Appendix J. Prairie Habitat Vegetation Management Guidelines

1.1 Introduction

Habitat loss and fragmentation is the biggest threat to the Covered Species through land conversion, invasive species spread, and successional processes (tree and shrub encroachment). Two key components of any restoration, enhancement, or maintenance effort is removal of woody vegetation and invasive species. These guidelines largely follow those in the U.S. Fish and Wildlife Service Biological Opinion for prairie restoration in western Oregon (USFWS 2008a).

A number of restoration, enhancement, and maintenance techniques are available (see below) and whether a particular technique will be implemented will depend, in part, on the needs of the particular site and on the presence or absence of the Covered Species, in particular Fender's blue butterfly and Taylor's checkerspot butterfly. These techniques include, but are not limited to, manual or machine cutting, mowing, prescribed burning, herbicide application, solarization, and use of shade cloth. Once a site has been manipulated to remove unwanted vegetation, the site will need to be replanted with appropriate native prairie species, which may include the covered plant species. For specific habitat restoration and enhancement protocols for Taylor's checkerspot butterfly see the Taylor's Checkerspot Butterfly Management Plan (Appendix N).

1.2 Habitat Restoration and Enhancement Techniques

The following habitat restoration and enhancement protocols will be followed by the County and Cooperators when implementing a voluntary or mitigation related habitat restoration, enhancement or management project.. These protocols may be updated as new information becomes available on effective restoration and enhancement techniques for the Covered Species.

1.2.0 Cutting

Cutting is used to remove woody species such as hawthorn (*Crataegus* spp.), blackberry (*Rubus* spp.), rose (*Rosa* spp.), Scot's broom (*Cytisus scoparius*), Douglas-fir (*Pseudotsuga menziesii*), Oregon ash (*Fraxinus latifolia*) and other species from native prairie communities, and to control and remove resprouting stems.

Machine cutting includes trimming, girdling trees, and chain saw removal of woody species. Manual cutting involves the use of loppers, shovels, hoes, weed wrenches/pullers, and trowels to remove woody vegetation through cutting, hoeing, grubbing, pulling, chipping, or digging techniques.

- Directional falling shall be used to avoid impacts to listed and/or covered plant species as much as possible.
- All cut material will be removed from the site.
- To reduce potential impacts to Covered Species, cutting will occur only while the listed and/or covered plant species on site are dormant (late August through February).
- Cutting of woody species may also be combined with application of herbicide to the cut stems to reduce resprouting.
- If no listed and/or Covered Species are present, manual cutting may occur at any time of year.
- The necessity of treatment requirements will be determined by a qualified specialist (see Appendix K: Project Site Survey and Reporting Protocols for Plants and Butterfly Habitat) who will direct the on-site implementation of this technique to reduce potential impacts to any Covered Species.

1.2.0.0 Girdling Trees

Girdling trees involves the removal of a ring of bark near the base of the tree with either an ax or chainsaw. Girdling eventually kills the tree. This practice is used to control and remove invasive woody plants.

- Girdling may occur at any time of year.
- Workers shall enter the site on foot and take care to avoid trampling listed and/or covered plant species.
- Girdled trees may remain on site or be removed during the dry season, depending on management objectives for the site.

1.2.0.1 Cutting, Thinning, and Removing Tree Stumps

- Handheld power tools may be used to cut down, control, or remove woody vegetation.
- Such activities will occur when listed and/or covered plant species are dormant or during the flowering season so long as workers take precautions to avoid trampling of any listed and/or Covered Species, including working no closer than 2 m (6 ft) from a Covered Species.
- No trees shall be removed from Fender's blue butterfly habitat during the flight season (May 1 – June 15).
- Vehicle-supported stump removal will occur only during dry periods.
- All cut material will be piled or chipped and spread away from any listed and/or covered plant populations or hauled off-site for disposal.

- If activities occur during the wet season, the tree debris may be left on site away from the listed and/or covered plant species until the dry season when workers can access the work area with equipment to remove tree debris.

1.2.1 Mowing

Mowing annually or as needed can reduce invasive and woody vegetation and maintain or enhance existing native species populations. This activity is anticipated to enhance growing conditions for Covered Species. At sites with Covered Species present, the following conditions apply:

1.2.1.0 Covered Plant Species

- Mowing shall occur 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.
- Mowing will be avoided when soil is saturated to avoid compaction and rutting.
- 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.
- Flail mowers will not be used.

1.2.1.1 Fender's Blue Butterfly

In areas with Fender's blue butterfly, mowing will occur under the following limitations.

- Mowing will be limited to June 15-February 15 at sites with Fender's blue butterflies.
- After the flight season and before Kincaid's lupine senescence (June 15 – July 15), tractor mowing may occur no closer than 2 m (6 ft) from the nearest Kincaid's lupine plant.
- Mowing with hand-held mowers may be implemented during the flight season (May 1 – June 15) so long as a buffer of ≥ 8 m (≥ 25 ft) is maintained between the mower and any Kincaid's lupine plants.
- Mowing may be conducted throughout the site after Kincaid's lupine has senescence and before lupine re-emerge the following spring (generally July 15 – March 1).
- Tractor decks will be set at a minimum of 15 cm (6 in) above ground to reduce impacts to Fender's blue butterfly larvae.
- Flail mowers will not be used.

1.2.2 Prescribed Burning

The purpose of this treatment is removal and control of invasive woody plants, thatch removal, preparation for seeding and planting, and invigoration of native plant populations. The area burned in any given year at each site, also called the annual burn unit, will be determined yearly based on individual site conditions and population sizes.

- All burns will comply with state regulations and protocols.
- Woody debris will be removed from the burn unit prior to burning as needed to reduce fire intensity.
- Appropriate barriers will be used to contain burns such as perimeter mowing, wet lines with hose lays, disk lines, foam or other retardants, etc.
- 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.

1.2.2.0 Fender's Blue Butterfly (FBB) Habitat

- At sites supporting 100 or more FBB, the burn unit will encompass no more than 1/3 of the occupied FBB habitat.
- At sites supporting less than 100 FBB, the burn unit will encompass no more than ¼ of the occupied FBB habitat.
- The center of the burn unit must be within 100 m (100 yds) of unburned occupied habitat.
- Butterfly larvae habitat (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 2008a). This limit is 400 ha (1,000 ac). Prior to prescribed burns, USFWS will be consulted to determine if the area proposed for burning is compatible with regional habitat management activities.
- If post-burn butterfly numbers show a stable or increasing population, burning may continue on a rotational cycle with continued monitoring. If the butterfly population declines, USFWS will be consulted prior to additional burns (See HCP Chapter 7: Monitoring and Adaptive Management.

1.2.2.1 Covered Plant Species Habitat

- Prescribed burning will occur as needed to restore habitat for Nelson's checkermallow, Bradshaw's lomatium, Kincaid's lupine, peacock larkspur, and Willamette daisy. Where prior research has demonstrated that fire effects are positive or neutral for these Covered Species (such as Bradshaw's lomatium, Kincaid's lupine, peacock larkspur, and Willamette daisy), 100% of the populations may be burned in any given year. For those species with uncertain

responses to fire (such as Nelson's checkermallow), burning will be limited to 50% of the population until research indicates fire effects are positive or neutral.
- Frequency of burning will depend on habitat conditions, Covered Species population trends, funding, staffing, weather, and fire conditions.
- Prescribed burning will occur in late summer or early fall after the Covered Species have gone dormant.

1.2.3 Chemical Treatment

Chemical treatments are used to control woody vegetation and invasive species. However, 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.
- Percentage cover measurements (or abundance measurements) will be taken in the spring to determine if the herbicide treatment has adversely affected any listed and/or covered plant species.
- 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.

1.2.3.0 Acceptable Chemicals

Only the chemicals in Table J.1 below are acceptable herbicides for management of habitats under this Plan. If new, more effective or less toxic herbicides become available, Benton County will coordinate with USFWS and ODA to update this Appendix for their inclusion.

1.2.3.1 Controlling Herbicide Drift

The following procedures will be used to control herbicide drift:

- 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 km (7 mi) 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 and applied under the above strict application requirements.
- Dyes may be used for applications to ensure complete and uniform application and to observe the amount of drift.

1.2.3.2 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, pendimethalin, imazapic, and fluazifop 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.

- For non-tested herbicides, 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.
- The area allowed for herbicide application will be less in small compared to large butterfly populations. These restrictions are noted in Table J.1.

1.2.3.3 Restrictions for use near Nelson's checkermallow

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.

1.2.3.4 Shade Cloth

Shade cloth is used to control dense weed infestations. A dark cloth is placed over the infestation and fastened to the ground with stakes. The cloth is generally removed after two years.

- Shade cloths shall be installed during the growing season, but will not be used directly over any Covered Species or within 5 m (15 ft) of Kincaid's lupine plants in order to prevent impacts to Fender's blue butterfly eggs or larvae.
- A qualified specialist will direct the on-site implementation of this technique to reduce potential impacts to any covered plant species.

1.2.4 Solarization

This technique is also used to control dense weed infestations and may be combined with tilling prior to treatment. The weed infestation is covered with plastic sheeting and remains in place for at least three months during the subsequent growing season. Once the plastic is removed, follow-up weeding may be necessary.

- This technique will be used not bused over any Covered Species and no closer than 5 m (15 ft) to Kincaid's lupine plants in order to prevent impacts to Fender's blue butterfly eggs or larvae.

- Solarization can be used for site preparation prior to reintroductions or augmentations.
- A qualified specialist will direct the on-site implementation of this technique to reduce potential impacts to any covered plant species.

1.2.5 Tilling/Disking

Tilling and disking is used to remove invasive species.

- Tilling/disking will, to the extent practicable, be implemented along existing ground contours.
- Tilling/disking shall not occur during the wet season to minimize alterations to site hydrology and destruction of the soil structure.
- Absent the need for additional weed control (such as solarization), tilling/disking will be immediately followed by planting native plant species groundcover via seeding or outplanting.
- This technique will be used no closer than 5 m (15 ft) to Covered Species.

1.2.6 Raking

Raking is used to reduce thatch build up.

- Rakes may be tractor mounted or hand held.
- Raking will occur after listed and/or covered plants have gone dormant for the season.
- Efforts will be made to avoid disturbing the underlying soil.
- At sites with 100 or more Fender's blue butterfly, no more than 1/3 of the site may be racked annually.
- At sites with less than 100 Fender's blue butterfly, no more than ¼ of the site may be racked annually.
- Efforts will be made to identify and avoid Nelson's checkermallow.
- Tractors shall be equipped with rubber tracks to minimize soil compaction when needed.
- Thatch and leaf litter will be removed off site.

1.2.7 Sod Rolling

Sod rolling is used for invasive species removal, especially those with rhizomes.

- This technique will be used no closer than 5 m (15 ft) to covered plants and butterflies.
- This method may be used for site preparation prior to introductions or augmentations.

1.2.8 Grazing

Grazing may be used to control woody vegetation encroachment and invasive species. Grazing shall be permitted to occur if it is managed so as not to impede the ability of

the Covered Species to survive and reproduce. The following guidelines are suggested to avoid negative impacts from grazing. Monitoring and adaptive management that is completed in grazed areas will provide additional management guidelines.

In areas with the Covered Species:

- Grazing will not occur during the wet season when soils are soft.
- Grazing will not occur at intensities that result in trampling or creation of bare soil.
- Grazing at low to moderate levels during the dry season (after July 15) is generally allowed in most upland prairies.
- Grazing in areas with Kincaid's lupine may be possible once soils are sufficiently dry, and before the lupine is dormant, as this species is generally not palatable to most livestock.
- No grazing shall occur in areas with Nelson's checkermallow present, as this species frequently does not go completely dormant.
- No grazing shall occur in areas with Fender's blue butterfly larvae present, as the impacts of trampling on larvae are unknown.
- The type of animals used will depend upon the type of invasive species control needed, availability of the animals, and the time of year control is needed.
- Animals brought in from another site will be cleaned of weed seeds prior to use.

1.2.9 Biological Control

- Currently there are no biological controls for invasive species of concern. If in the future such controls become available, Benton County and/or any holder of a Certificate of Inclusion will work with the USFWS, ODA, and the 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.

Table J.1. Approved Herbicides

Herbicide	Brand Names(s)	Surfactant or Adjuvant	Target Species	Application Period	Application Method	Restrictions
Triclophyr	Garlon		Woody species and broadleafs	February 1–August 15: wipe on applications only. August 15–October 31: spray and wipe applications. August 15–April 1: Applications in areas with Nelson's checkermallow, provided restrictions are followed	Woody Species: Hand painted or directly wicked onto fresh cut stumps within 24 hours of cutting. Broadleaf Species: Apply using a hand-held wand or mounted on an all-terrain vehicle.	**Fender's blue butterfly:** Do not spray over Kincaid's lupine where Fender's blue is present
Glyphosate	Rodeo, Round-up, Aqua-Master, Accord	Vegetable oil based surfactant	Grasses and broadleafs, some woody species including blackberry	February 1–August 15: wipe on applications only. August 15–October 31: spray and wipe applications. August 15-April 1: Nelson's checkermallow, provided precautions are followed	Apply with a hand-held wand or boom mounted on an all-terrain vehicle.	**Nelson's checkermallow:** No covering of Nelson's checkermallow is required where glyposhate is applied with a weed wipe (target upper grass stems, avoiding Nelson's checkermallow plants.) **Fender's blue butterfly:** Apply in fall with an all-terrain vehicle boom mounted sprayer or via spot treatment of target plants.
Imazapic	Plateau	Vegetable oil based surfactant	Grasses and broadleaf sp. (pre- and post-emergent)	September 1-November 30: Spray or wipe on.	Apply with a hand-held wand or boom mounted on an all-terrain vehicle.	**Fender's blue butterfly:** Apply in fall with an all-terrain vehicle boom mounted sprayer or via spot treatment of target plants.

Herbicide	Brand Names(s)	Surfactant or Adjuvant	Target Species	Application Period	Application Method	Restrictions
Pendimethalin	Pendulum		Grasses and broadleaf sp. (pre-emergent)	September 1-November 30: Spray on	Apply with a hand-held wand or boom mounted on an all-terrain vehicle.	Control germination of seeds; will not harm established plants. **Fender's blue butterfly:** Apply in fall with an all-terrain vehicle boom mounted sprayer or via spot treatment.
2,4-D amine	Weedar 64	Vegetable oil based surfactant	Broadleaf sp.	February 1 – August 15: wipe on applications only. August 15 – October 31: spray and wipe applications. August 15- April 1: Nelson's checkermallow, provided precautions are followed.	Apply with a hand-held wand or boom mounted on an all-terrain vehicle..	**Fender's blue butterfly:** With areas supporting 100 adult FBB, the area to be treated will be no more than 1/3 of the occupied habitat. For sites supporting fewer than 100 adult FBB, the area to be treated will be no more than ¼ of the occupied habitat. .
Clethodim	Envoy	Vegetable oil based surfactant	Non-native grasses	June 1 – October 25: upland prairie. August 1 – October 25: Wet Prairie.	Apply with a hand-held wand or boom mounted on an all-terrain vehicle. Weed wiping during the growing season near covered plants should target taller grasses, avoiding low-stature plants.	**Nelson's checkermallow:** No covering of Nelson's checkermallow is required. **Fender's blue butterfly:** With areas supporting 100 adult FBB, the area to be treated will be no more than 1/3 of the occupied habitat. For sites supporting fewer than 100 adult FBB, the area to be treated will be no more than ¼ of the occupied habitat.
Sethoxydim	Poast	Vegetable oil based surfactant	Grasses	Upland Prairie: June 1 – October 25 Wet Prairie: August 1 – October 25 General: February 15 – May 15 (early application)	Apply with a hand-held wand or boom mounted on an all-terrain vehicle.	**Nelson's checkermallow:** No covering of Nelson's checkermallow is required. **Fender's blue butterfly:** With areas supporting 100 adult FBB, the area to be treated will be no more than 1/3 of the occupied habitat. For sites supporting fewer than 100 adult FBB, the area to be treated will be no more than ¼ of the occupied habitat.

Herbicide	Brand Names(s)	Surfactant or Adjuvant	Target Species	Application Period	Application Method	Restrictions
Fluazifop-P-butyl	Fusilade	Vegetable oil based surfactant	Grasses	Upland Prairie: June 1 – October 25 Wet Prairie: August 1 – October 25 General: February 15 – May 15	Spot foliar application using a hand-held wand or mounted on an all-terrain vehicle. If weed wiper is used to apply Fluazifop-P-butyl near listed or covered plants during the growing season, the herbicide shall be applied at a height to target the upper grass stems and avoid lower stature listed and/or covered plant species.	**Nelson's checkermallow:** No covering of Nelson's checkermallow is required. **Fender's blue butterfly:** Apply in the fall or winter with an all-terrain vehicle boom mounted sprayer or via spot treatment.
Oryzalin	Surflan	Activator 90	Grasses	Upland Prairie: August 1 – October 31	Broadcast spray application using a backpack sprayer with a hand-held wand.	**Nelson's checkermallow:** Protect plants from herbicide drift or overspray (species does not go dormant), cover using buckets, tree protection tubes, or other suitable material that covers or shields the plants. **Fender's blue butterfly:** Apply in the fall with an all-terrain vehicle with boom sprayer or via spot treatment. With areas supporting 100 adult FBB, the area to be treated will be no more than 1/3 of the occupied habitat. For sites supporting fewer than 100 adult FBB, the area to be treated will be no more than ¼ of the occupied habitat.