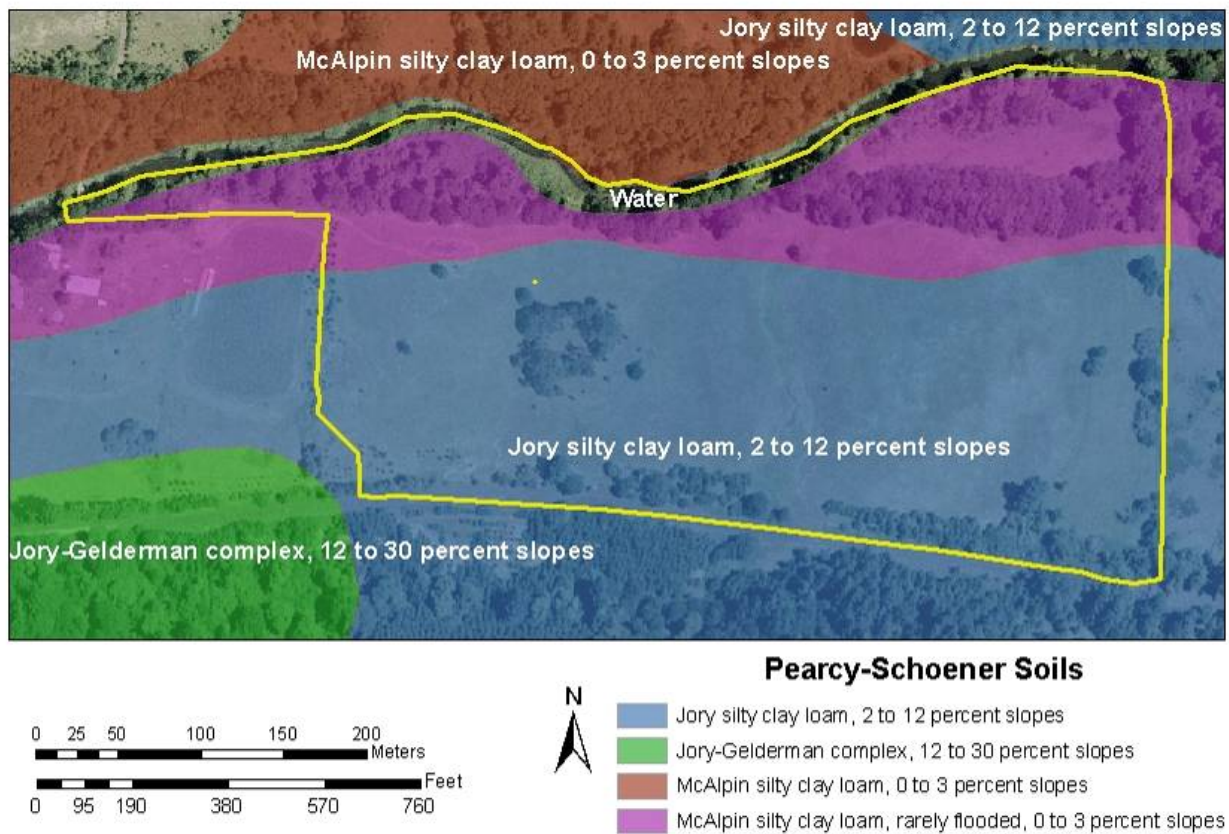


Figure 7.2 Soils at the Percy-Schoener Easement.

Historic Vegetation

From 1851 to 1865, the General Land Office surveyed the Willamette Valley in preparation for Euro-American settlement. The surveyors’ notes detailed the vegetation, soils, and topography encountered as they crossed the landscape. The Nature Conservancy has used this information to reconstruct the historic vegetation patterns of the Willamette Valley (Christy et al. 2005). This mapping suggests that the Percy-Schoener Easement was entirely composed of upland prairie, and likely dominated by Roemer’s fescue (Figure 7.3).

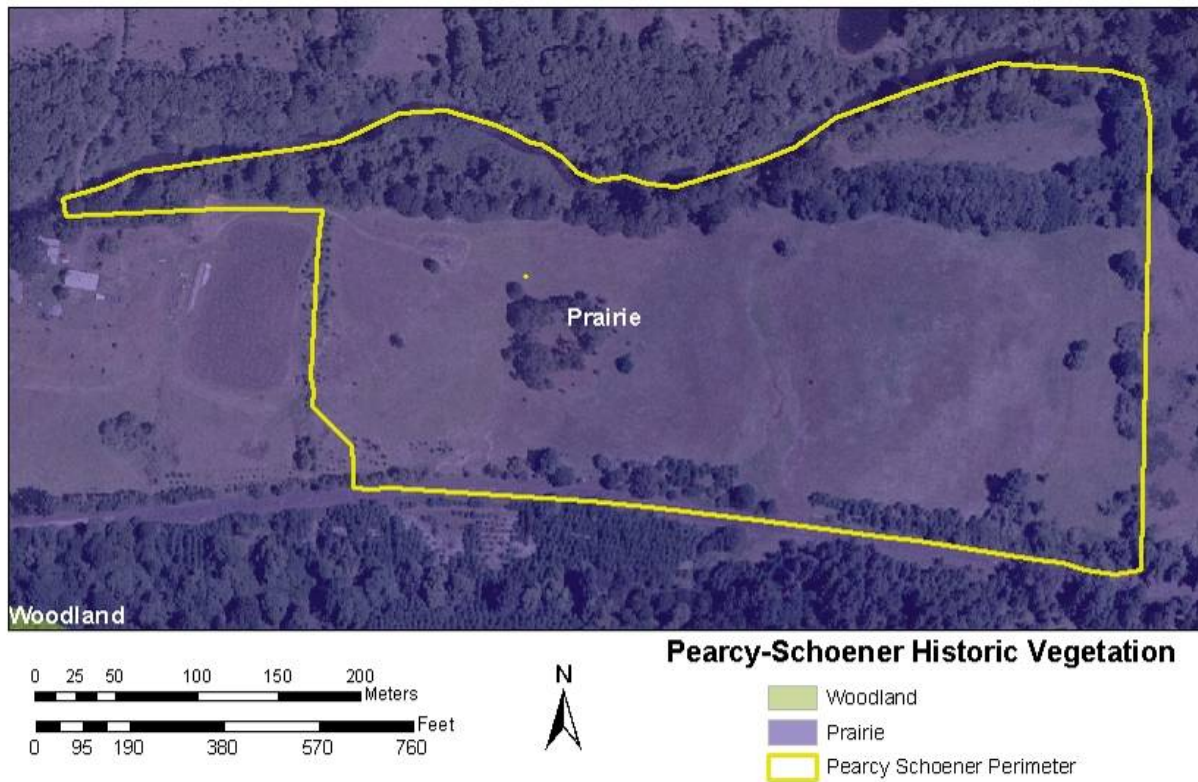


Figure 7.3 Pre-European settlement vegetation at the Percy-Schoener Easement.

Sensitive Species

The easement area supports one of the largest known populations of Fender’s blue butterfly, an endangered species, and its host plant, Kincaid’s lupine, a threatened species, in Benton County. It also contains suitable upland prairie habitat for introduction of Willamette daisy (endangered species) and golden paintbrush (endangered, and currently extirpated from Oregon). The riparian edge and wet prairie habitat of the site includes areas suitable for Nelson’s checkermallow (a threatened species) introduction.

Sensitive Species Introductions

There have been no sensitive species introductions to date.

Issues of Concern

False brome

False brome (*Brachypodium sylvaticum*), is an extremely invasive perennial grass. This species is widespread within the Cardwell Hill area. Controlling false brome and minimizing its spread into high-value prairie areas will require regular treatments and monitoring. All management activities must take care not to spread this species within the site or to other sites.

The most effective treatment known currently, other than complete removal by hand, is to mow in the summer (July) then treat with glyphosate and a pre-emergent in the Fall (glyphosate (2%) plus oryzalin at 3.3% with a non-ionic or MSO/silicon blend surfactant at 0.5%).

Access Concerns

Several access and parking issues for this easement need timely resolution.

- A small parking area shall be established on the property, and located to have the minimum possible impact, if any on the natural habitats at the site. The surface of the parking area shall be graveled to reduce fire hazard, and any drainage issues shall be addressed with culverts or other means.
- Access to the property through the adjoining property to the west shall be secured and formalized as needed.
- Access for the property owners through the property to their adjoining property on the north side will be developed and maintained, at the minimum possible impact to existing habitats.

7.4 Habitat Management Units

H. This section describes the rare species present or potentially present for each unit, in addition to recent management actions, desired future condition, and habitat management goals, objectives and tasks.

Zone A: Upland Prairie-Open Oak Savanna

Rare Species and Habitats

This habitat type occupies the majority of the easement area. The plant community in this zone includes abundant Kincaid's lupine- the main concentrations of the host plant are on the two prominent knoll features, though patches are present on the western side of the west knoll, and near a powerpole on the southeasterly border.. Native nectar species for the butterfly are also present with a patchy distribution, including dwarf checkermallow (*Sidalcea virgata*), Tolmie's mariposa lily (*Calochortus tolmiei*), Oregon sunshine (*Eriophyllum lanatum*), and Oregon iris (*Iris tenax*). The site includes native perennial grasses such as California oatgrass (*Danthonia californica*) and Roemer's fescue (*Festuca roemerii*), but much of the area is dominated by introduced pasture grasses, frequently tall fescue (*Festuca arundinacea*). Thinner soil areas support broad patches of almost exclusive strawberry (*Fragaria virginiana*) cover, areas of dense California oatgrass, and some annual exotic bromes (e.g., *Bromus hordeaceus* or *B. sterilis*). Small isolated patches of false brome occur in this zone. Oregon white oaks (*Quercus garryana*) are scattered throughout, primarily on the far west and east sides of the Zone.

Recent Management Actions

The prairie has been mowed annually in the fall for many years though a Partners for Fish and Wildlife Agreement with the USFWS. The landowners have been vigilant with weed control, removing Scotch broom, blackberry and false brome.

Desired Future Conditions

Zone will be managed for healthy populations of Fender's blue butterfly and native species diversity through upland prairie restoration and enhancement. Oak savanna habitat will be encouraged, with scattered trees at a density of 1-2 trees per acre.

Habitat Management Goals, Objectives and Tasks

Goal 1: Enhance and augment critical sources of nectar and host plants for Fender's blue butterfly, to sustain the existing population and promote expansion of the population.

Objective 1: Reduce competition from introduced perennial grasses and shrubs.

- Either burn or mow at least every two years, especially in introduced perennial grass or shrub dominated areas.
- Remove or rake to side the cut material to minimize thatch accumulation (<20% cover), decrease moss at the soil surface and increase the opportunity for seed to soil contact for native forb species.
- If prescribed fire is used, seed with native forbs the fall after the burn to take advantage of "release" in competition and nutrients.
- All burning and mowing activities must be compatible with large populations of Fender's blue, therefore only 1/3 of occupied habitat will be treated annually (USFWS 2008).

Objective 2: Increase native forb nectar species seed availability in grass dominated areas through drilling seeds, broadcasting seeds and using plugs (transplants).

- Use a seed drill to plant larger seeded natives in areas with existing heavy cover.
- Use broadcast seeding when conditions or site preparation will allow seed to soil contact.
- Utilize plugs of nectar species as appropriate in areas where establishment by seed proves difficult, such as in areas with dense perennial grasses.

Objective 3: Work to expand areas of Kincaid's lupine, especially targeting the smaller patches of lupine on the west side of the west knoll, and near the power pole on the east side of the east knoll.

- Direct seeding of lupine seeds with site preparation.
- Use transplanted plugs of lupine as appropriate.

Objective 4: Take advantage of bare soil areas as opportunities for lupine and nectar species direct seeding.

- Direct seed lupine and nectar species seeds.
- Direct seed quick growing natives, for example Clarkia (*Clarkia amoena*) or madia (*Madia gracilis*) to occupy the space and exclude competitors, and introduce lupine and nectar species later.

Objective 5: Encourage oak savanna to create habitat for additional bird species and generate partial shade to facilitate nectar and host species establishment and persistence through climate change.

- Plant scattered oaks.
- Retain some existing young oaks.

Goal 2: Reduce to the maximum degree possible, threats to Fender’s blue butterfly, Kincaid’s lupine and associated habitat posed by aggressive introduced plant species.

Objective 1: Prevent establishment of new invasive species or invasive species that are currently uncommon at the site.

- Annually, use a grid search to locate and manually remove new or uncommon invaders, including false-brome, scotch broom, and meadow knapweed.
- Steam clean all equipment that is brought in to avoid seed transfer

Objective 2: Control existing invasive or aggressive exotic species.

- Heavy tall oatgrass (*Arrhenatherum elatius*) and tall fescue (*Festuca arundinacea*) areas should be annually mowed before the grass flowers (by early June). If herbicide is to be used for tall grass control, spot spray in April (at the “boot” stage) with a grass specific herbicide.
- Armenian blackberry will be dug up to completely remove crowns. If herbicide is used, spot spray in September-October to hit target the maximum leaf area.
- Control bracken fern as possible. When this species forms a canopy over nectar species and Kincaid’s lupine it can disrupt feeding and reproduction of Fender’s blue. Repeated mowing or weed-eating at a high level (above lupine and nectar species) may be effective to suppress bracken temporarily. If herbicide is used, weed wipe as needed (with attention to Fender’s blue habitat needs).
- Monitor cultivated oat (*Avena*) population on northwest side of the Zone, and treat as needed.

Objective 3: Manage any currently “bare” areas and any areas where bare or disturbed soil is created by weed control or tree removal to keep native seed pressure and native species propagule availability high.

- Drill Roemer’s fescue in “bare” or annual dominated areas in September or October. In dry and cold years, it may be possible to seed Roemer’s in February and March- the species requires 2 weeks chilling prior to germination. This species, or others, may be used to “hold space” for other nectar species to be introduced later.
- Thin soil areas dominated by annual bromes may need to “start over”, by disturbing the ground again, and heavily re-seed with native species, including Oregon sunshine. Only the patch size that can be intensively managed shall re-started in any given year.
- If herbicides are to be used for weed control in weedy areas where other manual removal efforts fail, a soil active variety may be most effective to control the weedy species seedbed.

Goal 3: Manage the prairie habitat at the site to remain as open prairie, by controlling encroachment of woody shrub species such as hawthorn (*Crataegus monogyna*) and young Douglas-fir (*Pseudotsuga menziesii*).

Objective 1: Control woody shrub species.

- Either burn or mow at least every two years, especially in introduced shrub dominated areas.

Objective 2: Remove Douglas-fir and other conifers.

- Small Douglas-fir that recruit naturally shall be removed, as well as larger fir that are suppressing oaks.
- Proceeds (above costs) of any timber harvested shall be invested in habitat management within the easement area.

Goal 4: As possible, introduce populations of other rare Willamette Valley species.

Objective 1: Introduce and establish populations.

- Introduce populations of Willamette daisy, golden paintbrush, and shaggy horkelia.

Zone B: Wet Prairie/Riparian

Rare Species and Habitats

This zone includes roughly ½ mile of riparian habitat along the main stem of the Marys River, including Oregon ash (*Fraxinus latifolia*) swale-riparian forest and associated wet prairie areas. The riparian ash swale habitat is relatively intact and includes habitat for many species, including Western pond turtle, Western gray squirrel and Cutthroat trout.

Surrounded by ash swale is an area of wet prairie. It is primarily dominated by introduced pasture grasses, with some native and introduced shrub species. Small patches of false brome occur in the prairie.

Also included in this zone is the small riparian area of Winter Creek, which bisects Zone A: Upland prairie and oak savanna. The water level in the creek fluctuates seasonally with weather conditions. The plant community in this area includes camas (*Camassia quamash*).

Along the east perimeter of the property, the upland prairie transitions to wet prairie, with plant communities dominated by meadow foxtail (*Alopecurus pratensis*), a non-native perennial grass.

Recent Management Actions

The landowner has implemented some weed control. Some native trees were recently planted.

Desired Future Conditions

This Zone will be managed to retain the relatively intact riparian/ash swale conditions, to benefit the species that reside in this habitat (for example, Nelson's checkermallow, cutthroat trout, Western gray squirrel and western pond turtle), so long as it is compatible with the adjacent Fender's blue butterfly habitat. Retention of riparian cover is critical to addressing the TMDL listing for temperature on the Marys River.

Habitat Management Goals, Objectives and Tasks

Goal 1: Manage the riparian forest to retain current intact conditions and support habitat for species including Western pond turtle, Western gray squirrel and Cutthroat trout.

Objective 1: Prevent establishment of new invasive species or invasive species that are currently uncommon at the site.

- Annually, use a grid search to locate highly invasive species known in the area, including reed canarygrass, Japanese knotweed, etc., and apply appropriate control mechanism as soon as possible.
- Monitor to evaluate weed control methods.

Objective 2: Increase native species diversity

- Introduce additional native forbs (e.g., camas).

Objective 3: Maintain current openings, prevent total ash domination, and keep patches of woody shrubs under control.

- Either burn or mow at least every two years, especially in introduced perennial grass or shrub dominated areas. If prescribed fire is used, seed with native forbs the fall after the burn to take advantage of “release” in competition and nutrients.

Goal 2: Manage the prairie habitat to remain as open prairie, by controlling encroachment of woody shrub species such as hawthorn and young Douglas-fir.

Objective 1: Control woody shrub species in wet prairie areas.

- Either burn or mow at least every two years, especially in introduced shrub dominated areas.

Objective 2: Remove Douglas-fir and other conifers.

- Small Douglas-fir that recruit naturally shall be removed, as well as larger fir that are suppressing oaks.
- Proceeds (above costs) of any timber harvested shall be invested in habitat management within the easement area.

Goal 3: As possible, introduce populations of other rare Willamette Valley species.

Objective 1: Introduce populations of Nelson’s checkermallow.

- Obtain needed plant materials.
- Conduct any needed site prep to remove competing vegetation in planting areas.
- Direct seed or plant plugs.
- Monitor to determine establishment.

Zone C: Oak Savanna Grove

Rare Species and Habitats

This zone is located on the small knoll on the west side of Winter Creek. Small suppressed oaks and large full canopy oaks are mixed, with an understory including rose (*Rosa* spp.), poison oak (*Toxicodendron diversilobum*), and snowberry (*Symphoricarpos albus*). Herbaceous species in the understory include rose checkermallow and abundant Oregon iris.

Recent Management Actions

Douglas fir and some smaller oaks were recently removed from the knoll area, restoring it to a primarily oak-dominated overstory.

Desired Future Conditions

This Zone will be managed for healthy populations of Fender's blue butterfly and native species diversity through upland prairie restoration and enhancement. Oak savanna habitat will be encouraged, with scattered trees at a density of 1-2 trees per acre.

Habitat Management Goals, Objectives and Tasks

Goal 1: Enhance and augment critical sources of nectar and host plants for Fender's blue butterfly, to sustain the existing population and promote expansion of the population.

Objective 1: Reduce competition from introduced perennial grasses and shrubs.

- Either burn or mow at least every two years, especially in introduced perennial grass or shrub dominated areas.
- Remove or rake to side the cut material to minimize thatch accumulation (<20% cover), decrease moss at the soil surface and increase the opportunity for seed to soil contact for native forb species.
- If prescribed fire is used, seed with native forbs the fall after the burn to take advantage of "release" in competition and nutrients.
- All burning and mowing activities must be compatible with large populations of Fender's blue, therefore only 1/3 of occupied habitat will be treated annually (USFWS 2008).

Objective 2: Increase native forb nectar species seed availability in grass dominated areas through drilling seeds, broadcasting seeds and using plugs (transplants).

- Where trees permit, use a seed drill to plant larger seeded natives in areas with existing high cover.
- Use broadcast seeding when conditions or site preparation will allow seed to soil contact.
- Utilize plugs of nectar species as appropriate in areas where establishment by seed proves difficult, such as in areas with dense perennial grasses.

Objective 4: Take advantage of bare soil areas as opportunities for lupine and nectar species direct seeding.

- Direct seed lupine and nectar species seeds.
- Direct seed quick growing natives, for example Clarkia (*Clarkia amoena*) or madia (*Madia gracilis*) to occupy the space and exclude competitors, and introduce lupine and nectar species later.

Goal 2: Maintain open oak savanna structure.

Objective 1: Manage oaks to develop spacing that allows a tractor to mow or seed between trees.

- Thin oaks as needed.

Objective 2: Minimize Douglas-fir and shrub cover.

- Mow or burn in the fall every other year.
- Cut and remove Douglas-fir and larger shrubs.

Goal 3: Reduce threats to Fender’s blue butterfly, Kincaid’s lupine and associated habitat posed by aggressive introduced plant species.

Objective 1: Prevent establishment of new invasive species or invasive species that are currently uncommon at the site.

- Annually, use a grid search to locate and manually remove new or uncommon invaders, including false-brome, scotch broom, and meadow knapweed.
- Steam clean all equipment that is brought in to avoid seed transfer

Objective 2: Control existing invasive or aggressive exotic species.

- Heavy tall oatgrass and tall fescue areas should be annually mowed before the grass flowers (by early June). If herbicide is to be used for tall oatgrass control, spot spray in April (at the “boot” stage) with a grass specific herbicide.
- Armenian blackberry will be dug up to completely remove crowns. If herbicide is used, spot spray in September-October to hit target the maximum leaf area.
- Control bracken fern as possible. Repeated mowing or weed-eating at a high level (above lupine and nectar species) may be effective to suppress bracken temporarily. If herbicide is used, weed wipe as needed (with attention to Fender’s blue habitat needs).

Objective 3: Manage any currently “bare” areas and any areas where bare or disturbed soil is created by weed control or tree removal to keep native seed pressure and native species propagule availability high.

- Where trees permit, drill Roemer’s fescue in ‘bare’ or annual dominated areas in September or October. In dry and cold years, it may be possible to seed Roemer’s in February and March- the species requires 2 weeks chilling prior to germination. This species, or others, may be used to “hold space” for other nectar species to be introduced later.
- Thin soil areas dominated by annual bromes may need to “start over”, by disturbing the ground again, and heavily re-seed with native species, including Oregon sunshine. Only the patch size that can be intensively managed shall re-started in any given year.
- If herbicides are to be used for weed control in weedy areas where other manual removal efforts fail, a soil active variety may be most effective to control the weedy species seedbed.

7.5 Site Uses

Research

Scientific studies at the site should be encouraged but will be limited to those with minimal or no destructive sampling (e.g., removal of large amounts of native vegetation, severe soil disturbance, alteration of hydrology). The goals of research at the site should include improvement of conditions in native ecosystems. Treatment area sizes should be small enough to limit risks of unexpected, harmful results.

Recreation

The property may be used to encourage appreciation of nature and local habitats, but such use will occur only where and when it will not cause harm to the site. Any trails will be located around the perimeter of the easement area, in a manner to avoid sensitive species and habitats on the site, and will specifically avoid interior areas of the easement within habitat of Kincaid's lupine and Fender's blue butterfly. Public access to the interior of the easement site will be through supervised tours only. These visits may happen year-round, but access where Kincaid's lupine and Fender's blue butterfly occur will be prohibited from the beginning of March through June. In the event that a perimeter trail is established, visitors will be restricted to the trail except during guided events, and dogs and wildflower picking will be prohibited.

Deer hunting by the easement grantors will be allowed, as it occurs after the butterfly flight season and shall have minimal impact on the upland prairie habitat at the site.

Education

Participation of local groups, including schools, watershed councils or conservation organizations with activities at the easement will be an important opportunity for educational outreach in our area. Such groups may visit the site to assist with restoration and management activities and to tour the site as an example of Willamette Valley ecosystems. In addition, the site can serve as a demonstration site for groups of land managers and members of the public interested in prairie conservation, restoration and management.

7.6 Schedule

	Year 1	Year 2	Year 3	Year 4	Year 5
January-February	Review management activities with lepidopterist and botanist				
March-April		Plant native forbs/nectar, LUSUKI and other rare species		Plant native forbs/nectar, LUSUKI and other rare species	
May-June	Survey and map invasive species.				
	Weed control				
	HCP Monitoring (Baseline)			HCP Monitoring	
	Monitor planting establishment as needed				
July-August	Obtain plant materials for fall or upcoming spring plantings				
	Collect Kincaid's lupine seeds				
September-October	Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species		Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species		Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species
	Weed control				
As appropriate	Tree removal/thin	Manual/ mechanical Scotch broom removal		Tree removal/thin	Manual/ mechanical Scotch broom removal

LUSUKI= Kincaid's lupine

CHAPTER 8: OVERALL SCHEDULE



Calochortus tolmiei

8.1 Restoration Planning

Successful restoration work requires advance planning and preparation. Work is also frequently affected by unpredictable outside factors, especially weather conditions. The following checklist (Table 8.1) is intended to assist in planning efforts, and should complement the overall schedule presented for all County sites presented below.

Table 8.1 Restoration checklist.

	Tasks	Timing
Fall Prescribed Burn	Schedule with Oregon Department of Forestry.	1-2 years in advance
	Site preparation- fuels reduction.	Within the year before the burn
	Invasive species eradication from burn area.	Fall, spring, and immediately prior to the burn
	Notify and coordinate with neighbors.	6 months in advance and immediately prior to burn.
	Rare species seed collection- most seeds on the soil surface will be destroyed in fire	End of growing season prior to burn.
	Plan post-burn plantings and treatments, ensure needed plant materials are available.	9-12 months in advance.
Native Plant Material Procurement	Determine quantities needed across all sites, and potentially coordinate with other land managers (e.g., City of Corvallis or Greenbelt Land Trust) to increase efficiency and reduce cost.	Regular basis.
	Collect seeds of rare species on county sites as possible (e.g., Kincaid’s lupine, Nelson’s checkermallow and Bradshaw’s lomatium). Give to contractor for seed increase or grow-out and/or follow seed preparation guidelines in HCP to direct seed.	Growing season before direct seeding, or 1-2 years before planting plugs.
	Contact native plant producer to purchase seeds, plugs, bulbs or rhizomes.	6 months to 3 years in advance. Items like Calochortus or Camas bulbs

		may take 3 years to obtain in large quantities.
Monitoring	Schedule contractor if needed- possibly coordinate with other land managers.	December/January prior, especially for butterfly surveys.
Labor/Work Crew	Determine needs, coordinate funding and schedule crew.	6-9 months in advance.
Contractor	Determine needs for mowing, tree removal, weed control, etc., that will be contracted out.	Growing season prior.
	Site visit and coordinate schedule with contractor	6-9 months in advance.

8.2 Multi-Site Schedule

The following schedule includes many of the regular tasks at all six county managed prairie sites:

- Beazell Memorial Forest (BMF)
- Fitton Green Natural Area (FGNA)
- Fort Hoskins Historic Park (FH)
- Jackson-Frazier Wetland (JFW)
- Fender’s Blue Butterfly Conservation Areas (FBBCAs)

Tasks are listed individually by site in each site’s management plan chapter. Scheduling will be updated and revised through adaptive management.

The following abbreviations are used for rare species:

- Bradshaw’s lomatium: LOBR
- Fender’s blue butterfly: FBB
- Golden paintbrush: CALE
- Kincaid’s lupine: LUSUKI
- Nelson’s checkermallow: SINE
- Taylor’s checkerspot butterfly: TCB
- Willamette daisy: ERDE

	Year 1	Year 2	Year 3	Year 4	Year 5
January-February	Review management activities with lepidopterist and botanist				
March-April			JFW: Plant LOBR & SINE plugs		JFW: Plant LOBR & SINE plugs
	FGNA: Plant native forbs/nectar, LUSUKI and other rare species	FBBCAs, BMF: Plant native forbs/nectar, LUSUKI and other rare species	FGNA: Plant native forbs/nectar, LUSUKI and other rare species	FBBCAs, BMF: Plant native forbs/nectar, LUSUKI and other rare species	FGNA: Plant native forbs/nectar, LUSUKI and other rare species
May-June	All Sites: Survey and map invasive species.				
	All Sites: Weed control				
	All Sites: HCP Monitoring (Baseline)			All Sites: HCP Monitoring	
	All Sites: Monitor planting establishment as needed				
		JFW: Collect LOBR seeds		JFW: Collect LOBR seeds	
July-August	All Sites: Obtain plant materials for fall or upcoming spring plantings				
	JFW: Mow reed canarygrass and rose areas				
	JFW: Collect Nelson's checkermallow seeds FBBCAs: Collect Kincaid's lupine seeds				
September-October		JFW: Mow wet prairie unit, seed SINE, native forbs		JFW: Mow wet prairie unit, seed SINE, native forbs	
	JFW: Mow LOBR	JFW: Burn LOBR, then seed LOBR and native forbs	JFW: Mow LOBR	JFW: Burn LOBR, then seed LOBR and native forbs	JFW: Mow LOBR
	FBBCAs, BMF: Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species	FGNA: Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species	FBBCAs, BMF: Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species	FGNA: Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species	FBBCAs, BMF: Burn or mow, then seed native grasses forbs/nectar, LUSUKI and other rare species
	All Sites: Weed control				
	JFW: Treat reed canarygrass with glyphosate				
As appropriate	All Sites: Tree removal/thin	All Sites: Manual/mechanical Scotch broom removal		All Sites: Tree removal/thin	All Sites: Manual/mechanical Scotch broom removal

REFERENCES

- Bartels, M. R., and M. V. Wilson. 2003. Flood tolerance of the threatened plant *Sidalcea nelsoniana* (Malvaceae): Ecological and management implications. *Madrono* 50:265-270.
- Benton County, 2010. Prairie Species Habitat Conservation Plan. 160 pp plus appendices. www.co.benton.or.us/parks/hcp.
- Christy, J.A., E.R. Alverson, M.P. Dougherty, S.C. Kolar, C.W. Alton, S.M. Hawes, L. Ashkenas & P. Minear. 2009. GLO Historical vegetation of the Willamette Valley, Oregon, 1851-1910. Shapefile, Version 2009_07. Oregon Natural Heritage Information Center, Oregon State University, Portland, OR.
- Frenkel, B. and D. Reed. 2005. Jackson-Frazier Wetland Management Plan. Prepared for the Benton County Natural Areas & Parks Department. 52 pp + appendices.
- Gisler, S.D. 2004. Developing biogeographically based population introduction protocols for at-risk Willamette Valley plant species. Report to US Fish and Wildlife Service, Portland, Oregon. Native Plant Conservation Program, Oregon Department of Agriculture, Salem, Oregon.
- Glad, J.B, R.R. Halse, and R. Mishaga. 1994. Observations on distribution, abundance, and habitats of *Sidalcea nelsoniana* Piper (Malvaceae) in Oregon. *Phytologia* 76:307-323.
- ITS Management, Inc. 2001. Beazell Memorial Forest Stewardship Management Plan. Prepared for Benton County Natural Areas and Parks. 70 pp + appendices. http://www.co.benton.or.us/parks/documents/beazell_plan_no_appendices.pdf
- Kaye, T.N. 2003. Rare plant survey of Jackson-Frazier Wetland. Unpublished report to Benton County. Institute of Applied Ecology, Corvallis, Oregon.
- Kaye, T.N., K.L. Pendergrass, K. Finley, and J.B. Kauffman. 2001. Effects of Fire on Population Viability of an Endangered Prairie Plant. *Ecological Applications* 11:1366-1380.
- Oregon Department of Agriculture. 2009. Noxious weed policy and classification system 2009. Oregon Department of Agriculture Noxious Weed Control Program, Salem, OR. 11pp.
- Oregon Department of Fish and Wildlife. 2006. Oregon Conservation Strategy. Oregon Department of Fish and Wildlife, Salem, OR. 375 pp plus appendices.
- Pendergrass, K.L., P.M. Miller, J.B. Kauffman, and T.N. Kaye. 1999. Role of Fire in Maintenance of an Endangered Plant Species, *Lomatium bradshawii*. *Ecological Applications* 4:1420-1429.

Pyle, R. M. 1989. Washington Butterfly Conservation Status Report and Plan. Report Submitted to the Nongame Program, Washington Department of Wildlife, Olympia, Washington. 217 pp.

Ross, D.N. 2007. Summary Report to the Institute for Applied Ecology: Unpublished results from 2007 Surveys for Taylor's Checkerspot and Fender's Blue Butterflies for the Benton County Habitat Conservation Plan. Unpublished report for the Institute for Applied Ecology. 9 pp.

Ross, D. 2009. 2009 Population Estimates for Taylor's checkerspot at Fitton Green Natural Area and Beazell Memorial Forest. A report to the Benton County Natural Areas and Parks Department and the USFWS (Portland OR).

Ross, D. 2010. 2010 Population Estimates for Taylor's checkerspot at Fitton Green Natural Area and Beazell Memorial Forest. A report to the Benton County Natural Areas and Parks Department and the USFWS (Portland OR).

Stanley, A. G., T. N. Kaye, P. W. Dunwiddie. 2010. Regional strategies for restoring invaded prairies, final technical report. Institute for Applied Ecology, Corvallis, Oregon and The Nature Conservancy, Seattle, Washington. 34 pp.

Stinson, D.W. 2005. Washington State Status Report for the Mazama Pocket Gopher, Streaked Horned Lark, and Taylor's Checkerspot Butterfly. Washington Department of Fish and Wildlife, Olympia, WA. pp 129+xii.

US Fish and Wildlife Service. 1988. Endangered and Threatened Wildlife and Plants; Final Endangered Status for *Lomatium bradshawii* (Bradshaw's lomatium). Federal Register 53:38448-38451.

US Fish and Wildlife Service. 1993a. *Lomatium bradshawii* (Bradshaw's lomatium) Recovery Plan. Portland, Oregon. 47pp.

US Fish and Wildlife Service. 1993b. Endangered and Threatened Wildlife and Plants: Threatened Status for the Plant *Sidalcea nelsoniana* (Nelson's checkermallow) – Final Rule. Federal Register 58:8235-8243.

US Fish and Wildlife Service. 2000. Final Rule: Endangered and Threatened Wildlife and Plants: Endangered Status for *Erigeron decumbens* var. *decumbens* (Willamette Daisy), and Fender's Blue Butterfly (*Icaricia icarioides fenderi*) and Threatened Status for *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine). Federal Register 65:3876-3890.

US Fish and Wildlife Service. 2001. Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Species That Are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions; Proposed Rule. Federal Register 66: 54807-54832.

U.S. Fish and Wildlife Service. 2008. Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion. U.S. Fish and Wildlife Service, Portland, OR. 54 pp.

US Fish and Wildlife Service. 2010. Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington. US Fish and Wildlife Service, Portland, Oregon. 224 pp.
www.fws.gov/ecos/ajax/docs/recovery_plan/080922_1.pdf

Vance, N.C., A. Neill, F. Morton. 2006. Native grass seeding and forb planting establishment in a degraded oak savanna plant community in the Coast Range foothills of western Oregon. *Native Plants Journal* 7: 35-46.

Wilson, M.V. 2004. The Analysis of Management Strategies to Restore and Enhance Nelson's Checkermallow (*Sidalcea nelsoniana*) Habitat at William L. Finley National Wildlife Refuge: Response to two years of restoration techniques in an existing *Sidalcea nelsoniana* habitat. Report to the US Fish and Wildlife Service. 30 pp.

APPENDIX A: HCP MONITORING DATA SUMMARY FORM



BENTON COUNTY PRAIRIE SPECIES HCP Reporting Form C: Effectiveness Monitoring Summary

SUBMIT TO: BENTON COUNTY COMMUNITY DEVELOPMENT
DEPARTMENT, 360 SW Avery Avenue, Corvallis, OR

Complete this form using effectiveness monitoring data from a single site, and ***SUBMIT BY DECEMBER 31 OF THE YEAR IN WHICH MONITORING WAS COMPLETED. For Baseline Monitoring, complete the shaded fields only.*** For continuing monitoring, if an adaptive management threshold has been triggered (e.g., if YES is checked in any box below), it is the responsibility of the landowner/manager to take and document the designated corrective action (see HCP Section 7.3.2).

CHECK ONE: WORK FOR MITIGATION VOLUNTARY WORK FOR CONSERVATION

Cooperator Name: _____

Site: _____ Date of Effectiveness Monitoring: _____

HCP SPECIES STATUS/ABUNDANCE

Species	Abundance (note units)			% Change		<u>THRESHOLD CHECK:</u> >30 % Decrease from Prior?
	Baseline Date: (/ /)	Prior Monitoring Date: (/ /)	Current Monitoring	From Baseline =100x (Current # - Baseline #) / Baseline #	From Prior =100x (Current # - Prior #) / Prior #	
						<input type="checkbox"/> YES <input type="checkbox"/> NO
						<input type="checkbox"/> YES <input type="checkbox"/> NO
						<input type="checkbox"/> YES <input type="checkbox"/> NO
						<input type="checkbox"/> YES <input type="checkbox"/> NO
						<input type="checkbox"/> YES <input type="checkbox"/> NO
						<input type="checkbox"/> YES <input type="checkbox"/> NO

TREE AND SHRUB ENCROACHMENT

_____ Estimated baseline meadow size.
_____ % Estimated decrease in meadow size from baseline

THRESHOLD CHECK

Decrease >30%? YES NO

INVASIVE SPECIES: GROUP A

New population(s) discovered of _____
New population(s) discovered of _____

New occurrence? YES NO
New occurrence? YES NO

Existing population of _____ increased by _____ %

Increase >30%? YES NO

Existing population of _____ increased by _____% Increase >30%? YES NO
 Existing population of _____ increased by _____% Increase >30%? YES NO

INVASIVE SPECIES: GROUP B

New population(s) discovered of _____ New population? YES NO
 New population(s) discovered of _____ New population? YES NO

Existing population of _____ increased by _____% Increase >30%? YES NO
 Existing population of _____ increased by _____% Increase >30%? YES NO
 Existing population of _____ increased by _____% Increase >30%? YES NO
 Existing population of _____ increased by _____% Increase >30%? YES NO

DISTURBANCE

Rodent ground disturbance: Baseline _____% of site, Current _____% Increase >30%? YES NO
 Mammal grazing of Covered plants: Baseline: _____% Current _____% Increase >30%? YES NO
 Significant windfall, erosion or hydrology issues? YES NO
Briefly describe or attach additional sheets.

Describe baseline trail use/trampling: _____
 Significant increase in trail use or trampling? YES NO

Describe baseline surrounding land use _____
 Significant change in surrounding land use? YES NO

PLANT COMMUNITY COMPOSITION & PLANT LITTER/THATCH ACCUMULATION (5x5m plots)

	Total % Cover and Date			% Change		<u>THRESHOLD CHECK:</u> Change from Baseline?
	Baseline	Prior Monitoring	Current Monitoring	From Baseline =100 x (Current # - Baseline #) /Baseline #	From Prior =100 x (Current # - Prior #) /Prior #	
Native Species						>30 % Decrease? <input type="checkbox"/> YES <input type="checkbox"/> NO
Exotic Species						>30 % Increase? <input type="checkbox"/> YES <input type="checkbox"/> NO
Woody Vegetation						>15 % Increase? <input type="checkbox"/> YES <input type="checkbox"/> NO
Plant Litter/ Thatch						>30 % Increase? <input type="checkbox"/> YES <input type="checkbox"/> NO

OTHER NOTES (attach additional pages)

COI Number: _____ COI Date: _____

[[[Signature of Cooperator Representative]]] Date

Name of cooperator

Address Phone

Community Development Director, Benton County Representative Date

APPENDIX B: MANAGEMENT LOG TEMPLATE

