# United States Department of the Interior

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File Number: 2022-F-0014
File Name: OR126: Veneta to Eugene
TS Number: 22-197
Ecosphere: 2022-0039175

August 31, 2022

Keith Lynch, Acting Division Administrator
Federal Highway Administration, Oregon Division
530 Center Street NE
Salem, Oregon, 97301

Subject: Project proposal for multiple safety and congestion relief improvements along Oregon Highway 126 between the cities of Eugene and Veneta

Dear Mr. Lynch:

This letter transmits the Fish and Wildlife Service's Biological Opinion (attached) on the proposed Oregon Highway 126 (OR 126): Veneta to Eugene highway expansion project located in Lane County, Oregon, in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.). The Federal Highway Administration requested formal consultation on Fender's blue butterfly (*Icaricia icarioides fenderi*), Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), Willamette daisy (*Erigeron decumbens*), and Designated Critical Habitat for one plant (Willamette daisy). We received your January 19, 2022, request for formal consultation on January 19, 2022. We requested additional information on February 21, 2022, and we received a response via email on March 10, 2022. We requested additional information on June 2, 2022, and we received a response on June 3, 2022.

The Oregon Department of Transportation and the lead federal action agency, the Federal Highway Administration, propose multiple safety and congestion relief improvements along OR 126 between the cities of Eugene and Veneta. The project will include widening the 2-lane road to a 4-lane road, traffic control changes, such as roundabouts, additional and modified left-turn lanes at multiple intersections, as well as a shared-use path adjacent to the roadway.

After reviewing the current status of the species, the environmental baseline, the effects of the proposed action and the cumulative effects, we conclude that the proposed project will not

jeopardize the continued existence of Fender's blue butterfly, Kincaid's lupine, and Willamette daisy. We also conclude that the proposed action will not destroy or adversely modify designated critical habitat for the Willamette Daisy. The attached Biological Opinion is based on information provided in your Biological Assessment, discussions, field visits, and other sources of information cited in the Biological Opinion. This project includes conservation measures, including selecting are restoring replacement sites, with details yet to be determined. These conservation measures are part of the project and this Biological Opinion depends upon their being implemented. Further consultation with the Service will be needed to ensure restoration activities are covered by a section 7(a)(1) process. Any impacts to plants or animals due to capture or reducing to possession, such as salvage and seed collection would need to be covered by an Endangered Species Act section 10(A)(1)(a) permit and process. This Biological Opinion expires 15 years after the date of signature. A complete record of this consultation is on file at the Orgon Fish and Wildlife Office in Portland, Oregon.

If you have any questions regarding the enclosed Biological Opinion, or our shared responsibilities under Endangered Species Act, please contact Rhiannon Cochrane (971-352-5779) or Jeff Everett (503-231-6952) of my staff.

Sincerely,

JEFFREY DILLON

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Date: 2022.08.31 15:47:09 -07'00'

Acting for Craig Rowland
Acting State Supervisor

Attachment(s)
Biological Opinion - OR 126: Veneta to Eugene

cc:
Satvinder Sandhu, Federal Highway Administration
Cindy Callahan, Senior Biologist, Federal Highway Administration

# Endangered Species Act - Section 7 Consultation

# Biological Opinion

## OR 126: Veneta to Eugene
## Lane County, Oregon

**U.S. Fish and Wildlife Service Reference:**
**ECOSphere #** 2022-0039175
File Log Number 2022-F-0014
OFWO Tracking System record number TS# 22-197

**Federal Action Agency:**
**U.S. Department of Transportation - Federal Highway Administration**

**Consultation Conducted By:**

**U.S. Fish and Wildlife Service**
**Oregon Fish and Wildlife Office**

JEFFREY DILLON

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Date: 2022.08.31 15:47:33 -07'00'

August 31, 2022

Craig Rowland
Acting for Acting State Supervisor

Date

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# INTRODUCTION

This document represents the Fish and Wildlife Service's (Service) Biological Opinion (BO) based on our review of the proposed Oregon Highway 126 (OR 126): Veneta to Eugene project in Lane County, Oregon, and its effects on Fender's blue butterfly (*Icaricia icarioides fenderi*), Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), and Willamette daisy (*Erigeron decumbens*), and Designated Critical Habitat (DCH) for one plant (Willamette daisy) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et *seq.*). We received your January 19, 2022, request for formal consultation on January 19, 2022. We requested additional information on February 21, 2022, and we received a response on March 10, 2022 (Cindy Callahan, Senior Biologist, Federal Highway Administration Washington/Oregon Divisions, Olympia, Washington. pers. comm., March 10, 2022. RE: Response to USFWS comments on OR 126 BA (Service Tracking 22-197).

This BO is based on information provided in your Biological Assessment (BA) for the proposed project (Attached as Appendix B), additional information provided by you on March 10 and June 3, 2022, discussions with action agency staff and consultants, species experts, field visits and other information. A complete record of this consultation is on file at this office.

## Consultation History

The following are the dates of Oregon Department of Transportation (ODOT) and Federal Highway Administration (FHWA) discussions with the Service:

- December 2020 early coordination meeting between ODOT and the Service
- May 2021 meeting between ODOT, FHWA, and the Service - coordination on content of BA, process for developing BA
- July 2021 meeting between ODOT, FHWA, and the Service – discussion of BA progress, species addressed in BA, and mitigation requirements
- August 2021 meeting between ODOT, FHWA, and the Service – discussion of impacts, habitat assessment methods, and Service geodatabase
- October 2021 meeting between ODOT, FHWA, and the Service – discussion of conservation measures
- November 2021 meeting between ODOT, FHWA, and the Service – discussion of the Service review of draft BA sections, conservation measures, and timeline
- January 2022 BA received by the Service
- February 2022 the Service reviewed BA and sent request for more information via email
- March 2022 responses to questions received by the Service
- June 2022 the Service requested clarification on impacts and received response from FHWA via email
- July 2022 the Service provided a draft BO to FHWA and ODOT for review
- July 2022 Congress rescinded the 2019 Act regulations requiring the Service to incorporate the pre 2019 regulations prior to signature
- August 2022 the Service received comments on the draft BO from FWHA and ODOT

# BIOLOGICAL OPINION

## DESCRIPTION OF THE PROPOSED ACTION

### Project Overview

The ODOT and the lead federal action agency, the FHWA, propose multiple safety and congestion relief improvements along OR 126 between the cities of Eugene and Veneta. The project will include widening the 2-lane road to a 4-lane road. The improvements include traffic control changes, such as roundabouts, additional and modified left-turn lanes at multiple intersections, as well as a shared-use path adjacent to the roadway.

Purpose and Need (Appendix B, p.4)

The project purpose is to provide safety and congestion relief improvements along OR 126 through the project corridor. The OR 126 roadway segment is classified as a Freight Route and Statewide Highway with a posted speed of 88.5 kph (55 miles per hour). The OR 126 is currently two travel lanes with left-turn lanes at major intersections. The proposed improvements along OR 126 address safety deficiencies that were documented in the Highway 126 Fern Ridge Corridor Plan, prepared by ODOT, and adopted by the Oregon Transportation Commission on April 17, 2013. The Highway 126 Fern Ridge Corridor Plan summarizes the alternatives evaluated and includes a recommendation to advance the Four-Lane Alternative as the best solution to meet the project goals and objectives.

This project builds upon the Highway 126 Fern Ridge Corridor Plan to refine the design of the Four-Lane Alternative and complete the National Environmental Policy Act documentation necessary for the project to advance. The current project is state funded through House Bill 2017 but has a federal nexus for environmental clearances with FHWA to qualify the project for future federal funding. Additional funding for final design, right of way acquisition, and construction has not yet been identified.

Proposed Action (Appendix B, p.4)

This section provides preliminary details regarding project elements, construction materials, and methods. See Figures 3-1A to 3-1C (Appendix B) for the locations of major project elements discussed below. Descriptions below are focused on aspects of the proposed action that will impact habitat occupied by Act-listed species and/or DCH. Act resources to be impacted by the proposed action are Fender's blue butterfly, Kincaid's lupine, Willamette daisy, and DCH for Willamette daisy. Future site evaluations, including geotechnical investigations, will affect final project design; however, it is anticipated that changes to the project design will not alter the level of effect on species listed under the Act and habitats because these activities will occur within the analyzed Area of Potential Impact (API).

Project area Map – refer to Figures 3-1A to 3-1C for more detail (Appendix B, p. 5-7):


Site Preparation (Appendix B, p.8-9):

Clearing and Grubbing: Clearing and grubbing for project construction and staging will occur throughout the API. Clearing and grubbing will consist of removal of existing pavement and vegetation to the ground surface, and sub-grade grubbing in some areas. This will include tree and down timber removal, and removal of shrubs and herbaceous species. Clearing and grubbing is needed to accommodate the widened roadway, multi-use path, intersection improvements, bioretention ponds at roundabouts, replaced stormwater ditches, shifted ODOT operation and maintenance zone, and temporary construction equipment access zone. Since all other proposed actions will occur within the cleared and grubbed API and due to the nature of species listed under the Act and DCH, site clearing, and grubbing is the only project element that will have effects.

As part of the agreed upon conservation measures, prior to clearing and grubbing in areas that currently support listed plants, individual Kincaid's lupine and Willamette daisy plants will be salvaged and relocated to appropriate protected sites.

Grading and Earthwork: Grading and earthwork will occur after clearing and grubbing to prepare the ground surface for construction of the widened roadway, the new bridges, stormwater facilities, and other project elements. This work will occur within upland and wetland. Earthwork will include importing weed-free fill material in areas adjacent to sensitive habitats, particularly through the areas adjacent to existing plant populations and wet prairie

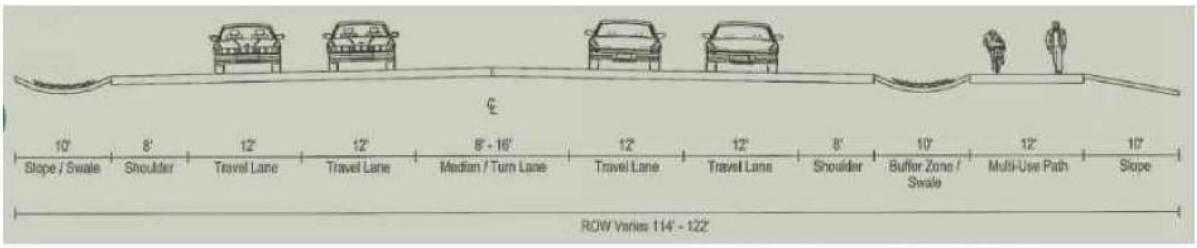
where the roadway embankment will be widened to accommodate the additional lanes and multi-use path.

Staging: Staging areas for project-related equipment, materials, and construction crews will be required. The location of staging areas is at the contractor's discretion. The contractor will be required to secure all appropriate environmental clearances, permits and regulatory approvals for staging areas selected.

Roadway Widening (Appendix B, p. 9):

The OR 126 roadway will be widened from two travel lanes to four. The maximum width of the proposed roadway cross-section from edge of pavement to edge of pavement, including travel lanes, left turn lanes, shoulders, median, and multi-use path, plus the roadside ditch and 4-foot maintenance zones, is 37.2 m (122 feet) (Figure 3-2 in Appendix B). The cross-section width will vary throughout the overall roadway alignment and will generally be less than the maximum. There will also be limited roadwork on the intersecting roads where they approach and feed into the roundabouts. It is assumed that the old pavement and roadway will be completely reconstructed with the project. Approximately 21.6 ha (53.3 acres) of new pavement are proposed across the 11.6 km (7.2 miles) of highway. Roadway widening will be staged to maintain two lanes of vehicular traffic and pedestrian access throughout construction.

Figure 3-2. Typical Roadway Cross-Section




Intersection Improvements (Appendix B, p. 9):

The existing roadway has left turn lanes at major intersections and no roundabouts. Additional and modified left turn lanes are proposed at several intersections. Roundabouts are proposed at five intersections: Huston Road, Ellmaker Road, Central Road, Fisher Road, and Green Hill Road. The location of the Greenhill Road intersection roundabout is currently designed to avoid all impacts to Willamette daisy and minimize impacts to Willamette daisy DCH to the greatest extent practicable.

Bridges (Appendix B, p. 9-10):

Three streams, West Fork Coyote Creek, Middle Fork Coyote Creek, and Coyote Creek, cross under OR 126 bridges within the API and flow into the Fern Ridge Reservoir. These creeks existed prior to construction of the reservoir and the historic channels located within the reservoir are still visible; the Middle Fork channel is only visible when reservoir water levels are low. The proposed action includes replacing the bridges that cross each of these three channels. The

existing two-lane bridges will be replaced with longer, wider bridges that will accommodate four lanes of traffic, a median, two shoulders, and a multi-use path. The following bridges will be replaced:

- Bridge BR02520A across Coyote Creek
- Bridge BR02522A across Middle Fork Coyote Creek
- Bridge BR17410 across West Fork Coyote Creek

To accommodate the horizontal roadway shift in the vicinity of existing bridge BR21307 over the Coos Bay Rail Line, a new permanent structure will be constructed that will carry westbound traffic. The existing two-lane bridge will remain in place and will ultimately carry eastbound traffic.

Bridge BR02765 located east of the Fisher Butte Wildlife Area parking lot will be replaced with a circular culvert under the highway.

The replacement bridges over the reservoir and the new bridge over the railroad are not associated with species listed under the Act or DCH. The new culvert replacing bridge BR02765 will be in the vicinity of Willamette daisy DCH but will be entirely contained within the footprint of the new roadway and roadside ditches and will not result in impacts to DCH.

Culverts (Appendix B, p.10):

Three existing culverts (17409, D02712, UNTF1) will be lengthened to accommodate the widened roadway. Two circular culverts (T02657 and T02676) will be replaced with longer box culverts. One circular culvert (D027126) will be replaced with a long storm drain collection system. Many other smaller-diameter, cross-drain culverts exist throughout the API. These may need to be replaced or extended depending on their condition and location.

The six culverts discussed above are not associated with species listed under the Act or DCH. Neither culvert replacement nor culvert lengthening will result in a change in the hydrology that supports habitat for listed plants. All culverts will be entirely contained within the footprint of the new roadway and roadside ditches and will not result in impacts to DCH.

Stormwater Management (Appendix B, p.10-11):

On-site stormwater management will involve replacing roadside ditches, constructing new inlets and drainage pipes, removing existing stormwater facilities and replacing them where possible, and constructing new bioretention ponds and bioslopes.

Existing roadside ditches will be shifted with the widened roadway prism. Given that all new ditches will replace existing ditches, the ditches will be oriented in the same direction (parallel to the roadway), and they will be in the same location relative to adjacent wetlands. No changes to the hydrology of the surrounding area are anticipated.

The project will increase the contributing impervious area along the alignment from 13.93 ha (34.41 acres) to 36 ha (88.95 acres). Oregon Department of Transportation's stormwater program water quality guidelines require that projects that increase impervious surface area or change drainage patterns must treat all roadway stormwater runoff. Due to right-of-way and natural resources constraints, it will not be possible to provide on-site treatment for much of the runoff between the Coos Bay Rail Line bridge crossing and Ellmaker Road. Providing new stormwater treatment facilities for this portion of the corridor would result in additional fill in the reservoir, and/or impacts to wet meadow habitat, wetlands, species listed under the Act, or DCH. Instead of developing on-site treatment facilities in this area, stormwater runoff will be collected by a combination of inlets and roadside ditches and conveyed, untreated, into Fern Ridge Reservoir through a system of small storm sewers, culverts, and ditches.

Runoff from 13.2 ha (32.62 acres) of contributing impervious area will be treated on-site in new bioretention ponds and bioslopes. Bioretention ponds are proposed at four intersections: Green Hill Road, Fisher Road, Central Road, and Ellmaker Road. Bioslopes are proposed on the south roadway embankment from Terry Street to approximately 0.48 km (0.3 miles) west of the railroad crossing. Stormwater management facilities will be designed to address typical roadway runoff pollutants, including sediments, nutrients, heavy metals (both dissolved and particulate), polycyclic aromatic hydrocarbon, and hydrocarbons (oils, greases, etc.).

Constructed stormwater management Best Management Practices (BMPs) in areas with plants listed under the Act and/or DCH have been minimized; however, shifted roadside ditches will encroach into these areas. Associated impacts are accounted for in Table 3-1 (Appendix B).

Off-Site Stormwater Management: The lack of complete onsite runoff treatment will be offset by treating currently untreated runoff from an offsite location. Approximately 44.11 ha (109 acres) of untreated area have been identified at sites along I-5, Highway 569 (Randy Pape Beltline), and Highway 99, generally located northeast of the project corridor; additional sites may be identified in the future. The current design requires at least 22.8 ha (56.33 acres) total of off-site area to be treated. The offsite areas are outside of DCH and a survey for species listed under the Act will be conducted at the sites prior to site selection or development to ensure impact avoidance.

Additional Project Elements (Appendix B, p.11-12):

In addition to the major project elements discussed above, the proposed action includes:

- Geotechnical drilling: A thorough geotechnical exploration plan will be needed to better define foundation recommendations for the proposed bridges and roadway embankment. Exploratory drilling will be required at several locations along the alignment and will be contained within the API associated with the roadway widening and roundabouts. No additional area will be required for geotechnical exploration.
- Pedestrian and bicycle improvements: Safety improvements such as warning signage, median refuge islands at crosswalks, and lighting will be installed as needed.

- New retaining walls: Five retaining wall locations have been identified for the project. Any additional retaining walls deemed necessary at future design phases will be within the API.

- Other permanent structures and construction activities: Guardrails, existing signs, fences, electrical systems, and roadway illumination will be impacted by the proposed project. These features will be moved, removed, or replaced as needed. The median islands on the east end of the project may have planting areas that require irrigation systems. Plantings in the median islands will be native species appropriate for the location and will be controlled for weeds.

- Utility relocation: Multiple utilities are located within the API. These project elements will either be entirely contained within the footprint of the new roadway and roadside ditches or will be located away from areas with species listed under the Act and/or DCH.

Long-Term Operation and Maintenance:

The ODOT operational maintenance zone generally extends 1.22 m (4 feet) beyond the back of the existing roadside ditches and will be shifted along with the ditches. This zone is part of the permanent impact area since following construction, ODOT will require long-term access to the area for roadside ditch maintenance to maintain the operational right-of-way.

**Conservation Measures**

Impact Avoidance and Minimization Measures – BMPs (Appendix B, p. 12-13)

The project will employ avoidance and minimization measures through project design to avoid and/or minimize impacts to species listed under the Act and their DCH within the API. Minimization measures include:

- Actions to deter streaked horned larks from occupying temporarily cleared construction areas will be implemented to prevent streaked horned larks from using temporary construction sites within the API.
- In areas where onsite stormwater treatment would result in additional impacts to habitat occupied by plants listed under the Act or Willamette daisy DCH, offsite stormwater treatment is proposed.
- 'No work areas' will be implemented outside the permanent construction impact area to contain construction impacts. The Service requests copies of final design documents prior to construction that clearly show "no work areas" and any areas within the API where listed species will and will not be impacted.
- The road will be widened in both directions from the existing centerline, but in order to minimize impacts to plants listed under the Act and Willamette daisy DCH located north of the road, widening will occur as far south of the existing centerline as allowed by the presence the Coos Bay Rail Line.

- Approximately twice the required area has been identified for offsite stormwater treatment. Surveys for species listed under the Act will be conducted at the sites prior to site selection, and stormwater treatment will not be located in areas occupied by these species.

  All temporarily impacted areas will be restored to pre-construction contours and seeded as appropriate following project construction. Seed mix(es) will be appropriate for the location and habitat to be restored and species will be chosen that will not impact nearby habitat supporting listed species. The service interprets "appropriate" to mean that seed mixes would include only native seed sourced from local and appropriate seed zones and habitats. The Service PROJECTS Biological Opinion (Fish and Wildlife Service 2015, entire) and associated Contractor's handbook (Fish and Wildlife Service 2020, entire) and the Benton County Habitat Conservation Plan (Kaye et al., 2010, entire) may be referenced for BMP's consistent with recovery criteria for species listed under the Act.

- Temporary erosion and sediment controls will be installed prior to project construction, will be inspected regularly and maintained, and will be left in place until permanent erosion and sediment control measures have established.

- Emergency spill response materials will be onsite prior to construction.

Conservation Measures (Appendix B, p.13)

The Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington provides recommendations for achieving range-wide recovery goals for Fender's blue butterfly, Kincaid's lupine, and Willamette daisy. Recommendations include preventing future habitat loss by acquiring and managing properties with existing populations of listed species; enhancing or restoring degraded habitat for populations of listed species; and augmenting existing small populations of listed species using appropriate genetic resources (Fish and Wildlife Service 2010, pp. IV-3 to IV-5). The conservation measures below were developed with these recommendations in mind and Appendices J, K, and L of the Benton County Prairie Species Habitat Conservation Plan were used as a resource for developing appropriate mitigation ratios and best practices. See Appendix 4 in the BA (Appendix B) for sections of the Benton County Prairie Species Habitat Conservation Plan that were used when developing these conservation measures.

At the replacement ratios presented in Table 3-2 below, ODOT would commit to the following conservation measures:

Compensation for Loss of Fender's Blue Butterflies: To compensate for the loss of 0.045 ha (0.11 acre) of Fender's blue butterfly habitat, ODOT will establish between 0.13 and 0.22 ha (0.33 and 0.55 acres) of high-quality habitat for Fender's blue butterfly on a site that contains suitable habitat including suitable soils, little to no woody overstory, less than 30 percent cover of List A or B noxious weeds and is protected with a permanent conservation easement. The larger acreage will be required if the habitat is restored to adequate condition. The smaller acreage will be required if the habitat is restored to excellent condition.

Compensation for Loss of Kincaid's Lupine Plants: To compensate for the loss of 156 Kincaid's lupine plants, ODOT will establish or restore between 0.13 and 0.22 ha (0.33 and 0.55 acres) of high-quality habitat that supports between 3 and 5 times the impacted amount of Kincaid's lupine foliar cover. Plant establishment will occur on a site with suitable soils, little to no woody overstory, less than 30 percent cover of List A or B noxious weeds and is protected with a permanent conservation easement.

Compensation for Loss of Willamette Daisy Plants: To compensate for the loss of 90 Willamette daisy plants, ODOT will establish between 270 and 450 new Willamette daisy plants on a site that contains suitable habitat including suitable soils, little to no woody overstory, less than 30 percent cover of List A or B noxious weeds and is protected with a permanent conservation easement.

Compensation for Loss of Designated Critical Habitat for Willamette Daisy: To compensate for the loss of 1.42 ha (3.52 acres) of designated Critical Habitat for Willamette daisy, ODOT will either restore 4.27 ha (10.56 acres) of degraded Willamette daisy habitat or protect (through purchase and deed-restriction) 4.27 ha (10.56 acres) acres of currently un-protected high-quality Willamette daisy habitat. This could include designated critical habitat that is currently privately owned and therefore vulnerable to development or high-quality wet prairie habitat that is not already protected as designated critical habitat.

**Table 3-2. Replacement Ratios**

| Species/Habitat | Impact Quantity | | Replacement Quantity | |
|---|---|---|---|---|
| | Area | Individuals | Exceptional Replacement Site* + Deed Restriction + Concurrent Mitigation 3:1 | Adequate Replacement Site* + Deed Restriction + Concurrent Mitigation 5:1 |
| Kincaid's lupine/Fender's blue butterfly | 0.045 ha (0.11 acre) | 156 plants | 0.013 ha (0.33 acre) | 0.22 ha (0.55 acre) |
| Willamette daisy | 0.012 ha (0.03 acre) | 90 plants | 0.036 ha (0.09 acre) or 270 plants | 0.061 ha (0.15 acre) or 450 plants |
| Willamette daisy DCH | 1.42 ha (3.52 acres) | N/A | 4.27 ha (10.56 acres) | 7.12 ha (17.60 acres) |

*As defined in the Benton County Habitat Conservation Plan.

Timing and monitoring of restoration:

The replacement ratios for this project were developed using the Benton County Habitat Conservation Plan as a reference since it deals with the same species as found in the project area. The constraints regarding timing, monitoring, and determining habitat found in the Benton County Habitat Conservation Plan will be used to guide restoration actions in this project. However, the Service expects that ODOT and FWHA will continue to ensure that sites meet

habitat quality and offset ratios for listed species, and that adequate funds will be allocated to ensure success in perpetuity. The Service recommends that restoration begin early enough that sites can support plants salvaged prior to construction.

Section 7(a)(1) and Section 10 permits:

The restoration and project impact offset activities described above, and committed to by the action agency, are part of the project, and the effects analysis below depends on these measures being implemented. Any impacts to plants or animals due to capture or reducing to possession, such as salvage and seed collection would need to be covered by section 10(A)(1)(a) of the Act permit process. Restoration activities would need to be covered by a section 7(a)(1) process and BO such as tiering to the Service PROJECTS Biological Opinion (Fish and Wildlife 2015, entire). Since specifics of these restoration projects are unknown at this time, this will take place once projects are planned in detail. Oregon Department of Transportation and FHWA agree this is the case (Cindy Callahan, Senior Biologist, Federal Highway Administration Washington/Oregon Divisions, Olympia, Washington. pers. comm., March 10, 2022. RE: Response to USFWS comments on OR 126 BA (Service Tracking 22-197).

Please refer to the BA (Appendix B) for more project details, references, and figures.

**Action Area**

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment.

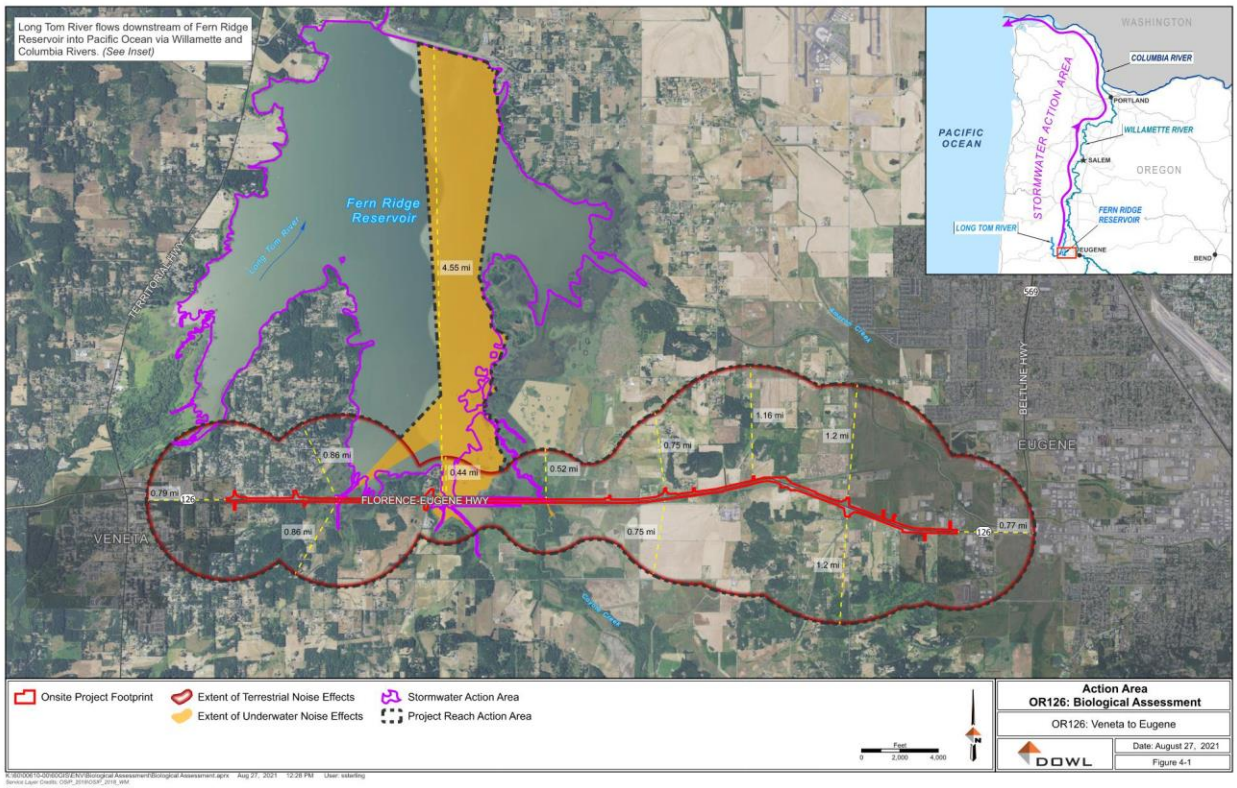
The action area proposed by ODOT and FHWA is as follows and Service has not made alterations (BA – Appendix B, p. 13-18):

The project's action area includes the geographic extent to which project-related noise travels through the air and underwater before attenuating to background levels, and the extent of potential stormwater effects from short- and long-term project-related water quality impacts. Any offsite mitigation and conservation areas will also be part of the project's action area. Noise and stormwater effects are not a concern for the species addressed in this BA. However, the action area is delineated based on the regulatory definition and is not species-specific.

As described in Section 3.0 in the BA (Appendix B) Project Description, the project includes various onsite project elements plus offsite areas for stormwater treatment, wetland mitigation, and conservation measures. For defining the action area, these project elements can be separated into five types of construction actions. **Table 4-1 (in the BA, Appendix B)** lists the construction actions and the types of effects each will generate beyond the direct impacts in the API.

**Determining the Action Area**

The methods for determining the geographic extent of effects from project actions were based on those described in the Online WSDOT Biological Assessment Preparation Manual (Washington Department of Transportation 2020). The outer extent of geographic effects for all actions are combined to determine the overall project action area. An effect does not necessarily equate to an impact to species listed under the Act or DCH. While the following effects will not constitute impacts to the species addressed in this BA, these effects needed to be quantified in order to define the action area.




For a complete description of how the action area was determined, refer to the BA (Appendix B, p. 17).

Action Area Summary (Appendix B, p. 17-18):

The project action area is split into five subareas: Project Reach Action Area, Stormwater Action Area, Offsite Stormwater Treatment Action Area, Offsite Wetland Impact Mitigation Areas, and Offsite Areas for Implementing Conservation Measures. These areas are shown on **Figure 4-1** (Appendix B) and are defined as follows:

- Project Reach Action Area: Measured from points along the project corridor, the radius of the extent of in-air noise effects ranges from 0.26 to 1.9 km (0.16 to 1.2 miles). Lower background sound and higher construction noise levels are both associated with a greater extent of effects. Underwater noise effects extend from the three in-water bridge locations

out to the edges of the reservoir for all areas within line-of-sight of the noise sources (the reservoir bridge sites).

- Stormwater Action Area: Includes the entire Fern Ridge Reservoir downstream to the Pacific Ocean via the Long Tom River, Willamette River, and Columbia River.
- Offsite Stormwater Treatment Action Area: The locations for these facilities have not been determined. Oregon Department of Transportation and FHWA commit to siting these facilities in locations without listed species. Oregon Department of Transportation will conduct site investigations to confirm absence of listed species prior to selecting locations.
- Offsite Areas for Implementing Conservation Measures: The locations for these facilities have not been determined. Oregon Department of Transportation and FHWA will communicate with the Service as project plans develop and will collaboratively identify locations for conservation measure implementation.

## ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND DESTRUCTION OR ADVERSE MODIFICATION DETERMINATIONS

### Jeopardy

In accordance with regulation (see 84 FR 44976), the jeopardy determination in this Biological Opinion relies on the following four components:

1. The *Status of the Species*, which evaluates the species' current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; its survival and recovery needs; and explains if the species' current range-wide population is likely to persist while retaining the potential for recovery or is not viable;

2. The *Environmental Baseline*, which evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the direct and indirect effects of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species;

3. The *Effects of the Action*, which evaluates all future direct and indirect effects to the species that are reasonably certain to be caused by the proposed action, including the effects of other activities that are caused by the proposed action, and how those impacts are likely to influence the survival and recovery role of the action area for the species; and

4. *Cumulative Effects*, which evaluates the effects of future, non-Federal activities reasonably certain to occur in the action area on the species, and how those impacts are likely to influence the survival and recovery role of the action area for the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current range-wide status, taking into account any cumulative effects, to determine if implementation of the proposed

action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild. The key to making this finding is clearly establishing the role of the action area in the conservation of the species, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role and the continued existence (*i.e.*, survival) of the species.

NOTE: If recovery units were defined in the final recovery plan for the species for use in completing jeopardy analyses, pursuant to Service policy, when an action impairs or precludes the capacity of a recovery unit from providing both the survival and recovery function assigned to it, that action may represent jeopardy to the species. When using this type of analysis, the Biological Opinion describes how the effects of the proposed Federal action on the listed species, taken together with cumulative effects, affect the capability of the recovery unit to support both the survival and recovery of the species.

**Destruction or Adverse Modification**

This Opinion applies the revised regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02 (81 FR 7214, published February 11, 2016). The revised definition states:

"Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features."

In accordance with policy and regulation, the destruction or adverse modification determination in this Biological Opinion relies on the following four components:

1. The *Status of Critical Habitat*, which describes the range-wide condition of the critical habitat in terms of essential habitat features, primary constituent elements, or physical and biological features that provide for the conservation of the listed species; the factors responsible for that condition; and the intended value of the critical habitat for the conservation/recovery of the listed species;

2. The *Environmental Baseline*, which refers to the current condition of critical habitat in the action area absent the consequences to critical habitat caused by the proposed action; the factors responsible for that condition; and the conservation value of critical habitat in the action area for the conservation/recovery of the listed species;

3. The *Effects of the Action*, which represents all direct and indirect effects to critical habitat that are reasonably certain to be caused by the proposed action, including the effects of other actions caused by the proposed action, and how those impacts are likely to influence the conservation value of the affected critical habitat; and

4. *Cumulative Effects*, which represent the effects to critical habitat of future, non-Federal activities that are reasonably certain to occur in the action area and how those impacts are likely to influence the conservation value of the affected critical habitat.

For purposes of making the "destruction or adverse modification" determination, the Service evaluates if the effects of the proposed Federal action on critical habitat, taken together with cumulative effects, when added to the current range-wide condition of critical habitat, are likely to impair or preclude the capacity of critical habitat to serve its intended function for the conservation of the listed species. The key to making this finding is clearly establishing the role of critical habitat in the action area relative to the value of critical habitat, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role.

Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), "physical or biological features" (PBFs) or "essential features" to characterize the key components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations discontinue use of the terms "PCEs" or "essential features," and rely exclusively on use of the term "PBFs" for that purpose because that term is contained in the statute. However, the shift in terminology does not change the approach used in conducting a "destruction or adverse modification" analysis, which is the same regardless of whether the original designation identified PCEs, PBFs or essential features. For those reasons, in this Biological Opinion, references to PCEs or essential features should be viewed as synonymous with PBFs. All of these terms characterize the key components of critical habitat that provide for the conservation of the listed species.

## STATUS OF THE SPECIES

For a detailed account of the status of the species, refer to Appendix A (Status of the Species and Critical Habitat).

### Willamette daisy

The Willamette daisy was listed as endangered on January 25, 2000 (Fish and Wildlife Service 2000, entire). A recovery plan for the Willamette daisy was published on May 20, 2010 (Fish and Wildlife Service 2010, entire). Critical habitat was designated for the species on October 6, 2006 (Fish and Wildlife Service 2006a, entire). This species is known to exist in Benton, Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill Counties in Oregon. This species is also on the state of Oregon's State Endangered Plant list.

A 2018 rangewide survey of Willamette daisy (Ottombrino-Haworth *et al.* 2019, entire) found a total of 81,303 (+/- 25,826) plants across 46 extant sites. Surveyors were unable to relocate plants at 25 sites known to previously contain Willamette daisy. Plants and populations are unevenly distributed across the range, with the majority occurring in the Salem East recovery zone (51,820 plants), and the second most in the Eugene West recovery zone (26,043 plants).

### Kincaid's lupine

Kincaid's lupine is a perennial herb that was listed as threatened, without critical habitat, on January 25, 2000 (Fish and Wildlife Service 2000, entire). A recovery outline for the species was published in 2006 (Fish and Wildlife Service 2006b, entire). Critical habitat was designated on October 6, 2006 (Fish and Wildlife Service 2006a, entire). Kincaid's lupine is known from Benton, Douglas, Lane, Linn, Marion, Polk, Yamhill, and Washington Counties in the state of Oregon, and Lewis County in Washington State.

A rangewide survey of Kincaid's lupine was completed over the years 2014 through 2016 (Ottombrino-Haworth *et al*. 2017, entire). Overall foliar cover has increased from an estimated range of 1.4 to 1.9 ha (3.5 to 4.7 acres) at the time of listing to approximately 2.3 ha (5.6 acres). While significant progress towards recovery has been and continues to be made, only one of the 8 recovery zones (Salem West) meets populations goals for recovery, and there is a long way to go to achieve the recovery plan goal of 50,000 $m^2$ (538,196 square feet) of lupine cover across the range.

### Fender's blue butterfly

The Fender's blue butterfly was listed as endangered, without critical habitat on January 25, 2000 (Fish and Wildlife Service 2000, entire). Critical habitat for the butterfly was designated on October 31, 2006, in Benton, Lane, Polk, and Yamhill Counties, Oregon (Fish and Wildlife Service 2006a, entire). At the time of designation, critical habitat consisted of both known occupied areas and areas with the potential to support Fender's blue butterfly. The Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington, which includes Fender's blue butterfly and four prairie plant species, was published by the Service in May 2010 (Fish and Wildlife Service 2010, entire).

Estimates from 1993 to 2018 for all the surveyed Fender's blue butterfly metapopulations in the Willamette Valley indicate the total number of butterflies fluctuated from an estimate of 3,200 in 32 sites in 1993 to an estimate of 24,460 (Hammond 1994, pp. 35-37; Menke 2019, p. 2). Numbers of butterflies naturally vary annually at individual sites, often doubling or halving between years. The total Fender's blue population estimate for all sites sampled in 2021 was 17,165 butterflies, which is approximately a 9 percent decrease from the 5-year (2016-2020) geometric mean population estimate for the species (Diaz and Harris 2021, entire).

## STATUS OF CRITICAL HABITAT

### Willamette daisy (*Erigeron decumbens*)

For a detailed account of the status of critical habitat for the Willamette daisy, refer to Appendix A: Willamette Daisy (*Erigeron decumbens*): Status of the Species and Critical Habitat.

Critical habitat was designated on October 6, 2006 (Fish and Wildlife Service 2006a, entire). Critical habitat units for the Willamette daisy have been designated in Benton, Lane, Linn, Marion and Polk Counties, Oregon. The Primary Constituent Elements of critical habitat are the habitat components that provide early seral upland prairie, wet prairie, or oak savanna habitat with a mosaic of low growing grasses, forbs, and spaces to establish seedlings or new vegetative growth, with an absence of dense canopy vegetation providing sunlight for individual and population growth and reproduction, and with undisturbed subsoils and proper moisture and protection from competitive invasive species.

Critical habitat is designated for Willamette daisy on 290.6 ha (718 acres) in Oregon's Willamette Valley (Fish and Wildlife Service 2006, entire). Of those, 154.4 ha (381.5 acres) are designated on private lands, 131.2 ha (324.2 acres) on Federal lands, 2.4 ha (6 acres) on State lands, and 2.5 ha (6.3 acres) on county/city property.

## ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The effects to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

### Current Condition of the Species and Critical Habitat in the Action Area

The action area is located in Lane County, west of Eugene, Oregon. This area has a high concentration of prairie plant diversity and contains some of the last best examples of Willamette Valley wet and upland prairie. Government and conservation groups, beginning in the 1980's, joined forces to conserve a patchwork of sites referred to jointly as the West Eugene Wetlands. Many of these sites are within the action area (Appendix B, p.16). Note that this area was defined based on in air and water noise. The bright red outlines the Area of Potential Impact (Figure 2-1 in Appendix B, p.3) where on the ground disturbance may occur. Land ownership in the Action area is a patchwork of public, private, and non-governmental organizations ownership. Most of the properties managed for conservation are owned by Bureau of Land Management (BLM), City or Eugene, Lane County, The Nature Conservancy, The U.S. Army Corps of Engineers (USACE), ODOT, and Oregon Department of Fish and Wildlife.

Willamette daisy

Willamette daisy populations are divided into six recovery zones (see Appendix 1). Only two of these zones meet population size recovery goals per the recovery plan (Fish and Wildlife Service 2010, pp. IV-32); Eugene West and Salem East. In the Eugene West zone (location of the action area) 26 populations contain about 26,000 plants, or roughly about 30 percent of the overall population (Fish and Wildlife Service 2019b, entire). There are 22,407 of these plants (about ¼ of the range wide population) are within the action area. Willamette daisy plants in the action

area are nearly all on protect lands managed for this species. The Fisher Butte unit of the Fern Ridge Wildlife Area is owned by USACE and managed for prairie habitat and daisy conservation and contains about half of the plants in the action area (11,273). Another 2,699 plants are protected in the USACE's Fern Ridge South Marsh unit. East of Fern Ridge, most plants are protected in several natural areas managed by BLM, City of Eugene, The Nature Conservancy, and others. These include the Speedway site (2,079 plants), Balboa (584 plants), Oxbow West (2,499 plants), Vinci (841 plants), and North Greenhill (1,669 plants) (Ottombrino-Haworth et al. 2019, entire). Only a few scattered plants on roadsides and private property are unprotected. Habitat quality at these sites varies, but all protected sites are managed for prairie habitat and species listed under the Act. Willamette Daisy population estimates in the action area have generally increased over time.

Willamette Daisy Critical Habitat Units WD-6A and WD-7B are almost entirely contained within the action area. The BA describes these units as follows: "Unit WD-6 includes approximately 34.6 ha (85.4 acres) of critical habitat with approximately 89 percent occurring on Federal land (BLM and USACE) and 11 percent on private land (Fish and Wildlife Service 2006, pp. 63893). Unit WD-6A supports one of the largest remaining populations of Willamette daisy (Fish and Wildlife Service 2006, p. 63893). Unit WD-7B includes approximately 58 ha (143.4 acres) of critical habitat with approximately 78 percent occurring on Federal land and 11 percent on private land (Fish and Wildlife Service 2006, p. 63893)" (See Appendix 2 in the BA).

Kincaid's lupine

Kincaid's lupine is known from 6 small sites in the action area. Together these populations contain about 450 $m^2$ (1,476 square feet) of lupine cover. This is less than 10 percent of the lupine cover in the Eugene West recovery zone, and about 2 percent of known cover range wide. The largest site in the action area is on private land and has not been monitored since 2008, so status is unknown. Four of the sites are on protected land, and two of these support small populations of Fender's blue Butterfly. One site is along OR 126 within the API (The West 11$^{th}$ site).

Fender's blue butterfly

Fender's blue butterfly has been detected in surveys in two lupine patches within the action area. These are Oxbow West and Turtle Swale. These sites are owned and managed by BLM. The Turtle Swale population has fluctuated between 0 and 20 adult butterflies over the past 20 years, with 10 butterflies recorded in the 2021 survey. This site is within flight distance of several larger populations and is important as a stepping-stone connecting populations across the landscape. The Oxbow West population has ranged from 2 to 122 since 2000 and is another important stepping-stone site. Butterfly eggs likely to be Fender's blue were detected on the West 11$^{th}$ lupine patches and this site is within flight distance of one occupied patch. The West 11$^{th}$ patch is fairly isolated compared to the other Fender's blue populations in the action area and in this recovery zone.

## Conservation Role of the Action Area

Overall, the action area is important for the continued existence of the species addressed in this BO. For Kincaid's lupine and Fender's blue butterfly, the action area represents only a small portion of the existing population, but for Willamette Daisy, about one quarter of existing plants occur in populations that intersect, or are entirely in, the action area. These sites are remnant wet prairies containing natural populations of the plant, so are particularly important for recovery. The sites in the action area are mostly managed for conservation and preserve some of the best remaining habitat. Threats to these sites include invasive plant species, succession, habitat alteration due to development, impacts from recreation and unauthorized camping, habitat fragmentation, and genetic isolation.

## Climate Change

Climate change in the Willamette Valley is predicted to result in warmer temperatures and dryer summers, with winters predicted to be warmer and as wet or slightly wetter than the 20$^{th}$ century (Intergovernmental Panel on Climate Change 2007, pp. 889-890). Extreme weather events such as heat waves and storms are expected to increase in frequency. The region will likely have reduced winter snowpack. Species specific response to these conditions are difficult to predict but are likely to include changes in phenology (potentially resulting in mismatch between co-dependent species), reduced fitness at the southern and lower elevation portions of species ranges, and inability of many species to adapt due to the rapidity of change and fragmentation of habitat in the region.

Over the past decade, several studies have aimed to assess current and future effects of climate change on the prairie species of the Willamette Valley. Kaye et al. (2013, entire) assessed climate change vulnerability specifically for species in the West Eugene Wetlands. They used NatureServ's Climate Vulnerability Index to assess the relative risk of species to predicted future climate. All three species addressed in the BO were addressed in this study. They assessed risk at three scales: local (west Eugene wetlands), regional (Willamette Valley), and range wide for each species. They addressed risk using three climate scenarios ranging from an increase of 1.2 C to 3.8 C by 2100 (B1, A1B, and A2 in Intergovernmental Panel on Climate Change 2007, PP. 889-890). It is important to note that that current temperature increase predictions are higher because global emissions continue to increase (Intergovernmental Panel on Climate Change 2021, entire). In general, all species were presumed stable at the low (B1) emission scenario. Fender's blue butterfly was "Moderately Vulnerable" in the A1B (mid) scenario and "Highly Vulnerable" at all scales in the A2 ("worst-case") scenario. Kincaid's lupine and Willamette daisy were "presumed stable" in the A1 scenario and "Moderately Vulnerable" in the A2 scenario.

Experimental climate manipulations led by University of Oregon researchers have attempted to predict and quantify effects of climate change on the prairie plant species of the Pacific Northwest. The experimental plots are described in Pfeifer-Meister *et al*. (2013, p. 2132) and papers based on experiments using the plots have shown that future conditions will likely reduce the establishment success of native prairie plant species (Pfeifer-Meister *et al*. 2013, entire),

reduce fitness of native annual plants, increasing the need for disturbance to maintain populations (Reed *et al*. 2021, entire), and have shown that that warmer temperatures will drive flowering phenology earlier in spring (Reed *et al*. 2019, entire). Dwarf checkermallow (*Sidalcea malviflora* ssp. *virgata)*, an important nectar species for Fender's blue butterfly, was found to be very responsive to experimental warming treatments, shifting both first flowering and peak flowering earlier by more than 2 weeks at the Willamette Valley site (Reed *et al*. 2019, p. 3642).

## EFFECTS OF THE ACTION

Effects of the action refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

The action area was defined using the maximum extent of in air and in water noise and the stormwater downstream area. Willamette daisy, Kincaid's lupine, and Fender's blue butterfly are not affected by noise, so only those individuals located in the project footprint Area of Potential Impact (API) on the map (Appendix B, p. 3) would be affected by this project. Maps in the BA effectively show the location of the impacted species in the API in relation to the various project elements. Refer to maps on pages 6-7, 27-33, and 35 in the BA for details (Appendix B).

Although roadside ditches will be shifted with the widened roadway prism, no changes to the hydrology of the surrounding areas are anticipated. "All new ditches will replace existing ditches, will be oriented in the same direction as existing (parallel to the roadway), will be of similar depths and widths, and will be in the same position relative to adjacent wetlands. In the Fisher Butte area, Willamette daisy plants currently grow close to the north edge of the existing ditch in wet prairie habitat, demonstrating that the existing ditch does not drain the adjacent wetland. The existing ditch was likely constructed in wet prairie and there is nothing about the surrounding landscape to suggest that a replacement ditch located in the same vicinity with the same depth and orientation as the existing ditch would drain the wetland. Soils in the area are poorly drained and hydric with a clay layer to 57 inches typical in the soil profile. The new ditch in this area would be shallow, similar to the existing shallow ditch, and should not break through to a more infiltrative layer below the clay therefore a perched water table and sheet flow during winter months at these populations is expected post construction." (Cindy Callahan, Senior Biologist, Federal Highway Administration Washington/Oregon Divisions, Olympia, Washington. pers. comm., March 10, 2022, RE: Response to USFWS comments on OR 126 BA (Service Tracking 22-197). In addition, sheet flow at this site is generally SE to NW across the site and the new ditch would not interrupt flow or increase drainage from the field to the North.

The FHWA and ODOT conducted surveys in the API and provided an analysis of the impacts in the action area (Appendix B, p.34).

Fender's blue butterfly:

Six small patches of Kincaid's lupine occur in upland prairie habitat within the API. These six patches are located east of Fisher Road and occupy a total of 434.2 $m^2$ (4,674 square feet) within 6.1 m (20 feet) of the existing OR 126 roadway to the north and within 1.52 m (5 feet) to the south (see Figure 5-1A through 5-1L in the BA – Appendix B). The lupine population located within the API likely provides egg-laying habitat, food, and shelter for Fender's blue butterfly larvae, and we assume these patches of lupine support Fender's blue butterflies. At the time that Fender's blue butterfly was proposed for reclassification from endangered to threatened, there were 137 total sites containing 13,700 individuals estimated throughout an area of approximately 333.9 ha (825 acres) of occupied prairie habitat (Fish and Wildlife Service 2021a, p. 32864). Therefore, the 0.045 ha (0.11-acre) of Kincaid's lupine habitat within the API that is assumed to support Fender's blue butterflies constitutes approximately 0.013 percent of the total known occupied habitat range wide.

Wet prairies typically provide nectaring habitat for Fender's blue butterfly. Approximately 10.9 acres of wet prairie are present within the API, with the nearest patch approximately 70 feet west of the nearest Kincaid's lupine patch. This wet prairie habitat contains an abundance of non-native vegetation and has the potential for restoration to higher quality wet prairie habitat. Even in its current condition, the wet prairie habitat in the API does contain a diversity of native forbs that may serve as nectar sources for Fender's blue butterflies. Note that the Service discovered an error in the geodatabase (Fish and Wildlife 2021b) during review of this document. The Fender's blue population at the Fisher Butte North Site was mistakenly attached to the Fisher Butte RNA point. No Fender's blue butterflies have been found at the point labeled 33 on Figure 5-2 in Appendix B. These butterflies are located about a mile to the north at the mapped lupine patches and would be unlikely to use the API as nectaring habitat.

In addition to the assumed population in the API, the Service identifies two populations of Fender's blue butterfly within the action area. One population is located between Ed Cone Boulevard and the Coos Bay Rail Line, west of Amazon Creek, approximately 0.64 km (0.4 miles) north of the API and over 3.2 km (2 miles) east of the assumed population in the API. A second population is located in the vicinity of the first, north of Amazon Creek and approximately 1.45 km (0.9 miles) north of the API, and approximately 3.2 km (2 miles) northeast of the assumed population in the API.

Nicholas R. Testa (ODOT Biologist) conducted surveys within the action area in June 2021 and observed possible Fender's blue butterfly eggs on the underside of one Kincaid's lupine plant, and apparent insect herbivory on the leaves of other Kincaid's lupine plants. While this information does not confirm the presence of Fender's blue butterfly in the action area, its presence cannot be ruled out.

Since the West 11$^{th}$ Ave patches (the ones that would be destroyed by this project) are small and relatively isolated, removal of this patch would be unlikely to affect movement routes or viability for Fender's blue butterfly. The patch is 1.77 km (1.1 miles) from the nearest Fender's blue butterfly population; this is within known Fender's dispersal distance, but the west 11$^{th}$ patch is not a steppingstone connecting the occupied patch to other patches in the area. Because of this,

removal of the west 11th lupine patch would be unlikely to affect viability of other patches in the area or the population as a whole. If successful, salvage of lupine plants and seeds prior to the project and establishment at a protected location as close or closer to patches occupied by Fender's blue butterfly would offset the loss of this patch and reduce the impacts of this project to Fender's blue butterfly in the action area and to the population as a whole.

Kincaid's lupine:

Six small populations of Kincaid's lupine were observed within the API during May 2020 and May 2021 surveys (see Figure 5-1H, Appendix B). These populations comprise a total of 157 individuals and 0.045 ha (0.11-acre) of occupied habitat. They were located between Fisher Road and Richmond Street on both sides of the highway, occurred on dry soils, and were associated with Douglas fir (*Pseudotsuga menziesii*), Pacific poison oak (*Toxicodendron diversilobum*), and black hawthorn (*Crataegus douglasii*).

Within 3.2 km (2 miles) of the onsite population, there are approximately six distinct populations of lupine mapped by the Service during surveys completed between 2013 and 2019, with the nearest patch approximately 1.77 km (1.1 miles) to the northwest (see Figure 5-2, Appendix B).

If successful, salvage of lupine plants and seeds prior to the project and establishment at a protected location within pollinator distance of other lupine patches would offset the loss of this patch and reduce the impacts of this project to Kincaid's lupine in the action area and to the population as a whole.

Willamette Daisy:

Seven patches of Willamette daisy were observed within the API during May 2020 and May 2021 surveys (see Figures 5-1F and 5-1G). These populations comprised a total of 170 individuals and approximately 0.029 ha (0.072 acres) of occupied habitat within the API. They were located in the vicinity of the Fisher Butte Wildlife Area parking lot on both sides of the highway, in wet prairie habitat. Due to the conservation measures described above, only 90 of the 170 plants and 0.012 ha (0.03 acres) of occupied habitat located within the API would be impacted by this (Cindy Callahan, Senior Biologist, Federal Highway Administration Washington/Oregon Divisions, Olympia, Washington. pers. comm., June 3, 2022. RE: Response to USFWS comments on OR 126 BA (Service Tracking 22-197).

Approximately 4.41 ha (10.9 acres) of wet prairie, including 4.33 ha (10.7 acres) not currently occupied by Willamette daisy are present within the API (see Figures 5-1A to 5-1L). Most of the occupied and unoccupied wet prairie habitat has some degree of woody species presence, typically consisting of Himalayan blackberry (*Rubus armeniacus*), Oregon ash (*Fraxinus latifolia*), and/or roses (*Rosa sp*). Within 1.6 km (1 mile) of the site, there are approximately 7.97 ha (19.7 acres) of mapped Willamette daisy patches (Fish and Wildlife Service 2021b, geodatabase).

Since only a small portion of the daisy in the action area would be impacted, this projected would not significantly reduce the value of the patches in the vicinity of the project or the species

as a whole. Salvage of Willamette daisy plants and seeds prior to the project and successful establishment at a protected location within pollinator distance of other daisy patches would offset the loss of this patch and reduce the impacts of this project to Willamette daisy in the action area and to the population as a whole.

Willamette Daisy Critical Habitat:

Portions of two units (WD-6A and WD-7B) of Willamette daisy critical habitat occupy the API. Within the API, one patch of Unit WD-6A is located north of OR 126, and west, north, and east of the Fisher Butte Wildlife Area parking lot. One patch of Unit WD-7B is located northwest, northeast, and southeast of the Green Hill Road intersection, and north of the road in an area east of the intersection. Of the 3.24 ha (8.0 acres) mapped in the API, approximately 0.28 ha (0.7 acre) would not qualify as Willamette daisy DCH, either because it includes buildings or paved areas, or lacks sufficient primary constituent elements (PCEs) to support the species (for example, maintained lawn) (see Figures 5-1F, 5-1G, and 5-1K). There are approximately 291 ha (718 acres) of Willamette daisy DCH (this may include some small areas that do not qualify as Willamette daisy DCH, as is the case in the API). Therefore, the 2.95 ha (7.3 acres) of onsite suitable DCH comprises approximately 1 percent of the total Willamette daisy DCH. Due to the conservation measures described above, only 1.42 of the 2.95 ha (3.52 of the 7.3 acres) of DCH located within the API would be permanently impacted by this project (Cindy Callahan, Senior Biologist, Federal Highway Administration Washington/Oregon Divisions, Olympia, Washington. pers. comm., June 3, 2022. RE: Response to USFWS comments on OR 126 BA (Service Tracking 22-197).

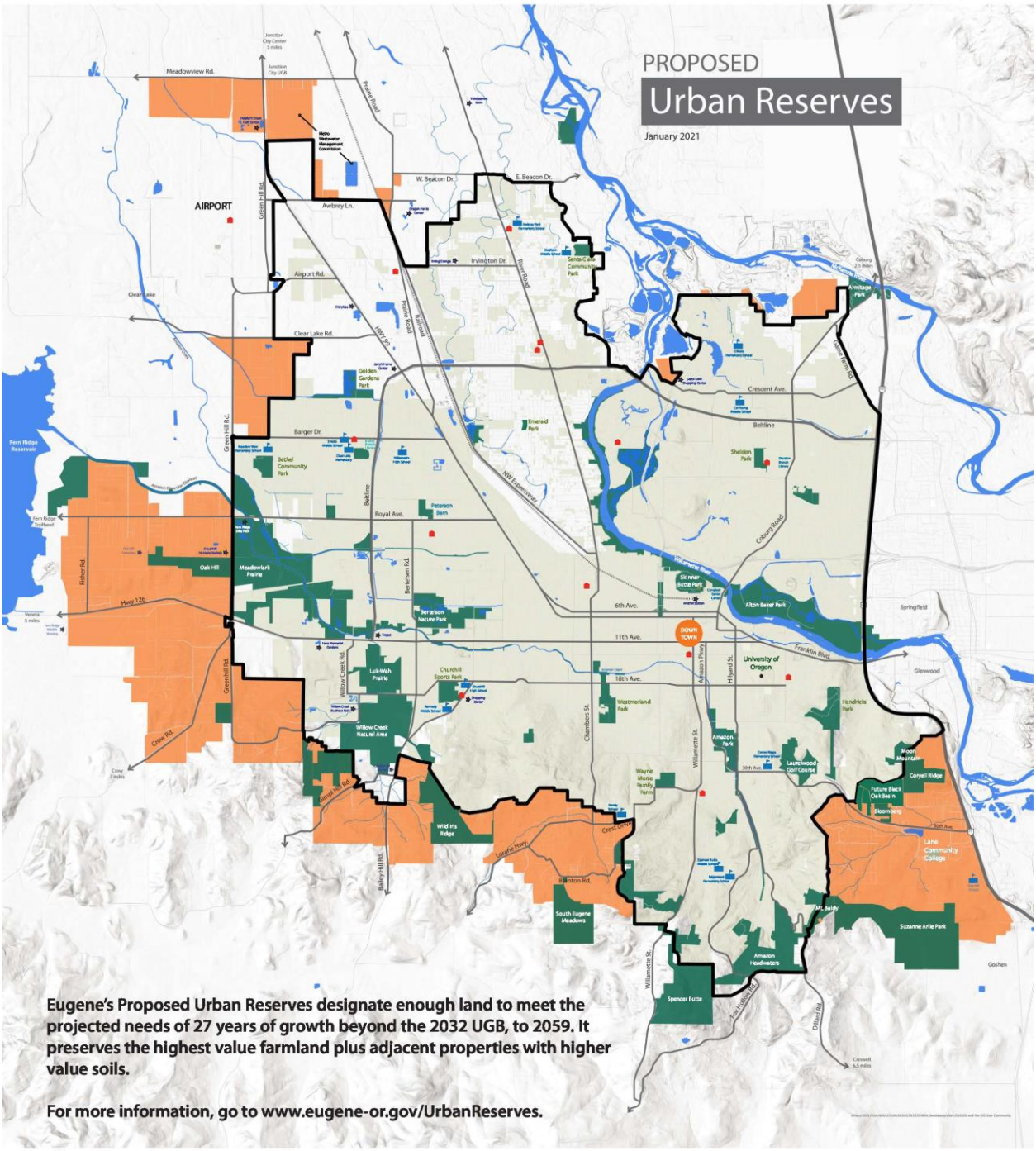
Impacts to Willamette daisy DCH would be small compared to overall DCH in the Action area and the Willamette Valley. This project would destroy several acres of DCH, but this would be offset at a ratio of 3:1 or 5:1 as described in previous sections.

## CUMULATIVE EFFECTS

Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future federal actions that are unrelated to the proposed action are not considered in this section because they will require separate consultation pursuant to section 7 of the Act.

The City of Eugene is planning for housing for an additional 34,000 people by 2032 (McDonald 2017) and many more by 2059. This process has already included a 392 ha (969 acre) expansion of the Urban Growth Boundary (UGB) (Department of Land Conservation and Development 2017, entire). The city also proposes adoption of Urban Reserves beyond Fisher Road to the Fern Ridge Reservoir USACE property line (see map below). Adoption of land into the UGB allows for higher density housing developments, schools, utilities and other urban infrastructure. Areas within the UGB that are not protected are reasonably certain to be developed. Urban reserves are areas designated to be adopted into the UGB in future. While some development in these zones may have a federal nexus and require consultation under section 7, others may not.

More than 99 percent of the plants in the action area, and about 89 percent of critical habitat in the action area that intersect the UGB and Urban Reserves are protected in natural areas. Plants and critical habitat outside of these zones and on private, unprotected lands could be destroyed through development, as plants are not protected on private lands in Oregon. Plants in protected areas within the action area would likely be impacted by increased pressures from recreation as more people move to the area. Land managers would likely need to build infrastructure to accommodate these people and protect high value areas. The City of Eugene and the other protected area land managers in the area have robust Natural Areas teams including botanists and ecologists, and it is expected they would succeed in protecting the majority of the plants and Fender's blue butterflies on protected areas. Fender's blue butterflies may forage and disperse to unprotected locations.


PROPOSED
Urban Reserves
January 2021
AIRPORT
Meadowview Rd.
Green Hill Rd.
Awbrey Ln.
W. Beacon Dr.
E. Beacon Dr.
Irvington Dr.
Airport Rd.
Clear Lake Rd.
Clear Lake
Fern Ridge Reservoir
Barger Dr.
Bethel Community Park
Golden Gardens Park
Emerald Park
Santa Clara Community Park
River Road
Pleasant Hill Rd.
Beltline
NW Expressway
Crescent Ave.
Coburg Road
Coburg Rd.
Armitage Park
Sheldon Park
Royal Ave.
Peterson Barn
Fern Ridge Trailhead
Fisher Rd.
Oak Hill
Meadowlark Prairie
Hwy 126
Bertelsen Nature Park
Bertelsen Rd.
Willow Creek Rd.
Luh-Wah Prairie
Churchill Sports Park
Willow Creek Natural Area
Greenhill Rd.
Crow Rd.
Crow Fields
6th Ave.
11th Ave.
18th Ave.
DOWN TOWN
Skinner Butte Park
Alton Baker Park
Franklin Blvd.
Springfield
Glenwood
University of Oregon
Hilyard St.
Arrington Pkwy
Chambers St.
Willamette St.
Westmoreland Park
Amazon Park
Hendricks Park
Laurelwood Golf Course
Wayne Morse Family Farm
Moon Mountain
Coryell Ridge
Future Black Oak Basin
Bloomberg
30th Ave.
Lane Community College
Wild Iris Ridge
Crest Drive
Bailey Hill Rd.
Elmira Rd.
Elmira Hill Rd.
Ellenton Rd.
South Eugene Meadows
Mt. Baldy
Suzanne Arlie Park
Amazon Headwaters
Spencer Butte
Fox Hollow Rd.
Deadmond Ferry Rd.
Goshen
Creswell
6.5 miles
Eugene's Proposed Urban Reserves designate enough land to meet the projected needs of 27 years of growth beyond the 2032 UGB, to 2059. It preserves the highest value farmland plus adjacent properties with higher value soils.
For more information, go to www.eugene-or.gov/UrbanReserves.
Key
Proposed Urban Reserves
Parks & Open Space
Rivers & Waterways
City Limits
Streets & Roadways
Urban Growth Boundary (UGB)
Railroad
Fire Stations
Schools
Point of Interest
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## SUMMARY AND SYNTHESIS

Effects of the project on listed species are described in the Effects of the Action section. For Willamette daisy, the action area contains a majority of the plants in the West Eugene recovery zone, but only 90 of the more than 22,000 plants that occur in the action area would be impacted. This is less than one percent of plants in this zone and a tiny portion of the overall population. Willamette Daisy Critical Habitat likewise would be destroyed within the API, but the 1.42 ha (3.52 acres) is only 1 percent of the total designated Critical Habitat for Willamette Daisy. For both individual daisies and critical habitat, FHWA and ODOT have incorporated avoidance, offset measures, and BMPs to ensure that the individuals impacted and DCH destroyed during construction would be compensated for at a ratio of 3:1 or 5:1 through restoration and/or protection of another appropriate site as described in the Conservation Measures section and the BA (Appendix B) and in previous sections of this document. Plants would be salvaged and moved to protected sites prior to project construction. While the action area is critical to the continued existence of the Willamette Daisy, the effects of this action are not sufficient to jeopardize the continued existence of Willamette Daisy, either by reducing appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution; or by destroying or adversely modifying critical habitat by appreciably diminishing the value of critical habitat for the conservation of Willamette Daisy.

The 6 small patches of Kincaid's lupine would be relocated prior to construction, and the lupine may support a small population of Fender's blue butterflies. Since it is unknown how many Fender's blue butterflies may occupy the West 11$^{th}$ site, the Service reviewed the database of known Kincaid's lupine sites to determine how many butterflies this site would be expected to support. Search criteria were sites with similar foliar cover of Lupine (40-80 $m^2$ [431-861 square feet] was used), and isolated from other patches by at least 0.4 km (0.25 miles). The search returned 16 sites, 3 of which were occupied by Fender's blue butterfly. The average number of butterflies from the most recent survey at these three sites was 7.3. We rounded up to 8 butterflies for our estimate.

The West 11$^{th}$ site is a small and isolated patch within a larger network of Kincaid's lupine and Fender's blue butterfly populations. Within the action area, about 450 $m^2$ (4,844 square feet) of lupine and up to 120 adult butterflies have been observed during the most recent surveys. Designated Critical Habitat for both Kincaid's lupine and Fender's blue butterfly are present in the action area but would not be affected by the action. While the area in the vicinity of the action area is important to the continued existence of these species, the effects of this action are not sufficient to jeopardize the continued existence of the species by reducing appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution.

This project includes offsite runoff treatment locations and staging areas as well as conservation areas that have not yet been selected. The FWHA and ODOT have committed to the following constraints that ensure these locations will not adversely impact listed species: The runoff offsite areas are outside of DCH and a survey for Act-listed species will be conducted at the sites prior to site selection or development to ensure impact avoidance. The location of staging areas is at the contractor's discretion. The contractor will be required to secure all appropriate

environmental clearances, permits and regulatory approvals for staging areas selected. ODOT and FHWA will communicate with Service as project plans develop and will collaboratively identify locations for conservation measure implementation.

## CONCLUSION

After reviewing the status of the Fender's blue butterfly, Kincaid's lupine, Willamette daisy, the environmental baseline for the action area, and the effects of the proposed action, including all measures proposed to avoid and minimize adverse effects, and the cumulative effects, it is the Service's Biological Opinion that the OR 126: Veneta to Eugene project is not likely to jeopardize the continued existence of the Fender's blue butterfly, Kincaid's lupine, Willamette daisy, and DCH for Willamette daisy.

This no jeopardy finding for the Fender's blue butterfly is supported by the following:

1. The expected impacts to individual Fender's blue butterflies are very small compared to the overall population size.
2. The potentially occupied site that will be impacted is small and isolated, making it unlikely to be important to the overall network of sites in the area, and smaller than the minimum population size to count towards recovery (Fish and Wildlife Service 2010, pp. IV-30).
3. The project includes salvage and replanting of lupine plants to another location, and restoration or protection of impacted habitat at a 3:1 or 5:1 ratio (see Conservation Measures section above and the BA, Appendix B) and may benefit Fender's blue butterflies in another location. This may result in a net benefit to the species.
4. We conclude that the proposed action is not likely to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution of the species.

This no jeopardy finding for the Kincaid's lupine is supported by the following:

1. The expected impacts to individual Kincaid's lupine plants are very small compared to the overall population size.
2. The impacted population is smaller than the minimum size to count towards recovery (Fish and Wildlife Service 2010, pp. IV-25).
3. The project includes salvage and replanting of lupine plants to another location and offset of impacts at a 3:1 or 5:1 ratio (see Conservation Measures section above and the BA, Appendix B). This may result in a net benefit to the species.
4. We conclude that the proposed action is not likely to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution of the species.

This no jeopardy finding for the Willamette daisy is supported by the following:

1. The expected impacts to individual Willamette daisy plants are very small compared to the overall population size.
2. While the action will impact several large and important populations of Willamette daisy, only a small portion of plants and habitat from each population would be impacted, leaving adjacent areas intact and with large populations.
3. The project includes avoidance measures, BMPs, and salvage of plants, along with and offset of impacts at a 3:1 or 5:1 ratio (see Conservation Measures section above and the BA, Appendix B). This may result in a net benefit to the species.
4. We conclude that the proposed action is not likely to reduce appreciably the likelihood of both the survival and recovery of the species in the wild by reducing the reproduction, numbers, or distribution of the species.

After reviewing the status of the species, the environmental baseline for the action area, and the effects of the proposed action, including all measures proposed to avoid and minimize adverse effects, and the cumulative effects, it is the Service's Biological Opinion that the OR 126: Veneta to Eugene project is not likely to result in the destruction or adverse modification of designated critical habitat for Willamette daisy.

This finding of no destruction or adverse modification of critical habitat is supported by the following:

1. The area of critical habitat that would be destroyed is small, less than 1 percent of all designated critical habitat.
2. The project includes avoidance measures, BMPs, and salvage of plants, along with and offset of impacts at a 3:1 or 5:1 ratio (see Conservation Measures section above and the BA, Appendix B). This may result in a net benefit to the species.
3. Overall, we conclude that the proposed action is not likely to appreciably diminish the value of critical habitat for the conservation of the species.

## INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened animal species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. *Harm* is defined by the Service as an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary and must be undertaken by the FHWA so that they become binding conditions of any grant or permit issued to the ODOT, for the exemption in section 7(o)(2) to apply. The Federal Highway Administration has a continuing duty to regulate the activity covered by this incidental take statement. If the Federal Highway Administration: (1) fails to assume and implement the terms and conditions, or (2) fails to require the ODOT to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FHWA or ODOT must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

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

As stated in the Conservation Measures section above, any impacts to plants or animals due to capture or reducing to possession, such as salvage and seed collection, would need to be covered by a 10a1a permit and process. Restoration activities would need to be covered by a section 7a1 process and BO such as tiering to the Service PROJECTS Biological Opinion. Since specifics of these restoration projects are unknown at this time, this will take place once projects are planned in detail.

### AMOUNT OR EXTENT OF TAKE

The Service anticipates incidental take of Fender's blue butterfly will be difficult to detect for the following reason(s): Fender's flight and populations fluctuate from year to year and butterflies may occupy this patch in some years and not others. Eggs were present during the most recent survey, but adults have not been confirmed. Work may take place at times of year when butterflies can't be detected. However, the following level of take of this species can be

anticipated by loss of Kincaid's lupine host plants and associated habitat. As stated above, since it is unknown how many Fender's blue butterflies may occupy the West 11th site, the Service reviewed the database of known Kincaid's lupine sites to determine how many butterflies this site would be expected to support. The three occupied sites similar to this site were determined to support an average of 7.3 (rounded up to 8) adult Fender's blue butterflies in the most recent survey. Therefore, we think it reasonably certain that up to 8 Fender's butterflies will be killed as a result of this project. It is expected that all 157 lupine plants will be removed (salvaged to another site), and that 0.045 ha (0.11 acres) of habitat will be destroyed as a result of this project. The action agency is required to inform the Service of the destruction of habitat.

**EFFECT OF THE TAKE**

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

**REASONABLE AND PRUDENT MEASURES**

The conservation measures and project design criteria negotiated in cooperation with the Service and included as part of the proposed action constitute all of the reasonable measures necessary to minimize the impacts of incidental take. On that basis, no Reasonable and Prudent Measures except for monitoring and reporting requirements are included in this Incidental Take Statement.

**TERMS AND CONDITIONS**

No Terms and Conditions are included as there are no reasonable and prudent measures.

The Service believes that no more than eight individuals of Fender's blue butterfly will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

The Service is to be notified within three working days upon locating a dead, injured or sick endangered or threatened species specimen. Initial notification must be made to the nearest U.S. Fish and Wildlife Service Law Enforcement Office. Notification must include the date, time, precise location of the injured animal or carcass, and any other pertinent information. Care should be taken in handling sick or injured specimens to preserve biological materials in the best possible state for later analysis of cause of death, if that occurs. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence associated with the specimen is not unnecessarily disturbed. Contact the U.S. Fish and Wildlife Service Law

Enforcement Office at (503) 682-6131, or the Service's Oregon Fish and Wildlife Office at (503) 231-6179.

## CONSERVATION RECOMMENDATIONS

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

The FHWA and ODOT have agreed to conservation measures, including salvage and restoration activities, as part of the project, and these have been discussed in previous sections. In addition to these, we recommend seed collection from Willamette daisy and Kincaid's lupine plants in the API prior to salvage. This will ensure these individual plants contribute to the species genetic diversity even if they do not survive transplanting.

Several species not covered by the Act, but of concern to the Service occur in the action area and the API. It is recommended that impacts to these species be avoided where possible, and that individuals be salvaged and included in conservation areas conserved as offset for impacts to Act species and critical habitat. These include the following:

Bradshaw's lomatium (recently delisted) occurs with Willamette daisy and is known from the action area. If found, please salvage plants and/or collect seeds where possible and plant into restoration sites selected for restoration or protection. Note that this species is still listed as Endangered by the State of Oregon.

Monarch butterfly (candidate) – We recommend incorporating Monarch butterfly host plants (native milkweed species appropriate for the Willamette Valley) into restoration sites selected for restoration or protection and for management activities to incorporate BMPs to protect Monarchs.

Western pond turtle (proposed) – We recommend incorporating conservation measures for Western Pond turtles.

Other native plants – We recommend collecting seed from and salvaging any native plant species that occur in the project area and translocating them to other protected sites. Especially rare species, such as those tracked by the Oregon Biodiversity Information Center or those on the Oregon Endangered Species List and the FWS Species of Concern list.

We recommend locating restoration and planting sites for translocated plants near the project area so these plants continue to contribute to the overall network in this recovery zone and the Kincaid's lupine may support Fender's blue in this network.

We recommend allowing Camas (and/or other culturally important species) salvage by local tribal members if that is of interest to them.

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

**REINITIATION NOTICE**

This concludes formal consultation on the Oregon Highway 126: Veneta to Eugene highway expansion project. As provided in 50 CFR 402.16, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the Biological Opinion; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action. This Biological Opinion expires after 15 years from the date of signature. If you have any questions about this consultation, please contact Rhiannon Cochrane (971-352-5779) or Jeff Everett (503-231-6952) of my staff.

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## Appendix A. Status of the Species and Critical Habitat

### Willamette Daisy (*Erigeron decumbens*): Status of the Species and Critical Habitat

### Willamette Daisy

The Willamette daisy was listed as endangered on January 25, 2000 (U.S. Fish and Wildlife Service 2000). A recovery plan for the Willamette daisy was published on May 20, 2010 (U.S. Fish and Wildlife Service 2010a). Critical habitat was designated for the species on October 6, 2006 (U.S. Fish and Wildlife Service 2006). This species is known to exist in Benton, Clackamas, Lane, Linn, Marion, Polk, Washington, and Yamhill counties in Oregon. This species is also on the state of Oregon's State Endangered Plant list.

### Critical Habitat for Willamette Daisy

Critical habitat was designated on October 6, 2006 (U.S. Fish and Wildlife Service 2006). Critical habitat units for the Willamette daisy have been designated in Benton, Lane, Linn, Marion and Polk Counties, Oregon. The Primary Constituent Elements of critical habitat are the habitat components that provide early seral upland prairie, mesic areas of wet prairie, or oak savanna habitat with a mosaic of low growing grasses, forbs, and spaces to establish seedlings or new vegetative growth, with an absence of dense canopy vegetation providing sunlight for individual and population growth and reproduction, and with undisturbed subsoils and proper moisture and protection from competitive invasive species.

Critical habitat is designated for Willamette daisy on 718 acres in Oregon's Willamette Valley (U.S. Fish and Wildlife Service 2006). Of those, 381.5 acres are designated on private lands, 324.2 on Federal lands, 6 on State lands, and 6.3 on county/city property.

### Population Trends and Distribution for Willamette Daisy

The Willamette daisy is endemic to the Willamette Valley of western Oregon. Herbarium specimens show a historical distribution of Willamette daisy throughout the Willamette Valley; frequent collections were made in the period between 1881 and 1934, yet no collections or observations were recorded from 1934 to 1980 (Clark *et al.*1993). The species was rediscovered in 1980 in Lane County, Oregon.

At the time of listing, 28 occurrences of Willamette daisy were recognized with a total of 286 acres of occupied habitat (U.S. Fish and Wildlife Service 2000). In 2010, the total acreage considered to be occupied was 233 at 39 sites (U.S. Fish and Wildlife Service 2010a). In 2010, Willamette daisy was believed to be extant at 37 sites that comprise 17 populations (U.S. Fish and Wildlife Service 2010b). Of these, 3 populations had been augmented and Willamette daisy had been introduced to 5 new sites since the time of listing.

For most sites, long-term data needed to detect population trends is not available. In some cases, documentation of the number of plants at a site is not available. Where sites are within 3 km (2 miles) of each other, they are generally considered to be subpopulations that comprise a

larger population (i.e., metapopulation) based on pollinator travel distance (U.S. Fish and Wildlife Service 2010a).

A 2018 rangewide survey of Willamette daisy (Ottombrino-Haworth *et al.* 2019, entire) found a total of 81,303 (+/- 25,826) plants across 46 extant sites. Surveyors were unable to relocate plants at 25 sites known to previously contain Willamette daisy. Plants and populations are unevenly distributed across the range, with the majority occurring in the Salem East recovery zone (51,820 plants), and the second most in the Eugene West recovery zone (26,043 plants).

Trend data is not available for most sites, and many sites are not formally protected. Recovery criteria outlined for downlisting have not been met in any of the recovery zones. Almost all previously identified threats to the species still remain. Significant progress has been made to store genetic material, and efforts to collect and store seed will likely continue.

Population size may fluctuate substantially from year to year. Monitoring at the Oxbow West site, near Eugene, found 2,299 Willamette daisy plants in 1999, 2,912 plants in 2000, and only 1,079 plants in 2001 (Kaye and Brandt 2005). The population at Baskett Butte declined to 48 percent of the original measured population between 1993 and 1999 (Clark 2000; Clark *et al.*1995). Detecting trends in Willamette daisy populations is complicated by the biology and phenology of the species. For instance, Kagan and Yamamoto (1987) found it difficult to determine survival and mortality between years because of irregular emergence and sporadic flowering from year to year. They suggested that some plants probably lie dormant during some years, as indicated by the sudden appearance of large plants where they were not previously recorded, and the disappearance and later re-emergence of large plants within monitoring plots. In addition, Clark *et al.*(1993) stated that non-reproductive individuals can be very difficult to find and monitor due to their inconspicuous nature, and that the definition of individuals can be complicated when flowering clumps overlap.

**Life History and Ecology for Willamette Daisy**

The Willamette daisy is a taprooted perennial herb in the sunflower or daisy family (*Asteraceae*). It grows 1.5 to 6 cm (0.6 to 2.4 inches) tall, with erect to sometimes prostrate stems at the base. The basal leaves often wither prior to flowering and are mostly linear, 5 to 12 cm (2 to 5 inches) long and 3 to 4 mm (0.1 to 0.2 inches) wide. Flowering stems produce two to five heads, each of which is daisy-like, with pinkish to pale blue ray flowers and yellow disk flowers. The morphologically similar Eaton's fleabane (*E. eatonii*) occurs east of the Cascade Mountains, while the sympatric species Hall's aster (*Aster hallii*) flowers later in the summer. In its vegetative state, the Willamette daisy can be confused with Hall's aster, but close examination reveals the reddish stems of Hall's aster in contrast to the green stems of the Willamette daisy (Clark *et al.*1993).

The Willamette daisy typically flowers throughout June and July with pollination carried out by syphrid flies and solitary bees (Clark *et al.*1995). The daisy produces and subsequently disperses large quantities of wind-dispersed seed in July and August. The seeds of the daisy are achenes, like those of other *Erigeron* species, and have a number of small capillary bristles (the pappus) attached to the top, which allow them to be distributed by the wind. Due to the small size and number of these bristles, the seeds do not fly well in the wind, so seed distribution is quite

restricted. The Willamette daisy is capable of spreading vegetatively through rhizomes over very short distances of less than 10 cm (4 inches) and is commonly found in large clumps scattered throughout a site (Clark *et al.*1993).

Willamette daisy responds positively to late spring and early summer rains. Studies conducted at the Willow Creek Preserve indicate that not all individuals of the Willamette daisy bloom every year, and that some individuals may remain dormant for an entire growing season (Kagan and Yamamoto 1987).

**Habitat Characteristics for Willamette Daisy**

The Willamette daisy typically occurs where woody cover is nearly absent and where herbaceous vegetation is low in stature (Clark *et al.*1993; U.S. Fish and Wildlife Service 2010a). It occurs in both wet prairie grasslands and drier upland prairie sites. The wet prairie grassland community, which was historically maintained by periodic flooding and fires, is characterized by the dominance of tufted-hairgrass, California oatgrass, and a number of Willamette Valley endemic forbs. It is a flat, open, seasonally wet prairie with bare soil between the pedestals created by the bunching Deschampsia cespitosa (Kagan and Yamamoto 1987). On drier upland prairie sites, associated species commonly include *Symphotrichum hallii*, *Festuca idahoensis* ssp. *roemeri* and *Toxicodendron diversilobum* (Meinke 1982, Clark *et al.*1993). Willamette daisy prefers heavier soils, and has been found on the following soil associations: Bashaw, Briedwell, Chehulpum, Dayton, Dixonville, Dupee, Hazelair, Marcola, Natroy, Nekia, Pengra, Philomath, Salkum, Saturn, Stayton, and Witzel.

**Threats/ Reasons for Listing for Willamette Daisy**

Like many native species endemic to Willamette Valley prairies, the Willamette daisy is threatened by habitat loss due to urban and agricultural development, secondary successional encroachment of habitat by trees and brush, competition with non-native weeds, and small population sizes (Kagan and Yamamoto 1987, Clark *et al.*1993). The Service (U.S. Fish and Wildlife Service 2000) estimated that habitat loss is occurring at 80 percent of remaining 84 remnants of native prairies occupied by Willamette daisy and Kincaid's lupine. The Service (U.S. Fish and Wildlife Service 2000) also stated that 24 of the 28 extant Willamette daisy populations occur on private lands and, "without further action, are expected to be lost in the near future."

Although populations occurring on private lands are the most vulnerable to threats of development (state and Federal plant protection laws do not apply to private lands), publicly owned populations are not immune to other important limitations to the species. For instance, Clark *et al.*(1993) identified four populations protected from development on public lands (Willow Creek, Basket Slough National Wildlife Refuge, Bald Hill Park, and Fisher Butte Research Natural Area), but stated that even these appear to be threatened by the proliferation of non-native weeds and successional encroachment of brush and trees. Likewise, vulnerability arising from small population sizes and inbreeding depression may be a concern for the species, regardless of land ownership, especially among 17 of the 28 remaining sites that are smaller than 8 acres (U.S. Fish and Wildlife Service 2000). Given the predominance of privately-owned

populations, land ownership represents a serious obstacle to conservation and recovery of Willamette daisy.

**Recovery Measures for Willamette Daisy**

Some research has been conducted on the ecology and population biology of Willamette daisy, effective methods for habitat enhancement, and propagation and reintroduction techniques (Clark *et al.*1995, 1997; Wilson and Clark 1997; Kaye and Kuykendall 2001; Leininger 2001; Kaye *et al.*2003a, 2003b). The results of these studies have been used to direct the management of Willamette daisy populations at sites that are managed for native prairie values.

The efficacy of mowing and burning as tools to restore habitat for the Willamette daisy is under investigation. Preliminary findings indicate that the Willamette daisy responds negatively to both mowing and burning, although it is possible that positive effects will be detected in future (Thorpe and Kaye 2007).

Several studies have investigated the feasibility of growing the Willamette daisy in controlled environments for augmentation of wild populations. Cold stratification or seed-coat scarification is necessary for successful germination (Clark *et al.*1995, Kaye and Kuykendall 2001). Stem and rhizome cuttings have also been used successfully to establish plants in the greenhouse (Clark *et al.*1995, Wilson *et al.*2001). Attempts to establish the Willamette daisy at new sites has shown that transplanting cultivated plants is much more effective than sowing seeds directly (Kaye *et al.*2003b). It is likely that conservation of the Willamette daisy may require augmenting small populations with propagated individuals (Clark *et al.*1995). Seeds of this species have been banked at the Rae Selling Berry Seed Bank in Portland, Oregon (Portland State Environmental Science and Management 2015).

Habitat for the Willamette daisy occurs on public lands or lands that are managed by a conservation organization at the Service's Baskett Slough National Wildlife Refuge, the Army Corps of Engineer's Fern Ridge Reservoir, the Bureau of Land Management's West Eugene Wetlands, and The Nature Conservancy's Willow Creek Preserve. All of these parcels have some level of management for native prairie habitat values. For additional information on recovery goals, objectives, and criteria, see *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington (U.S. Fish and Wildlife Service 2010a)*: http://www.fws.gov/oregonfwo/Species/PrairieSpecies/Documents/PrairieSpeciesFinalRecoveryPlan.pdf.

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## Fender's Blue Butterfly (*Icaricia icarioides fenderi*): Status of the Species and Critical Habitat

### Legal Status

The Fender's blue butterfly (*Icaricia icarioides fenderi*) was listed as endangered, without critical habitat, under the Endangered Species Act, as amended (16 U.S. C. 1531 *et seq.*) on January 25, 2000 (65 FR 3875). Critical habitat for the butterfly was designated on October 31, 2006 in Benton, Lane, Polk, and Yamhill Counties, Oregon (71 FR 63862). At the time of designation, critical habitat consisted of both known occupied areas and areas with the potential to support Fender's blue butterfly. The Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington, which includes Fender's blue butterfly and four prairie plant species, was published by the Service in May 2010 (U.S. Fish and Wildlife Service 2010, entire).

### Species Description

The Fender's blue butterfly is a subspecies of Boisduval's blue butterfly (*Icaricia icarioides*) in the family Lycaenidae found only in the upland prairies of the Willamette Valley in western Oregon. Adult Fender's blue butterflies are quite small, having a wingspan of approximately 25 millimeters (mm) (1 inch). The upper wings of males are brilliant blue in color with black borders and basal areas, whereas the upper wings of females are completely brown. The undersides of the wings of both sexes are cream-tan with small, black spots surrounded by a fine white border or halo. The size of the spots and both the color and size of the halos distinguishes the Fender's blue butterfly from other subspecies of Boisduval's blue butterfly and similar species such as the silvery blue butterfly (*Glaucopsyche lygdamus*), which may co-occur in areas with Fender's blue butterfly (Schultz et al. 2003, pp. 62-63). In the larval state, this species emerges as a reddish-pink color before changing to solid green and appears humped in profile. The eggs are small, 2 mm (0.08 inch) in diameter, puck shaped, and white when unhatched. Very little is known regarding the Fender's blue butterfly pupae (chrysalis).

### Life History

Butterflies have four stages in their life cycle: egg, larva/caterpillar, chrysalis/pupa, and adult butterfly. The life history of the Fender's blue butterfly is completed in one year and it is similar to other subspecies of *Icaricia icarioides*. Between late-April and the end of June, approximately 350 eggs are individually oviposited from each adult female exclusively on the underside of the leaves of the following three plant species: Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), longspur lupine (*Lupinus arbustus*), or sickle-keeled lupine (*Lupinus albicaulis*) (Schultz et al. 2003, pp. 64-67). Of the three possible host plant species, Fender's blue butterflies are most frequently found on Kincaid's lupine (Hammond and Wilson 1993, p. 2); however, one of the largest current Fender's blue butterfly sites primarily utilizes longspur lupine. When the eggs hatch after 2-3 weeks in mid-May through mid-July, the larvae feed exclusively on the host lupine plant, which allows them to reach their second instar in mid-summer. An instar is a developmental stage that allows the larvae to grow in preparation for the chrysalis stage. The second instar larvae move to the base of the plant when the host lupine plant senesces in July to enter diapause (a state of developmental arrest) for the fall and winter. Most larvae stay within 1 centimeter (cm) (0.33 inch) of the soil surface and within 1 cm (0.33 inch) of lupine during diapause

(Schultz 1996, p. 1). After approximately 8 months, the larvae exit diapause, generally beginning to emerge in March. Once diapause is broken, the larvae feed exclusively on the host lupine and grow through 3 to 4 additional instars in March and April. Once the larvae reach approximately 18 mm (0.7 inch) in size, they will enter the pupation stage to undergo metamorphosis. We do not know where the Fender's blue butterfly pupates, though we presume it is in the leaf litter near the host lupine plant. After approximately 2 weeks as a chrysalis, adult butterflies emerge between mid-April and the end of June, living only 7-14 days (Schultz 1995, p. 36; Schultz et al. 2003, pp. 64-65).

Given its short adult lifespan, the Fender's blue butterfly has limited dispersal ability. In their 7-14 day lifetime, both male and female Fender's blue butterflies are estimated to disperse approximately 0.75 kilometers (km) (0.5 miles) if they remain in their natal lupine patch and approximately 2 km (1.2 miles) if they disperse between lupine patches (Schultz 1998, p. 290). Within a lupine patch, Fender's blue butterflies often fly short distances, turning frequently, whereas outside lupine patches, butterflies fly longer distances in straight lines (Crone and Schultz 2003, p. 568). A study at Willow Creek Preserve in Lane County, Oregon, showed 95 percent of adult Fender's blue butterflies are found within 10 meters (m) (33 feet) of large lupine patches (Schultz 1998, p. 289), reinforcing that dispersal may be infrequent. The maximum dispersal distance reported for the Fender's blue butterfly is 3.2 km (2 miles) (Severns 2004, p. 4). Habitat fragmentation makes dispersal of this magnitude less likely to occur.

The Fender's blue butterfly is restricted to the upland prairies and oak savannah habitats in the Willamette Valley in western Oregon. The Willamette Valley is approximately 200 km (130 miles) long and 30 to 50 km (20 to 40 miles) wide, characterized by a broad alluvial floodplain with an overall northward gradient (Franklin and Dryness 1988, p. 15). The prairies of the Willamette Valley occur at low elevation (between 50 and 130 m (165 and 425 feet)), generally on deep alluvial soils in the valley bottoms and low foothills (Franklin and Dryness 1988, p. 16). The association of Fender's blue butterfly with upland prairie is a direct result of its dependence on specific species of lupine throughout its entire life cycle. Lupine plays an integral function in Fender's blue butterfly reproduction because the plants provide the sole food source for the developing larvae. Currently, the most frequent larval host plant, Kincaid's lupine, is present at the majority of known Fender's blue butterfly population sites. Kincaid's lupine occurs in dry, open prairies in well-drained soils. If Kincaid's lupine is minimal or unavailable, Fender's blue butterfly larvae will feed on longspur lupine and sickle-keeled lupine (Schultz et al. 2003, p. 65). The three aforementioned lupine species' leaves grow to approximately 61 cm (24 inches) tall, with the flowers extending up to 90 cm (35 inches) and all require sunny open areas without dense canopy cover to grow.

While lupine is an obligate larval food source for Fender's blue butterfly, wildflowers are essential for the adult stage. Nectar from wildflowers is the sole food source for adult butterflies, making it a required component of Fender's blue butterfly prairie habitat. Nectar provides sugar, water and amino acids for adult butterflies and evidence from other butterfly species suggests that butterflies live longer and lay more eggs as nectar availability increases (Murphy et al. 1984, p. 269; Boggs and Ross 1993, p. 437; O'Brien et al. 2004, p. 279). Both nectar availability and nectar use by Fender's blue butterfly changes throughout the flight season depending on which plants are present (Thomas and Schultz 2016, p. 174). Native nectar sources used most

frequently, in addition to lupine host plants, include wild onion (*Allium amplecten*) also known as narrowleaf onion, Tolmie star-tulip (*Calochortus tolmiei*), dwarf checkermallow also known as rose checkermallow, Oregon sunshine (*Eriophyllum lanatum*), Oregon geranium (*Geranium oreganum*), and common camas (*Camassia quamash*) (Wilson et al. 1997, pp. 9-10; Schultz et al. 2003, p. 67; Thomas and Schultz 2016, p. 176). Nonnative species such as oxeye daisy (*Leucanthemum vulgare*), common vetch (*Vicia sativa*), and tiny vetch (*V. hirsuta*) are also frequently used as nectar sources (Wilson et al. 1997, pp. 9-10; Thomas and Schultz 2016, p. 176).

In addition to lupine and wildflowers, upland prairie habitats used by Fender's blue butterfly often contain scattered Oregon white oaks (*Quercus garryana*) and the following grass species: California oatgrass (*Danthonia californica*), colonial bentgrass (*Agrostis capillaris*), sweet vernalgrass (*Anthoxanthum oderatum*), Roemer's fescue (*Festuca idahoensis roemeri*), blue wild rye (*Elymus glaucus*), silver hairgrass (*Aira caryophylla*), little quaking grass (*Briza minor*), rattail fescue (*Vulpia myuros*), tall oatgrass (*Arrhenatherum elatius*), and tall fescue (*Festuca arundinacea*) with the latter five being exotic invasive species.

**Population Status**

We do not know the precise historical distribution of Fender's blue butterfly due to the limited information collected on this subspecies prior to its description in 1931 (Macy 1931, pp. 1-2). Although the type specimen for this butterfly was collected in 1929, few collections were made between the time of the subspecies' discovery and Macy's last observation of the butterfly on May 23, 1937, in Benton County, Oregon (Hammond and Wilson 1992, p. 3). Fifty years later, the Fender's blue butterfly was rediscovered at the McDonald Research Forest, Benton County, Oregon.

Estimates from 1993 to 2018 for all the surveyed Fender's blue butterfly metapopulations in the Willamette Valley indicate the total number of butterflies fluctuated from an estimate of 3,200 in 32 sites in 1993 to a current estimate of 24,460 (Figure 1; Hammond 1994, pp. 35-37; Menke 2019, p. 2). Numbers of butterflies naturally vary annually at individual sites, often doubling or halving between years (*e.g.*, as seen between 2004 and 2005, Figure 1). Interpretation of these data is complicated by changes in sites surveyed, changes in our survey methodology as well as differences in observer ability to detect butterflies at varying distances, and to differentiate between the Fender's blue butterfly and the related silvery blue butterfly. To reduce the complexity of data interpretation, the Service developed a standardized rangewide monitoring plan to gather Fender's blue butterfly population estimates using a structured decision-making framework (Collins et al. 2011, entire). The Service began implementation of the standardized monitoring plan in 2012 using distance sampling at the largest habitat areas supporting the largest Fender's blue butterfly populations and peak count assessments at smaller sites.

Since being listed as endangered in 2000, the abundance and distribution of Fender's blue butterfly has improved as a result of metapopulation expansion via habitat restoration, metapopulation discovery through extensive survey efforts, and metapopulation creation via reintroductions. For instance, a large Fender's blue butterfly population was found at Hagg Lake in Washington County, Oregon (Hammond 2011, p. 3) and the Service introduced Fender's blue butterfly to the William Finley National Wildlife Refuge in 2014 (Severns and Fitzpatrick 2014,

p. 2). At the time of listing, butterflies were located in 32 prairie fragments across 165 hectares (ha) (408 acres) in Yamhill, Polk, Benton, and Lane Counties (65 FR 3875). Butterflies are now found on 137 sites across 344 ha (825 acres) in Benton, Lane, Linn, Polk, Washington, and Yamhill Counties as of 2019 (Menke 2019, p. 2; Figure 1). The butterflies are distributed across 15 metapopulations (groups of occupied sites within 2 km (1.2 miles) of one another, interacting with one another, and not separated by barriers) and 6 independent groups across the known historical range. Of those metapopulations, six are located in the Salem Recovery Zone, five are in the Corvallis Recovery Zone, and four are in the Eugene Recovery Zone. The 137 sites comprising the metapopulations have varying degrees of protection, management, and connectivity; habitat heterogeneity; and unique landscape features.

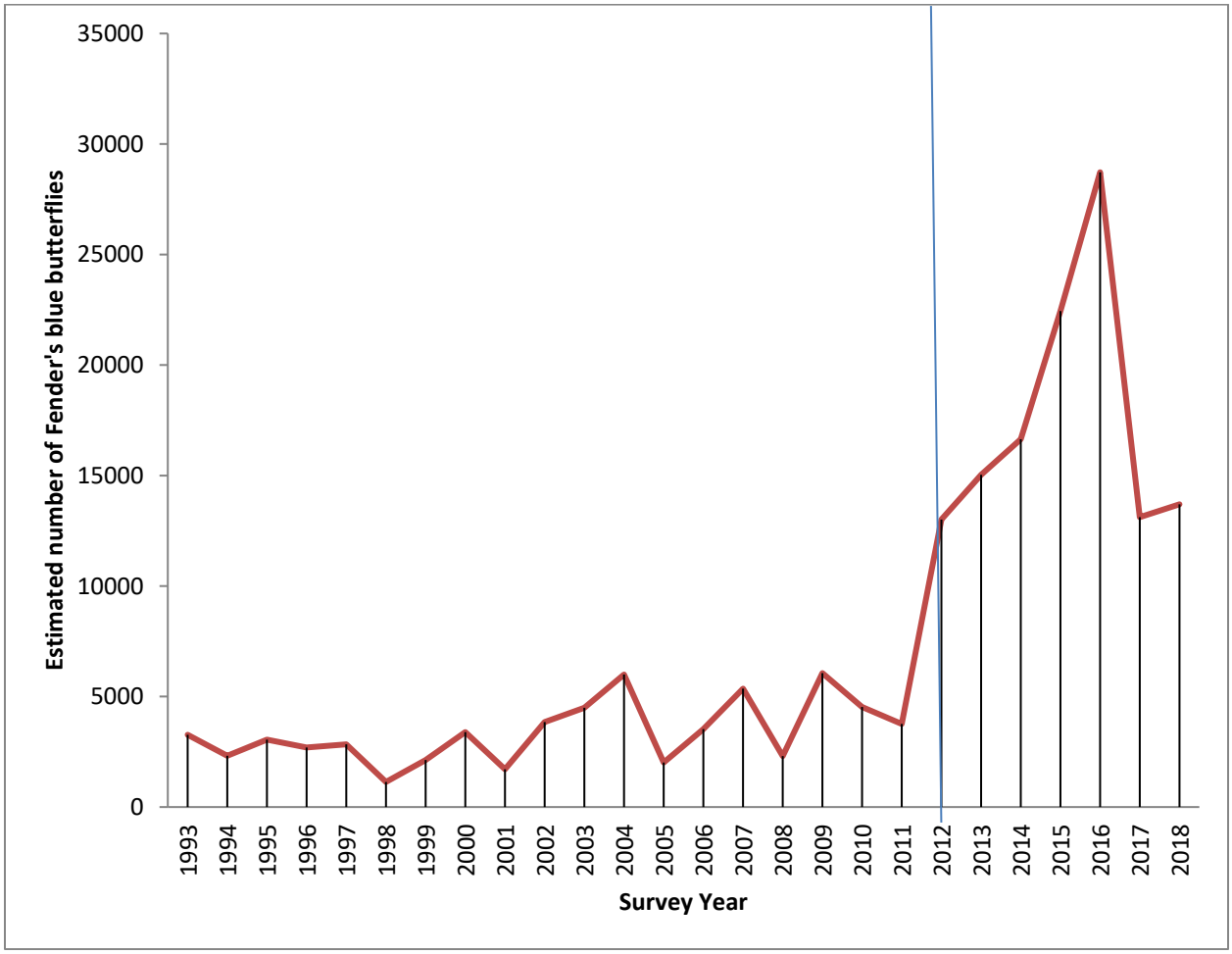


Figure 1. Annual rangewide Fender's blue butterfly population estimates. Greater confidence exists in estimates from 2012-2018 due to implementation of new survey methods in 2012 (blue line).

### Threats, Reasons for Listing

Habitat loss from a wide variety of causes (*e.g.*, urbanization, agriculture, silvicultural practices, and roadside maintenance); encroachment of shrubs and trees into prairie habitats due to fire suppression; fragmentation; invasion by nonnative plants; and elimination of natural disturbance

regimes were identified as problems faced by both Fender's blue butterfly and Kincaid's lupine (U.S. Fish and Wildlife Service 2000, pp. 3882, 3886; U.S. Fish and Wildlife Service 2010, p. III-10). In addition, many butterflies occur on private lands that are not managed to maintain native prairie habitats.

For Fender's blue butterfly, loss of prairie habitat due to habitat conversion is considered one of the largest causes for metapopulation declines. Conversion to agriculture has been the largest driver of prairie habitat loss in the Willamette Valley (Johannessen et al. 1971, p. 296; Hulse et al. 2002, pp. 78-81), with approximately 50 percent of the modern Willamette Valley in agricultural production (Morlan et al. 2011, p. 11). In addition to agricultural conversion, prairies in the Willamette Valley are experiencing urban and residential development (U.S. Fish and Wildlife Service 2000, p. 3880). Converting habitat, regardless of the type of conversion, fragments existing Fender's blue butterfly habitat, isolating some metapopulations. The rarity of host lupine patches and fragmentation of habitat are the major ecological factors limiting reproduction, dispersal, and subsequent colonization of new habitat by Fender's blue butterfly (Hammond and Wilson 1993, p. 26; Schultz 1997, p. 88; Schultz and Dlugosch 1999, p. 237). Small, isolated populations are especially vulnerable to extirpation from localized events and probable low genetic diversity associated with small populations. In addition, small patch size is a problem for emigration out of sites as well as immigration into sites. All of these factors limit the potential redundancy of Fender's blue butterfly metapopulations and its representation across its range.

Throughout the Fender's blue butterfly range, alteration of natural and human-mediated disturbance processes (e.g., fire and flooding) that historically maintained the early seral stage of prairie plant communities has allowed shrub and tree species to overtake grasslands, while agricultural practices have hastened the decline of native prairie species through habitat loss and increased grazing (Johannessen et al. 1971, p. 286; Franklin and Dyrness 1988, p. 122). Additionally, the prairies of western Oregon have been overtaken by nonnative plants that dramatically change the structure of prairies, often forming tall, dense patches that shade out the natives, and compete for water and nutrients (Wilson et al. 2003, pp. 79-80). When woody and invasive nonnative plants become dominant, they can preclude Fender's blue butterfly from using the native plant species the butterfly needs to survive and reproduce (Hammond 1996, pp. 28-31; Schultz et al. 2003, p. 68). Common native species that invade and ultimately take over prairie habitats in the absence of periodic disturbance include: black hawthorn (*Crataegus douglasii*), Oregon ash (*Fraxinus latifolia*), Oregon white oak (*Quercus garryana*), Douglas fir (*Pseudotsuga menziesii*), and Western poison oak (*Toxicodendron diversilobum*). Thick, shrubby invasive plants such as Scotch broom and Himalayan blackberry crowd out native species, including host lupines and nectar plants, and impede movement by adult butterflies. Among the most common and difficult to manage invasive plant species are bentgrasses (*Agrostis* spp.), tall oat grass meadow knapweed (*Centaurea* x *pratensis*), Scotch broom, and Himalayan blackberry. Of these aforementioned invasive plants, tall nonnative grasses such as oat grass may be the most significant species limiting the ability of the Fender's blue butterfly to find its host plant (Severns 2008, p. 651). Fence rows and intervening strips of land along agricultural fields and roadsides often serve as the only refugia from these forces of change. Habitat succession from prairie to woody species and invasion by nonnative plant species alters the light environment and causes a shift in plant community structure and composition. The increased shading and resource

competition associated with woody encroachment results in reduced growth, survival, and reproduction of both lupine host plants and nectar plants. This can lead to reduced connectivity for Fender's blue butterfly and affects all life stages due to the loss of host and nectar plants.

Since listing, threats from insecticides and herbicides (collectively known as pesticides) and climate change have been identified. Pesticides directly kill eggs, larvae, and adult butterflies during application of the chemicals to vegetation and sublethal effects may indirectly kill all life stages. Both insecticides and herbicides are used in agricultural practices, while herbicides are also used for roadside maintenance, timber management, and to control invasive species and woody vegetation encroachment. Two models have conducted climate change vulnerability assessments for butterfly species within the Willamette Valley using the Special Report on Emissions Scenarios (SRES) created by the Intergovernmental Panel on Climate Change. Under the SRES B1 scenario (comparable to the RCP 4.5 scenario), which represents a best-case climate change scenario, both models ranked Fender's blue butterfly as stable. Under the SRES A1B scenario (RCP 6.0), which represents a moderate level of climate change, both models ranked Fender's blue butterfly as moderately vulnerable (Steel et al. 2011, p. 5; Kaye et al. 2013, p. 23). Under the SRES A2 scenario (RCP 8.5), which represents a worst-case climate change scenario, however, Fender's blue butterfly was ranked as extremely vulnerable under one model (Steel et al. 2011, p. 5) and highly vulnerable under another model due to its limited range and loss of both nectar and host plants (Kaye et al. 2013, p. 23). While the models do not agree on the degree of vulnerability, both models did show an increase in vulnerability as climate change scenarios worsened. Fender's blue butterflies would be negatively impacted by the loss of nectar species (observed only under severe climate change scenarios) resulting from natural and anthropogenic barriers, limited dispersal capacity, minimal historical variation in temperature, and unknown genetic variability (Kaye et al. 2013, p. 24).

**Recovery Measures**

Conservation measures are ongoing efforts that offset influences on Fender's blue butterfly viability. These actions are performed by Federal, State and County agencies; non-governmental organizations (NGO); and private landowners. Collectively, the agencies and organizations that manage lands have acquired conservation easements and conducted habitat restoration and management actions to benefit prairie habitat and the Fender's blue butterfly. Various types of agreements are also in place with private landowners to perform voluntary conservation actions on their land. Given the vast amount of private lands occupied by Fender's blue butterfly, the conservation and recovery of the butterfly, Kincaid's lupine, and the suite of native species associated with them will rely in large part on the voluntary actions of many willing non-Federal landowners to conserve, enhance, restore, reconnect, and actively manage native prairie habitats that support these species (U.S. Fish and Wildlife Service 2010, entire).

The Service administers and implements a programmatic Safe Harbor Agreement (SHA) for the benefit of Fender's blue butterfly, which encourages non-Federal landowners to undertake proactive conservation and restoration actions in Benton, Lane, Linn, Marion, Polk, Washington, and Yamhill Counties of Oregon (U.S. Fish and Wildlife Service 2008, entire). The programmatic SHA provides eligible landowners with a streamlined process for obtaining assurances that certain actions taken to benefit the Fender's blue butterfly will not result in additional regulatory obligations under the Act. Under the programmatic SHA, the Service has

19 properties with site-specific plans and Certificates of Inclusion covering approximately 567 ha (1,400 ac) as of February 2019. Three Habitat Conservation Plans (HCPs) have also been developed to minimize and mitigate effects to the Fender's blue butterfly: the 2011 Benton County HCP, the 2014 Yamhill County Road Right-of-Ways HCP, and the 2017 Oregon Department of Conservation HCP.

Studies have shown that Fender's blue butterfly populations respond positively to habitat restoration. Active management, such as prescribed fire and mowing, can help to reduce impacts of woody succession by native and nonnative species on the Fender's blue butterfly (Schultz and Crone 1998, entire). In the West Eugene Wetlands, for example, annual mowing reduced shrubby blackberry cover and increased lupine leaves, flowers, and foliar cover when compared to mowing every other year or every third year (Kaye and Benfield 2005, p. 24). Although fire killed all larvae in burned patches in another study, female butterflies from the nearby unburned source patch were able to colonize the entire burned area, including lupine patches that were 107 m (350 feet) from the unburned source plants (Wilson and Clark 1997). They also found that Fender's blue butterfly eggs were 10-14 times more abundant in plots that were mowed or burned compared to undisturbed, control plots. Woody plants were reduced 45 percent with burning and 66 percent with mowing. While mowing and burning are effective at reducing native and nonnative woody species, reliable and effective methods for managing and controlling herbaceous invasive species are unclear. Habitat management efforts are underway to remove invasive plants; however, invasive plants continue to increase in some areas despite active management. In addition, both woody succession and invasive nonnative plants are likely increasing in areas without management.

## STATUS OF CRITICAL HABITAT

### *Legal Status*

Critical habitat for the Fender's blue butterfly was designated on October 31, 2006, in Benton, Lane, Polk, and Yamhill Counties, Oregon (71 FR 63862). At the time of designation, critical habitat consisted of 1,218 hectares (ha) (3,010 acres) in both known occupied areas and areas with the potential to support Fender's blue butterfly.

Critical habitat is defined in section 3 of the Act as: (1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features: (a) essential to the conservation of the species, and (b) which may require special management considerations or protection; and (2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. Conservation, as defined under section 3 of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary.

### *Primary Constituent Elements*

Under the Act and its implementing regulations, the physical or biological features essential to the conservation of the Fender's blue butterfly must be identified in areas occupied at the time of

listing, focusing on the features' primary constituent elements. Primary constituent elements are the features that provide for the species' life-history processes and are essential to the conservation of the species. The primary constituent elements specific to the Fender's blue butterfly are: (1) Early seral upland prairie, wet prairie, or oak savanna habitat with undisturbed subsoils that provides a mosaic of low growing grasses and forbs, and an absence of dense canopy vegetation thereby allowing access to sunlight needed to seek nectar and search for mates; (2) Larval host plants: Kincaid's lupine (*Lupinus sulphureus ssp. kincaidii*), longspur lupine (*L. arbustus*), or sickle-keeled lupine (*L. albicaulis*); (3) Adult nectar sources, such as: tapertip onion (*Allium acuminatum*), narrowleaf onion (*Allium amplectens*), Tolmie's mariposa lilly (*Calochortus tolmiei*), small camas (*Camassia quamash*), clearwater cryptantha (*Cryptantha intermedia*), wooly sunflower (*Eriophyllum lanatum*), Oregon geranium (*Geranium oreganum*), toughleaf iris (*Iris tenax*), pale flax (*Linum angustifolium*), blue flax (*Linum perenne*), meadow checkermallow (*Sidalcea campestris*), rose checkermallow (*Sidalcea virgata*), bird vetch (*Vicia cracca*), common vetch (*V. sativa*) and tiny vetch (*V. hirsute*); (4) Stepping stone habitat: undeveloped open areas with the physical characteristics appropriate for supporting the short stature prairie, oak/savanna plant community (well drained soils), within and between natal lupine patches 2 kilometers (km) (1.2 miles), necessary for dispersal, connectivity, population growth, and, ultimately, viability.

***Critical Habitat Units***

The Service designated 13 units of critical habitat for the Fender's blue butterfly based on the presence of sufficient elements of physical or biological features to support life history processes.

Table 1. Approximate area ha (acres) for Critical Habitat Units Designated for the Fender's blue butterfly

| Unit | Federal | State | County/City | Private | Total |
|---|---|---|---|---|---|
| FBB-1 | 0 (0) | 0 (0) | 0 (0) | 8.2 (20.4) | 8.2 (20.4) |
| FBB-2 | 0 (0) | 0 (0) | 0 (0) | 20.6 (51) | 20.6 (51) |
| FBB-3 | 0 (0) | 1 (2.5) | 0 (0) | 0.5 (1.1) | 1.5 (3.7) |
| FBB-4 | 254.4 (628.6) | 0 (0) | 0 (0) | 216.8 (535.8) | 471.2 (1,164.4) |
| FBB-5 | 0 (0) | 0 (0) | 0 (0) | 5 (12.3) | 5 (12.3) |
| FBB-6 | 0 (0) | 0 (0) | 0 (0) | 7.4 (18.3) | 7.4 (18.3) |
| FBB-7 | 0 (0) | 0.7 (1.8) | 0 (0) | 3.9 (9.7) | 4.6 (11.5) |
| FBB-8 | 0 (0) | 0 (0) | 0 (0) | 290 (716.7) | 290 (716.7) |
| FBB-9 | 0 (0) | 0 (0) | 0 (0) | 19.6 (48.5) | 19.6 (48.5) |
| FBB-10 | 124.5 (307.8) | 0 (0) | 7.2 (17.8) | 65.5 (161.8) | 197.2 (487.3) |
| FBB-11 | 71.1 (175.7) | 1 (2.5) | 5.3 (13.9) | 14.9 (36.7) | 92.6 (228.8) |
| FBB-12 | 0 (0) | 0 (0) | 0 (0) | 46.3 (114.4) | 46.3 (114.4) |
| FBB-13 | 0 (0) | 0 (0) | 0 (0) | 53.6 (132.5) | 53.6 (132.5) |
| Total | 450 (1,112) | 2.8 (6.8) | 12.8 (31.7) | 752.4 (1,859.2) | 1,218 (3,009.7) |

*Unit 1 for Fender's blue butterfly (Units FBB-1A and 1B):*

Units FBB-1A and 1B encompass approximately 2.5 ha (6.2 acres) and 5.7 ha (14.1 acres), respectively, of private land occurring within northern Yamhill County. FBB-1A represents the northernmost critical habitat unit in the current range of Fender's blue butterfly and occurs along both the east and west sides of Oak Creek Road. FBB-1B is located approximately 1.1 km (0.7 miles) south of FBB-1A along both the east and west sides of Oak Creek Road, near the junction with Fairdale Road. The habitat identified in FBB-1A and 1B has the features essential to the conservation of Fender's blue butterfly; it has one of the largest Fender's blue butterfly metapopulations; supports the butterfly's primary host plant, Kincaid's lupine; and there is surrounding prairie habitat available for population expansion.

This critical habitat unit contains the Oak Ridge butterfly metapopulations, supported by three separate habitat patches. The population has been monitored annually since 1993 (Hammond 2004, pp. 1, 3). While the Oak Ridge butterfly metapopulation has been evenly distributed among the three lupine patches, ten years of monitoring reports indicate that the number of individuals supported by each habitat patch has increased and decreased annually with one habitat patch disproportionately supporting the population each year. The population fluctuations documented at these sites are attributed to roadside maintenance and presence of invasive species (Hammond 2002, pp. 3, 4; Hammond 2004, pp. 5, 33). The overall population has remained relatively stable, likely because its distribution among three habitat patches provides opportunity for recolonization of impacted habitat patches (Hammond 2004, pp. 4-5). This metapopulation is estimated to be comprised of 569 individuals as of 2019 (Menke 2019, p. 8).

*Unit 2 for Fender's blue butterfly (Unit FBB-2):*

Unit FBB-2 consists of approximately 20.6 ha (51 acres) of private lands within southern Yamhill County. The Kincaid's lupine habitat supporting this population occurs in two habitat patches scattered along the east and west sides of Gopher Valley Road. The largest distance separating lupine patches is approximately 0.2 km (0.12 miles). The habitat in FBB-2 has the features essential to the conservation of Fender's blue butterfly; it has one of the largest remaining Fender's blue butterfly populations in this portion of the butterfly's range; supports one of Fender's blue butterfly's primary host plants; and there is surrounding prairie habitat available for population expansion.

This critical habitat unit contains the Gopher Valley butterfly metapopulation. It has been monitored annually since 1995 (Hammond 2004, p. 7) and has remained relatively stable with a current population estimate of 299 individuals (Menke 2019, p. 8). This metapopulation is threatened by the limited availability of nectar sources, presence of invasive species, and roadside maintenance activities.

*Unit 3 for Fender's blue butterfly (Unit FBB-3):*

Unit FBB-3 encompasses approximately 1.5 ha (3.7 acres) of primarily state-owned lands within northern Polk County with the Oregon Department of Transportation (ODOT) being the primary landowner. Habitat management activities implemented by ODOT since 2000 have resulted in a large growth flush of lupine and an increased number of Fender's blue butterflies.

The Mill Creek butterfly metapopulation has been monitored annually since 1993 (Hammond 1993, pp. 18, 24; Hammond 2004, pp. 9, 10). The lupine habitat supporting this population occurs in two patches scattered along the northeast and southwest sides of Highway 22, near the intersection with Mill Creek Road. The greatest threat to this unit is the presence of invasive grasses and shrubs that have overgrown the habitat, suppressing the lupine occupying this prairie remnant (Hammond 2004, p. 10). Fender's blue butterflies have not been seen at this site since 2012 (Menke 2019, p 8).

*Unit 4 for Fender's blue butterfly (Units FBB-4A and 4B):*

Units FBB-4A and 4B encompass approximately 302.9 ha (748.4 acres) and 168.4 ha (416.1 acres), respectively, of private and Federal land occurring within northern Polk County. These units FBB-4A and 4B are located adjacent to Highway 22 approximately 8.8 km (5.5 miles) northeast of the city of Dallas. Unit FBB-4B is located approximately 0.2 km (0.12 miles) from FBB-4A with predominately agricultural lands occurring between the areas supporting butterflies. An estimated 64 percent of the habitat encompassed within Unit FBB-4 occurs within the boundaries of the Service's Baskett Slough National Wildlife Refuge (Refuge) and approximately 36 percent of the prairie habitat occurs on adjacent private lands.

Unit FBB-4 (FBB-4A and 4B) supports one of the largest Fender's blue butterfly metapopulations (known as Baskett Butte) and the largest contiguous occupied prairie patch in the range of the species. This relatively large, contiguous prairie habitat is one of a few occupied remnants occurring on valley hillsides, with most remaining populations occurring on the valley floor. The open nature of the lands occurring between FBB-4A and 4B increases the potential for individuals to successfully disperse among habitat patches. Many of the populations occurring in FBB-4A have been monitored annually since 1993 (Hammond 2004, p. 17), and the populations occupy ten separate patches of longspur lupine which are scattered across the unit. This metapopulation is estimated to be comprised of 1,806 individuals as of 2019 (Menke 2019, p. 8). Habitat management has been actively performed since 2001 to reduce the encroachment of grasses and brush in the upland prairie habitat (Hammond 2004, p. 18), however, tall oatgrass encroachment remains an ongoing concern.

*Unit 5 for Fender's blue butterfly (Unit FBB-5):*

Unit FBB-5 consists of approximately 5 ha (12.3 acres) of private lands within the central portion of Polk County near the junction of Highway 223 and Oakdale Avenue. The unit largely falls within the City of Dallas' urban-growth boundary. The landowner entered into a Partners for Fish and Wildlife Agreement and in cooperation with Refuge staff, has agreed to manage his portion of the Fender's blue butterfly and Kincaid's lupine populations. The Fender's blue butterfly metapopulation is threatened by the limited availability of food plants, presence of invasive species, and the impacts associated with the encroachment of urban development.

*Unit 6 for Fender's blue butterfly (Units FBB-6A and 6B):*

Units FBB-6A and 6B encompass approximately 1 ha (2.4 acres) and 6.4 ha (15.9 acres), respectively, of private lands occurring within southern Polk County. Unit FBB-6A is located along McCaleb Road near Cooper Creek and Unit FBB-6B is approximately 1.4 km (0.8 miles) south of FBB-6A along Monmouth Highway. Several Fender's blue butterfly populations historically occurring south of Dallas, Oregon, have been extirpated (Hammond 2004, pp. 12, 13). The habitat encompassed within FBB-6 (FBB-6A and 6B) supports the core butterfly population occurring at the southern end of the range and has been monitored annually since 1994 (Hammond 2005, p. 16). FBB-6A supports a roadside population of Kincaid's lupine and is located between FBB-6B and a Fender's blue butterfly site where, in spite of surveys, individuals

have not been seen. FBB-6A provides stepping-stone habitat for Fender's blue butterfly. The larval host plant found in FBB-6B is sickle-keeled lupine.

*Units 7, 8, and 9 for Fender's blue butterfly (Units FBB-7, FBB-8, and FBB-9):*

Units FBB-7, FBB-8, and FBB-9 collectively represent the areas of habitat containing the features essential to the conservation of the Fender's blue butterfly metapopulations in northern Benton County. This reserve is located in the central region of the species range and consists of two large, and one medium, sized populations that are isolated from one another. The availability of habitat in each of these units provides opportunity for population growth and expansion, with appropriate stepping-stone habitat conditions available for facilitating movement within units.

Stepping-stone habitat between FBB-7, FBB-8, and FBB-9 will likely be necessary for these currently isolated populations to function as a larger metapopulation. The habitat included within each of these units provides the foundation for long-term persistence of each respective isolated population and recovery strategies should focus on opportunities to connect metapopulations to larger, functioning metapopulations. FBB-7, FBB-8 and FBB-9 contain the Butterfly Meadows metapopulation.

Unit FBB-7 consists of approximately 4.6 ha (11.5 acres) of private and State lands within Benton County. The habitat in this unit, uniquely located in a meadow surrounded by forested land, supports a large Fender's blue butterfly metapopulation and occurs in McDonald Forest located off Oak Creek Road. Approximately 15 percent of the habitat supporting the PCEs within FBB-7 occurs on Oregon State University lands and the remaining 85 percent occurs on private lands. This Fender's blue butterfly metapopulation has been monitored annually since 1993 (Hammond 2004, pp. 26-27). This metapopulation is threatened by the encroachment of invasive grasses and succession to forest, especially in narrow areas of the meadow where tree encroachment could block-off portions of the habitat and isolate portions of the populations (Hammond 2004, p. 27). In cooperation with Oregon State University scientists, the landowner is studying appropriate management techniques for controlling invasive false brome (*Brachypodium sylvaticum*). Unit FBB-7 provides a diverse composition of high-quality habitat utilized by all life stages of the Fender's blue butterfly.

Unit FBB-8 encompasses approximately 290 ha (716.7 acres) of private lands within Benton County. This unit is located in Wren, Oregon, between Kings Valley Highway, Cardwell Hill Road and Blakesly Creek Road, approximately 3.2 km (2 miles) southwest of Unit FBB-7. Several of the Fender's blue butterfly metapopulations occupying this unit have been surveyed regularly since 1991 (Hammond and Wilson 1993, p 10, 22; Hammond 1997, p. 6; Hammond 1999, p. 20; Hammond 2001, p. 22; Hammond 2003, pp. 22, 23; Hammond 2004, pp. 23 – 25; Hammond 2005, p. 26). A new Fender's blue butterfly population has been documented using a large population of Kincaid's lupine located between two of the regularly monitored populations of Fender's blue butterfly (Hammond 2004, p. 23).

Unit FBB-9 consists of approximately 19.6 ha (48.5 acres) of private lands located north of Philomath. The habitat occurs primarily to the south of West Hills Road and to the west of 19$^{th}$ Street. The Greenbelt Land Trust holds a conservation easement for 51 percent of the prairie

habitat supporting this population. Adult Fender's blue butterfly individuals have been observed using the nectaring habitat in this remnant prairie and many of the Kincaid's lupine populations scattered throughout the unit. The Fender's blue butterfly population utilizing the eastern portion of this site has been monitored annually since 1999 (Hammond 2005, p. 34), with the first observation of individuals occurring in 1992 (Hammond and Wilson 1993, pp. 10, 21). Threats to this site include encroachment of invasive species, trees and shrubs, and a small portion of the Unit FBB-9 is located along West Hills Road and impacted by roadside maintenance activities.

*Units 10, 11, and 12 for Fender's blue butterfly (Unit FBB-10, FBB-11, and FBB-12):*

Units FBB-10, FBB-11, and FBB-12, support the core populations essential to the conservation of the species in the southern portion of their range. Collectively, these units contain the West Eugene metapopulation. This reserve supports three core populations that are mostly isolated from one another (greater than 1.5 km (0.93 miles) from the nearest occupied lupine patch) with stepping-stone populations located between core populations. The availability of habitat within each of these units provides opportunity for population growth and expansion, as well as areas appropriate for stepping-stone habitat that will facilitate ease of movement within units. These units support two of the largest Fender's blue butterfly metapopulations, which are located in relatively close proximity to one another, the butterfly populations are all supported by *L. kincaidii*, and there is surrounding prairie habitat available for population expansion. Stepping-stone habitat in FBB-11 is necessary to provide connectivity among core butterfly populations to ensure the long-term persistence of this metapopulation.

Unit FBB-10A-E encompass approximately 197.2 ha (487.3 acres) of prairie habitat in Lane County, Oregon. The prairie habitat included within FBB-10A- E occurs on Bureau of Land management (BLM) and U.S. Army Corps of Engineers land (63 percent), private lands (33 percent), and County lands (4 percent). Unit FBB-10A, 10B, and 10C collectively support two core metapopulations of Fender's blue butterfly and Kincaid's lupine, which have been surveyed annually since 1993 (Severns 2004, p. 2; Fitzpatrick 2005, p. 2). Eighty-four percent of the area included within FBB-10A occurs on Corps lands located near Shore Lane, NE Fern Ridge Reservoir. Kincaid's lupine has successfully reestablished between Fender's blue butterfly sites located within this unit to provide butterfly stepping-stone habitat and increase connectivity.

Unit FBB-11A consists of 6.3 ha (15.5 acres) of privately owned land. FBB-11B includes approximately 5.7 ha (14 acres) of primarily BLM land (94 percent) with 6 percent occurring on private lands. FBB-11C encompasses approximately 9 ha (22 acres) with 94 percent occurring on BLM land and 6 percent on private lands. FBB-11D encompasses approximately 11.9 ha (29.3 acres) with 68 percent on federally owned lands and 32 percent on private lands. FBB-11E consists of approximately 1.8 ha (4.4 acres) of land entirely owned by Lane County. FBB-11F encompasses approximately 11.6 ha (28.8 acres) with 80 percent on federally owned lands, 9 percent on state owned lands and 11 percent on private lands. FBB-11G encompasses approximately 1.9 ha (4.6 acres) with 67 percent on Federal lands and 33 percent on private lands. FBB-11H consists of approximately 23.7 ha (58.6 acres) with 97 percent on Federal lands, less then 2 percent on private lands and less then 1 percent on county lands. FBB-11I encompasses approximately 20.8 ha (51.5 acres) with 75 percent occurring on Federal lands and

25 percent on private lands. Most of the lupine populations scattered across the prairie habitat within this unit are relatively small.

Units FBB-12A and 12B encompasses approximately 46.3 ha (114.4 acres) near the intersection of Bailey Hill Road and Bertelson Road, with the majority of this land occurring on The Nature Conservancy's property. The habitat within FBB-12A and 12B is threatened by exotic vegetation and succession to woody vegetation yet still includes some of the highest quality remaining upland prairie. The Kincaid's lupine and Fender's blue butterfly populations are scattered across the 206 ha (508 acres) of prairie known as the Willow Creek Natural Area (Fitzpatrick 2005, pp. 2, 27).

*Unit 13 for Fender's blue butterfly (Unit FBB-13):*

Unit FBB-13 encompasses approximately 53.6 ha (132.5 acres) of private land that supports several patches of primarily *L. arbustus* scattered across the remnant prairie. The Fender's blue butterfly metapopulation occupying this unit has been monitored since 1993 (Fitzpatrick 2005, p. 7). This habitat supports one of the largest butterfly populations and it supports the highest diversity of native plants documented for Fender's blue butterfly habitat (Hammond 1994, p. 45). This butterfly population occurs on a valley hillside and is supported by habitat that appears to be stable climax grassland which is very different than the populations growing on the valley floor (Hammond and Wilson 1993, p. 45; Hammond 1994, p. 45).

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## Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*): Status of the Species and Critical Habitat

### Kincaid's lupine

*Lupinus sulphureus* ssp. *kincaidii* is a perennial herb that was listed as threatened, without critical habitat, on January 25, 2000 (U.S. Fish and Wildlife Service 2000). A recovery outline for the species was published in 2006 (U.S. Fish and Wildlife Service 2006b). Critical habitat was designated on October 6, 2006 (U.S. Fish and Wildlife Service 2006a). Kincaid's lupine is known from Benton, Douglas, Lane, Linn, Marion, Polk, Yamhill, and Washington counties in the state of Oregon, and Lewis County in Washington State.

### Kincaid's lupine Critical Habitat

Critical habitat was designated on October 6, 2006 (U.S. Fish and Wildlife Service 2006a). Critical habitat units for *Lupinus sulphureus* ssp. *kincaidii* have been designated in Benton, Lane, Polk and Yamhill Counties, Oregon, and Lewis County, Washington. The primary constituent elements of critical habitat are (1) early seral upland prairie or oak savanna habitat with a mosaic of low-growing grasses and forbs and spaces to establish seedlings or new vegetative growth, an absence of dense canopy vegetation, and undisturbed subsoils; and (2) the presence of insect outcrossing pollinators, such as *Bombus mixtus* and *B. californicus* (bumblebees), with unrestricted movement between existing lupine patches. Critical habitat does not include human-made structures existing on the effective date of the rule and not containing one or more of the primary constituent elements, such as buildings, aqueducts, airports, and roads, and the land on which such structures are located.

### Population Trends and Distribution for Kincaid's lupine

*Lupinus sulphureu*s ssp. *kincaidii* is found in dry upland prairies from Lewis County, Washington in the north, south to the foothills of Douglas County, Oregon; however, most of the known and historical populations are found in the Willamette Valley (Figure II-4, Appendix B, Tables B-1 and B-2). Historically, the species was documented from Vancouver Island, British Columbia, Canada (Dunn and Gillet 1966), but has not been located in that region since the 1920s (Kaye 2000). At the time of the Recovery Plan, *Lupinus sulphureu*s ssp. *kincaidii* is was known at about 164 sites, comprising about 246 hectares (608 acres) (Appendix B, Table B-2 in U.S. Fish and Wildlife Service 2010).

As noted in the 2010 5-year review, at the time of listing the Service recognized 54 sites of *Lupinus sulphureus* ssp. *kincaidii,* which had grown to a total of 154 extant sites by 2010. However, as also recognized at that time, determining the number of "sites" in a manner that allows for comparison over time is difficult because there are no standard naming conventions, and sites occurring on different properties, although in close proximity and likely functioning as a single biological population, often had separate names due to past naming conventions or differences in ownership or management practices. The 2010 5-year review recommended the development of a standardized naming convention that reflects "populations" as functional biological units, in conjunction with a clear, consistent method for aggregating sites into populations as defined by the recovery plan for the species. The 2010 5-year review additionally

recommended a complete survey effort to assess the status of all presumed extant populations of *L. sulphureus* spp. *kincaidii* throughout its range, and to gather accurate and up-to-date population estimates in the form of foliar cover (the accepted method for determining population size for this species) for a number of sites.

Both of these recommendations have now been carried out. As part of the construction of a Threatened and Endangered Plants Geodatabase (U.S. Fish and Wildlife Service 2018; developed for the Service by the Institute for Applied Ecology), we now have an established protocol for consolidating *Lupinus sulphureus* ssp. *kincaidii* sites into populations and standardized names for those populations (Ottombrino-Haworth *et al*. 2017, p. 16). In addition, a rangewide survey of *L. sulphureus* ssp. *kincaidii* was completed over the years 2014 through 2016 (Ottombrino-Haworth *et al*. 2017, entire). However, because these new conventions utilized in the geodatabase differ from those relied upon in the 2010 5-year review, the results are not directly comparable between the two reviews, thus any apparent changes in numbers of sites, populations, foliar cover or mapped extent over time should be interpreted with caution. From this point forward, however, all sites and population names will be consistently identified in the geodatabase and should provide the basis for more direct and accurate comparisons of changes in abundance and or distribution over time.

The rangewide survey for *Lupinus sulphureus* ssp. *kincaidii* did not census every known occurrence of the species but concentrated on those populations with the potential to contribute to the recovery goals for the species. Sites were selected for survey based on a priority system considering population size, connectivity with other populations, landownership, co-occurrence with Fender's blue butterfly, and date of most recent monitoring efforts. Small, isolated populations, especially those on private lands, were not prioritized for surveys. If sites had been monitored within the last 5 years, these sites were not resurveyed, but instead the most recent data were utilized in the report. As a result, the rangewide survey and monitoring report provides data from 84 populations of *L. sulphureus* ssp. *kincaidii* across its range (Ottombrino-Haworth *et al*. 2017, pp. 16, 23, 72–582). These 84 populations are distributed across six recovery zones for *L. sulphureus* spp. *kincaidii* as follows: 27 in Salem West, 26 in Corvallis West, 14 in Eugene West, 8 in Douglas County, 5 in SW Washington, and 4 in Eugene East. There are no known extant populations in the Corvallis East and Salem East recovery zones.

Table 1 presents a comparison of the estimated extent of foliar cover and mapped polygon extent in each recovery zone for *Lupinus sulphureus* ssp. *kincaidii* at the time of listing (2000), at the time of the 2010 5-year review, and at present. The 2010 5-year review reported a total of 154 extant sites; as of 2019, we have a record of 238 extant sites; however, as noted earlier, due to past inconsistencies in naming conventions not all of these sites are necessarily comparable to the sites that were identified in past analyses. To avoid the inconsistencies with site identification over time, we used measures of foliar cover totaled by recovery zone as the most directly comparable metric by which to assess changes in populations of *L. sulphureus* ssp. *kincaidii* across its range over time.

Overall foliar cover has increased from an estimated range of 14,070 to 19,118 square meters ($m^2$) (1.4 to 1.9 hectares (ha); 3.5 to 4.7 acres (ac)) at the time of listing to approximately 22,785 $m^2$ (2.3 ha; 5.6 ac) today (Table 1). A few recovery zones have seen increases in foliar cover of

*L. sulphureus* ssp. *kincaidii* since the 2010 5-year review, and in some cases, those increases are quite large; these increases are primarily in the Corvallis West and Salem West recovery zones, where recovery efforts, including augmentation and outplanting of *L. sulphureus* ssp. *kincaidii*, have been concentrated in recent years. These zones have benefitted from the availability of seed specific to these areas (the lack of genetically appropriate seed sources is a continuing problem in many of the recovery zones), as well as the incidental advantage gained by *L. sulphureus* spp. *kincaidii* from being cultivated as the host plant for the endangered Fender's blue butterfly (*Icaricia icarioides fenderi*), which also occurs in those recovery zones. In contrast the foliar cover of *L. sulphureus* ssp. *kincaidii* has declined in the Douglas County and Southwest Washington recovery zones and has remained roughly the same in Eugene West. However, as this most recent survey was the first rangewide effort using a standardized approach, at this point in time it is difficult to make any truly definitive assessments regarding population trend (Ottombrino-Haworth *et al*. 2017, p. 45). Recovery criteria have not been met for *L. sulphureus* ssp. *kincaidii* in any recovery zone (Ottombrino-Haworth *et al*. 217, p. 45; see also Appendix A).

In sum, although the overall abundance of *L. sulphureus* ssp. *kincaidii* appears to have increased in foliar cover from a range of roughly 1.6 to 1.9 ha (3.8 to 4.5 ac) in 2010 to 2.3 ha (5.6 ha) today, the magnitude of the change is not so great as to alter our understanding of the status of the species as evaluated in our 2010 5-year review (U.S. Fish and Wildlife Service 2010). Furthermore, inconsistencies in past data collection and site naming conventions make it difficult to draw any real conclusion regarding population trend over time. We have no new information to suggest that there has been any change in the distribution of the species across its historical range since our 2010 5-year review, nor do we have information to suggest that the nature, magnitude, or severity of threats to the species have changed over this time period (see Threats, below).

Table 1. Population estimates for *Lupinus sulphureus* ssp. *kincaidii* over time, by recovery zone. The most recent rangewide survey reported foliar cover only in terms of a single point estimate; however, estimates from the time of listing (denoted as "historic") and at the time of the 2010 5-year review were presented in terms of both a lower and upper estimate, thus we present those values here as a range (a single value in that column indicates the lower and upper foliar cover estimates were the same).

| | Foliar Cover Estimate ($m^2$) | | | Mapped Polygon Extent ($m^2$) | | |
|---|---|---|---|---|---|---|
| Recovery Zone Year | 2000[a] | 2010[a] | 2019[b] | 2000[a] | 2010[a] | 2019[b] |
| Corvallis West | 4,330.0- 6,330.0 | 1,236.4 | 4,787.7 | 372,961.1 | 404,708.0 | 158,000 |
| Douglas County | 1,226.0 – 2,274.0 | 4,734.2 – 4,865.3 | 2,447.5 | 47,799.9 | 76,851.8 | 50,745 |
| Eugene East | 11.0 | 446.7 | 819.7 | 7,811.6 | 33,374.9 | 39,900 |
| Eugene West | 7,898.0 – 9,898.0 | 4,026.7 – 5,948.2 | 5,898.3 | 283,346.0 | 139,493.4 | 146,400 |
| Salem West | 605.0 | 3,586.7 – 3,995.3 | 7,540.8 | 612,283.6 | 912,452.1 | 1,150,500 |
| SW Washington | 0.0 | 1,471.6 – 1,801.3 | 1,291.3 | 1,084,481.3 | 24,974.5 | 35,500 |
| *Grand Total ($m^2$)* | 14,070.0 – 19,118.0 | 15,502.4 – 18,293.4 | 22,785.3 | 2,408,683.4 | 1,591,854.5 | 1,581,045 |
| *Grand Total (hectares)* | 1.4 - 1.9 | 1.6 – 1.8 | 2.3 | 240.9 | 159.2 | 158.1 |
| *Grand Total (acres)* | 3.5 – 4.7 | 3.8 – 4.5 | 5.6 | 594.9 | 393.1 | 391.0 |

[a] data from 2010 5-year review (U.S. Fish and Wildlife Service 2010, p. viii)

[b] data derived from Threatened and Endangered Plants Geodatabase (U.S. Fish and Wildlife Service, version 9/18/20

**Life History and Ecology for Kincaid's lupine**

Flowering begins in April and extends through June. As the summer dry season arrives, *Lupinus sulphureu*s ssp. *kincaidii* becomes dormant, and is completely senescent by mid-August (Wilson *et al.* 2003). Pollination is largely accomplished by small native bumblebees (*Bombus mixtus* and *B. californicus*), solitary bees (*Osmia lignaria*, *Anthophora furcata*, *Habropoda* sp., *Andrena* spp., *Dialictus* sp.), and occasionally European honey bees (*Apis mellifera*) (Wilson *et al.* 2003). Insect pollination appears to be critical for successful seed production (Wilson *et al.* 2003).

*Lupinus sulphureu*s ssp. *kincaidii* reproduces by seed and vegetative spread. It is able to spread extensively through underground growth. Individual clones can be several centuries old (Wilson *et al.* 2003), and become quite large with age, producing many flowering stems. Excavations and morphological patterns suggest that plants 10 meters (33 feet) or more apart can be interconnected by below-ground stems, and that clones can exceed 10 meters (33 feet) across (Wilson *et al.* 2003). As part of a genetic evaluation, collections taken from small populations of *Lupinus sulphureu*s ssp. *kincaidii* at the Baskett Slough National Wildlife Refuge were found to be genetically identical, indicating that the population consists of one or a few large clones (Liston *et al.* 1995). Reproduction by seed is common in large populations where inbreeding depression is minimized and ample numbers of seeds are produced. In small populations, seed production is reduced and this appears to be due, at least in part, to inbreeding depression (Severns 2003).

*Lupinus sulphureu*s ssp. *kincaidii* is vulnerable to seed, fruit and flower predation by insects, which may limit the production of seeds. Seed predation by bruchid beetles and weevils and larvae of other insects has been documented, and may result in substantially reduced production of viable seed (Kaye and Kuykendall 1993, Kuykendall and Kaye 1993). Floral and fruit herbivory by larvae of the silvery blue butterfly (*Glaucopsyche lygdamus columbia*) has also been reported (Kuykendall and Kaye 1993). The vegetative structures of *Lupinus sulphureu*s ssp. *kincaidii* support a variety of insect herbivores, including root borers, sap suckers and defoliators (Wilson *et al.* 2003).

*Lupinus sulphureu*s ssp. *kincaidii* is the primary larval host plant of the endangered Fender's blue butterfly (Wilson *et al.* 2003). Female Fender's blue butterflies lay their eggs on the underside of *Lupinus sulphureu*s ssp. *kincaidii* leaves in May and June; the larvae hatch several weeks later and feed on the plant for a short time before entering an extended diapause, which lasts until the following spring (Schultz *et al.* 2003). *Lupinus sulphureu*s ssp. *kincaidii*, like other members of the genus *Lupinus*, is unpalatable to vertebrate grazers. *Lupinus sulphureu*s ssp. *kincaidii* forms root nodules with *Rhizobium* spp. bacteria that fix nitrogen, and also has **vesicular-arbuscular mycorrhizae**, which may enhance the plant's growth (Wilson *et al.* 2003).

**Habitat Characteristics for Kincaid's lupine**

In the Willamette Valley and southwestern Washington, *Lupinus sulphureu*s ssp. *kincaidii* is found on upland prairie remnants where the species occurs in small populations at widely scattered sites. A number of populations are found in road rights-of-way, between the road shoulder and adjacent fence line, where they have survived because of a lack of agricultural disturbance. Some of the populations in Washington occur in pastures and appear to benefit from light grazing by livestock, which reduces the cover of competing shrubs and grasses (Joe Arnett, Washington Department of Natural Resources, *in litt* 2008). Common native species typically associated with *Lupinus sulphureu*s ssp. *kincaidii* include: *Festuca idahoensis* ssp. *roemeri*, *Danthonia californica*, *Calochortus tolmiei*, *Eriophyllum lanatum*, and *Fragaria virginiana.* The species appears to prefer heavier, generally well-drained soils and has been found on 48 soil types, typically Ultic Haploxerolls, Ultic Argixerolls, and Xeric Palehumults (Wilson *et al.* 2003).

In Douglas County, Oregon, *Lupinus sulphureu*s ssp. *kincaidii* appears to tolerate more shaded conditions, where it occurs at sites with canopy cover of 50 to 80 percent (Barnes 2004). In contrast to the open prairie habitats of the more northerly populations, the Douglas County sites are dominated by tree and shrub species, including *Pseudotsuga menziesii* (Douglas-fir), *Quercus kelloggii* (California black oak), *Arbutus menziesii* (Pacific madrone), *Pinus ponderosa* (ponderosa pine), *Calocedrus decurrens* (incense cedar), *Arctostaphylos columbiana* (hairy manzanita) and *Toxicodendron diversilobum*. In contrast to historical ecosystem composition, invasive non-native species are a significant component of *Lupinus sulphureu*s ssp. *kincaidii* habitat today. Common invasives include: *Arrhenatherum elatius*, *Brachypodium sylvaticum*, *Dactylis glomerata*, *Festuca arundinacea*, *Rubus armeniacus* and *Cytisus scoparius* (Wilson *et al.* 2003). In the absence of fire, some native species, such as *Toxicodendron diversilobum* and *Pteridium aquilinum*, invade prairies and compete with *Lupinus sulphureu*s ssp. *kincaidii.*

**Threats/ Reasons for Listing for Kincaid's lupine**

The three major threats to *Lupinus sulphureu*s ssp. *kincaidii* populations are habitat loss, competition from non-native plants and elimination of historical disturbance regimes (Wilson *et al.* 2003). Habitat loss from a wide variety of causes (*e.g.*, urbanization, agriculture, silvicultural practices, and roadside maintenance) has been the single largest factor in the decline of *Lupinus sulphureu*s ssp. *kincaidii* (U.S. Fish and Wildlife Service 2000). Land development and alteration in the prairies of western Oregon and southwestern Washington have been so extensive that the remaining populations are essentially relegated to small, isolated patches of habitat. Habitat loss is likely to continue as private lands are developed; at least 49 of 54 sites occupied by *Lupinus sulphureu*s ssp. *kincaidii* in 2000 at the time of listing were on private lands and are at risk of being lost unless conservation actions are implemented (U.S. Fish and Wildlife Service 2000). Habitat fragmentation and isolation of small populations may be causing inbreeding

depression in *Lupinus sulphureu*s ssp. *kincaidii*. The subspecies was likely widespread historically, frequently outcrossing throughout much of its range, until habitat destruction and fragmentation severely isolated the remaining populations (Liston *et al.* 1995). There is some evidence of inbreeding depression, which may result in lower seed set (Severns 2003). **Hybridization** between *Lupinus sulphureu*s ssp. *kincaidii* and *Lupinus arbustus* has been detected at Baskett Slough National Wildlife Refuge (Liston *et al.* 1995).

Before settlement by Euro-Americans, the regular occurrence of fire maintained the open prairie habitats essential to *Lupinus sulphureu*s ssp. *kincaidii*. The loss of a regular disturbance regime, primarily fire, has resulted in the decline of prairie habitats through succession to native trees and shrubs, and has allowed the establishment of numerous nonnative grasses and forbs. Some aggressive non-native plants form dense monocultures, which compete for space, water and nutrients with the native prairie species, and ultimately inhibit the growth and reproduction of *Lupinus sulphureu*s ssp. *kincaidii* by shading out the plants (Wilson *et al.* 2003). When *Lupinus sulphureu*s ssp. *kincaidii* was listed, we estimated that 83 percent of upland prairie sites within its range were succeeding to forest (U.S. Fish and Wildlife Service 2000).

**Recovery Measures for Kincaid's lupine**

Active research efforts have focused on restoring the essential components of *Lupinus sulphureu*s ssp. *kincaidii* habitat by mimicking the historical disturbance regime with the application of prescribed fire, mowing and manual removal of weeds. Research and habitat management programs for *Lupinus sulphureu*s ssp. *kincaidii* have been implemented at several sites, including Baskett Slough National Wildlife Refuge, Bureau of Land Management's Fir Butte site and The Nature Conservancy's Willow Creek Preserve (Wilson *et al.* 2003, Kaye and Benfield 2005a). Prescribed fire and mowing before or after the growing season have been effective in reducing the cover of invasive non-native plants; following treatments, *Lupinus sulphureu*s ssp. *kincaidii* has responded with increased leaf and flower production (Wilson *et al.* 2003). Research has also been conducted on seed **germination**, propagation and reintroduction of *Lupinus sulphureu*s ssp. *kincaidii* (Kaye and Kuykendall 2001a, 2001b, Kaye and Cramer 2003, Kaye *et al.* 2003b). Seeds of this species have been banked at the Berry Botanic Garden in Portland, Oregon (Berry Botanic Garden 2005).

The Bureau of Land Management, Umpqua National Forest and U.S. Fish and Wildlife Service completed a programmatic conservation agreement for *Lupinus sulphureus* ssp. *kincaidii* in Douglas County, Oregon, in April 2006 (Roseburg Bureau of Land Management *et al*. 2006). The objectives of the agreement are (1) to maintain stable populations of the species in Douglas County by protecting and restoring habitats, (2) to reduce threats to the species on Bureau of Land Management and Forest Service lands, (3) to promote larger functioning metapopulations, with increased population size and genetic diversity, and (4) to meet the recovery criteria in the Recovery Outline for the species (U.S.

Fish and Wildlife Service 2006b).

Populations of *Lupinus sulphureus* ssp. *kincaidii* occur on public lands or lands that are managed by a conservation organization at the U.S. Fish and Wildlife Service's William L. Finley National Wildlife Refuge and Baskett Slough National Wildlife Refuge, the Army Corps of Engineers' Fern Ridge Reservoir, Bureau of Land Management units in Lane and Douglas Counties, the Umpqua National Forest, The Nature Conservancy's Willow Creek Preserve, and at a small portion of Oregon State University's Butterfly Meadows in the McDonald State Forest. All of these parcels have some level of management for native prairie habitat values

Since the publication of the 2010 Recovery plan (Appendix 1 from the 5-year review) …

The Recovery Plan for Prairie Species of Western Oregon and Southwestern Washington set distribution and abundance goals for Kincaid's lupine to be considered for delisting (U.S. Fish and Wildlife Service 2010, Table IV-5; see Table A-1, below). Additional recovery criteria for the species were set in terms of population trend and evidence of reproduction, habit quality and management (including prairie quality, security of habitat, and management, monitoring, and control of threats), and storage of genetic material (U.S. Fish and Wildlife Service 2010, p. IV-35).

Here we present a brief summary of the most recent data for Kincaid's lupine based on the results of the 2014-2016 rangewide survey, with respect to the delisting criteria for distribution and abundance, as well as the recovery plan guidelines for prairie quality and diversity (Table A-2). In addition, we provide a summary of the current protection status of the sites, based on the information in our most recent update of the Threatened and Endangered Plants Geodatabase (U.S. Fish and Wildlife Service 2018, accessed July 25, 2019). The recovery plan set goals for a minimum number of populations and foliar cover for eight recovery zones throughout the historical range of the species. Foliar cover goals ranged from one population with a total of 2,500 $m^2$ foliar cover in the Salem East recovery zone to three populations with a total of 7,500 $m^2$ foliar cover in the Salem West, Corvallis West, and Eugene West recovery zones (U.S. Fish and Wildlife Service 2010, Table IV-5). At the present time, only one recovery zone, Eugene West, meets the recovery target for foliar cover. All recovery zones are lacking in meeting recovery plan guidelines for prairie quality and diversity, and the Salem East and Corvallis East recovery zones still do not have any Kincaid's lupine populations.

**Table A-1.** Distribution and abundance goals for *Lupinus sulphureus* ssp. *kincaidii*, adapted from Table IV-5 in the Recovery Plan for Prairie Species of Western Oregon and Southwestern Washington (U.S. Fish and Wildlife Service 2010, p. IV-36); recovery zones that did not include distribution or abundance goals are not included in this version of the table.

| **Table IV-5. Distribution and Abundance Goals for *Lupinus sulphureus* ssp. *kincaidii*** | | |
|---|---|---|
| **Status:** Threatened | | |
| **Recovery Zone** | **Delisting Goals** | |
| | **Minimum # of Populations / Zone** | **Target Foliar Cover / Zone** |
| SW Washington | 2 | 5,000 $m^2$ |
| Salem East | 1 | 2,500 $m^2$ |
| Salem West | 3 | 7,500 $m^2$ |
| Corvallis East | 2 | 5,000 $m^2$ |
| Corvallis West | 3 | 7,500 $m^2$ |
| Eugene East | 2 | 5,000 $m^2$ |
| Eugene West | 3 | 7,500 $m^2$ |
| Douglas County | 2 | 5,000 $m^2$ |
| + additional populations (may occur in any zone within species' range) | 2 | 5,000 $m^2$ |
| **Total** | 20 | 50,000 $m^2$ |

**Table A-2**. Evaluation of all populations of *Lupinus sulphureus* ssp. *kincaidii* inventoried in 2014-2016 against recovery plan guidelines for prairie quality and diversity and abundance criteria for delisting (from Ottombrino-Haworth *et al*. 2017, pp. 31-34)

| **Recovery Zone** | **Total number of populations evaluated in each recovery zone** | **Number of populations that meet prairie quality and diversity guidelines** | **Number of populations with abundance meeting (foliar cover > 1000 $m^2$) or contributing to (foliar cover >100 $m^2$) recovery guidelines** |
|---|---|---|---|
| SW Washington | 7 | 0 | 3 total<br>3 ( > 100 $m^2$) |
| Salem East | 0 | 0 | 0 |
| Salem West | 29 | 3 | 7 total<br>5 (> 100$m^2$)<br>2 (>1,000 $m^2$) |
| Corvallis East | 0 | 0 | 0 |
| Corvallis West | 26 | 6 | 9 total<br>8 (>100 $m^2$)<br>1 (>1,000 $m^2$) |
| Eugene East | 7 | 0 | 0 |
| Eugene West | 14 | 0 | 5 total<br>3 (> 1,000 $m^2$)<br>2 (> 100 $m^2$) |
| Douglas County | 7 | 0 | 0 |

**Table A-3.** Number of extant populations for each recovery zone, and protection status of sites comprising those populations, based on Threatened and Endangered Plants Geodatabase (U.S. Fish and Wildlife Service 2018m accessed July 25, 2019).

| | | | **Provenance of sites** | | | **Protection status of sites** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Recovery Zone** | **# of populations** | **# of sites** | **Augmented** | **Introduced** | **Wild** | **Unknown** | **CE/other*** | **Public** | **Public ROW** | **SHA** | **None** |
| SW Washington | - | 6 | - | - | - | 2 | | 1 | | | 3 |
| Salem East | 0 | - | - | - | - | | | | | | |
| Salem West | 26 | 86 | 2 | 3 | 81 | 1 | 9 | 15 | 21 | 4 | 36 |
| Corvallis East | 0 | - | - | - | - | | | | | | |
| Corvallis West | 14 | 85 | 2 | 8 | 75 | | 8 | 20 | 21 | 3 | 33 |
| Eugene East | 6 | 12 | | | 12 | 1 | 3 | 4 | | | 4 |
| Eugene West | 4 | 33 | 3 | 4 | 26 | 1 | 7 | 17 | 2 | | 5 |

*****CE/Other = conservation easement or Partners for Fish and Wildlife landowner agreement

**New research publications available since 2010**

Giles-Johnson, D.E.L., A.S. Thorpe, R.E. Newton, T.N. Kaye. 2010. *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine) and *Icaricia icarioides fender* (Fender's blue butterfly) in the West Eugene Wetlands: Population monitoring, reintroduction success, and an evaluation of experimental treatments. 2010 Report. Prepared by Institute for Applied Ecology for Eugene District BLM. 26 pp.

> **Summary**: Kincaid's lupine cover at monitored sites increased from the previous year. Burning and mowing both benefit lupine cover; burning is more effective. Estimating foliar cover is a suitable alternative to leaf counting to track trends in Kincaid's lupine within a site. The method is not suitable for comparison between sites, because leaf density is dependent on the light environment.

Gray, E.C., A.S. Thorpe, T.N. Kaye. 2012. Abating climate change impacts on Kincaid's lupine. 2012 Interim Report. Prepared by Institute for Applied Ecology for the USDI Bureau of Land Management, Eugene District. Corvallis, Oregon. iii + 13 pp.

> **Summary**: Interim report on experiment to determine effects of microclimate on Kincaid's lupine establishment. Reports variable germination rates at study sites, but does not include final microclimate effects results.

Severns, P.M., M.V. Wilson. 2011. Resolving conflicts between butterfly host resource abundance and genet population size estimates for a vegetatively spreading, threatened grassland legume. Biological Conservation. 144:1152-1158.

> **Summary**: If properly calibrated, percent cover can be used to estimate genet number of Kincaid's lupine.

Severns, P.M, A. Liston, M.V. Wilson. 2011. Habitat fragmentation, genetic diversity, and inbreeding depression in a threatened grassland legume: is genetic rescue necessary? Conservation Genetics 12:881-893.

> **Summary**: Analysis of simple sequence repeat (SSR) loci in nuclear and chloroplast DNA suggest that a century of habitat fragmentation has not caused a loss in genetic diversity. Kincaid's lupine likely to retain high levels of genetic diversity within populations.

Severns, P.M., A. Liston, M.V. Wilson. 2011. Implications of nonadventitious rhizome spread on reproduction, inbreeding, and conservation for a rare grassland legume. Journal of Heredity 102(4):371-379.

**Summary**: Individual genets in study had a maximum average spread distance of 5.5 meters and integrated with intervening genets. Genotype diversity was high, and no evidence was seen indicating a recent genetic bottleneck. Typical *Bombus* sp. foraging flight has approximately 80 percent chance of crossing between genets.

Severns, P.M., E. Bradford, A. Liston. 2012. Whole genome duplication in a threatened grassland plant and the efficacy of seed transfer zones. Diversity and Distributions (2012):1-10.

**Summary**: Existing seed zones may not be sufficient to prevent mixing of plants with incompatible ploidy levels, which could undermine conservation efforts. Recommends screening populations for ploidy variations prior to introducing seed from off-site.

Severns, P.M. S.C. Meyers, T. Tran. 2012. Taxonomic clarification of *Lupinus oreganus* and *Lupinus biddlei* in the Pacific Northwest, USA. Western North American Naturalist 72(3):407-411.

**Summary**: Reviews botanical literature and conducts phylogenetic analysis to suggest that Kincaid's lupine be reclassified as *Lupinus oreganus* (its original name) from *Lupinus sulphureus* ssp. *kincaidii*. Also asserts evidence of hybridization between Kincaid's lupine and *L. arbustus* and *L. albicaulis*.

Thorpe, A.S., S. Perakis, C. Catricala, T.N. Kaye. 2013. Nutrient limitation of native and invasive $N_2$-fixing plants in northwest prairies. PLoS ONE 8(12):e84593.

**Summary**: Non-nitrogen fertilization (phosphorous or other macro- and micro-nutrients) can boost performance of Kincaid's lupine and may present a strategy to aid populations, but may also boost non-native legumes.

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## Appendix B: Biological Assessment

# BIOLOGICAL ASSESSMENT

# OR 126: Veneta to Eugene

Federal Aide #SA00(166)
ODOT Key #21231

Prepared for

U.S. Department of Transportation
Federal Highway Administration

Prepared by

DOWL

Lizzie Zemke, Primary Author

Austin Bloom, Senior Reviewer
Oregon Department of Transportation, Qualified Consultant, 2016

January 19, 2022

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# Executive Summary

The Oregon Department of Transportation (ODOT) and the lead federal action agency, the Federal Highway Administration (FHWA), propose multiple safety and congestion relief improvements along OR 126 between the cities of Eugene and Veneta. The project will include widening the 2-lane road to a 4-lane road. The improvements include traffic control changes, such as roundabouts, additional and modified left-turn lanes at multiple intersections, as well as a shared-use path adjacent to the roadway.

The current project is state funded through House Bill 2017 (HB2017) but has a federal nexus for environmental clearances with FHWA to qualify the project for future federal funding. Federal funding and impacts to jurisdictional wetlands and Waters of the U.S., requiring a permit from the U.S. Army Corps of Engineers, trigger consultation per Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §§1531-1543).

This biological assessment analyzed the effects (permanent and temporary) of the OR 126: Veneta to Eugene project to ESA-listed species and their critical habitat, as well as impact avoidance and minimization measures and mitigation. Impacts analyzed in this assessment include:

- Clearing and grubbing
- Temporary construction staging and access

The proposed project may affect ESA-listed species and designated critical habitat (DCH), as summarized in **Table ES-1** below.

**Table ES-1. Effect Determination Summary**

| Species/Habitat | Effect Determination |
|---|---|
| *Insects* | |
| **Fender's Blue Butterfly** *Icaricia icarioides fenderi* | *May Affect, Likely to Adversely Affect* |
| *Flowering Plants* | |
| **Kincaid's Lupine** *Lupinus sulphureus ssp. kincaidii* | *May Affect, Likely to Adversely Affect* |
| **Willamette Daisy** *Erigeron decumbens* | *May Affect, Likely to Adversely Affect* |
| *Critical Habitats* | |
| **Willamette Daisy** *Erigeron decumbens* | *May Affect, Likely to Adversely Affect* |

The project will employ avoidance and minimization measures through project design and implementation to avoid and/or minimize impacts to ESA-listed species and Willamette daisy DCH within the area of potential impact (API). These include project design changes to reduce impacts to Willamette daisy DCH, offsite stormwater treatment where onsite treatment would result in additional impacts to ESA-listed plants and/or DCH, establishing "no work areas" outside of the permanent construction impact area, temporary erosion and sediment controls, restoration of temporary impact areas, and more.

The following six ESA-listed species were determined to be potentially present in the project's action area but were determined to not be affected by the project and are therefore not discussed in detail in the document:

- **Pacific Marten**, Coastal Distinct Population Segment *Martes caurina*
- **Marbled Murrelet** *Brachyramphus marmoratus*
- **Northern Spotted Owl** *Strix occidentalis caurina*
- **Streaked Horned Lark** *Eremophila alpestris strigata*
- **Taylor's Checkerspot** *Euphydryas editha taylori*
- **Nelson's Checker-mallow** *Sidalcea nelsoniana*

Designated critical habitat for the following seven species is mapped in the project's action area but was determined to not be affected by the project and is therefore not discussed in detail in the document:

- **Pacific Marten**, Coastal Distinct Population Segment *Martes caurina*
- **Marbled Murrelet** *Brachyramphus marmoratus*
- **Northern Spotted Owl** *Strix occidentalis caurina*
- **Streaked Horned Lark** *Eremophila alpestris strigata*
- **Taylor's Checkerspot** *Euphydryas editha taylori*
- **Fender's Blue Butterfly** *Icaricia icarioides fender*
- **Kincaid's Lupine** *Lupinus sulphureus ssp. kincaidii*

# 1.0 Introduction

The purpose of this biological assessment (BA) is to evaluate the potential effects of the OR 126: Veneta to Eugene project on federally listed species and DCH in accordance with the provisions of Section 7 of the ESA, as amended (16 U.S.C. §§1531-1543). Section 7(a)(2) of the ESA (16 USC 1531-1544 and Section 1536) requires that each Federal agency shall, in consultation with the Service(s), ensure that any action authorized, funded, or carried out by such agency, is not likely to jeopardize the continued existence of an endangered or threatened species, or result in the destruction or adverse modification of critical habitat.

This BA addresses one insect (Fender's blue butterfly), two plants (Kincaid's lupine and Willamette daisy), and DCH for one plant (Willamette daisy). The remainder of this BA presents details regarding the proposed action, why these particular species and habitat are addressed, measures to avoid and minimize impact to the species and habitat, and proposed measures to protect and restore these species and habitats.

## 1.1 Consultation History

Through discussions with US Fish and Wildlife Service (USFWS), ODOT determined individual consultation appropriate because not all species potentially affected by the proposed action are covered by the existing programmatic consultation.

The following are the dates of ODOT discussions with USFWS:

- December 2020 early coordination meeting between ODOT and USFWS
- May 2021 meeting between ODOT, FHWA, and USFWS - coordination on content of BA, process for developing BA
- July 2021 meeting between ODOT, FHWA, and USFWS – discussion of BA progress, species addressed in BA, and mitigation requirements
- August 2021 meeting between ODOT, FHWA, and USFWS – discussion of impacts, habitat assessment methods, and USFWS geodatabase
- October 2021 meeting between ODOT, FHWA, and USFWS – discussion of conservation measures
- November 2021 meeting between ODOT, FHWA, and USFWS – discussion of USFWS review of draft BA sections, conservation measures, and timeline

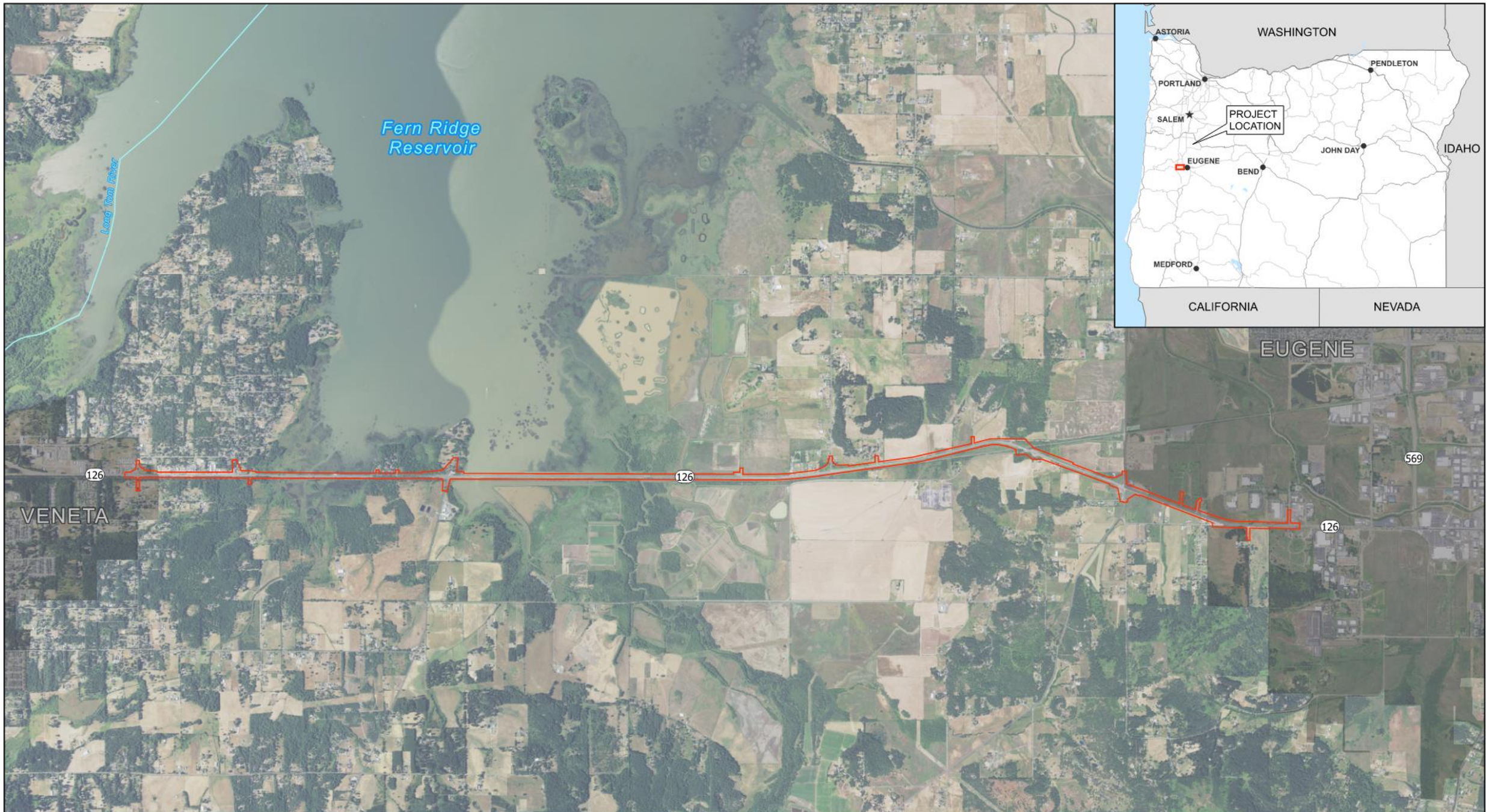
# 2.0 Project Location

The project is located along approximately 7.2 miles of OR 126 in Lane County, Oregon. The western project limit is Huston Road in Veneta (OR 126, Florence-Eugene Highway No. 062, milepost 47.83) and the eastern project limit is Terry Street in the City of Eugene (Beltline Highway No. 069, milepost 2.35) (Figure 2-1). The middle third of the project corridor crosses over the Fern Ridge Reservoir, and Coos Bay Rail Line owns and operates the railroad located along the south side of the corridor. The surrounding land includes federal, state, and other lands managed for public use, conservation of wetlands, wet prairie habitat, and wildlife habitat; agricultural and residential land uses; and an increased density of commercial and industrial development on the western and eastern edges of the corridor near the Veneta and Eugene city limits.

The project area is equivalent to the area of potential impact (API) and includes the extent of clearing and temporary construction impacts along and adjacent to the roadway, and five intersections through the corridor where roundabouts are proposed. The project also includes several potential offsite stormwater treatment areas along Interstate 5 (I-5), Highway 569 (Randy Pape Beltline), and Highway 99.

The legal location of the project along OR 126 is as follows:

- City of Eugene; City of Veneta; Unincorporated Lane County, OR
- Legal Description: Township 17 South, Range 05 West, Sections 31 through 36; Township 17 South, Range 04 West, Sections 30 through 33
- Coordinates: 44.052723, -123.331879 (west end), 44.048302, -123.186990 (east end)
- Sixth Field Hydraulic Unit Code (HUC): 170900030103 – Lower Coyote Creek; 170900030106 – Amazon Diversion Canal-Amazon Creek
- ODOT Region 2




API

Feet
0 750 1,500 3,000

N

**Project Location & Vicinity**
**OR126: Biological Assessment**

OR126: Veneta to Eugene

DOWL

Date: November 30, 2021

Figure 2-1

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# 3.0 Project Description

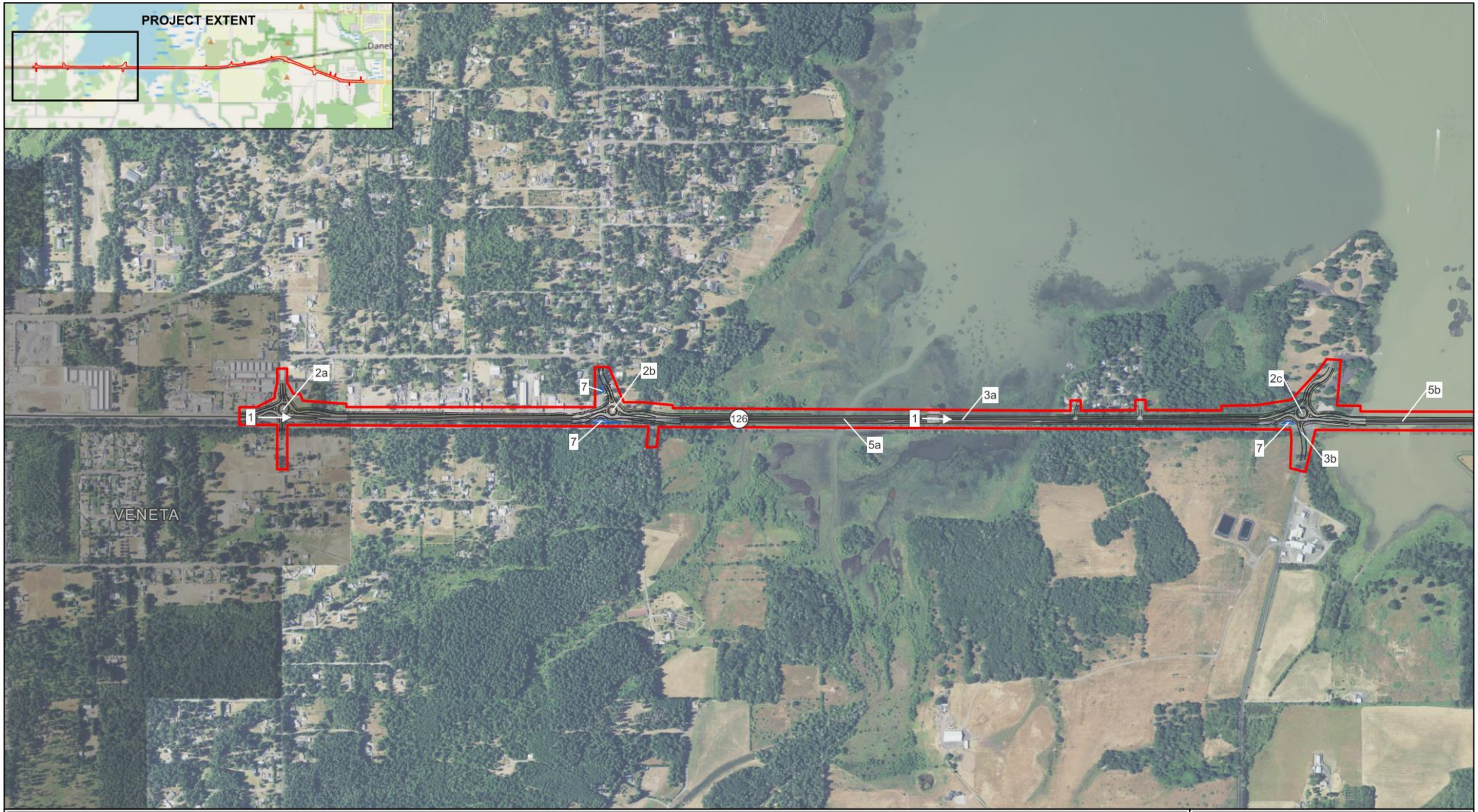
## 3.1 Purpose and Need

The project purpose is to provide safety and congestion relief improvements along OR 126 through the project corridor. The OR 126 roadway segment is classified as a Freight Route and Statewide Highway with a posted speed of 55 miles per hour (mph). OR 126 is currently two travel lanes with left-turn lanes at major intersections. The proposed improvements along OR 126 address safety deficiencies that were documented in the Highway 126 Fern Ridge Corridor Plan (Corridor Plan), prepared by ODOT, and adopted by the Oregon Transportation Commission on April 17, 2013. The Corridor Plan summarizes the alternatives evaluated and includes a recommendation to advance the Four-Lane Alternative as the best solution to meet the project goals and objectives.

This project builds upon the Corridor Plan to refine the design of the Four-Lane Alternative and complete the NEPA documentation necessary for the project to advance. The current project is state funded through House Bill 2017 (HB2017) but has a federal nexus for environmental clearances with FHWA to qualify the project for future federal funding. Additional funding for final design, right of way (ROW) acquisition, and construction has not yet been identified.

## 3.2 Proposed Action

This section provides preliminary details regarding project elements, construction materials, and methods. See Figures 3-1A to 3-1C for the locations of major project elements discussed below. Descriptions below are focused on aspects of the proposed action that will impact habitat occupied by ESA-listed species and/or DCH. ESA resources to be impacted by the proposed action are Fender's blue butterfly (*Icaricia icarioides fenderi*), Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), Willamette daisy (*Erigeron decumbens*), and DCH for Willamette daisy. Future site evaluations, including geotechnical investigations, will affect final project design; however, it is anticipated that changes to the project design will not alter the level of effect on ESA-listed species and habitats because these activities will occur within the analyzed API.




1. Widen Roadway Throughout Project Corridor
2a. Huston Road Roundabout
2b. Ellmaker Road Roundabout
2c. Central Road Roundabout
3a. Culvert 17409
3b. Culvert D02712
5a. Bridge BR17410
5b. Bridge BR02522A
7. Bioretention Pond
API

Feet
0 450 900

N

**Project Elements**
**OR126: Biological Assessment**

OR126: Veneta to Eugene

DOWL

Date: December 30, 2021

Figure 3-1A

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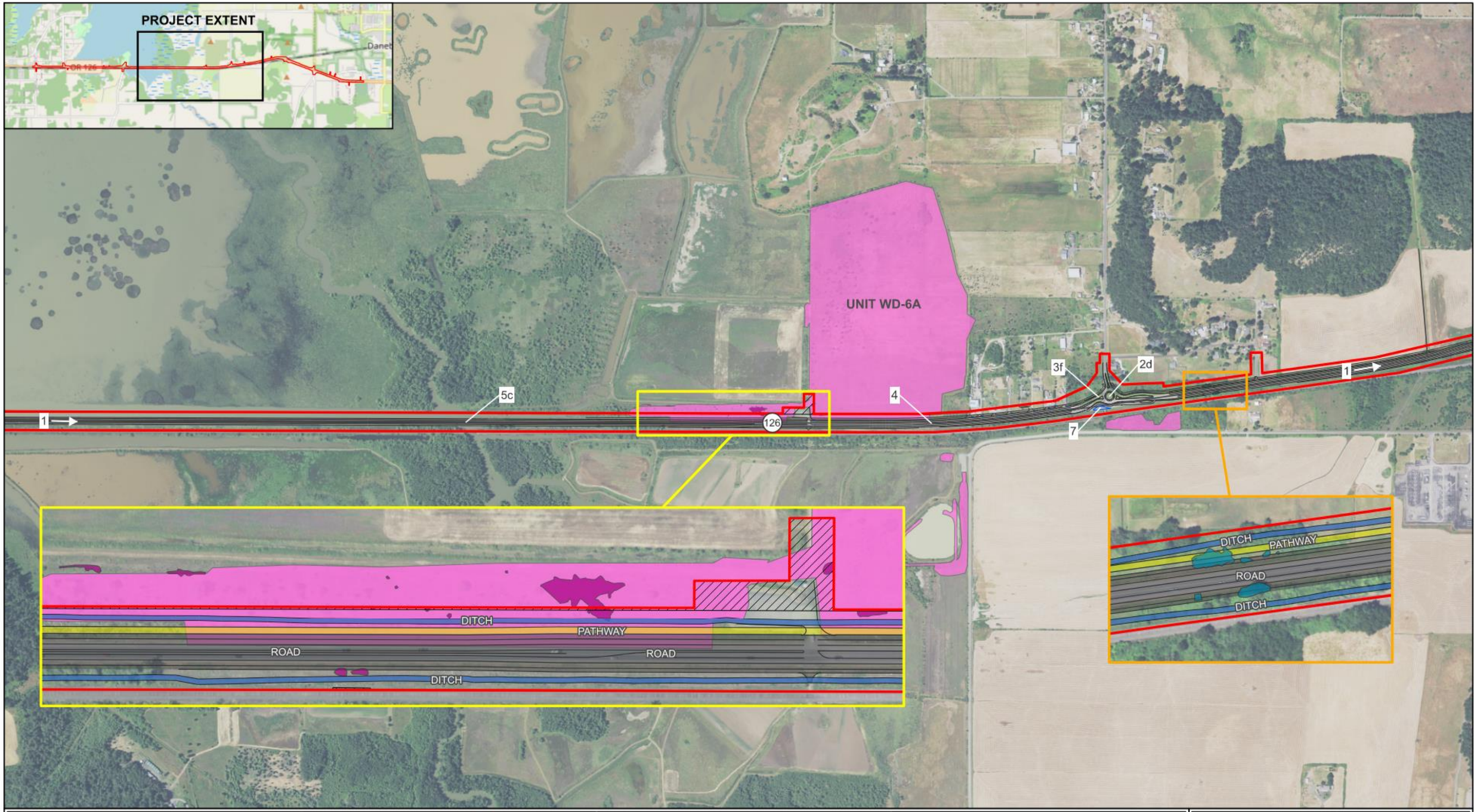


1. Widen Roadway Throughout Project Corridor
2d. Fisher Road Roundabout
3f. Culvert D027126
4. Bridge BR02765
5c. Bridge BR02520A
7. Bioretention Pond

API
No Work Area

**Mapped ESA - Listed Plant**
Kincaid's Lupine
Williamette Daisy

**Designated Critical Habitat**
Willamette daisy

Feet
0 450 900

N

**Project Elements**
**OR126: Biological Assessment**

OR126: Veneta to Eugene

DOWL

Date: December 29, 2021

Figure 3-1B

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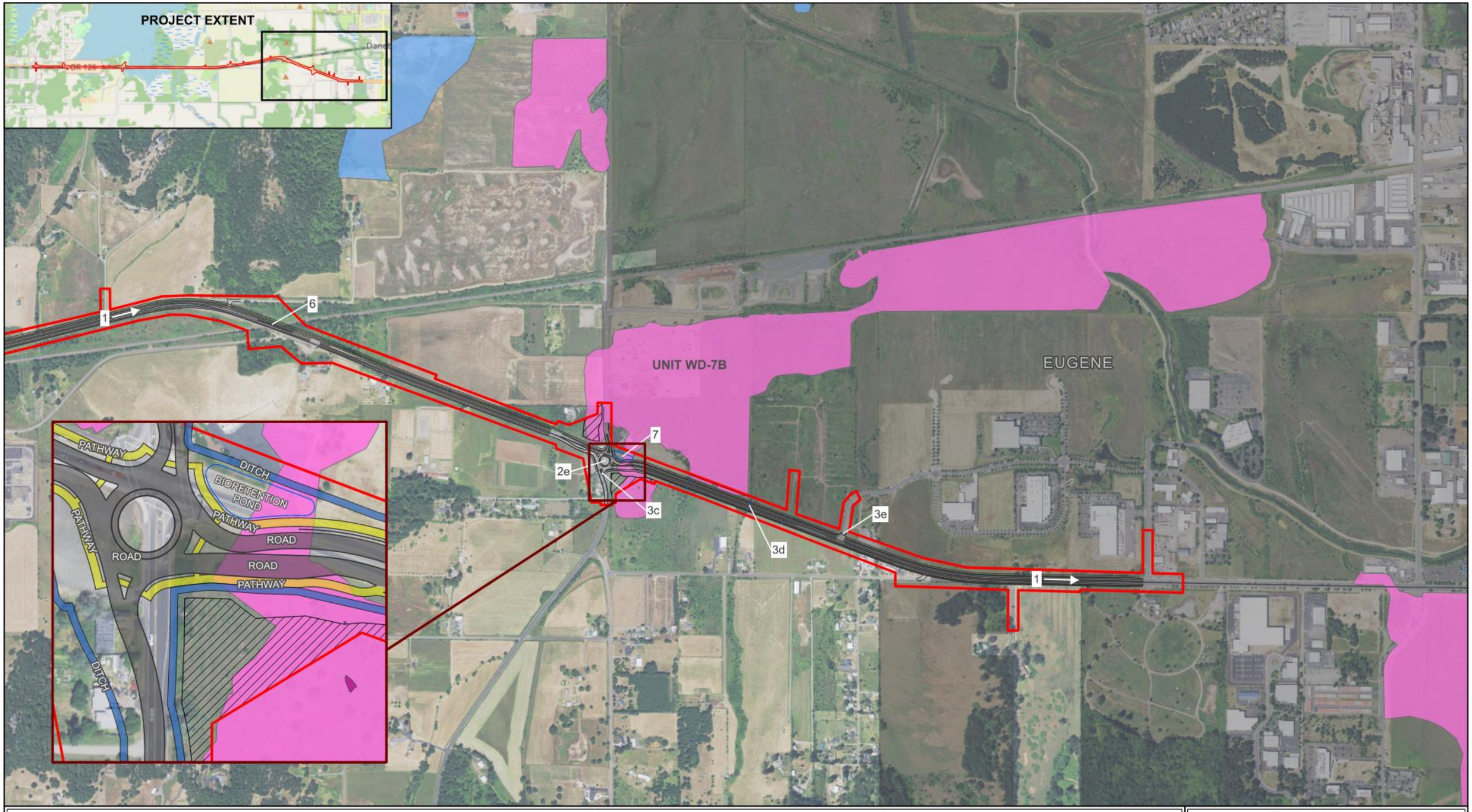


1. Widen Roadway Throughout Project Corridor
2e. Green Hill Road Roundabout
3c. Culvert UNTF1
3d. Culvert T02657
3e. Culvert T02676
6. Coos Bay Rail Line Bridge
7. Bioretention Pond

API
No Work Area

**Mapped ESA - Listed Plant**
Williamette Daisy

**Designated Critical Habitat**
Kincaid's lupine
Willamette daisy

Feet
0 450 900

N

**Project Elements**
**OR126: Biological Assessment**

OR126: Veneta to Eugene

DOWL

Date: December 29, 2021

Figure 3-1C

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*Service Layer Credits: OpenStreetMap: © OpenStreetMap (and) contributors, CC-BY-SA*
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### 3.2.1 Site Preparation

*Clearing and Grubbing*

Clearing and grubbing for project construction and staging will occur throughout the API. Clearing and grubbing will consist of removal of existing pavement and vegetation to the ground surface, and sub-grade grubbing in some areas. This will include tree and down timber removal, and removal of shrubs and herbaceous species. Clearing and grubbing is needed to accommodate the widened roadway, multi-use path, intersection improvements, bioretention ponds at roundabouts, replaced stormwater ditches, shifted ODOT operation and maintenance zone, and temporary construction equipment access zone. Since all other proposed actions will occur within the cleared and grubbed API and due to the nature of ESA-listed species and DCH, site clearing and grubbing is the only project element that will have effects.

Prior to clearing and grubbing in areas that currently support listed plants, individual Kincaid's lupine and Willamette daisy plants will be salvaged and relocated to appropriate protected sites.

**Table 3-1** provides the quantities of habitat occupied by listed species, and DCH that will be impacted by the proposed action.

**Table 3-1. Impacts to ESA-Listed Species and/or DCH from the Proposed Action**

| Resource | Permanently Cleared Area (sq ft) | Permanently Cleared Area (acres) | Temporarily Cleared Area (sq ft) | Temporarily Cleared Area (acres) | Total Cleared Area (sq ft) | Total Cleared Area (acres) |
|---|---|---|---|---|---|---|
| Fender's blue butterfly | 4,674 | 0.11 | N/A* | N/A* | 4,674 | 0.11 |
| Kincaid's lupine | 4,674 | 0.11 | N/A* | N/A* | 4,674 | 0.11 |
| Willamette daisy | 1,095 | 0.03 | N/A* | N/A* | 1,095 | 0.03 |
| Willamette daisy critical habitat | 153,331 | 3.52 | 15,693 | 0.36 | 169,024 | 3.88 |

*All direct impacts to individual listed plants are considered permanent.

Impacts to these resources are discussed in detail in Section 7.0 Effects of the Action.

*Grading and Earthwork*

Grading and earthwork will occur after clearing and grubbing to prepare the ground surface for construction of the widened roadway, the new bridges, stormwater facilities, and other project elements. This work will occur within upland and wetland. Earthwork will include importing

weed-free fill material in areas adjacent to sensitive habitats, particularly through the areas adjacent to existing plant populations and wet prairie where the roadway embankment will be widened to accommodate the additional lanes and multi-use path.

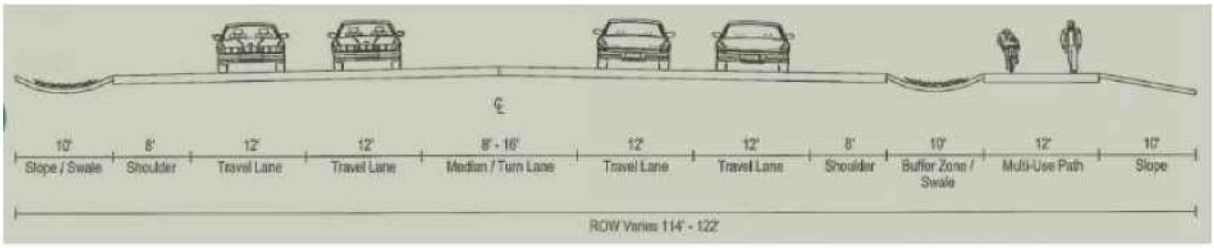
*Staging*

Staging areas for project-related equipment, materials, and construction crews will be required. The location of staging areas is at the contractor's discretion. The contractor will be required to secure all appropriate environmental clearances, permits and regulatory approvals for staging areas selected.

### 3.2.2 Roadway Widening

The OR 126 roadway will be widened from two travel lanes to four. The maximum width of the proposed roadway cross-section from edge of pavement to edge of pavement, including travel lanes, left turn lanes, shoulders, median, and multi-use path, plus the roadside ditch and 4-foot maintenance zones, is 122 feet (**Figure 3-2**). The cross-section width will vary throughout the overall roadway alignment and will generally be less than the maximum. There will also be limited roadwork on the intersecting roads where they approach and feed into the roundabouts. It is assumed that the old pavement and roadway will be completely reconstructed with the project. Approximately 53.3 acres of new pavement are proposed across the 7.2 miles of highway. Roadway widening will be staged to maintain two lanes of vehicular traffic and pedestrian access throughout construction.

**Figure 3-2. Typical Roadway Cross-Section**




### 3.2.3 Intersection Improvements

The existing roadway has left turn lanes at major intersections and no roundabouts. Additional and modified left turn lanes are proposed at several intersections. Roundabouts are proposed at five intersections: Huston Road, Ellmaker Road, Central Road, Fisher Road, and Green Hill Road. The location of the Greenhill Road intersection roundabout is currently designed to avoid all impacts to Willamette daisy and minimize impacts to Willamette daisy DCH to the greatest extent practicable.

### 3.2.4 Bridges

Three streams, West Fork Coyote Creek, Middle Fork Coyote Creek, and Coyote Creek, cross under OR 126 bridges within the API and flow into the Fern Ridge Reservoir. These creeks existed prior to construction of the reservoir and the historic channels located within the reservoir are still visible; the Middle Fork channel is only visible when reservoir water levels are low. The proposed action includes replacing the bridges that cross each of these three channels. The

existing two-lane bridges will be replaced with longer, wider bridges that will accommodate four lanes of traffic, a median, two shoulders, and a multi-use path. The following bridges will be replaced:

- Bridge BR02520A across Coyote Creek
- Bridge BR02522A across Middle Fork Coyote Creek
- Bridge BR17410 across West Fork Coyote Creek

To accommodate the horizontal roadway shift in the vicinity of existing bridge BR21307 over the Coos Bay Rail Line, a new permanent structure will be constructed that will carry westbound traffic. The existing two-lane bridge will remain in place and will ultimately carry eastbound traffic.

Bridge BR02765 located east of the Fisher Butte Wildlife Area parking lot will be replaced with a circular culvert under the highway.

The replacement bridges over the reservoir and the new bridge over the railroad are not associated with ESA-listed species or DCH. The new culvert replacing bridge BR02765 will be in the vicinity of Willamette daisy DCH but will be entirely contained within the footprint of the new roadway and roadside ditches and will not result in impacts to DCH.

### 3.2.5 Culverts

Three existing culverts (17409, D02712, UNTF1) will be lengthened to accommodate the widened roadway. Two circular culverts (T02657 and T02676) will be replaced with longer box culverts. One circular culvert (D027126) will be replaced with a long storm drain collection system. Many other smaller-diameter, cross-drain culverts exist throughout the API. These may need to be replaced or extended depending on their condition and location.

The six culverts discussed above are not associated with ESA-listed species or DCH. Neither culvert replacement nor culvert lengthening will result in a change in the hydrology that supports habitat for listed plants. All culverts will be entirely contained within the footprint of the new roadway and roadside ditches and will not result in impacts to DCH.

### 3.2.6 Stormwater Management

On-site stormwater management will involve replacing roadside ditches, constructing new inlets and drainage pipes, removing existing stormwater facilities and replacing them where possible, and constructing new bioretention ponds and bioslopes.

Existing roadside ditches will be shifted with the widened roadway prism. Given that all new ditches will replace existing ditches, the ditches will be oriented in the same direction (parallel to the roadway), and they will be in the same location relative to adjacent wetlands. No changes to the hydrology of the surrounding area are anticipated.

The project will increase the contributing impervious area along the alignment from 34.41 acres to 88.95 acres. ODOT's stormwater program water quality guidelines require that projects that

increase impervious surface area or change drainage patterns must treat all roadway stormwater runoff. Due to right-of-way and natural resources constraints, it will not be possible to provide on-site treatment for much of the runoff between the Coos Bay Rail Line bridge crossing and Ellmaker Road. Providing new stormwater treatment facilities for this portion of the corridor would result in additional fill in the reservoir, and/or impacts to wet meadow habitat, wetlands, ESA-listed species, or DCH. Instead of developing on-site treatment facilities in this area, stormwater runoff will be collected by a combination of inlets and roadside ditches and conveyed, untreated, into Fern Ridge Reservoir through a system of small storm sewers, culverts, and ditches.

Runoff from 32.62 acres of contributing impervious area (CIA) will be treated on-site in new bioretention ponds and bioslopes. Bioretention ponds are proposed at four intersections: Green Hill Road, Fisher Road, Central Road, and Ellmaker Road. Bioslopes are proposed on the south roadway embankment from Terry Street to approximately 0.3 miles west of the railroad crossing. Stormwater management facilities will be designed to address typical roadway runoff pollutants, including sediments, nutrients, hydrocarbons, heavy metals (both dissolved and particulate), polycyclic aromatic hydrocarbon (PAHs), and hydrocarbons (oils, greases, etc.).

Constructed stormwater management BMPs in areas with ESA-listed plants and/or DCH have been minimized; however, shifted roadside ditches will encroach into these areas. Associated impacts are accounted for in Table 3-1.

#### *Off-Site Stormwater Management*

The lack of complete onsite runoff treatment will be offset by treating currently untreated runoff from an offsite location. Approximately 109 acres of untreated area have been identified at sites along I-5, Highway 569 (Randy Pape Beltline), and Highway 99, generally located northeast of the project corridor; additional sites may be identified in the future. The current design requires at least 56.33 acres total of off-site area to be treated. The offsite areas are outside of DCH and a survey for ESA-listed species will be conducted at the sites prior to site selection or development to ensure impact avoidance.

### 3.2.7 Additional Project Elements:

In addition to the major project elements discussed above, the proposed action includes:

- Geotechnical drilling: A thorough geotechnical exploration plan will be needed to better define foundation recommendations for the proposed bridges and roadway embankment. Exploratory drilling will be required at several locations along the alignment and will be contained within the API associated with the roadway widening and roundabouts. No additional area will be required for geotechnical exploration.
- Pedestrian and bicycle improvements: Safety improvements such as warning signage, median refuge islands at crosswalks, and lighting will be installed as needed.
- New retaining walls: Five retaining wall locations have been identified for the project. Any additional retaining walls deemed necessary at future design phases will be within the API.

- Other permanent structures and construction activities: Guardrails, existing signs, fences, electrical systems, and roadway illumination will be impacted by the proposed project. These features will be moved, removed, or replaced as needed. The median islands on the east end of the project may have planting areas that require irrigation systems. Plantings in the median islands will be native species appropriate for the location and will be controlled for weeds.
- Utility relocation: Multiple utilities are located within the API.

These project elements will either be entirely contained within the footprint of the new roadway and roadside ditches or will be located away from areas with ESA-listed species and/or DCH.

### 3.2.8 Long-Term Operation and Maintenance

The ODOT operational maintenance zone generally extends 4 feet beyond the back of the existing roadside ditches and will be shifted along with the ditches. This zone is part of the permanent impact area since following construction, ODOT will require long-term access to the area for roadside ditch maintenance to maintain the operational right-of-way.

### 3.2.9 Impact Avoidance and Minimization Measures – BMPs

The project will employ avoidance and minimization measures through project design to avoid and/or minimize impacts to ESA-listed species and their DCH within the API. Minimization measures include:

- Actions to deter streaked horned larks from occupying temporarily cleared construction areas will be implemented to prevent streaked horned larks from using temporary construction sites within the API.
- In areas where onsite stormwater treatment would result in additional impacts to habitat occupied by ESA-listed plants or Willamette daisy DCH, offsite stormwater treatment is proposed.
- 'No work areas' will be implemented outside the permanent construction impact area to contain construction impacts.
- The road will be widened in both directions from the existing centerline, but in order to minimize impacts to ESA-listed plants and Willamette daisy DCH located north of the road, widening will occur as far south of the existing centerline as allowed by the presence the Coos Bay Rail Line.
- Approximately twice the required area has been identified for offsite stormwater treatment. Surveys for ESA-listed species will be conducted at the sites prior to site selection, and stormwater treatment will not be located in areas occupied by these species.
- All temporarily impacted areas will be restored to pre-construction contours and seeded as appropriate following project construction. Seed mix(es) will be appropriate for the location and habitat to be restored and species will be chosen that will not impact nearby habitat supporting listed species.

- Temporary erosion and sediment controls will be installed prior to project construction, will be inspected regularly and maintained, and will be left in place until permanent erosion and sediment control measures have established.
- Emergency spill response materials will be onsite prior to construction.

### 3.2.10 Conservation Measures

The *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* provides recommendations for achieving range-wide recovery goals for Fender's blue butterfly, Kincaid's lupine, and Willamette daisy. Recommendations include preventing future habitat loss by acquiring and managing properties with existing populations of listed species; enhancing or restoring degraded habitat for populations of listed species; and augmenting existing small populations of listed species using appropriate genetic resources. The conservation measures below were developed with these recommendations in mind and Appendices J, K, and L of the *Benton County Prairie Species Habitat Conservation Plan (HCP)* were used as a resource for developing appropriate mitigation ratios and best practices. See Appendix 4 for sections of the HCP that were used when developing these conservation measures.

At the replacement ratios presented in **Table 3-2** below, ODOT would commit to the following conservation measures:

#### *Compensation for Loss of Fender's Blue Butterflies*

To compensate for the loss of 0.11 acre of Fender's blue butterfly habitat, ODOT will establish between 0.33 and 0.55 acre of high-quality habitat for Fender's blue butterfly on a site that contains suitable habitat including suitable soils, little to no woody overstory, less than 30% cover of List A or B noxious weeds, and is protected with a permanent conservation easement. The larger acreage will be required if the habitat is restored to adequate condition. The smaller acreage will be required if the habitat is restored to excellent condition.

#### *Compensation for Loss of Kincaid's Lupine Plants*

To compensate for the loss of 156 Kincaid's lupine plants, ODOT will establish or restore between 0.33 and 0.55 acre of high-quality habitat that supports between 3 and 5 times the impacted amount of Kincaid's lupine foliar cover. Plant establishment will occur on a site with suitable soils, little to no woody overstory, less than 30% cover of List A or B noxious weeds, and is protected with a permanent conservation easement.

#### *Compensation for Loss of Willamette Daisy Plants*

To compensate for the loss of 90 Willamette daisy plants, ODOT will establish between 270 and 450 new Willamette daisy plants on a site that contains suitable habitat including suitable soils, little to no woody overstory, less than 30% cover of List A or B noxious weeds, and is protected with a permanent conservation easement.

#### *Compensation for Loss of Designated Critical Habitat for Willamette Daisy*

To compensate for the loss of 3.52 acres of designated Critical Habitat for Willamette daisy, ODOT will either restore 10.56 acres of degraded Willamette daisy habitat or protect (through

purchase and deed-restriction) 10.56 acres of currently un-protected high-quality Willamette daisy habitat. This could include designated critical habitat that is currently privately owned and therefore vulnerable to development or high-quality wet prairie habitat that is not already protected as designated critical habitat.

**Table 3-2. Replacement Ratios**

| Species/Habitat | Impact Quantity | | Mitigation Quantity | |
|---|---|---|---|---|
| | **Area** | **Individuals** | **Exceptional Mitigation Site* + Deed Restriction + Concurrent Mitigation 3:1** | **Adequate Mitigation Site* + Deed Restriction + Concurrent Mitigation 5:1** |
| Kincaid's lupine/Fender's blue butterfly | 0.11 acre | 156 plants | 0.33 acre | 0.55 acre |
| Willamette daisy | 0.03 acre | 90 plants | 0.09 acre or 270 plants | 0.15 acre or 450 plants |
| Willamette daisy DCH | 3.52 acres | N/A | 10.56 acres | 17.60 acres |

*As defined in the Benton County HCP.

# 4.0 Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). It extends outside of API to the point where there are no measurable effects from project activities (**Figure 4-1**). The project's action area includes the geographic extent to which project-related noise travels through the air and underwater before attenuating to background levels, and the extent of potential stormwater effects from short- and long-term project-related water quality impacts. Any offsite mitigation and conservation areas will also be part of the project's action area. Noise and stormwater effects are not a concern for the species addressed in this BA. However, the action area is delineated based on the regulatory definition and is not species-specific.

As described in Section 3.0 Project Description, the project includes various onsite project elements plus offsite areas for stormwater treatment, wetland mitigation, and conservation measures. For the purpose of defining the action area, these project elements can be separated into five types of construction actions. **Table 4-1** lists the construction actions and the types of effects each will generate beyond the direct impacts in the API.

**Table 4-1. Construction Actions and Effects that Determine the Action Area Extent**

| Construction Action | Effect Influencing Action Area |
|---|---|
| Non-Bridge Construction (primarily roadway construction) | • In-air noise<br>• Increased impervious surface area generating untreated stormwater that will enter the Fern Ridge Reservoir. |
| Bridge Construction | • In-air noise<br>• Underwater noise from in-water work, including impact pile driving |
| Offsite stormwater management | • In-air noise |
| Offsite Areas for Wetland Impact Mitigation | • In-air noise |
| Offsite Areas for Implementing Conservation Measures | • In-air noise |

## 4.1 Determining the Action Area

The methods for determining the geographic extent of effects from project actions were based on those described in the WSDOT Biological Assessment Preparation Manual (WSDOT 2020). The outer extent of geographic effects for all actions are combined to determine the overall project action area. An effect does not necessarily equate to an impact to ESA-listed species or DCH. While the following effects will not constitute impacts to the species addressed in this BA, these effects needed to be quantified in order to define the action area.

Long Tom River flows downstream of Fern Ridge Reservoir into Pacific Ocean via Willamette and Columbia Rivers. *(See Inset)*

Fern Ridge Reservoir

Long Tom River

4.55 mi

TERRITORIAL HWY

Amazon Creek

BELTLINE HWY

569

EUGENE

0.86 mi

0.44 mi

0.52 mi

0.75 mi

1.16 mi

1.2 mi

0.79 mi

126

FLORENCE-EUGENE HWY

VENETA

0.86 mi

0.75 mi

1.2 mi

126

0.77 mi

Coyote Creek


Onsite Project Footprint

Extent of Terrestrial Noise Effects

Extent of Underwater Noise Effects

Stormwater Action Area

Project Reach Action Area

Feet
0 2,000 4,000

N

**Action Area**
**OR126: Biological Assessment**

OR126: Veneta to Eugene

DOWL

Date: August 27, 2021

Figure 4-1

K:\60\00610-00\60GIS\ENV\Biological Assessment\Biological Assessment.aprx Aug 27, 2021 12:28 PM User: ssterling

*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*

### 4.1.1 In-Air Noise

Project activities will generate varying levels of in-air construction noise, depending upon the types of equipment used and whether multiple pieces of equipment are operated simultaneously. Construction noise will attenuate to background sound levels at varying distances, with the farthest-reaching in-air noise occurring where the loudest equipment is used (impact and vibratory pile drivers) and background sound levels are lowest. See **Appendix 5** for noise analysis details.

### 4.1.2 Underwater Noise

Proposed in-water work activities primarily consist of widening the roadway embankment and replacing three bridges through the reservoir. Impact pile driving will result in the farthest-reaching underwater noise impacts. The existing underwater background sound level is unknown. A similar site was used to approximate the background sound level (WSDOT BA Manual Table 7-13, Underwater Background sound Levels for Daytime Only). The in-water peak sound pressure level for the project was also approximated using data from a similar site (BA Manual Table 7-14, Attenuated sound pressure levels associated with pile types during impact pile driving).

The formula for distance to where source sound level drops off to background sound level was used to determine the extent of underwater noise effects. This includes attenuation from the use of a bubble curtain. The sound from the impact hammers would not drop below background sound levels before traveling the length of the reservoir. Therefore, the underwater action area was determined by line of sight from the bridge sites to the edges of the reservoir.

### 4.1.3 Stormwater

Much of the stormwater runoff generated within the project corridor will be collected by a combination of inlets and roadside ditches and conveyed, untreated, into Fern Ridge Reservoir through a system of small storm sewers, culverts, and ditches. Therefore, the extent of potential water quality effects from stormwater extends from the onsite API within the Fern Ridge Reservoir, an impoundment of the Long Tom River, downstream to its confluence with the Willamette River, and continues downstream to the Pacific Ocean via the Columbia River.

## 4.2 Action Area Summary

The project action area is split into five subareas: Project Reach Action Area, Stormwater Action Area, Offsite Stormwater Treatment Action Area, Offsite Wetland Impact Mitigation Areas, and Offsite Areas for Implementing Conservation Measures. These areas are shown on **Figure 4-1** and are defined as follows:

- Project Reach Action Area: Measured from points along the project corridor, the radius of the extent of in-air noise effects ranges from 0.16 to 1.2 miles. Lower background sound and higher construction noise levels are both associated with a greater extent of

effects. Underwater noise effects extend from the three in-water bridge locations out to the edges of the reservoir for all areas within line-of-sight of the noise sources (the reservoir bridge sites).

- Stormwater Action Area: Includes the entire Fern Ridge Reservoir downstream to the Pacific Ocean via the Long Tom River, Willamette River, and Columbia River.
- Offsite Stormwater Treatment Action Area: The locations for these facilities have not been determined. ODOT and FHWA commit to siting these facilities in locations without listed species. ODOT will conduct site investigations to confirm absence of listed species prior to selecting locations.
- Offsite Areas for Implementing Conservation Measures: The locations for these facilities have not been determined. ODOT and FHWA will communicate with USFWS as project plans develop and will collaboratively identify locations for conservation measure implementation.

# 5.0 Species and Habitat Information

## 5.1 Species Lists

Information on listed species and designated critical habitat potentially present in the action area was obtained from the USFWS Information for Planning and Consultation (IPaC) system (USFWS 2021a) on November 2, 2021. An official IPaC species list for the action area is located in **Appendix 1**. Species included on the IPaC list are listed in **Table 5-1** and as indicated, a smaller subset of these species/critical habitats are carried forward in the BA analysis. The rationale for this distinction is discussed below.

**Table 5-1. IPaC List**

| Species/Habitat | Status | Species/Habitats Potentially Affected by the Action |
|---|---|---|
| *Mammals* | | |
| **Pacific Marten**, Coastal Distinct Population Segment *Martes caurina* | Threatened | |
| *Birds* | | |
| **Marbled Murrelet** *Brachyramphus marmoratus* | Threatened | |
| **Northern Spotted Owl** *Strix occidentalis caurina* | Threatened | |
| **Streaked Horned Lark** *Eremophila alpestris strigata* | Threatened | |
| *Insects* | | |
| **Fender's Blue Butterfly** *Icaricia icarioides fenderi* | Endangered | X |
| **Taylor's Checkerspot** *Euphydryas editha taylori* | Endangered | |
| *Flowering Plants* | | |
| **Kincaid's Lupine** *Lupinus sulphureus ssp. kincaidii* | Threatened | X |
| **Nelson's Checker-mallow** *Sidalcea nelsoniana* | Threatened | |
| **Willamette Daisy** *Erigeron decumbens* | Endangered | X |
| *Critical Habitats* | | |
| **Pacific Marten** *Martes caurina* | Proposed | |
| **Marbled Murrelet** *Brachyramphus marmoratus* | Final | |
| **Northern Spotted Owl** *Strix occidentalis caurina* | Final | |
| **Streaked Horned Lark** *Eremophila alpestris strigata* | Final | |

| Species/Habitat | Status | Species/Habitats Potentially Affected by the Action |
|---|---|---|
| **Fender's Blue Butterfly** *Icaricia icarioides fenderi* | Final | |
| **Taylor's Checkerspot** *Euphydryas editha taylori* | Final | |
| **Kincaid's Lupine** *Lupinus sulphureus ssp. kincaidii* | Final | |
| **Willamette Daisy** *Erigeron decumbens* | Final | X |

As indicated in Table 5.1, based on site-specific habitat conditions and species occurrence documentation, four listed species have the potential to occur within the action area. Designated critical habitat for three of those species also occurs in the action area.

Streaked horned lark was identified in the IPaC report but would not be expected to occur in the API because streaked horned lark habitat is currently absent from the API. While streaked horned lark habitat has not been identified within the API, project construction activities including temporary clearing and grubbing, and the construction and operation of temporary access roads during construction could create new temporary streaked horned lark habitat, if preventative BMPs are not implemented. The project includes BMPs to prevent streaked horned larks from occupying temporary construction areas. The project will have No Effect on streaked horned larks and therefore the species will not be further analyzed in this BA.

Designated critical habitat for Fender's blue butterfly and designated critical habitat for Kincaid's lupine occur only in the portion of the action area defined by the extent of project-generated noise. From the project API, Fender's blue butterfly DCH is located 0.25 miles away and Kincaid's lupine DCH is 0.25 miles away. Therefore, the project will have No Effect on these critical habitats, and they will not be analyzed further in this BA. A summary of the other four species and habitats is provided in Section 5.2. Refer to **Appendix 2** for life history details for these species.

One of the species (Nelson's checker-mallow) identified in the IPaC report has not been documented in the action area or the API. Four of the species, specifically Pacific Marten, Coastal Distinct Population Segment; Marbled Murrelet; Northern Spotted Owl; and Taylor's Checkerspot would not be expected to occur in the action area because habitats for these species are not present within the action area. Critical habitat for these species as well as for streaked horned lark is absent from the action area. The proposed action will have No Effect on these species and critical habitats, and, therefore, they will not be further analyzed in this BA.

## 5.2 Species and Critical Habitat Occurrence

The following ESA-listed species and critical habitats identified by USFWS have been documented within the API: Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), Willamette daisy (*Erigeron decumbens*), and Fender's blue butterfly (*Icaricia icarioides fenderi*), and Designated Critical Habitat for Willamette daisy. The focus on API instead of action area for

these species' occurrence discussion is due to the fact that those portions of the action area that extend outside of the API will have no consequence for these species (in-air and in-water noise).

Fender's blue butterfly, Kincaid's lupine, Willamette daisy, and critical habitat for Willamette daisy have been documented in the API through site-specific surveys conducted in 2018, 2020, and 2021. In 2018 a team of biologists led by ODOT biologist Nicholas R. Testa conducted extensive surveys for rare plants in an area that included the API. In 2020 and 2021 DOWL botanist Lizzie Zemke, on behalf of ODOT, conducted surveys within the API for Kincaid's lupine, and Willamette daisy. In 2021 Nicholas R. Testa conducted surveys for Fender's blue butterfly in the Kincaid's lupine population that occurs within the project area.

### 5.2.1 Insects

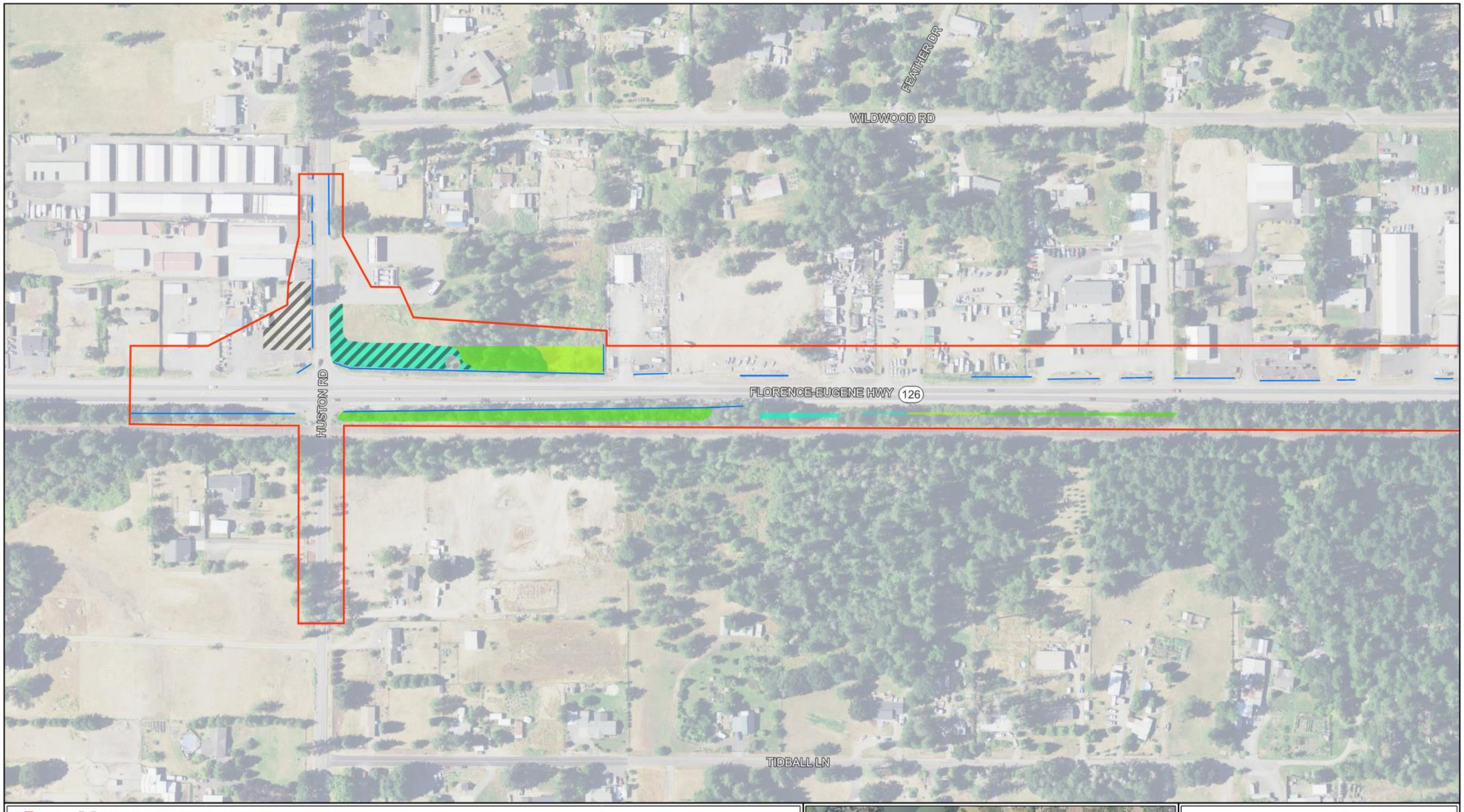
#### *Fender's Blue Butterfly*

Fender's blue butterfly was listed as endangered, without critical habitat, on January 25, 2000 (USFWS 2000). Critical habitat for the butterfly was designated on October 6, 2006 (USFWS 2006). A final recovery plan that includes the Fender's blue butterfly was published in May 2010 (USFWS 2010).

Detailed information on the life cycle, habitat needs, population status, and threats to continued survival of Fender's blue butterfly is presented in **Appendix 2** Species Biology; in the Federal Register (USFWS 2000); and in the *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* (USFWS 2010).

Presence in the Action Area

Six small patches of Kincaid's lupine occur in upland prairie habitat within the API. These six patches are located east of Fisher Road and occupy a total of 4,674 square feet within 20 feet of the existing OR 126 roadway to the north and within 5 feet to the south (see Figure 5-1H. Figures 5-1A to 5-1G and 5-1I to 5-1L are also included in the figure set below and referenced later in the document). The lupine population located within the API likely provides egg-laying habitat, food, and shelter for Fender's blue butterfly larvae, and as stated in Section 5.0, for the purpose of this analysis we assume these patches of lupine support Fender's blue butterflies. At the time that Fender's blue butterfly was proposed for reclassification from endangered to threatened, there were 137 total sites containing 13,700 individuals estimated throughout an area of approximately 825 acres of occupied prairie habitat (USFWS 2021a). Therefore, the 4,674 square feet (0.11-acre) of Kincaid's lupine habitat within the API that is assumed to support Fender's blue butterflies constitutes approximately 0.013 percent of the total known occupied habitat range wide.




API
Mowed
Ditch

**Cowardin Classification**

- PEM
- PFO
- PSS

N

0 50 100 200 Feet

PROJECT EXTENT

**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1A

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*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*

WILDWOOD RD

ELLMAKER RD

126

FLORENCE-EUGENE HWY

Job Swale Creek

API

Mowed

Ditch

**Cowardin Classification**

PEM

PFO

PSS

R

N

0 50 100 200 Feet

PROJECT EXTENT

# Environmental Baseline

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1B

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*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*


API
Ditch
**Cowardin Classification**
PEM
PSS

N

0 50 100 200 Feet

PROJECT EXTENT

**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1C

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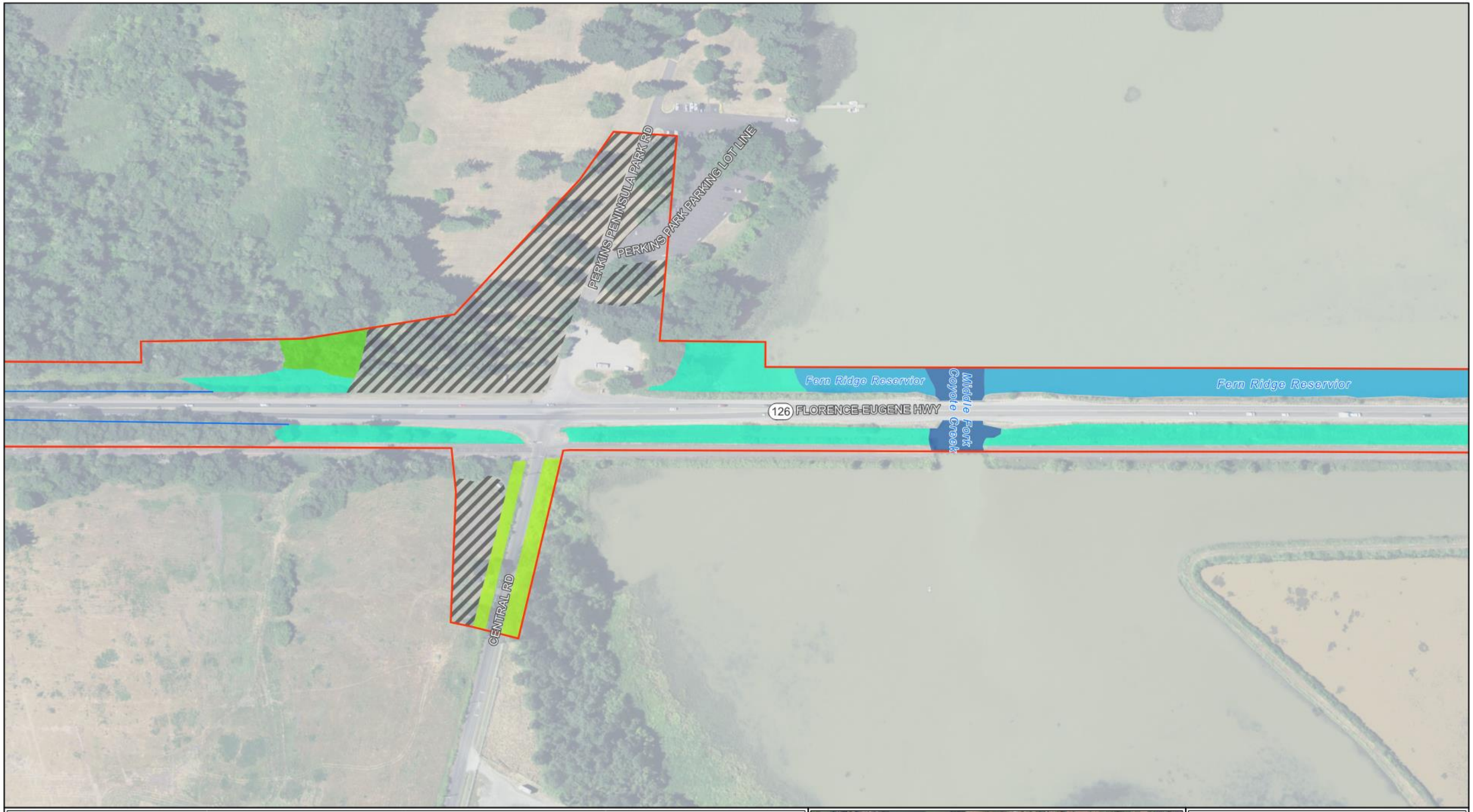


API
Mowed
Ditch

**Cowardin Classification**

- L
- PEM
- PFO
- PSS
- R

N

0 50 100 200 Feet

PROJECT EXTENT

**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1D

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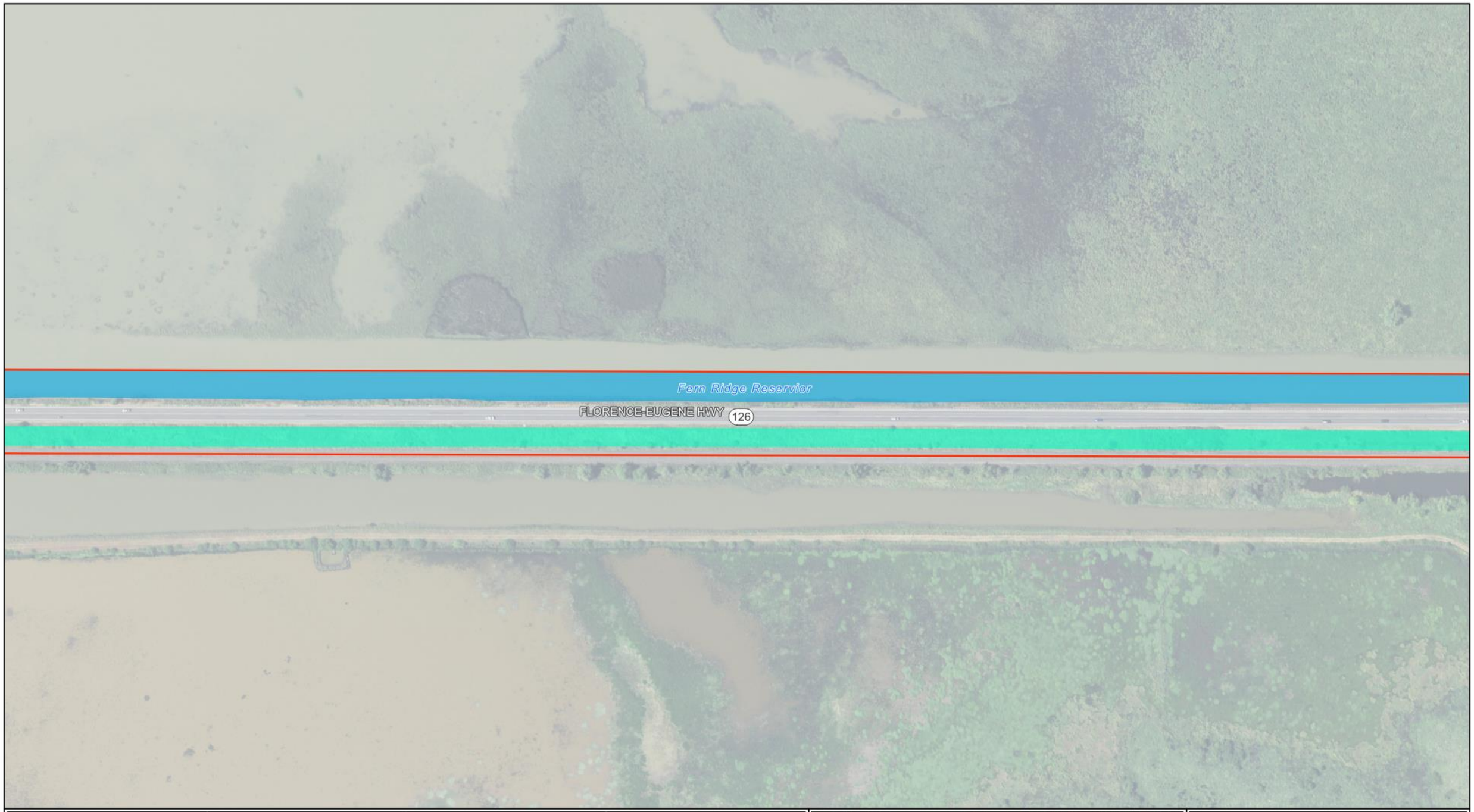


API

**Cowardin Classification**

L

PEM

N

0 50 100 200 Feet


**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1E

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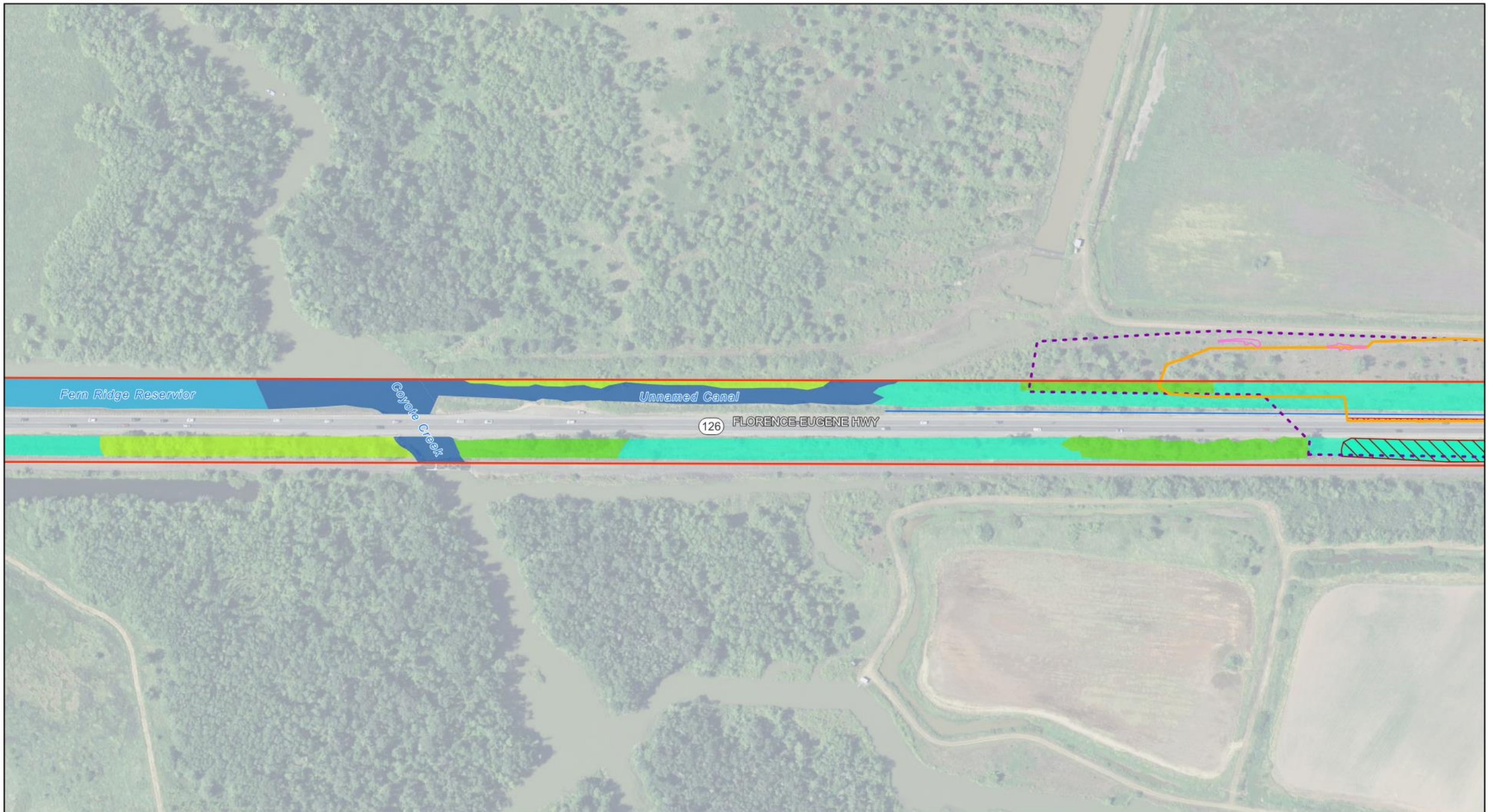
*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*




API
ODOT Special Management Area

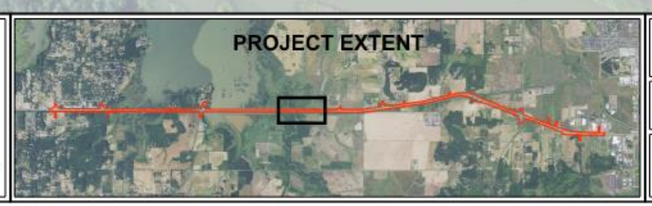
DCH Would Not Qualify
Williamette Daisy Critical Habitat (DCH)

**DOWL/ ODOT Mapped Plant**
Williamette Daisy

Ditch
Wet Prairie

**Cowardin Classification**
L
PEM
PFO
PSS
R

N
0 50 100 200 Feet




**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1F

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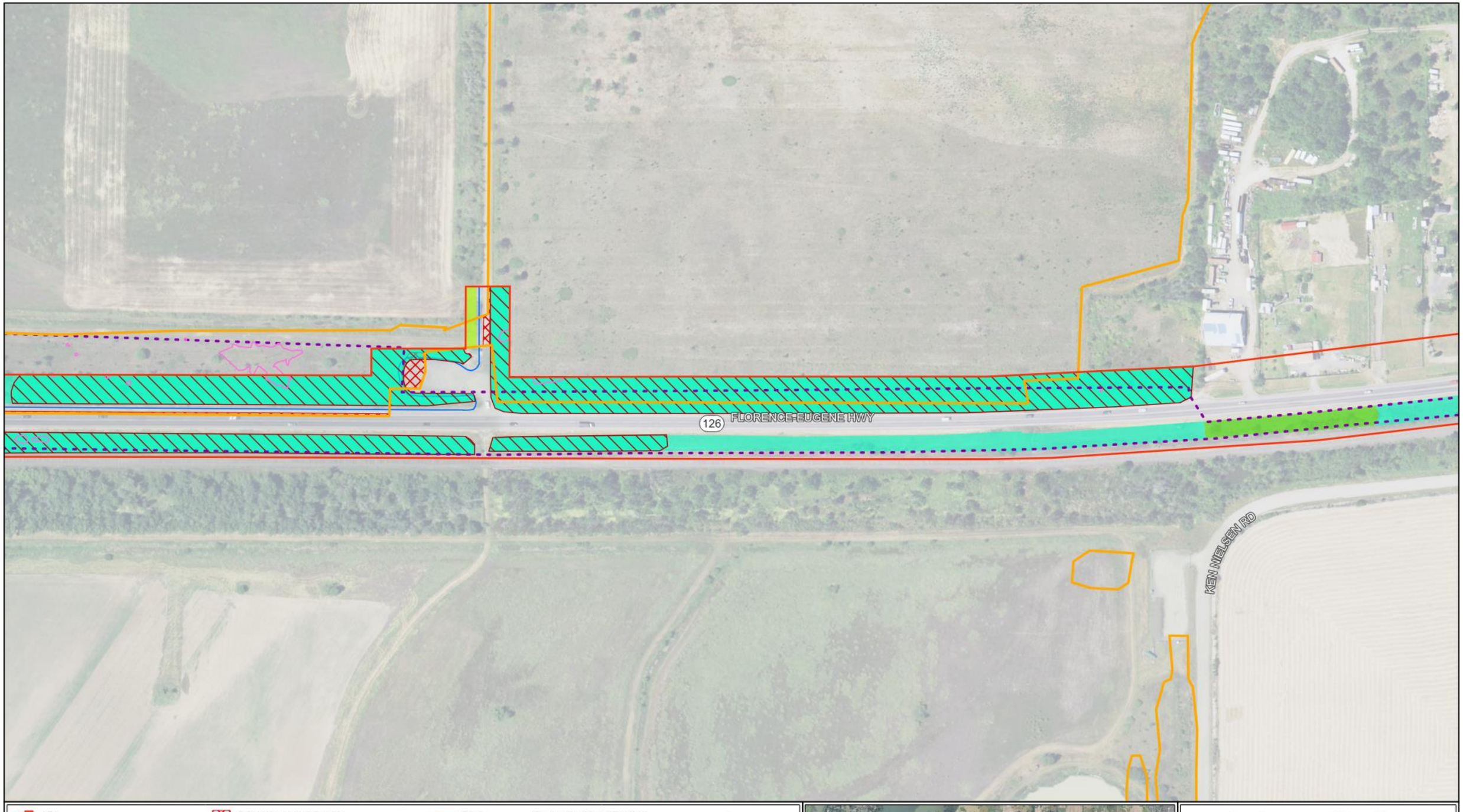


API
ODOT Special Management Area

DCH Would Not Qualify
Williamette Daisy Critical Habitat (DCH)

**DOWL/ ODOT Mapped Plant**
Williamette Daisy

Ditch
Wet Prairie

**Cowardin Classification**
PEM
PFO
PSS

N

0 50 100 200 Feet


# Environmental Baseline

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1G

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*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*

STONEHENGE LN

MCCLELLAND WAY

FISHER RD

JUDY AVE

RICHMOND ST

126 FLORENCE-EUGENE HWY

KEN NIELSEN RD

API
ODOT Special Management Area

Agriculture
Mowed
Upland Prairie

Williamette Daisy Critical Habitat (DCH)
**DOWL/ ODOT Mapped Plant**
Kincaid's Lupine

Ditch
Wet Prairie

**Cowardin Classification**
PEM
PSS

N

0 50 100 200 Feet

PROJECT EXTENT

# Environmental Baseline

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1H

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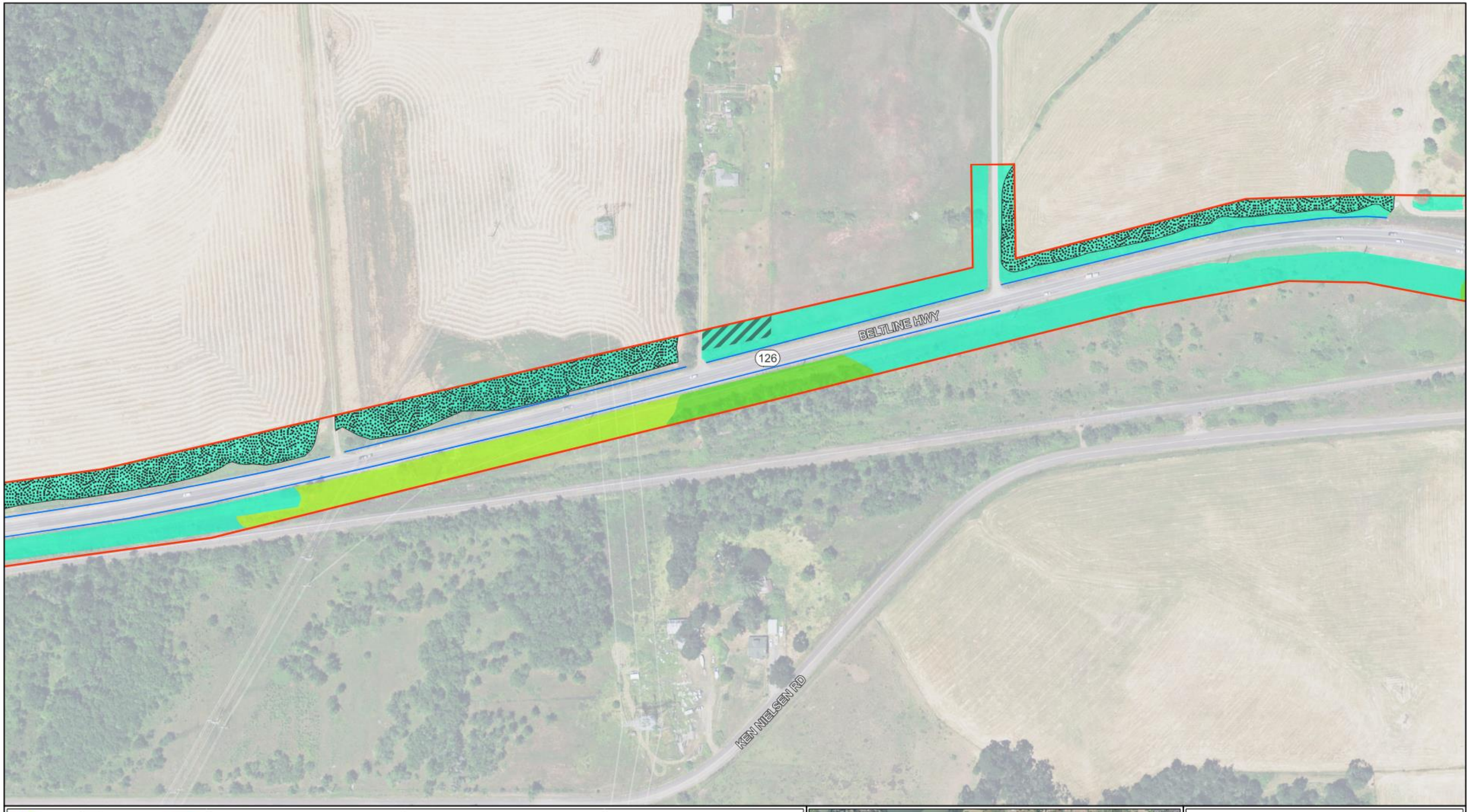
*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*




API
Agriculture
Mowed
Ditch

**Cowardin Classification**

PEM
PFO
PSS

N

0 50 100 200 Feet

PROJECT EXTENT

**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1l

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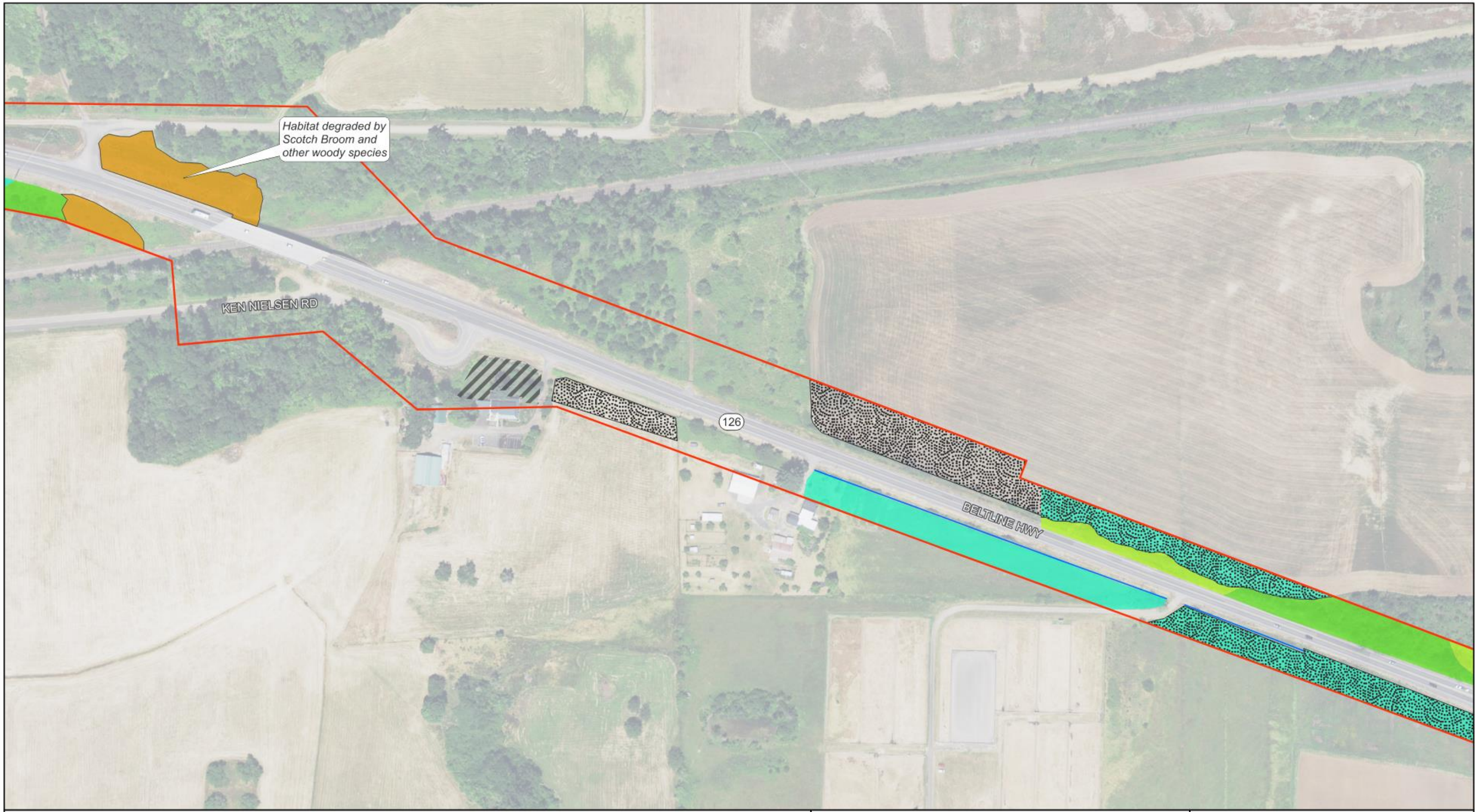
*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*




API
Agriculture
Mowed
Upland Prairie
Ditch
**Cowardin Classification**
PEM
PFO
PSS

N
0 50 100 200 Feet

PROJECT EXTENT

**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1J

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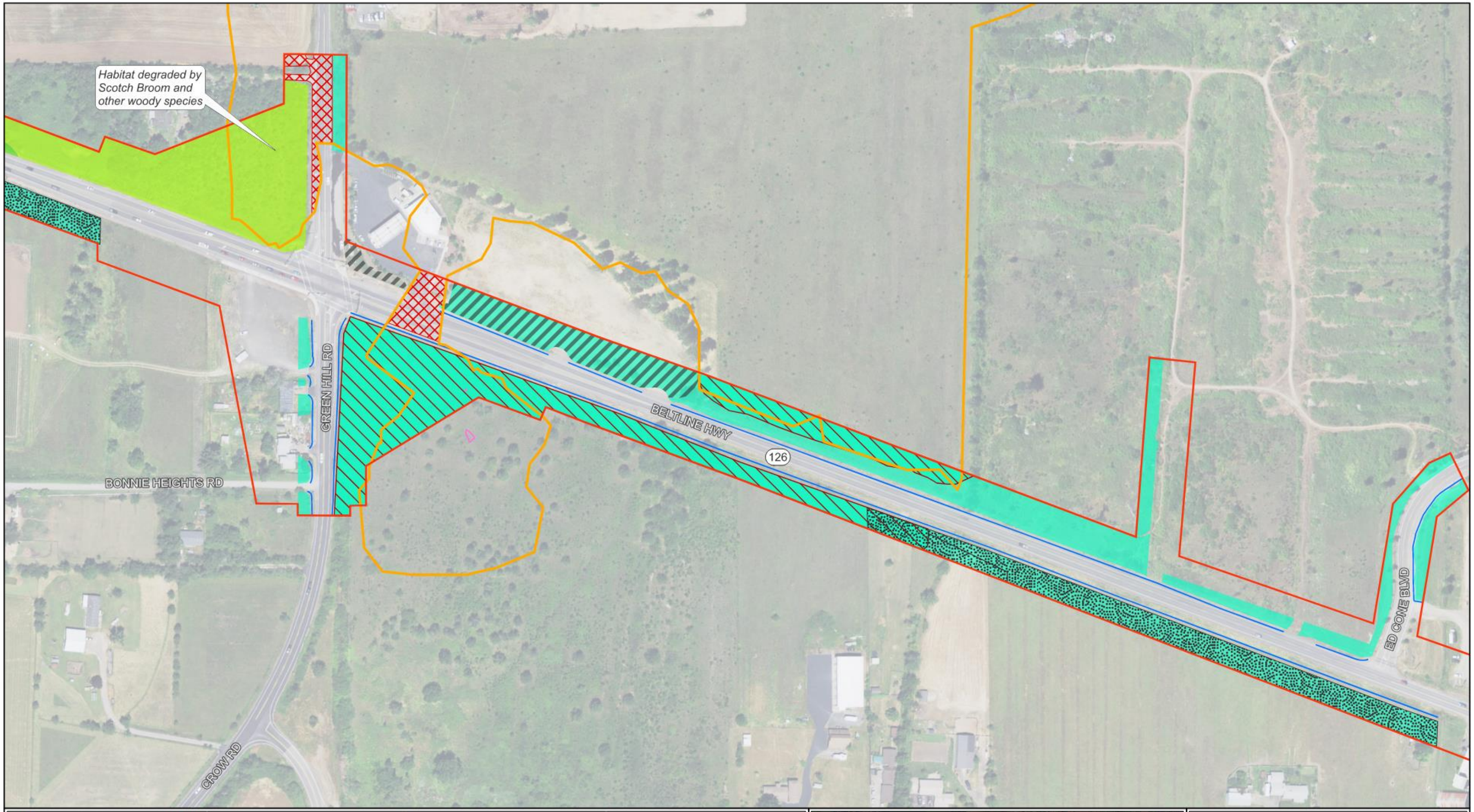


API
Agriculture
Mowed
DCH Would Not Qualify
Williamette Daisy Critical Habitat (DCH)
**DOWL/ ODOT Mapped Plant**
Williamette Daisy
Ditch
Wet Prairie
**Cowardin Classification**
PEM
PFO
PSS

N

0 50 100 200 Feet


**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1K

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*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*

ED CONE BLVD

OWEN LOOP SOUTH

TERRY ST

CROW RD

126

BELTLINE HWY

API

Mowed

Ditch

**Cowardin Classification**

PEM

N

0 50 100 200 Feet

PROJECT EXTENT

**Environmental Baseline**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-1L

K:\60\00610-00\60GIS\ENV\Biological Assessment\Biological Assessment.aprx Dec 17, 2021 2:08 PM User: tjameson

*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*

Wet prairies typically provide nectaring habitat for Fender's blue butterfly. Approximately 10.9 acres of wet prairie are present within the API, with the nearest patch approximately 70 feet west of the nearest Kincaid's lupine patch. This wet prairie habitat contains an abundance of non-native vegetation and has the potential for restoration to higher quality wet prairie habitat. Even in its current condition, the wet prairie habitat in the API does contain a diversity of native forbs that may serve as nectar sources for Fender's blue butterflies. The wet prairie in the API in the Fisher Butte Wildlife Area is within 0.1 miles of a Fender's blue butterfly population located to the north of the API and may provide nectar sources to these butterflies. See Figures 5-1F to 5-1H and 5-1K for the locations of wet prairie habitat in the API.

In addition to the assumed population in the API, USFWS identifies three populations of Fender's blue butterfly within the action area. One is located in the Fisher Butte Wildlife Area, approximately 0.1 mile north of the API and 0.6 mile west of the assumed population in the API (see **Figure 5-2**). A second population is located between Ed Cone Boulevard and the Coos Bay Rail Line, west of Amazon Creek, approximately 0.4 miles north of the API and over 2 miles east of the assumed population in the API. A third population is located in the vicinity of the second, north of Amazon Creek and approximately 0.9 miles north of the API, and approximately 2 miles northeast of the assumed population in the API.

ODOT Biologist Nicholas R. Testa conducted surveys within the action area in June 2021 and observed possible Fender's blue butterfly eggs on the underside of one Kincaid's lupine plant, and apparent insect herbivory on the leaves of other Kincaid's lupine plants. While this information does not confirm the presence of Fender's blue butterfly in the action area, its presence cannot be ruled out.

### 5.2.2 Flowering Plants

*Kincaid's Lupine*

Kincaid's lupine was listed as threatened, without critical habitat, on January 25, 2000 (USFWS 2000). A final recovery plan that includes Kincaid's lupine, *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* (USFWS 2010), was published in May 2010.

Detailed information on habitat needs, population status, and threats to continued survival of Kincaid's lupine is presented in **Appendix 2** Species Biology; in the Federal Register (USFWS 2000); and in the *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* (USFWS 2010).

Presence in the Action Area

Six small populations of Kincaid's lupine were observed within the API during May 2020 and May 2021 surveys (see **Figure 5-1H**). These populations comprise a total of 157 individuals and 4,674 square feet (0.11-acre) of occupied habitat. They were located between Fisher Road and Richmond Street on both sides of the highway, occurred on dry soils, and were associated with Douglas fir (*Pseudotsuga menziesii*), Pacific poison oak (*Toxicodendron diversilobum*), and black hawthorn (*Crataegus douglasii*).

FERN RIDGE RESERVOIR

FLORENCE-EUGENE HWY

BELTLINE HWY

PACIFIC HWY

103

0

0

6495

2

33

7

0

298

482

29

662

676

0.8 mi

1.1 mi

0.6 mi

0.9 mi

0.1 mi

0.9 mi

0.4 mi

1.2 mi

Upland Habitat dominated by Scotch Broom

API

Project Reach Action Area

**Species & Extent**

- Fender's Blue Butterfly Habitat, Extant
- Fender's Blue Butterfly Habitat, Intermittent
- Fender's Blue Butterfly Habitat, Potential
- Kincaid's Lupine, Extant
- Kincaid's Lupine, Unknown
- Willamette Daisy, Extant
- Willamette Daisy, Unknown

**DOWL/ODOT Mapped**

- Kincaid's Lupine
- Willamette Daisy

**Fender's Blue Butterfly Survey Location (year)**

- 2019
- 2020
- # Population Estimate from Most Recent Survey
- Fender's blue butterfly Likely Dispersal Distance from On-site Population

Feet

0 1,500 3,000

N

**Mapped Fender's Blue Butterfly, Kincaid's Lupine, and Willamette Daisy within 2 Miles of API**

OR126: Veneta to Eugene

DOWL

Date: December 17, 2021

Figure 5-2

K:\60\00610-00\60GIS\ENV\Biological Assessment\Biological Assessment.aprx Dec 17, 2021 1:59 PM User: tjameson

*Service Layer Credits: OSIP_2018\OSIP_2018_WM:*

Within two miles of the onsite population, there are approximately six distinct populations of lupine mapped by the USFWS during surveys completed between 2013 and 2019, with the nearest patch approximately 1.1 miles to the northwest (see **Figure 5-2**).

*Willamette Daisy*

Willamette daisy was listed as endangered without critical habitat, on January 25, 2000 (USFWS 2000).

Detailed information on habitat needs, population status, and threats to continued survival of Willamette daisy is presented in **Appendix 2** Species Biology; in the Federal Register (USFWS 2000); and in the *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* (USFWS 2010).

Presence in the Action Area

Seven patches of Willamette daisy were observed within the API during May 2020 and May 2021 surveys (see Figures 5-1F and 5-1G). These populations comprised a total of 170 individuals and approximately 3,132 square feet of occupied habitat within the API. They were located in the vicinity of the Fisher Butte Wildlife Area parking lot on both sides of the highway, in wet prairie habitat. When the Willamette daisy was listed in 2000, the species occupied approximately 28 sites across 286 acres (USFWS 2000). Getting an accurate estimate is difficult because population size may fluctuate greatly from year to year, and individual plants are difficult to survey, as they may not flower every year (USFWS 2010).

Approximately 10.9 total acres of wet prairie, including 10.7 acres not currently occupied by Willamette daisy are present within the API (see Figures 5-1A to 5-1L). Most of the occupied and unoccupied wet prairie habitat has some degree of woody species presence, typically consisting of Himalayan blackberry (*Rubus armeniacus*), Oregon ash (*Fraxinus latifolia*), and/or roses (*Rosa sp*). Within 1 mile of the site, there are approximately 19.7 acres of mapped Willamette daisy patches (USFWS 2021b).

### 5.2.3 Critical Habitats

*Willamette Daisy Critical Habitat*

Final critical habitat was designated on October 31, 2006 (USFWS 2006).

Detailed information on the attributes of Willamette daisy DCH is presented in **Appendix 2** Species Biology; in the Federal Register (USFWS 2006); and in the *Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington* (USFWS 2010).

Presence in the Action Area

USFWS has designated nine Willamette daisy critical habitat units, each of which represents the habitat containing the features essential to the conservation of core populations across the range of the species. Portions of Units WD-6 and WD-7 are overlapped by the project. Detailed descriptions of the units are included in **Appendix 2**.

Portions of two units (WD-6A and WD-7B) of Willamette daisy critical habitat occupy the API. Within the API, one patch of Unit WD-6A is located north of OR 126, and west, north, and east of the Fisher Butte Wildlife Area parking lot. One patch of Unit WD-7B is located northwest, northeast, and southeast of the Green Hill Road intersection, and north of the road in an area east of the intersection. Of the 8.0 acres mapped in the API, approximately 0.7 acre would not qualify as Willamette daisy DCH, either because it includes buildings or paved areas, or lacks sufficient primary constituent elements (PCEs) to support the species (for example, maintained lawn) (see Figures 5-1F, 5-1G, and 5-1K). There are approximately 718 total acres of Willamette daisy DCH (this may include some small areas that do not qualify as Willamette daisy DCH, as is the case in the API). Therefore, the 7.3 acres of onsite suitable DCH comprises approximately 1 percent of the total Willamette daisy DCH.

# 6.0 Environmental Baseline

The following sections describe habitat conditions, and past and present activities that have caused these conditions. A discussion of the impact of these activities on the condition of each of the listed species and critical habitat in the action area is provided.

## 6.1 General Setting

The project is located in Oregon's Willamette Valley, approximately 4 miles from the Willamette River. The highway intersects the south end of the Fern Ridge Reservoir in the western half of the project corridor. The environmental setting in the general project vicinity is upland and wetland prairie interspersed with rural/suburban development.

According to historical information from land survey records, prior to 1850 the Willamette Valley is estimated to have included 1,010,000 acres of historic native grasslands, approximately 685,000 acres of which consisted of upland prairie and 325,000 acres of wet prairie (E. Alverson, The Nature Conservancy, Eugene, pers. comm., 1994, as cited in Recovery Plan).

This extensive resource was depleted through fire suppression, agricultural conversion, and urbanization. Fire suppression allowed shrub and tree species to overtake grasslands, while agricultural practices hastened the decline of native prairie species through habitat loss and increased grazing (Johannessen et al. 1971; Franklin and Dyrness 1973, as cited in Recovery Plan). As of 2000, remaining native upland prairie in the Willamette Valley was estimated to be less than 988 acres (The Nature Conservancy 2000, as cited in Recovery Plan).

Although large prairie expanses dominated by native species had been lost by the early 1900s, many remnant grasslands with a large native species component remain. These remnants, often dominated by nonnative species, also support the only remaining occurrences of native prairie species in the Willamette Valley.

The prairies of western Oregon and southwestern Washington have been overtaken by nonnative plants that shade-out or crowd-out important native species. In the absence of a regular disturbance regime, succession of native trees and shrubs also threaten to alter prairie habitats. Common native species found to encroach on undisturbed prairies include Douglas-fir, Oregon white oak (*Quercus garryana*), Oregon ash, Douglas hawthorn, and Pacific poison oak.

Habitat loss from a wide variety of causes (e.g., urbanization, agriculture, silvicultural practices, and roadside maintenance) is a severe problem faced by Fender's blue butterfly, Kincaid's lupine, and Willamette daisy at a majority of occupied sites. Land development and alteration in the Willamette Valley has been so extensive that almost all of the occurrences of the three species on the valley floor have essentially been relegated to small patches of habitat (USFWS 2000).

## 6.2 Fender's Blue Butterfly

Fender's blue butterfly is endemic to the Willamette Valley. Key habitat features required for Fender's blue butterfly's continued survival and reproduction include upland prairie habitats that support populations of Kincaid's lupine, spurred lupine (*Lupinus arbustus*), or sickle-keeled lupine (*Lupinus albicaulis*); other Fender's blue butterfly populations within 1.2 miles; and forbs that provide nectar sources for adult butterflies. Adult Fender's blue butterflies feed on nectar from a variety of plant sources, including plants typically found in wet prairies.

### *Biological Requirements of the Species*

Physical and biological features essential to the conservation of the species are: (1) early seral upland prairie, wet prairie, or oak savanna habitat with a mosaic of low-growing grasses and forbs, an absence of dense canopy vegetation, and undisturbed subsoils; (2) larval host plants, (3) adult nectar sources, and (4) stepping-stone habitat, consisting of undeveloped open areas with the physical characteristics appropriate for supporting the short-stature prairie oak savanna plant community, within 1.2 miles of natal lupine patches (USFWS 2010). Kincaid's lupine is the preferred larval host plant at most known Fender's blue butterfly populations (USFWS 2010).

### *Habitat Conditions & What Has Led to Them*

Habitat that supports Fender's blue butterfly is limited in the API. Within the action area and the API, the remaining areas of native wet and upland prairie essential for Fender's blue butterfly are small and in poor to moderate condition. Most support populations of non-native invasive herbaceous species and are experiencing encroachment from native and non-native woody species.

The factors that have led to the decrease in Fender's blue butterfly populations within the action area and API are habitat loss, degradation, and fragmentation caused by development and agricultural uses; habitat degradation resulting from encroachment into prairie habitats by shrubs and trees due to fire suppression; and habitat degradation due to competition from non-native herbaceous species. All of these factors have contributed to a loss of the large expanses of native wet prairies that support essential nectaring habit for Fender's blue butterfly and the loss of Kincaid's lupine populations, both of which are necessary for the recovery and continued survival of the species.

### *Species Use in Action Area and API*

According to current USFWS mapping (**Figure 5-2**) there is one population of Kincaid's lupine within 1.2 miles of the Fender's blue butterfly population documented in the API; 33 Fender's blue butterflies were identified 0.6 mile west of the butterfly population documented in the API. No other Fender's blue butterfly populations or Kincaid's lupine populations are known to occur within 1.2 miles of the API population. There are several populations of Kincaid's lupine and three populations of Fender's blue butterfly mapped by the USFWS within the action area but more than 1.2 miles from Fender's blue butterfly population in the API.

Though relatively small and isolated, the Fender's blue butterfly habitat located within the API may function as a stepping stone between two nearby habitats, one of which is located north of the action area. Stepping stone habitat is a prairie patch that provides both lupine and nectar

plants and occurs in an area with barrier-free movement for butterflies (USFWS 2021a). Stepping stone habitat must also be accessible to nearby Fender's blue butterfly populations, the estimated dispersal distance of which is 1.2 miles (Schultz 1998, as cited in USFWS 2021a). The onsite (within the API) habitat includes Kincaid's lupine immediately adjacent to wet prairie habitat supporting nectar plants. The next nearest known population of Fender's blue butterfly is located 0.6 mile west of the onsite population and 0.8 mile south of the nearest offsite lupine patch, located north of the API and the action area within the Fisher Butte Wildlife Area (see **Figure 5-1**).

### *Influence of Habitat Condition on Species*

#### Population Trends

Surveys have determined that Fender's blue butterfly persists in about 17 populations on remnant prairies in Yamhill, Polk, Benton, and Lane Counties (USFWS 2010). A 2010 synthesis of existing data estimated the current range-wide number of butterflies to be about 3,000 to 5,000 individuals (Schultz *et al*. 2003, as cited in USFWS 2010). Fewer than 10 sites with populations of 100 adult butterflies or more are known (USFWS 2010). Since the species was listed in 2000, there has been a significant increase in the number of sites that are being actively managed to restore native prairie habitat and increase the abundance of lupine host plants in the butterfly's range (USFWS 2019a). Butterfly abundance has also likely increased significantly, although the USFWS notes that survey information collected since 2012 cannot be compared to data collected in previous years (USFWS 2019a).

#### Factors Influencing Population Trends

As stated previously, habitat loss, degradation, and fragmentation caused by development and agricultural uses; habitat degradation resulting from encroachment into prairie habitats by shrubs and trees due to fire suppression; and habitat degradation due to competition from non-native herbaceous species have contributed to a loss of the large expanses of native upland and wet prairies that support Fender's blue butterfly.

Most of the API is within ODOT right-of-way adjacent to OR 126, a well-traveled highway. Proximity of existing habitat to the highway results in frequent disturbance through routine roadside maintenance within ODOT's Operational Roadway. Outside of the Operational Roadway, known populations of ESA-listed species within the API are protected through ODOT's Special Management Area (SMA) Program. Routine maintenance activities within the SMA are designed to avoid impacting the protected species. Approximately 28 percent of upland prairie in the API is located in an SMA (see Figures 5-1F to 5-1H). This includes the area where Kincaid's lupine occurs and Fender's blue butterfly occupancy is assumed.

Encroachment into upland prairie habitat by trees and shrubs due to fire suppression and lack of other woody species management is degrading upland prairie habitat in the API and in the action area. Increased canopy cover reduces available light, which is not well-tolerated by Kincaid's lupine or many of Fender's blue butterfly nectar sources (USFWS 2006). Much of the upland area within the API is now shrub/scrub or forested. Approximately 1.35 acres of upland prairie not occupied by Kincaid's lupine are present in the API; this constitutes approximately 0.1 percent of the total upland prairie remaining in the Willamette Valley. Much of the unoccupied

habitat is vegetated with Scotch broom (*Cytisus scoparius*) and has the potential to be restored to higher quality upland prairie habitat. If restored and able to support Fender's blue butterflies, this area has the potential to function as stepping stone habitat, as it is between two known Fender's blue butterfly populations and within 1.2 miles of both. This area is located approximately 0.9 miles east of the assumed existing Fender's blue butterfly population located in the API (see **Figure 5-2**).

Fragmentation of upland prairie habitat and low availability of host lupine patches has led to isolated populations. Small and isolated populations typically have increased rates of inbreeding depression, genetic drift, and reduced genetic diversity, reducing their likelihood of survival. Its limited dispersal ability of 1.2 miles or less makes the Fender's blue butterfly particularly vulnerable to habitat fragmentation. Within 1.2 miles of the onsite patch of Kincaid's lupine, there is only one other known population of Fender's blue butterfly.

Weedy invasion reduces the abundance of host plants and nectaring plants. Additionally, tall non-native grasses can limit the ability of Fender's blue butterfly to find its host plant (Severns 2008, as cited in USFWS 2010). Weedy invasion is common along roadsides and is occurring in the API and the action area. Himalayan blackberry, tansy ragwort (*Senecio jacobaea*), and St. John's wort (*Hypericum perforatum*) are common invasive species in prairie habitats in the API.

Within the API and action area, upland areas have been converted to agricultural use or developed for commercial or residential use. Approximately 2.3 acres of upland area in the API is currently used for agriculture (see Figures 5-1H to 5-1K). Agricultural lands in the API undergo frequent disturbance through mowing or harvest, are planted monocultures, and likely receive pesticide applications.

## 6.3 Kincaid's Lupine

Historically Kincaid's lupine was likely widely distributed on upland prairie habitats throughout the Willamette Valley, Oregon, extending into the Umpqua Valley, Oregon. Key habitat features necessary for Kincaid's lupine continued survival and reproduction are upland prairie habitats dominated by fescue species such as red fescue (*Festuca rubra*), Idaho fescue (*Festuca idahoensis*), and Roemer's fescue (*Festuca roemeri*). It is also occasionally found on steep, south-facing slopes and barren rocky cliffs.

### *Biological Requirements of the Species*

The primary habitat requirements for Kincaid's lupine are early seral upland prairie or oak savanna habitat with a mosaic of low-growing grasses and forbs and spaces to establish seedlings or new vegetative growth, an absence of dense canopy vegetation, undisturbed subsoils, and the presence of insect outcrossing pollinators (*Bombus* species), with unrestricted movement between existing lupine patches.

### *Habitat Conditions & What Has Led to Them*

As described for Fender's blue butterfly, habitat that supports Kincaid's lupine is limited in the API. Within the action area and the API, the remaining areas of native upland prairie are small

and in poor condition. Most support populations of non-native invasive herbaceous species and are experiencing encroachment from native and non-native woody species.

The factors that have led to the decrease in Kincaid's lupine populations within the action area and API are habitat loss, degradation, and fragmentation caused by development and agricultural uses; habitat degradation resulting from encroachment into prairie habitats by shrubs and trees due to fire suppression; and habitat degradation due to competition from non-native herbaceous species.

### *Species Use in Action Area and API*

According to current USFWS mapping (**Figure 5-2**) and recent ODOT surveys, there are several populations of Kincaid's lupine within the action area. Outside of the API, all mapped populations in the action area are mapped east of the Coos Bay Rail Line crossing.

### *Influence of Habitat Condition on Species*

#### Population Trends

Alterations to native prairie habitat over the last 140 years have led to the loss of over 99 percent of known habitat area for the species (Alverson 1994, as cited in USFWS 2000). The upland prairie habitat where the species is found is highly fragmented and often degraded. In 2010, the species was known to occur at about 164 sites (USFWS 2010). The 2019 5-Year Review noted that although there are indications that new populations have been discovered or established and some populations have increased in abundance since 2010, other populations have declined (USFWS 2019a).

#### Factors Influencing Population Trends

As stated previously, habitat loss, degradation, and fragmentation caused by development and agricultural uses; habitat degradation resulting from encroachment into prairie habitats by shrubs and trees due to fire suppression; habitat degradation due to competition from non-native herbaceous species have contributed to a loss of habitat for Kincaid's lupine.

Most of the API is within ODOT right-of-way adjacent to OR 126, a well-traveled highway. Proximity of existing habitat to the highway results in frequent disturbance through routine roadside maintenance within ODOT's Operational Roadway. Outside of the Operational Roadway, known populations of ESA-listed species within the API are protected through ODOT's SMA Program. Routine maintenance activities within the SMA are designed to avoid impacting the protected species. Approximately 28 percent of upland prairie in the API is located in an SMA (see Figures 5-1F to 5-1H). This includes the area where Kincaid's lupine occurs.

Encroachment into upland prairie habitat by trees and shrubs due to fire suppression and lack of other woody species management is degrading upland prairie habitat in the API and in the action area. Increased canopy cover reduces available light, which is not well-tolerated by Kincaid's lupine or many of Fender's blue butterfly nectar sources (USFWS 2006). Much of the upland area within the API is now shrub/scrub or forested. Approximately 1.35 acres of upland prairie not occupied by Kincaid's lupine are present in the API; this constitutes approximately 0.1 percent of the total upland prairie remaining in the Willamette Valley. Much of the unoccupied

habitat is vegetated with Scotch broom (*Cytisus scoparius*) and has the potential to be restored to higher quality upland prairie habitat. This area is located approximately 0.9 miles east of the assumed existing Kincaid's lupine population located in the API (see Figure 5-2).

Weedy invasion is common along roadsides and is occurring in the API and action area. Himalayan blackberry, tansy ragwort (*Senecio jacobaea*), and St. John's wort (*Hypericum perforatum*) are common invasive species in prairie habitats in the API.

Within the API, upland areas have been converted to agricultural use or developed for commercial or residential use. Agricultural lands in the API undergo frequent disturbance through mowing or harvest, are planted monocultures, and likely receive pesticide applications. Approximately 2.3 acres of upland area in the API is currently used for agriculture (see Figures 5-1H to 5-1K).

## 6.4 Willamette Daisy

The Willamette daisy is endemic to the Willamette Valley. Key habitat features for Willamette daisy's continued survival and reproduction are wet prairie with low-growing grasses and forbs and an absence of woody cover. Wet prairie habitat is typically dominated by tufted hair grass (*Deschampsia cespitosa*), California oatgrass (*Danthonia californica*), and several forbs endemic to the Willamette Valley. Less commonly, the Willamette daisy is found in upland prairie habitat typically associated with Hall's aster (*Symphotrichum hallii*), Idaho fescue (*Festuca idahoensis* ssp. *roemeri*) and Pacific poison oak (*Toxicodendron diversilobum*) (Meinke 1982, Clark *et al.* 1993, as cited in USFWS 2010).

### *Biological Requirements of the Species*

Willamette daisy typically occurs in wet prairie grasslands where woody cover is nearly absent and where herbaceous vegetation is low in stature (USFWS 2010). Sites that support Willamette daisy are typically dominated by tufted hair grass, California oatgrass, and a number of other Willamette Valley endemic forbs. These areas are flat, open, seasonally wet prairie with bare soil between the pedestals created by the bunching tufted hair grass (USFWS 2010).

### *Habitat Conditions & What Has Led to Them*

Habitat that supports Willamette daisy is limited in the API. Within the action area and the API, the remaining areas of native wet prairie are small and in poor to moderate condition. Most support populations of non-native invasive herbaceous species and are experiencing encroachment from native and non-native woody species.

The factors that have led to the decrease in Willamette daisy populations within the action area and API are habitat loss, degradation, and fragmentation caused by development and agricultural uses; habitat degradation resulting from encroachment into prairie habitats by shrubs and trees due to fire suppression; and habitat degradation due to competition from non-native herbaceous species.

### *Species Use in Action Area and API*

According to current USFWS mapping (**Figure 5-2**) and recent ODOT surveys, there are several populations of Willamette daisy within the action area. The population within the API extends north out of the API and is entirely within the action area; during 2017 and 2018 surveys, 11,330 plants were counted in this population. Several other populations are mapped by USFWS within the action area (but outside of the API), most of which are adjacent to or east of Green Hill Road on the east end of the action area and away from the population within the API. There are two small patches mapped in the vicinity of the API population, both of which are unconfirmed to support an existing population based on the USFWS's survey data. There is also an introduced population west of Job Swale Creek.

### *Influence of Habitat Condition on Species*

#### Population Trends

In 2000 the USFWS estimated that habitat loss was occurring at 80 percent of the remaining 84 remnants of native prairies occupied by Willamette daisy, and that 24 of the 28 extant Willamette daisy populations occurred on private lands and were "expected to be lost in the near future unless conservation actions are implemented" (USFWS 2000). Detecting trends in Willamette daisy populations is complicated (USFWS 2010). The 2019 5-Year Review noted that although there are indications that new populations have been discovered or established and some populations have increased in abundance since 2010, other smaller sites have been extirpated and some populations have declined (USFWS 2019c).

#### Factors Influencing Population Trends

Willamette daisy is threatened by habitat loss due to urban and agricultural development, successional encroachment into its habitat by trees and shrubs, competition with non-native weeds, and small population sizes (USFWS 2010). Urban and agricultural development have removed populations and converted prairie habitats to managed land uses. Agricultural crops have replaced native prairie species in much of the action area and the API. Fire suppression has allowed woody native and non-native species to encroach into the prairie habitats that previously supported Willamette daisy, shading and out-competing the native prairie species, including Willamette daisy.

Much of the API was historically wet prairie supporting herbaceous plant communities. Threats to this habitat include habitat loss through development or conversion to agriculture or other uses, encroachment by trees and shrubs, competition with non-native weeds, and small population size (USFWS 2010). All of these threats occur within the API.

Populations occurring on private lands are the most vulnerable to threats of development because state and federal plant protection laws have little effect on private lands, although populations on public lands are not immune from other important limitations or threats to the species. Likewise, vulnerability arising from small population sizes and inbreeding depression may be a concern for the species, regardless of land ownership, especially among 17 of the 28 remaining sites that are smaller than 8 acres (USFWS 2000).

The API's proximity to the highway results in frequent disturbance through routine roadside maintenance within ODOT's Operational Roadway. Outside of the Operational Roadway, known populations of Willamette daisy species are protected by ODOT's SMA program. Approximately 46.8 percent of wet prairie within the API is located within an SMA.

Areas of wetland prairie have been converted to agricultural use within the API. Frequent disturbance and planted crop species discourage the growth of wet prairie species such as Willamette daisy. Nine percent of wetland area in the API is currently used for agriculture (herbaceous crops). Commercial and suburban development within the API has also impacted the abundance of wet prairie habitat. Approximately 8.1 percent of onsite wetland area appears to be regularly mowed for non-agricultural purposes.

Succession to woody vegetation has occurred and is occurring in wet prairie and other wetland habitat in the API, due to suppression of historical prairie disturbance regimes. The most common woody species occurring in wet prairie habitat in the API is Oregon ash. The increase in canopy cover reduces the light necessary for the species' survival and growth. In addition to invasion by woody species, non-native species threaten wet prairie habitats. These species can form tall, dense patches that shade out the native prairie species, including Willamette daisy, and outcompete the native species for water and nutrients (Wilson *et al.* 2003, as cited in USFWS 2010). Open space between bunch grasses allows the Willamette daisy to establish seedlings and spread vegetatively (USFWS 2006), and non-native species can eliminate these open spaces.

Fragmentation of Willamette daisy habitat has led to small, isolated habitat patches. Small populations lead to inbreeding depression and increase susceptibility to local population extirpation from events such as unusually wet or dry years. The reduction in suitable habitat within the API for reasons described above contributes to further fragmentation and threats to the species.

## 6.5 Willamette Daisy Critical Habitat

### *Biological Requirements of the Species*

The primary constituent elements of Willamette daisy DCH are early seral upland prairie, wet prairie, or oak savanna habitat with a mosaic of low-growing grasses, forbs, and spaces to establish seedlings or new vegetative growth; an absence of dense canopy vegetation; and undisturbed subsoils (USFWS 2006).

### *Habitat Conditions & What Has Led to Them*

Within the API, the quality of mapped Willamette daisy DCH ranges from unsuitable to support Willamette daisy to moderate-quality wet prairie. Most of the DCH within the API has some presence of woody species. In particular, 1.2 acres on the northwest side of the Green Hill Road intersection is densely vegetated with shrubs and small trees and will likely no longer exhibit the key habitat features required for Willamette daisy success in the future as the canopy becomes denser (see **Figure 5-1K**). Most of the remaining 6.1 acres have trees and shrubs that may reduce the quality of the habitat for Willamette daisy, but still function as wet prairie.

The threats to Willamette daisy critical habitat and its ability to support Willamette daisy populations within the API include close proximity to OR 126 and associated maintenance activities, succession to woody vegetation, invasion by non-native species, and commercial development that directly impacts the habitat and further contributes to habitat fragmentation.

Units WD–6, WD–7, WD–8, and WD– 9 collectively represent the largest, most-connected, functional network of suitable prairie habitat for Willamette daisy. Because these units support the only large metapopulation of Willamette daisy across its current range, the habitat supporting these populations provides the highest probability for long-term persistence of the species. Any reduction of available habitat will create more edge effect, increase habitat fragmentation, reduce outcrossing pollination potential, and further reduce population viability (USFWS 2006).

### *Critical Habitat in Action Area and API*

Portions of two units (WD-6A and WD-7B) totaling 7.3 acres, of suitable Willamette daisy critical habitat occupy the API. Within the API, one patch of Unit WD-6A is located north of OR 126, and west, north, and east of the Fisher Butte Wildlife Area parking lot. One patch of Unit WD-7B is located northwest, northeast, and southeast of the Green Hill Road intersection, and north of the road in an area east of the intersection (see Figures 5-1F, 5-1G, and 5-1K). The 7.3 acres of DCH within the API comprises approximately 1 percent of the total Willamette daisy DCH. Portions of five other units (WD-6B, WD-6C, WD-6D, WD-7B, and WD-8A) are located within the action area.

The USFWS (USFWS 2006) describes in detail some of the many procedural and resource difficulties associated with designating critical habitat for listed species. Given the documented challenges associated with establishing DCH, it is highly unlikely that additional Willamette daisy DCH will be established by USFWS, and therefore the extent of DCH for Willamette daisy will not increase.

The Willamette daisy DCH within the API is located in different management areas that have affected its protection and quality. Approximately 0.37 acre is located in the ODOT roadside maintenance area where frequent disturbance occurs. Approximately 0.74 acre is located in ODOT SMA and outside of the operational roadway where impacts to known plant populations are avoided. The DCH in SMA is mostly high-quality wet prairie habitat, with an abundance of native forbs and limited encroachment by woody species.

When compared with sites lacking critical habitat designation, Willamette daisy DCH is less vulnerable to loss resulting from federally funded projects because of its protected status under the ESA. However, DCH is not necessarily protected from factors such as succession or weedy invasion, or development, agriculture, and other activities that lack a federal nexus. The wettest areas of DCH are afforded some protection under federal, state, and local regulations that protect wetlands; and according to the economic analysis conducted at the time of the designation, development pressure in the Willamette Valley is mostly on currently farmed land rather than on the wet prairies that currently support Willamette daisy.

Despite protection under ESA and Section 404 of the Clean Water Act, areas of Willamette daisy DCH in the action area and the API are potentially vulnerable to decreasing in size and quality due to impacts from urban and agricultural development.

# 7.0 Project-Related Effects of the Action

"Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. [50 CFR §402.17]."

These effects are considered along with the environmental baseline and the predicted cumulative effects to determine the overall effects to the species for purposes of preparing a biological opinion on the proposed action. [50 CFR §402.02]

Direct effects are the direct or immediate effects of the project on the species or its habitat. Indirect effects are those that are caused by or will result from the proposed action and are later in time but are still reasonably certain to occur. Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area; future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation.

The following paragraphs provide an effect exposure and response analyses for each species or critical habitat that will be affected by the project.

## 7.1 Summary of the Action

Project-generated clearing and grubbing will remove all vegetation within the API. The project will permanently remove Kincaid's lupine, Willamette daisy, and designated critical habitat for Willamette daisy within the API. Estimated impact quantities are presented in **Table 7-1**.

**Table 7-1. Impact Quantities**

| Impacted Element | Permanent Impact (sq ft) | Permanent Impact (acres) | Temporary Construction-related Impact (sq ft) | Temporary Construction-related Impact (acres) |
|---|---|---|---|---|
| Willamette daisy | 1,095 | 0.03 | N/A | N/A |
| Willamette daisy DCH | 153,331 | 3.52 | 15,693 | 0.36 |
| Kincaid's lupine | 4,674 | 0.11 | N/A | N/A |

## 7.2 Direct Effects

### 7.2.1 Fender's Blue Butterfly

As described in Section 6.0 Environmental Baseline, habitat required for all life history stages (eggs, larvae, adults) of Fender's blue butterfly, including nectaring habitat and a population of Kincaid's lupine, exists within the API. Evidence of herbivory and possible Fender's blue butterfly eggs were observed on the Kincaid's lupine plants located within the API in summer 2021. While these observations do not confirm the presence of Fender's blue butterfly, FHWA/ODOT have assumed occupancy for the purposes of this consultation.

Project-related clearing and grubbing is expected to remove all Kincaid's lupine plants currently present in the API, resulting in the loss of any Fender's blue butterflies that occupy those lupine patches. The loss of these plants would constitute an unquantified direct adverse effect on the Fender's blue butterfly.

As stated in Section 6.0 Environmental Baseline, Fender's blue butterfly populations are in decline due to habitat loss and fragmentation from development, agriculture, and succession.

Implementation of a BMP that establishes no-work zones in Willamette daisy DCH (potential nectaring habitat) within the API will also minimize the impact to Fender's blue butterfly from the loss of Fender's blue butterfly nectaring habitat.

Implementation of a Conservation Measure that reestablishes Kincaid's lupine populations on nearby upland prairie restoration sites will help to minimize but will not eliminate the effect of habitat loss within the API and should contribute towards species conservation and recovery in the long term.

### 7.2.2 Kincaid's Lupine

Six small patches of Kincaid's lupine totaling 157 plants and occupying 4,674 square feet exist approximately 875 feet east of Fisher Road both north and south of OR 126 within the API. Proposed clearing and grubbing are expected to result in the permanent elimination of these lupine patches, constituting a direct adverse effect to at least 157 Kincaid's lupine plants.

As stated in Section 6.0 Environmental Baseline, the total population of Kincaid's lupine is very small and is decreasing due to habitat loss and fragmentation from development, agriculture, and plant community succession.

Implementation of a Conservation Measure that reestablishes Kincaid's lupine populations on nearby upland prairie restoration sites will help to minimize but will not eliminate the effect of habitat loss within the API and should contribute towards species conservation and recovery in the long term.

### 7.2.3 Willamette Daisy

Project-related clearing and grubbing is expected to permanently eliminate 170 individual Willamette daisy plants located west of Fisher Road, both north and south of OR 126 within the API. Elimination of these plants would constitute a direct adverse effect on Willamette daisy.

As stated in Section 6.0 Environmental Baseline, the total population of Willamette daisy is small and decreasing due to habitat loss and fragmentation from development, agriculture, and plant community succession.

Implementation of a BMP that establishes no-work zones in areas known to support Willamette daisy within the API and in areas of Willamette daisy DCH within the API will minimize direct impacts to Willamette daisy.

Implementation of a conservation measure that establishes populations of Willamette daisy in nearby wet prairie restoration sites will help to minimize but will not eliminate the effect of habitat loss within the API and should contribute towards species conservation and recovery in the long term.

### 7.2.4 Willamette Daisy Critical Habitat

Areas of Designated Critical Habitat for Willamette daisy occur within the API. Portions of Willamette daisy DCH Unit WD-6A are located west of Fisher Road and portions of Willamette daisy DCH Unit WD-7B are located immediately east and west of the intersection of Green Hill Road and OR 126 (see Figures 3-1A and 3-1B).

Establishment of temporary construction staging and access areas will impact 0.25 acre of WD-6A and 0.11 acre of WD-7B, resulting in 0.36 total acre of temporary direct adverse effects to Willamette daisy DCH. The temporarily-disturbed designated critical habitat for the Willamette daisy will be re-seeded with native seed mix which should allow the critical habitat to recover.

Project-related clearing and grubbing is expected to permanently eliminate 2.81 acres of WD-6A and 0.80 acre of WD-7B, totaling 3.61 acres of permanent impact and constituting a permanent direct adverse effect on Willamette daisy DCH.

## 7.3 Indirect Effects

### 7.3.1 Fender's Blue Butterfly

Project-related clearing and grubbing are expected to have the following indirect effects on Fender's blue butterfly:

- Loss of the Kincaid's lupine and its assumed population of Fender's blue butterfly from the API would eliminate potential expansion, refuge, or recolonization options for the population of Fender's blue butterfly located 0.6 miles to the west.
- Loss of Fender's blue butterfly nectaring habitat via highway expansion and potential increased burden of non-native plant species colonizing adjacent habitats within the API could potentially weaken individual Fender's blue butterflies and potentially reduce the overall population of Fender's blue butterfly.

As described in Section 6.0. Environmental Baseline, habitat loss and fragmentation caused by development and agriculture have contributed and continue to contribute to the loss of Fender's blue butterflies.

Implementation of a BMP that establishes no-work zones in Willamette daisy DCH (potential nectaring habitat) within the API will minimize but not eliminate the impact from the loss of Fender's blue butterfly nectaring habitat.

Implementation of a Conservation Measure that reestablishes Kincaid's lupine populations on nearby upland prairie restoration sites will potentially reduce the effect of eliminating the Kincaid's lupine plants from within the API.

Even if these minimization measures are implemented successfully, the project is likely to have an indirect adverse effect on individual Fender's blue butterflies. The adverse effect from the project combined with the existing threats described in Section 6.0 will negatively affect the Fender's blue butterfly.

### 7.3.2 Willamette Daisy

Permanent loss of DCH for Willamette daisy would contribute to habitat fragmentation. Loss of habitat and fragmentation of remaining habitat could indirectly affect Willamette daisy populations by reducing expansion, refuge, and recolonization options for those populations.

## 7.4 Cumulative Effects

There are currently no future state or private actions that are reasonably certain to occur within the action area or the API. Actions that are reasonably certain to occur are actions that have been discussed and planned at the local jurisdiction level, or projects that have applied for permits.

# 8.0 Effect Determinations

This section presents the effect determinations for each species and their designated critical habitat. Effect determinations were determined by considering the direct effects and delayed consequences of the proposed Project on each species and their designated critical habitat (**Section 7**).

A summary of the proposed effect determinations to species and critical habitats is presented in **Table 8-1**.

**Table 8-1. Effect Determination for Species and Critical Habitats**

| Species/Habitat | Effect Determination |
|---|---|
| *Insects* | |
| **Fender's Blue Butterfly** *Icaricia icarioides fenderi* | *May Affect, Likely to Adversely Affect* |
| *Flowering Plants* | |
| **Kincaid's Lupine** *Lupinus sulphureus ssp. kincaidii* | *May Affect, Likely to Adversely Affect* |
| **Willamette Daisy** *Erigeron decumbens* | *May Affect, Likely to Adversely Affect* |
| *Critical Habitats* | |
| **Willamette Daisy** *Erigeron decumbens* | *May Affect, Likely to Adversely Affect* |

## 8.1 Insects

### 8.1.1 Fender's Blue Butterfly

The proposed action **may affect** Fender’s blue butterfly because:

- Fender’s blue butterflies are assumed to occupy the action area and the API.

The proposed project is **likely to adversely affect** Fender’s blue butterfly because:

- The project will eliminate 156 Kincaid’s lupine plants occupying 0.11 acre of habitat for Fender’s blue butterfly.
- The project will eliminate any Fender’s blue butterfly eggs present on the eliminated Kincaid’s lupine plants.

## 8.2 Flowering Plants

### 8.2.1 Kincaid's Lupine

The proposed project **may affect** Kincaid’s lupine because:

- Populations of Kincaid’s lupine have been documented within the action area and the API.

The proposed project is **likely to adversely affect** Kincaid's lupine because:

- The proposed project will eliminate 156 Kincaid's lupine plants occupying 0.11 acre of upland prairie habitat.

### 8.2.2 Willamette Daisy

The proposed project **may affect** Willamette daisy because:

- The presence of Willamette daisy has been documented within the API.

The proposed project is **likely to adversely affect** Willamette daisy because

- The project will eliminate 90 individual Willamette daisy plants, occupying 0.03 acre of wet prairie habitat

## 8.3 Designated Critical Habitats

### 8.3.1 Willamette Daisy

The proposed project **may affect** critical habitat for Willamette daisy because:

- 7.3 acres of designated critical habitat for Willamette daisy occur within the action area.

The proposed project is **likely to adversely affect** critical habitat for the Willamette daisy because:

- The proposed project will eliminate 3.52 acres of designated critical habitat for the Willamette daisy.

# 9.0 References


USFWS (U.S. Fish and Wildlife Service). 2000. 65 FR 3875. 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). January 25, 2000.

USFWS (U.S. Fish and Wildlife Service). 2006. 71 FR 63861. Final Rule. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Fender's blue butterfly (Icaricia icarioides fenderi), Lupinus sulphureus ssp. kincaidii (Kincaid's lupine), and Erigeron decumbens var. decumbens (Willamette daisy). October 31, 2006.

USFWS (U.S. Fish and Wildlife Service). 2010. Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington. U.S. Fish and Wildlife Service, Portland, Oregon. Xi + 241 pp.

USFWS (U.S. Fish and Wildlife Service). 2019a. Fender's blue butterfly (Icaricia icarioides fender) 5-Year Review. March 6, 2019.

USFWS (U.S. Fish and Wildlife Service). 2019b. Kincaid's lupine (Lupinus sulphureus ssp. kincaidii) 5-Year Review. July 29, 2019.

USFWS (U.S. Fish and Wildlife Service). 2019c. Willamette daisy (Erigeron decumbens var. decumbens) 5-Year Review. July 29, 2019.

USFWS (U.S. Fish and Wildlife Service). 2020a. 85 FR 81813. Rule. Endangered and Threatened Wildlife and Plants; 12-Month Finding for the Monarch Butterfly. December 17, 2020.

USFWS (U.S. Fish and Wildlife Service). 2020b. U.S. Fish and Wildlife Service Finds Endangered Species Act Listing for Monarch Butterfly Warranted but Precluded. USFWS Press Release. December 15, 2020.

USFWS (U.S. Fish and Wildlife Service). 2021a. 86 FR 32859. Proposed Rule. Endangered and Threatened Wildlife and Plants; Reclassifying the Fender's Blue Butterfly from Endangered to Threatened With a Section 4(d) Rule. June 23, 2021.

USFWS (U.S. Fish and Wildlife Service). 2021b. GIS database.

WSDOT (Washington Department of Transportation). 2020. Biological Assessment Preparation Manual. Updated January 2020. https://wsdot.wa.gov/engineering-standards/design-topics/environment/environmental-disciplines/fish-wildlife/endangered-species-act-and-essential-fish-habitat/biological-assessment-preparation-manual-template

# *Appendix 1. Official Species List*

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish And Wildlife Office
2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398
Phone: (503) 231-6179 Fax: (503) 231-6195
https://www.fws.gov/oregonfwo/articles.cfm?id=149489416

In Reply Refer To:
Consultation Code: 01EOFW00-2022-SLI-0155
Event Code: 01EOFW00-2022-E-00379
Project Name: OR126: Veneta to Eugene

December 14, 2021

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact the Endangered Species Division at the Service's Oregon Fish and Wildlife Office at (503) 231-6179. For information regarding listed marine and anadromous species under the jurisdiction of NOAA Fisheries Service, please see their website (http://www.nwr.noaa.gov/habitat/habitat_conservation_in_the_nw/habitat_conservation_in_the_nw.html).

Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

# Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Oregon Fish And Wildlife Office**
2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398
(503) 231-6179

# Project Summary

Consultation Code: 01EOFW00-2022-SLI-0155
Event Code: Some(01EOFW00-2022-E-00379)
Project Name: OR126: Veneta to Eugene
Project Type: TRANSPORTATION
Project Description: The Oregon Department of Transportation (ODOT) is proposing multiple safety and congestion relief improvements along OR 126 between the cities of Eugene and Veneta. The project will include widening the 2-lane road to a 4-lane road. The improvements include traffic control changes, such as roundabouts, additional and modified left-turn lanes at multiple intersections, as well as a shared-use path adjacent to the roadway. Funding for final design, right of way (ROW) acquisition, and construction has not yet been identified and the start date is unknown.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.07665875,-123.28364048317104,14z


Counties: Lane County, Oregon

# Endangered Species Act Species

There is a total of 10 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## Mammals

| NAME | STATUS |
|---|---|
| Pacific Marten, Coastal Distinct Population Segment *Martes caurina*<br>There is **proposed** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/9081 | Threatened |

## Birds

| NAME | STATUS |
|---|---|
| Marbled Murrelet *Brachyramphus marmoratus*<br>Population: U.S.A. (CA, OR, WA)<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/4467 | Threatened |
| Northern Spotted Owl *Strix occidentalis caurina*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/1123 | Threatened |
| Streaked Horned Lark *Eremophila alpestris strigata*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/7268 | Threatened |

## Insects

| NAME | STATUS |
|---|---|
| Fender's Blue Butterfly *Icaricia icarioides fenderi*<br>There is **final** critical habitat for this species. Your location overlaps the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/6659 | Endangered |
| Monarch Butterfly *Danaus plexippus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9743 | Candidate |
| Taylor's (=whulge) Checkerspot *Euphydryas editha taylori*<br>There is **final** critical habitat for this species. The location of the critical habitat is not available.<br>Species profile: https://ecos.fws.gov/ecp/species/5907 | Endangered |

## Flowering Plants

| NAME | STATUS |
|---|---|
| Kincaid's Lupine *Lupinus sulphureus ssp. kincaidii*<br>There is **final** critical habitat for this species. Your location overlaps the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/3747 | Threatened |
| Nelson's Checker-mallow *Sidalcea nelsoniana*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/7340 | Threatened |
| Willamette Daisy *Erigeron decumbens*<br>There is **final** critical habitat for this species. Your location overlaps the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/6270 | Endangered |

## Critical habitats

There are 3 critical habitats wholly or partially within your project area under this office's jurisdiction.

| NAME | STATUS |
|---|---|
| Fender's Blue Butterfly *Icaricia icarioides fenderi*<br>https://ecos.fws.gov/ecp/species/6659#crithab | Final |
| Kincaid's Lupine *Lupinus sulphureus ssp. kincaidii*<br>https://ecos.fws.gov/ecp/species/3747#crithab | Final |
| Willamette Daisy *Erigeron decumbens*<br>https://ecos.fws.gov/ecp/species/6270#crithab | Final |

# *Appendix 2. Biology of Listed Species*

## Status of Species

### Fender's Blue Butterfly

Fender's blue butterfly (*Icaricia icarioides fenderi*) was listed as endangered on January 25, 2000 in the Federal Register (65 FR 3875). The species was proposed for reclassification as threatened on June 23, 2021 (86 FR 32859). At the time of its listing in 2000, there were approximately 3,391 individuals on 23 sites in 4 counties (USFWS 2020, as cited in USFWS 2021a), which was calculated to equal 12 metapopulations distributed across approximately 408 acres of occupied prairie. In 2016, the estimated number of individuals reached a presumed all-time high of nearly 29,000 individuals (USFWS 2020, as cited in USFWS 2021a). Currently, there are 15 metapopulations and 6 independent groups in 6 counties, consisting of 137 known sites containing more than 13,700 individuals throughout an area of approximately 825 acres of occupied prairie habitat (USFWS 2021a). Since the listing, there has been a significant increase in the number of sites that are being actively managed to restore native prairie habitat and increase the abundance lupine host plants in the butterfly's range (USFWS 2019a). Butterfly abundance has also likely increased significantly, although the USFWS notes that survey information collected since 2012 cannot be compared to data collected in previous years (USFWS 2019a).

### Kincaid's Lupine

Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) was listed as threatened on January 25, 2000 in the Federal Register (65 FR 3875). At the time of its listing, Kincaid's lupine occupied 54 sites across 370 acres of remnant prairie habitat (USFWS 2000); 48 of these sites were located in the Willamette Valley. In 2010, there were 164 total sites with approximately 608 acres of occupied habitat (USFWS 2010). The 2019 5-Year Review noted that although there are indications that new populations have been discovered or established and some populations have increased in abundance since 2010, other populations have declined (USFWS 2019a). In the review, the USFWS concluded that the species remains appropriately classified as threatened.

### Willamette Daisy

Willamette daisy (*Erigeron decumbens*) was listed as endangered on January 25, 2000 in the Federal Register (65 FR 3875). At the time of its listing, Willamette daisy occupied 28 sites across 286 acres of remnant prairie habitat (USFWS 2000) in the Willamette Valley. In 2010, there were 39 sites with approximately 233 acres of occupied habitat (USFWS 2010). The 2019 5-Year Review noted that although there are indications that new populations have been discovered or established and some populations have increased in abundance since 2010, other smaller sites have been extirpated and some populations have declined (USFWS 2019b). In the review, the USFWS concluded that the species remains appropriately classified as endangered.

## Status of Critical Habitat

### Fender's Blue Butterfly

Critical habitat for Fender's blue butterfly was designated in 2006 (71 FR 63862). Critical habitat units have been designated in Benton, Lane, Polk, and Yamhill Counties, Oregon. No Fender's blue butterfly designated critical habitat is located within the API.

### Kincaid's Lupine

Critical habitat for Kincaid's lupine was designated in in 2006 (71 FR 63862). Critical habitat units have been designated in Benton, Lane, Polk, and Yamhill Counties, Oregon. No designated critical habitat for Kincaid's lupine is located within the API.

### Willamette Daisy

Critical habitat for Kincaid's lupine was designated in in 2006 (71 FR 63862). Critical habitat units have been designated in Benton, Lane, Linn, Marion, and Polk Counties, Oregon. Designated critical habitat for the Willamette daisy is located in the API (Units WD-6A and WD-7B). Unit WD-6 includes approximately 85.4 acres of critical habitat with approximately 89 percent occurring on Federal land (BLM and USACE) and 11 percent on private land (USFWS 2006). Unit WD-6A supports one of the largest remaining populations of Willamette daisy (USFWS 2006). Unit WD-7B includes approximately 143.4 acres of critical habitat with approximately 78 percent occurring on Federal land and 11 percent on private land (USFWS 2006). Willamette daisy is patchily distributed across the subunit with enough supporting habitat to allow for population growth (USFWS 2006). The Willamette daisy populations in units WD-7B is less than 0.6 miles from the nearest neighboring population, providing for pollinator connectivity between habitat patches and increasing the potential for reproductive success (USFWS 2006).

## Life History Information

### Fender's Blue Butterfly

Fender's blue butterfly is found only in the Willamette Valley, on the west side of the valley with few exceptions, within 21 miles of the Willamette River. Individuals are small with a wingspan of approximately 1 inch. Males have iridescent blue upper wings with black borders and basal areas. Females have reddish-brown upper wings. Most populations are found in upland prairie sites characterized by *Festuca* species, although they have been found in wet *Deschampsia*-type prairie habitat (USFWS 2000).

Observation of the early life stages of the species has been limited but the life cycle of the species is likely similar to other subspecies of *Icaricia icariodides*. Adult females lay their eggs on perennial *Lupinus* species during May and June (Ballmer and Pratt 1988, as cited in USFWS 2000) and may lay approximately 350 eggs over her 10- to 15-day lifespan; fewer than two are likely to survive to adulthood (Schultz 1998, Schultz *et. al* 2003, as cited in USFWS 2010). Kincaid's lupine is the preferred larval host plant of most known Fender's blue butterfly populations (USFWS 2010). Larvae feed on the lupine and reach their second instar in the early summer, entering an extended diapause. Diapausing larvae remain in leaf litter near the host plant through the fall and winter and become active in March or April of the following year, or may extend diapause for more than one season depending on the individual and environmental conditions (R.H.T. Mattoni 1997, as cited in USFWS 2000). Following diapause, the larvae feed and grow through three to four more instars before entering their pupal phase and emerging as adult butterflies between mid-April and the end of June (USFWS 2021a).

The species has limited dispersal ability; adults may remain within 1.2 miles of their natal lupine patch (Schultz 1998, as cited in USFWS 2010). Anecdotal evidence suggests adults have dispersed

as far as 3.1 to 3.7 miles (Hammond and Wilson 1992, Schultz 1998, as cited in USFWS 2010), although this dispersal distance is now unlikely because of habitat fragmentation. In large habitat patches, 95 percent of adult Fender's blue butterflies are found within 33 feet of lupine patches (Schultz 1998, as cited in USFWS 2010).

Adult butterflies feed on nectar from wildflowers such as narrowleaf onion (*Allium amplectens*), Tolmie star-tulip (*Calochortus tolmiei*), Oregon geranium (*Geranium oreganum*), common woolly sunflower (*Eriophyllum lanatum*), and rose checkermallow (*Sidalcea multiflora* ssp. *virgata*) (Wilson *et al.* 1997, York 2002, Schultz *et al.* 2003, as cited in USFWS 2010). Fender's blue butterfly population density is positively correlated with the density of native nectar sources (Schultz 1998, as cited in USFWS 2000). At least 12 acres of high-quality habitat are necessary to support a population of Fender's blue butterflies (Crone and Schultz 2003, Schultz and Hammond 2003, as cited in USFWS 2010); in degraded, low-quality prairie habitat, a larger area is likely required to support a viable butterfly population.

### Kincaid's Lupine

Kincaid's lupine is found in dry upland prairies from Lewis County, Washington, in the north, south to the foothills of the Umpqua Valley in Douglas County, Oregon. However, most of the known and historical populations are found in the Willamette Valley on upland prairie remnants where the species occurs in small populations at widely scattered sites. A number of populations are found in road rights-of-way, between the road shoulder and adjacent fence lines, where they have survived because of a lack of agricultural disturbance. Common native species typically associated with the Kincaid's lupine include Roemer's fescue (*Festuca idahoensis* ssp. *roemeri*), California oatgrass (*Danthonia californica*), Tolmie star-tulip (*Calochortus tolmiei*), common woolly sunflower (*Eriophyllum lanatum*), and Virginia strawberry (*Fragaria virginiana*) (USFWS 2010). The species seems to prefer heavier, generally well-drained soils (Wilson *et al.* 2003, as cited in USFWS 2010). In the Willamette Valley, the species does not tolerate shading by woody plants (USFWS 2010).

Kincaid's lupine is low-growing, 16 to 32 inches tall, with single to multiple unbranched flowering stems and basal leaves that remain after flowering (Kuykendall and Kaye 1993a, as cited in USFWS 2000). Flowers have a distinctly ruffled banner and are often yellowish-cream colored with shades of blue on the keel. Kincaid's lupine blooms in the spring, usually in April and early May. Kincaid's lupine reproduces by seed and vegetative spread. It is able to spread extensively through underground growth. Insect pollination appears to be critical for successful seed production (Wilson *et al.* 2003, as cited in USFWS 2010). The plant is primarily pollinated by small native bumblebees (*Bombus mixtus* and *B. californicus*), solitary bees (*Osmia lignaria, Anthophora furcata, Habropoda* sp., *Andrena* spp., *Dialictus* sp.), and occasionally European honey bees (*Apis mellifera*) (Wilson *et al.* 2003, as cited in USFWS 2010).

### Willamette Daisy

The Willamette daisy is endemic to the Willamette Valley of western Oregon. It grows in wet prairie habitat on relatively impermeable soils (USFWS 2006) where woody cover is low or absent and where herbaceous vegetation is low in stature. Wet prairie habitat supporting the species is typically defined by the other plant species in the community. These include but are not limited to: sweet vernalgrass (*Anthoxanthum odoratum*), white- top aster (*Aster curtus*), Hall's aster (*Aster*

*hallii*), crown brodiaea (*Brodiaea coronaria*), common camas (*Camassia quamash*), California oatgrass (*Danthonia californica*), tufted hairgrass (*Deschampsia caespitosa*), tall fescue (*Festuca arundinacea*), gumweed (*Grindelia integrifolia*), velvet grass (*Holcus lanatus*), Sierra horkelia (*Horkelia congesta*), bog saxifrage (*Saxifraga integrifolia*), Bradshaw's lomatium (*Lomatium bradshawii*), wood rush (*Luzula campestris*), witchgrass (*Panicum capillare*), slender cinquefoil (*Potentilla gracilis*), common selfheal (*Prunella vulgaris*), and narrowleaf blue-eyed grass (*Sisyrinchium angustifolium*) (Clark *et al.* 1993, Clark *et al.* 1995a, 1995b, Jackson 1996, Clark 2000, as cited in USFWS 2006). The Willamette daisy has also been observed growing in upland prairies (Clark *et al.* 1993, Clark *et al.* 1995a, Jackson 1996, Clark 2000, as cited in USFWS 2006).

The Willamette daisy is a perennial herb, 0.6 to 2.4 inches tall, with erect to sometimes prostrate stems at the base. The basal leaves often wither prior to flowering and are mostly linear, 2 to 5 inches long and 0.1 to 0.2 inches wide. Flowering stems produce two to five daisy-like heads with pinkish to pale blue ray flowers and yellow disk flowers. The species produces large quantities of wind-dispersed seed. Flowering typically occurs in June and early July. Pollinators may include solitary bees (*Ceratina* sp., *Megachile* sp., *Nomada* sp., *Halictus ligatus*, and *Ashmeadiella* sp.), beetles (*Meligethes nigrescens* and *Acanthoscelides pauperculus*), flies (*Toxomerus marginata*, *T. occidentalis* and *Tachina* sp.), and butterflies (*Phyciodes campestris*) (Kagan Yamamoto 1987 ,Clark *et al.* 1993, Jackson 1996, Gisler 2004, as cited in USFWS 2010). Seeds are released in July and August. Although the seeds are wind-dispersed, the short stature of this species likely prevents the long-distance travel of many oof the seeds (USFWS 2000). The species is capable of vegetative spreading and is commonly found in large clumps scattered throughout a site (Clark *et al.* 1993, as cited in USFWS 2000).

Seedlings emerge in late winter or early spring, and plants require two to four years to reach flowering size . Population size may fluctuate substantially from year to year (USFWS 2010). Population size can significantly affect reproductive success. Populations with fewer than 20 individuals appear to suffer a high rate of reproductive failure due to inbreeding depression and reduced probability of being pollinated by a compatible mate (Wise and Kaye 2006, as cited in USFWS 2010).

# *Appendix 3. Candidate Species Information*

## Monarch Butterfly

### Status of Species

In December 2020, the USFWS announced a 12-month finding on a petition to list the monarch butterfly as a threatened species. They found that listing the butterfly as endangered or threatened is warranted but precluded by higher priority actions (USFWS 2020a). With this decision, the monarch butterfly became a candidate for listing under the Endangered Species Act, and its status will be reviewed each year until it is no longer a candidate (USFWS 2020b). It was assigned a listing priority number of eight, indicating that the magnitude of threats is moderate to low and those threats are imminent (USFWS 2020a).

Monarch butterflies are found in about 90 countries, islands, or island groups around the world. Two long-distance migratory monarch populations occur in North America and are thought to be the ancestral origin of the worldwide population; the largest is east of the continental divide and overwinters in the mountains of central Mexico (USFWS 2020a). Monarchs west of the continental divide overwinter primarily along coastal California. Other populations (including the southern Florida population) do not migrate long distances (USFWS 2020a).

Over the past 20 years, annual censuses have shown a general decline in the populations of North American monarchs overwintering in Mexico and California (USFWS 2020a). It is estimated that the eastern population fell from about 384 million in 1996 to a low of 14 million in 2013; the population in 2019 was about 60 million (USFWS 2020b). The western population declined from about 1.2 million in 1997 to fewer than 30,000 in 2019 (USFWS 2020b).

### Life History Information

The monarch (*Danaus plexippus*) is a large butterfly with orange and black wings. The upper surfaces of the forewing and hindwing have black or dark brown veins outlining an orange background, with two rows of white and whitish-yellow spots at the margins. Monarchs lay their eggs exclusively on milkweed, the sole source of food for monarch caterpillars (USFWS 2020a). Adult monarch butterflies feed on nectar from flowers. The migratory North American populations migrate up to thousands of miles to and from overwintering and breeding areas each year (USFWS 2020b).

# *Appendix 4. Conservation Measures Implementation Guidance from Benton County HCP*

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# 6. Conservation Measures

## 6.1 Biological Goal

For Habitat Conservation Plans (HCPs), biological goals are the broad, guiding principles of the required Conservation Measures set forth in the HCP. Conservation Measures are the actions proposed to avoid, minimize, and mitigate for impacts to the Covered Species resulting from Covered Activities. While the biological goal in this Habitat Conservation Plan (HCP or Plan) can contribute to range-wide recovery goals for the Covered Species, HCP goals and recovery goals are not required to be equivalent. Benton County will plan and design the habitat protection, restoration and enhancement required as mitigation in the HCP to contribute, to the maximum extent practicable, to the recovery of the Covered Species.

The biological goal of this Plan is to maintain viable populations of the Covered Species in Benton County.

## 6.2 Biological Objectives, Conservation Measures and Tasks

To achieve the biological goal, the following objectives shall be accomplished through the Conservation Measures of the HCP:

1) Conserve Covered Species populations and habitat.
2) Enhance Covered Species populations and habitat.
3) Increase the distribution and connectivity of Covered Species populations.

The Conservation Measures required of the County or any holder of a certificate of inclusion shall be commensurate with the type of impacts likely to occur to the Covered Species. Each conservation measure has one or more distinct tasks to be accomplished.

The USFWS and ODA may issue the County an incidental take permit provided the impacts to the Covered Species and the Conservation Measures to be performed to mitigate for those impacts do not appreciably reduce the likelihood of survival and recovery of the Covered Species. The USFWS and/or ODA will also consider the extent to which the HCP is likely to enhance the habitat for Fender's blue butterfly and the other Covered Species or increase these Covered Species' long term survivability or that of their ecosystem.

## 6.2.0 Objective 1: Conserve Covered Species populations and habitat.

| Conservation Measures | Tasks |
|---|---|
| 1.1 Acquire from willing sellers and manage properties (as Benton County Fender's Blue Butterfly Conservation Areas) with existing populations of Fender's blue butterfly and prairie habitat. | 1.1.1 Identify public or private properties for acquisition (fee simple or conservation easement).<br>1.1.2 Pursue funding for property acquisition.<br>1.1.3 Acquire (fee simple or conservation easement) approximately 20-25 ha (50-60 acres) of Fender's blue butterfly habitat.<br>1.1.4 Develop management plans for properties.<br>1.1.5 Implement management plans, including habitat restoration and enhancement activities. |
| 1.2 Establish roadside Special Management Areas (SMAs) for roadside populations of Covered Plants. | 1.2.1 Identify new Covered Species locations.<br>1.2.2 Classify roadside populations in SMA areas as Type 1 or Type 2, to prioritize roadside populations for management.<br>1.2.3 Sign SMA areas.<br>1.2.4 Conduct outreach to landowners adjacent to SMA zones, with the goal of avoiding accidental impacts to the Covered Species.<br>1.2.5 Conduct outreach to public road districts with roadside Covered Species.<br>1.2.6 Conduct outreach to utility companies with potential to impact roadside Covered Species. |
| 1.3 Implement best management practices for roadside populations. | 1.3.1 Follow guidelines in Appendix M: Roadside and Streambank Management Guidelines for Covered Plants during any ground disturbing activity.<br>1.3.2 In Type 2 roadside populations with anticipated impacts, avoid impacts to the maximum degree possible, salvage seeds and plant materials as possible prior to unavoidable impacts and replant at a PCA with appropriate habitat, and complete any mitigation according to the requirements outlined in Section 6.3. |

| Conservation Measures | Tasks |
|---|---|
| 1.4 Designate Prairie Conservation Areas (PCAs), lands within the County managed for prairie habitat and conservation the Covered Species. Some areas of some PCAs may be designated for use as mitigation sites. | 1.4.1 Designate prairie areas within the following properties as PCAs<br>• Benton County: Beazell Memorial Forest, Fitton Green Natural Area, Jackson Frazier Wetland, Fort Hoskins Historic Park<br>• City of Corvallis: Bald Hill Park, Herbert Farm and Natural Area, Lancaster Property, Corvallis Watershed<br>• ODOT Henkle Quarry & Wren Mitigation Site<br>• Greenbelt Land Trust Lone Star Ranch, Lupine Meadows, Owens Farm<br>• Any newly acquired and appropriate lands within the Plan Area. See Appendix D: Maps of Prairie Conservation Areas. |
| 1.5 Implement best management practices for Covered Species populations in Prairie Conservation Areas and other Covered Lands owned by Benton County or the Cooperators. | 1.5.1 Follow Prairie Vegetation Management Guidelines (Appendix J) during any habitat restoration, enhancement or management activities.<br>1.5.2 Avoid impacts to Covered Species to the maximum extent possible during any monitoring work.<br>1.5.3 Follow protocols for seed and plant materials collection that are set forth in the Prairie Vegetation Management Guidelines (Appendix l).<br>1.5.4 Follow protocols for population augmentations and introductions (Appendix L: Plant Material Collection and Plant Introduction Protocols).<br>1.5.5 At PCAs with public use, install signs to encourage the public to avoid impacting Covered Species and prairie habitat.<br>1.5.6 Avoid all impacts to Covered Species from construction of trails or interpretive structures.<br>1.5.7 Avoid all impacts to Covered Species from construction of recreation related facilities including but not limited to restrooms, picnic areas, and parking lots.<br>1.5.8 Establish and maintain a surveyed areas database for the Covered Species.<br>1.5.9 Avoid impacts to Covered Species to the maximum extent practicable |

| Conservation Measures | Tasks |
|---|---|
| | during any of the Covered Activities (Table 4.1) within the Plan Area (Figure 3.1). |
| 1.6 Implement Taylor's checkerspot management plan. | 1.6.1 See Appendix N: Taylor's Checkerspot Management Plan. |
| 1.7 Conduct outreach to the public. | 1.7.1 Distribute informational brochures regarding prairie species, habitats and conservation programs.<br>1.7.2 Hold workshops about prairie habitat management.<br>1.7.3 Participate in local community organization activities involving prairie habitat or species.<br>1.7.4 Encourage landowners with prairie habitat to engage in existing conservation programs, including those providing technical assistance, assistance for habitat improvements, funding for conservation easements, or conservation tax deferral programs such as the Wildlife Habitat Conservation and Management Program (WHCMP) (see Appendix E: Prairie Conservation Strategy for more information).<br>1.7.5 Encourage landowners with prairie habitat to enter into Safe Harbor Agreements (SHA) with the USFWS if they have Covered Species on their property, or are interested introducing these species as part of a habitat restoration, enhancement and management project (see Appendix E: Prairie Conservation Strategy for more information).<br>1.7.6 Encourage landowners with Taylor's checkerspot butterfly to enter into Candidate Conservation Agreements with Assurances (or Safe Harbor Agreements if the butterfly is listed) with the USFWS to conserve the butterfly (see Appendix E: Prairie Conservation Strategy for more information). |

| Conservation Measures | Tasks |
|---|---|
| | 1.7.7 Recruit and train volunteers to assist with monitoring and restoration work. |
| 1.8 Work with County permit and agricultural building authorization applicants (see Chapter 4 for list of covered permits) in the Fender's Blue Zone to avoid impacts to Fender's blue butterfly habitat from private development. | 1.8.1 Offer home or farm building permit applicants in the Fender's Blue Zone information about the butterfly and its habitat, and encourage them to have their property surveyed for butterfly habitat (Appendix K: Project Site Survey and Reporting Protocols for Plants and Butterfly Habitat).<br>1.8.2 On sites with known use by Fender's blue butterfly, work with landowners to site their construction activities to avoid or minimize impacts to the butterfly and its habitat. |
| 1.9 When Special Event Permits are issued by Benton County in areas where Covered Species occur, County will mandate avoidance of impacts to Covered Species. | 1.9.1 Modify language of Special Event Permits to include species protection language. |
| 1.10 Permits issued for utility work, other work, and road approach permits in County Rights-of-Way will mandate avoidance of all impacts to Covered Species on Type 1 roadsides, and mandate avoidance and minimization of impacts where possible in Type 2 roadsides. | 1.10.1 Utilize permit issuance process and permit language to reflect the difference between Type 1 and Type 2 roadside populations and include species protection language.<br>1.10.2 In the event that an applicant is not able to avoid impacts to Type 1 roadside populations, they shall be referred to USFWS and/or ODA to obtain incidental take authorization. County permit issuance will be contingent upon receipt of such authorization and any required mitigation by the USFWS/ODA. |

### 6.2.1 Objective 2: Enhance Covered Species populations and habitat.

| Conservation Measures | Tasks |
|---|---|
| 2.1 Implement best management practices during any habitat restoration, enhancement and management at the Prairie Conservation Areas (PCAs). | 2.1.1 Follow guidelines in Appendix J: Prairie Habitat Vegetation Management Guidelines at PCAs. |
| 2.2 Augment populations of covered plant species using appropriate genetic sources, to mitigate for impacts (See Section 6.3 Mitigation Requirements and Table 6.1). | 2.2.1 Augment Bradshaw's lomatium at the Lancaster Property and Jackson-Frazier Wetland (combined) by a minimum of 20 plants to offset estimated impacts to 2 plants at these sites from emergency activities.<br>2.2.2 Augment peacock larkspur populations at the Corvallis Watershed PCA by a minimum of 21 plants to offset impacts to 7 plants on Henkle Way from possible County road improvements.<br>2.2.3 Augment peacock larkspur populations at the Corvallis Watershed PCA by a minimum of 91 plants to offset impacts to 30 plants for estimated emergency activities on City, County, and ODOT lands.<br>2.2.4 Augment Nelson's checkermallow populations at Lancaster Property by a minimum of 45 plants to offset impacts to 5 plants on the agricultural portion of Owens Farm and 10 plants from water and wastewater management projects.<br>2.2.5 Augment Nelson's checkermallow populations at Jackson-Frazier Wetland by a minimum of 507 plants to offset impacts to 169 plants in Benton County rights-of-way.<br>2.2.6 Augment Nelson's checkermallow populations at Jackson-Frazier Wetland by a minimum of 33 plants to offset impacts to 11 plants from estimated emergency response activities. |

| Conservation Measures | Tasks |
|---|---|
| | 2.2.7 Introduce Kincaid's lupine populations (outside the Fender's Blue Zone) of a minimum of 23 $m^2$ (248 $ft^2$) total at Fitton Green, Lone Star Ranch or Beazell Memorial Forest to offset impacts to 4.3 $m^2$ (46 $ft^2$) of Kincaid's lupine in Benton County right-of-way from transportation projects, road maintenance, utility work and road approaches, and impacts to 3.4 $m_2$ (36.6 $ft^2$) from estimated emergency response activities.<br>2.2.8 Augment Willamette daisy populations at Bald Hill by at least 20 plants to offset impacts to 1 plant from estimated emergency response activities. |
| 2.3 Enhance habitat for populations of Fender's blue butterfly and associated Kincaid's lupine at Fender's Blue Butterfly Conservation Areas (See Section 6.3 Mitigation Requirements and Table 6.1). | 2.3.1 Follow Prairie Vegetation Management Guidelines (Appendix J) to avoid any permanent impacts to Fender's blue habitat other than short term impacts resulting from habitat restoration, enhancement and management activities for mitigation.<br>2.3.2 Through enhancement at the Benton County Fender's blue butterfly Conservation Areas, increase native nectar species cover by a minimum of 2,031 $m^2$ (21,862 $ft^2$) and Kincaid's lupine cover by a minimum of 35 $m_2$ (377 $ft^2$) to offset impacts in Benton County right-of-way within the Fender's Blue Zone.<br>2.3.3 Through enhancement at Benton County Fender's Blue Butterfly Conservation Area PCAs, increase native nectar species cover by a minimum of 222 $m^2$ (2,390 $ft^2$) and Kincaid's lupine cover by a minimum of 12.3 $m^2$ (129 $ft^2$) to offset impacts from Public Services Facility construction in the Fender's Blue Zone.<br>2.3.4 Through enhancement at Benton County Fender's Blue Butterfly Conservation Areas, increase native nectar species cover by a minimum of 5,466.5 $m^2$ (58,843 $ft^2$) and Kincaid's lupine cover by a minimum of 352.6 $m^2$ (3,789 $ft^2$) to offset impacts to Fender's blue butterfly habitat from home, farm and forest construction and utility construction and |

| Conservation Measures | Tasks |
|---|---|
| | maintenance on private lands in the Fender's Blue Zone.<br>2.3.5 Through enhancement at the ODOT Wren Mitigation Site and Henkle Quarry, increase native nectar species cover by a minimum of 2,103 $m_2$ (22,637 $ft^2$) to offset impacts to Fender's blue butterfly habitat from maintenance of ODOT rights-of-way in the nectar zone of the Fender's Blue Zone.<br>2.3.6 Through enhancement at one or more of the PCAs with Fender's blue butterfly, increase Kincaid's lupine cover by a minimum of 3.3 $m^2$ (36 $ft^2$) and increase native nectar species cover by a minimum of 265 $m^2$ (2,852 $ft^2$) to offset impacts from estimated emergency response activities on all Cooperator lands in the Fender's Blue Zone. |
| 2.4 Enhance habitat for populations of Taylor's checkerspot butterfly (see Table 6.1). | 2.4.1 Through habitat restoration, enhancement and management at Beazell Memorial Forest, increase habitat available to Taylor's checkerspot by 172 $m^2$ (1,854 $ft^2$) to offset impacts to 57 $m^2$ (618 $ft^2$) from estimated emergency response activities. Work may include augmentation of native nectar species, limited augmentation of plantain where it is limiting, control of aggressive introduced species, and habitat management to maintain the low vegetation structure preferred by Taylor's checkerspot. |
| 2.5 Manage and maintain Type 1 roadside populations of peacock larkspur, Kincaid's lupine and Nelson's checkermallow (Table 5.7). | 2.5.1 Manage and maintain the 722 Nelson's checkermallow plants in Type 1 roadside populations (SMAs) to offset estimated impacts to 27 plants that may result from transportation maintenance activities, utility work and road approach permits in unsurveyed County rights-of-way outside established SMAs.<br>2.5.2 Manage and maintain the 627 peacock larkspur plants in Type 1 roadside populations to offset estimated impacts to 19 plants that may result from transportation maintenance activities, utility work and road approach |

| Conservation Measures | Tasks |
|---|---|
| | permits in unsurveyed County rights-of-way outside established SMAs.<br>2.5.3 Manage and maintain the 9.5 $m^2$ (110 $ft^2$) of Kincaid's lupine and associated nectar species that are located in Type 1 roadside populations to offset estimated impacts to 1.4 $m^2$ (15 $ft^2$) of Kincaid's lupine and 61 $m_2$ (657 $ft^2$) of nectar species that may result from transportation maintenance activities, utility work and road approach permits in unsurveyed County rights-of-way outside established SMAs. |
| 2.6 Conduct restoration activities including burning, seeding with native plant species and planting plugs of native plant species at Prairie Conservation Areas. | 2.6.1 Follow guidelines in Appendix J: Prairie Habitat Vegetation Management Guidelines to avoid any permanent impacts to Covered Species other than short term impacts resulting from habitat restoration and enhancement. |

### 6.2.2 Objective 3: Increase the distribution and connectivity of Covered Species populations.

| Conservation Measure | Tasks |
|---|---|
| 3.1 Develop, update and maintain a Prairie Conservation Strategy (Appendix E) to facilitate effective conservation actions that contribute to the recovery of the Covered Species and other imperiled prairie species in Benton County. | 3.1.1 Identify prairie and oak habitats and habitat attributes important to Benton County's at-risk species.<br>3.1.2 Encourage voluntary cooperative partnerships among public and private landowners and the general community to enhance conservation.<br>3.1.3 Facilitate access to diverse sources of funding to maximize the likelihood of stable support.<br>3.1.4 Identify and engage public lands partners in this strategy, including Oregon State University, Oregon Department of Fish and Wildlife, City of Corvallis, Oregon Department of Agriculture, U.S. Fish and Wildlife |

| Conservation Measure | Tasks |
|---|---|
| | Service, The Nature Conservancy and Greenbelt Land Trust.<br>3.1.5 Use the Recovery Plan for Prairie Species of Western Oregon and Southwest Washington (USFWS 2010) and the Oregon Conservation Strategy (ODFW 2006) to identify conservation targets for listed, candidate, and at risk species. |

Table 6.1 Summary of mitigation to be completed by Benton County and Cooperators. Amounts reported are the minimum required, and assume pre-mitigation will be completed. If mitigation is concurrent, a higher mitigation ratio will be applied, and a larger amount of mitigation will be required (see Table 6.2). No mitigation required for impacts to nonnative nectar species for Fender's blue butterfly (See Section 6.3 for more information).

| | Bradshaw's lomatium (#) | Willamette daisy (#) | peacock larkspur (#) | Nelson's checkermallow (#) | Kincaid's lupine ($m^2$) (outside Fender's Blue Zone) | Kincaid's lupine ($m^2$) inside the Fender's blue zone | Native nectar for Fender's blue butterfly ($m^2$) | Non-Native Nectar for Fender's blue butterfly ($m^2$) | Taylor's checkerspot butterfly habitat ($m_2$) |
|---|---|---|---|---|---|---|---|---|---|
| ***Mitigation for Private Lands Impacts Under HCP:*** | | | | | | | | | |
| **Home, Farm and Forest Construction** | - | - | - | - | - | 346 | 5364 | n/a | - |
| **Telephone Utility Construction and Maintenance** | - | - | - | - | - | 6.4 | 101.1 | n/a | - |
| **Natural Gas Utility Construction and Maintenance** | - | - | - | - | - | 0.2 | 1.4 | n/a | - |
| **Private lands subtotal** | 352.6 | | | | | | 5466.5 | | |
| ***Mitigation for Benton County and Cooperator Impacts:*** | | | | | | | | | |
| **Public Service Facility Construction** | - | - | - | - | - | 12.3 | 222 | n/a | - |
| **~~Transportation Activities and Authorized Work in Rights-of-Way~~** | | | | | | | | | |
| Construction, maintenance, utility work and road approach | - | - | 21 | 507 | 12.9 | 35 | 4134 | n/a | - |
| Maintenance, utility and road approach outside known populations | - | - | 57 | 80 | 0.4 | 1.3 | 61 | n/a | - |
| **Water and Wastewater Management** | - | - | - | 30 | - | - | - | - | - |
| **Agriculture** | - | - | - | 15 | - | - | - | - | - |
| **Emergency Response Activities** | 7 | 2 | 91 | 33 | 10.1 | 3.3 | 265 | n/a | 172 |
| **County & Cooperator lands subtotal** | 7 | 2 | 169 | 665 | 23 | 51 | 4682 | n/a | 172 |
| **Mitigation Total** | **20*** | **20*** | **169** | **665** | **23.4** | **756.7** | **15615** | **n/a** | **172** |

* A minimum of 20 plants will be established for any covered plant mitigation project.

## 6.3 Mitigation Requirements

Mitigation will occur when impacts are unavoidable and will be completed at sites with appropriate habitat at the closest appropriate location in Benton County (e.g., for Fender's blue butterfly, within the Fender's Blue Zone). Mitigation may be achieved by butterfly habitat enhancement or species augmentations for covered plants. Mitigation will take place at sites already supporting the impacted specie, or currently unoccupied sites containing suitable habitat. Mitigation will not take place at sites where there is not suitable habitat for the species. Habitat enhancement or species augmentations must establish the amount of plants/butterfly habitat required for mitigation regardless of the pre-existing population or habitat amounts at the site. For definitions of "individuals" for each species see Section 7.2.1.2.

The estimated quantity of mitigation required for impacts requested in this Plan is identified in Table 6.1 (exact amounts will vary with actual project impacts, mitigation site, and timing of mitigation).

Mitigation requirements have been fulfilled when the following conditions are met:

- The required amount of plants or habitat persists six years after initiation of the mitigation;
- The trend in population size or habitat abundance is stable over the last three years of the six years (no significant population declines during that period); and
- For plants, at least 40% of the individuals initially planted or seeded are reproductive and produce seeds. This requirement does not apply to portions of the population that recruit (self-seed) naturally after planting.

If permanent impacts are to take place at a site (e.g., plants will be eliminated from the area as a result of construction activities), covered plants may be relocated from the impact site and transplanted to a mitigation site. At a minimum, any seeds produced in the population to be permanently impacted will be collected for use at the mitigation site or elsewhere. Successfully transplanted individuals that survive may count towards mitigation requirements. Section 8.5.1 describes the eligibility of funding sources and mitigation projects completed prior to HCP completion.

Mitigation shall not be required for impacts to non-native nectar species for Fender's blue butterfly, as these species, many of which are considered weeds, are common across the landscape. Fender's blue have demonstrated a preference for utilizing native nectar species over non-native ones (Schultz and Dlugosch 1999, Wilson et al. 1997). All of the nectar zones of the Fender's Blue Zone contain private properties with native nectar species present and confirmed by survey (Figure 6.1). A mix of native and nonnative nectar species are found along roadside rights-of way. Non-native nectar species tend to be self-mitigating (ground disturbance from projects tends to increase their cover, often at the expense of native species). Mitigation involving augmentation of

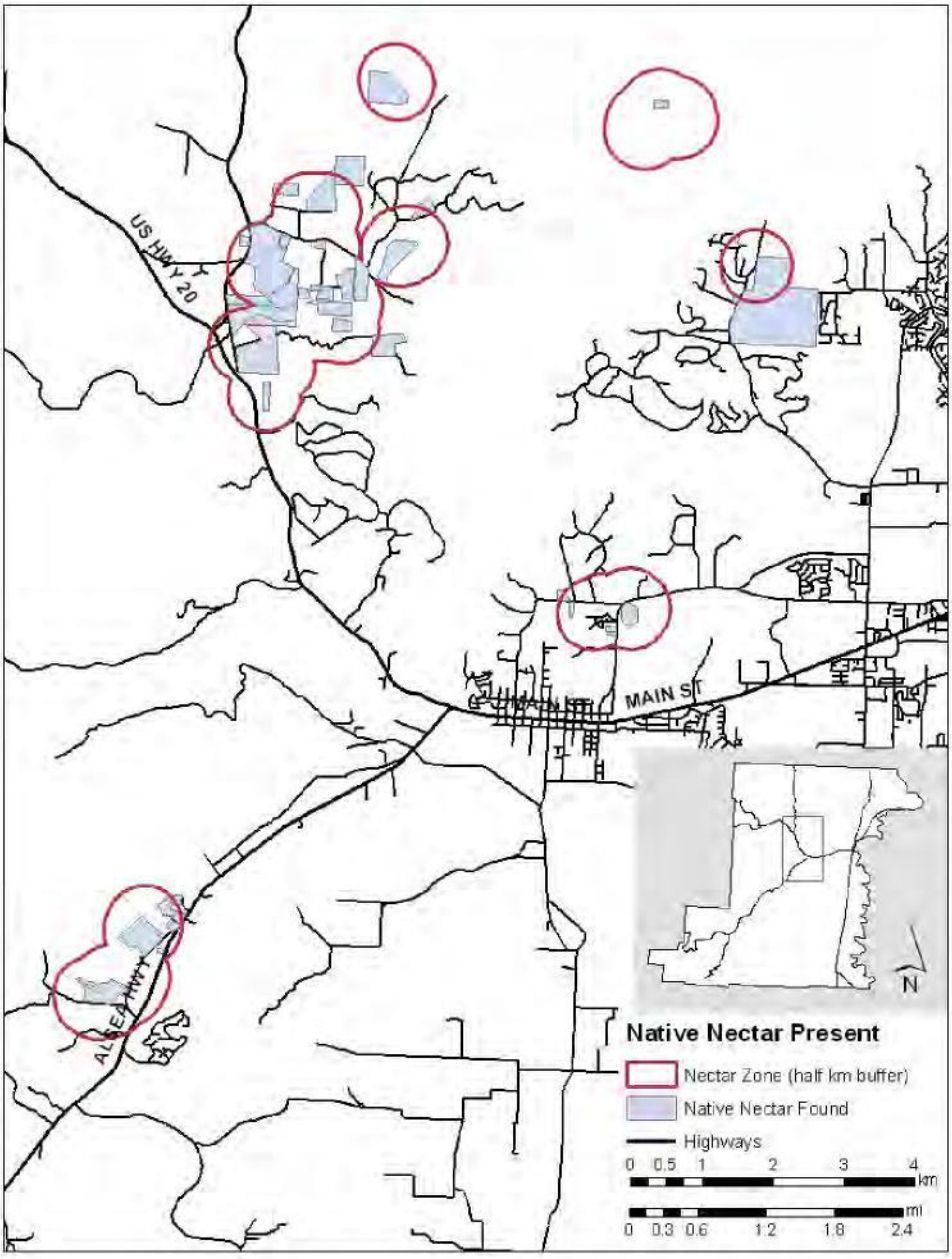


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Figure 6.1 Properties surveyed between 2006 and 2009 within the Fender's blue butterfly nectar zone that contained native nectar species for Fender's blue butterfly.

non-native nectar species at mitigation sites, would be counterproductive to long term goals of enhancing native habitat components. At sites with conservation easements, augmentation of non-native species may be prohibited in easement terms.

## 6.3.0 Factors Determining Mitigation Ratios

The quantity of mitigation to be completed is set forth in mitigation ratios. Mitigation ratios (Table 6.2) reflect the amount of plants (for covered plants) or habitat (for

butterflies) to be added to a site relative to the amount of plants or habitat impacted (Table 6.1). The type and quantity of mitigation required for specific impacts is determined by a combination of the:

- quality of the impacted site;
- quality of the mitigation site;
- timing of mitigation (before impacts or concurrent with impacts); and
- mitigation site status (site under permanent conservation easement/deed restriction or on non-federal public lands absent an easement or deed restriction).

For the purposes of determining population size, even if a naturally occurring population spans multiple ownerships, such as Bradshaw's lomatium at Jackson-Frazier Wetland and the Lancaster Property, it will be treated as one population. The size of that overall population will be used in site quality assessments at either site, even though only a portion occurs on each.

Table 6.2 Mitigation ratios that define the amount of plants (for covered plants) or habitat (for butterflies) to be added to a site relative to the amount of plants or habitat impacted.

| **Site Quality** | | **Site Protection** | **Mitigation Ratios Based on Timing of Mitigation** | |
|---|---|---|---|---|
| Impacted Site | Mitigation Site | Under permanent conservation easement or deed restriction? | Pre-Mitigation | Concurrent Mitigation |
| High | Exceptional | Yes | 1:1 | 3:1 |
| | Exceptional | No | 3:1 | 5:1 |
| | Adequate | Yes | 4:1 | 5:1 |
| | Adequate | No | 5:1 | 5:1 |
| Low | Exceptional | Yes | 1:1 | 3:1 |
| | Exceptional | No | 3:1 | 5:1 |
| | Adequate | Yes | 3:1 | 5:1 |
| | Adequate | No | 3:1 | 5:1 |

In the event that a new mitigation site becomes available in the future, or if Benton County or a Cooperator makes a property acquisition (from willing sellers, fee simple or conservation easement) and wishes to use the acquisition, perpetual maintenance, and/or enhancement of a site to fulfill a mitigation requirement, the site will be evaluated for baseline conditions and potential for enhancement. Negotiations with the County/Cooperator and USFWS and/or ODA will take place to determine mitigation ratios.

## 6.3.0.0 Impact and Mitigation Site Quality

The quality of an impacted site or a site where mitigation may take place will be determined by a combination of 1) Covered Species population size or area of habitat, for Fender's blue butterfly or Taylor's checkerspot butterfly, 2) associated vegetation and 3) connectivity.

### Impacted site quality

For an impacted site to be classified as high quality it must satisfy one of the site quality criteria (1-3) below. Any impacted site not meeting at least one of these criteria will be classified as low quality.

### Mitigation site quality

All mitigation sites must contain suitable habitat for the species for which mitigation is being completed. For a site to be considered as a mitigation site, and be categorized as having adequate quality, it must:

- have the correct vegetation structure;
- possess suitable soils (see Appendix O: Covered Plant Soils Lists);
- be located within current or historic prairie habitat;
- be located on lands protected by permanent conservation easement or under non-federal public ownership; and
- the site cannot have significant cover (e.g., >30% cover) by List A or B noxious weeds in the prairie area to be planted or enhanced.

For a mitigation site to be classified as exceptional quality it must satisfy at least one of the site quality criteria (1-3) below, in addition to the above general requirements. Any mitigation site that meets the general requirements (above), but not meeting any of the site quality criteria will be classified as adequate. The site quality criteria (below) have been used to classify all currently proposed mitigation sites (Table 6.3). Any newly acquired mitigation sites can also be classified using these criteria.

### Site quality criteria

Criterion 1:

- Population supports >60 $m^2$ (646 $ft^2$) of Kincaid's lupine outside the Fender's Blue Zone, or >200 individuals of the other covered plants, or >100 $m^2$ (1,076 $ft^2$) of Fender's blue habitat (Kincaid's lupine and native nectar species), of which at least 60% must be Kincaid's lupine cover, or 100 $m^2$ (1,076 $ft^2$) of occupied Taylor's checkerspot habitat (host plants and nectar species). The size threshold of 200 individuals was selected for the covered plants because this is the minimum size for a population to contribute to the recovery of the species (USFWS 2008).

Criterion 2:

- Population supports more than 30 $m^2$ (323 $ft^2$) of Kincaid's lupine outside the Fender's Blue Zone, or 100 individuals of the other covered plants, or 50 $m^2$ (538

$ft^2$) of Fender's blue habitat (Kincaid's lupine and native nectar species), of which at least 60% must be Kincaid's lupine cover, or 50 $m^2$ (538 $ft^2$) of occupied Taylor's checkerspot habitat (host plants and nectar species); and
- Site supports > 25% native forb and/or grass cover.

Criterion 3:
- Population supports more than 30 $m^2$ (323 $ft^2$) of Kincaid's lupine outside the Fender's Blue Zone, or 100 individuals of the other covered plants, or 50 $m^2$ (538 $ft^2$) of Fender's blue habitat (Kincaid's lupine and native nectar species), of which at least 60% must be Kincaid's lupine cover, or 50 $m^2$ (538 $ft^2$) of occupied Taylor's checkerspot habitat (host plants and nectar species); and
- Population provides connectivity between two other wild or introduced populations on protected lands that would not otherwise be connected. Covered plant populations must be within 3 km (1.8 mi) of each other, Fender's blue butterfly populations must be within 2 km (1.2 mi) of each other, and Taylor's checkerspot populations must be within 1.5 km (0.9 mi) of each other to be considered connected.

#### 6.3.0.1 Timing of Mitigation

Pre-mitigation is mitigation completed and established for six or more years prior to when impacts take place, thus reducing or eliminating any temporal loss to the species. If mitigation efforts are not successful after six years, the entity responsible for ensuring completion of the mitigation will continue efforts until mitigation requirements are met, using an alternate site, if necessary.

Concurrent mitigation is implemented within one year of when impacts occur and can result in temporal loss of habitat. In most cases, pre-mitigation will require lower mitigation ratios than concurrent mitigation. If concurrent mitigation efforts are not successful after six years, the entity responsible for ensuring completion of the mitigation will continue efforts until mitigation requirements are met, using an alternate site, if necessary. If mitigation continues to be unsuccessful 12 years after initiation, no additional take will be allocated to that entity pending completion of the initial mitigation, and the entity will be referred to the USFWS and/or ODA.

See Section 8.5 Mitigation Policies, for more information.

#### 6.3.0.2 Mitigation Site Protection

Mitigation must occur on publicly owned sites or lands with some degree of protection (e.g., it cannot occur on privately owned sites without a permanent deed restriction or permanent conservation easement). A lower mitigation ratio will be required at mitigation sites under permanent deed restriction or conservation easement. A higher mitigation ratio will be required on non-federal public land not under permanent deed restriction or conservation easement.

### 6.3.1 Mitigation Ratios

Mitigation ratios are set forth in Table 6.2.

If a project will only require mitigation of a few plants or a small area of habitat, there will be a mandatory minimum of 20 covered plants or 6 $m^2$ (65 $ft^2$) of Kincaid's lupine or native nectar species established as mitigation.

If Benton County acquires and protects sufficient Fender's blue butterfly habitat to establish the Benton County Fender's Blue Butterfly Conservation Areas, and restoration, enhancement and management activities (including Kincaid's lupine and native nectar species population augmentations) commence immediately, the County may use a pre-mitigation ratio during the first ten years of the HCP even though mitigation is concurrent.

# 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 $^1/_2$ 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 $^1/_4$ 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 $^1/_4$ 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 Species Adjuvant | Target | 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 $^1/_4$ 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 $^1/_4$ 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 $^1/_4$ 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<br>Wet Prairie: August 1 – October 25<br>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.<br>**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.<br>**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 $^1/_4$ of the occupied habitat. |

# Appendix K: Project Site Survey and Reporting Protocols for Plant and Butterfly Habitat

## 1.1 Introduction

This appendix provides protocols for completing a survey of a proposed project site for Covered Species.

## 1.2 Survey Windows

Surveys to document the presence or absence of Covered Species must occur during the season when the species are identifiable. In some cases this may need to be several months prior to habitat restoration or maintenance actions.

Nelson's checkermallow and Kincaid's lupine can be confused with similar, more common species, so surveys for them can be of two types. "Presence surveys" are conducted when the species can be positively identified (while the plants are in flower). "Absence surveys" are conducted during seasons when leaves of the species are reliably present so that if leaves are not encountered, neither the Covered Species nor its look-alike are present. Absence surveys can be conducted over a wider window of time than presence surveys. The two types of surveys can be used in series. If an absence survey finds the species may be present, a follow-up presence survey will be required for a positive identification. If the absence survey shows that the species is absent, no further survey is required.

### 1.2.0 Nelson's checkermallow (*Sidalcea nelsoniana*)

- Absence surveys can be conducted prior to and during the blooming period (April through July) to rule out the presence of any checkermallow species by looking for plants in a vegetative state.
- Presence surveys for *Sidalcea nelsoniana* must be conducted during the blooming period, mid June through mid July, to distinguish this species from other *Sidalcea* species, including field and rose checkermallow.

### 1.2.1 Peacock larkspur (*Delphinium pavonaceum*)

- Surveys should be conducted during the blooming period from May 1 through June 15.

### 1.2.2 Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*)

- Absence surveys may be conducted from March 1 through July 31.
- Presence surveys must occur from May 1 through June 30.

### 1.2.3 Bradshaw's lomatium (*Lomatium bradshawii*)

- Surveys should be conducted during the blooming period from April 1 through May 31.

### 1.2.4 Willamette daisy (*Erigeron decumbens*)

- Surveys should be conducted during the blooming period from June 1 through July 15.

### 1.2.5 Fender's blue butterfly (*Icaricia icarioides fenderi*) habitat

- Surveys for butterfly host plants (Kincaid's lupine) should be completed as described in Section 1.2.2. Surveys for nectar species can generally be completed during the flight period of the butterfly, May 1- June 15.

### 1.2.6 Taylor's checkerspot butterfly (*Euphydryas editha taylori*) habitat

- Surveys for butterfly host plants (English plantain) can be completed during the growing season. Surveys for nectar species can generally be completed during the flight period of the butterfly, which usually occurs between April 1 and May 31.

## 1.3 Qualifications for Botanical Surveys

The biologist or natural resource specialist conducting botanical surveys and providing direction and guidance regarding protection of Covered Species during vegetation management activities must possess the following qualifications:

- Experience conducting floristic field surveys and/or butterfly surveys depending on the species being targeted for survey.
- Familiarity identifying Willamette Valley prairie species and high priority weed species.
- Experience identifying each of the five covered plant species.

## 1.4 Field Survey Protocol

To ensure no rare species are missed during surveys, all species in the project area (area to be impacted by the proposed project) will be identified to species, subspecies,

or variety, as applicable. Some sites may require more than one visit during the growing season to ensure an accurate inventory of Covered Species at the site (i.e., if the site contains habitat for both Bradshaw's lomatium and Nelson's checkermallow the surveyor may need to visit the site in April to look for Bradshaw's lomatium and in June or July to look for Nelson's checkermallow).

All habitats within the project area will be surveyed thoroughly in order to properly inventory and document the plant species present. Population boundaries of any Covered Species populations will be mapped using GPS and sketch maps on aerial photos, to identify the location as accurately as possible. The number of individuals in each population will be counted or estimated, as appropriate (i.e., individual peacock larkspur plants will be counted while lupine abundance would be recorded as area of foliar coverage in $m^2$).

## 1.4.0 Required Reporting and Documentation

Written survey reports will include the following sections, some of which will be completed by the biologist/natural resource specialist, and some of which may be completed by the permit applicant or Cooperator.

## 1.4.1 Project location and description

- A detailed map of the location and footprint of the proposed project.
- A detailed description of the proposed project, including one-time or ongoing activities that may affect botanical resources.
- A description of the general biological setting of the project area.
- Dates of surveys and rationale for timing and intervals; names of personnel conducting the surveys; and total hours spent in the field for each surveyor on each date.

## 1.4.2 Results

- A description and map of the vegetation communities on the project site.
- A description of the phenology of each of the plant communities at the time of each survey date.
- A list of all plants observed on the project area using accepted scientific nomenclature, along with any special status designation. The reference(s) used for scientific nomenclature shall be cited.
- Written description and detailed GIS map(s) showing the location of each Covered Species, butterfly nectar-plant species (if within the Fender's Blue Butterfly nectar zone), or locally significant plant found, the size of each population, and method used to estimate or census the population.
- Copies of survey forms (if applicable) and accompanying maps.

## 1.4.3 Discussion

- Any factors affecting the results of the surveys
- An assessment of potential impacts of the proposed project to the Covered Species. This shall include a map showing the distribution of Covered Species and locally significant plants and communities on the site in relation to the proposed activities. Impacts to the Covered Species shall be discussed.
- Recommended measures to avoid and/or minimize impacts.
- References cited and persons contacted.
- Qualifications of surveyor(s) - a Curriculum Vitae or similar.

# Appendix L: Plant Material Collection and Plant Introduction Protocols

## 1.1 Introduction

To mitigate for impacts to Covered Species of plants resulting from one or more Covered Activities (including habitat restoration and enhancement activities), Benton County and Cooperators will, in addition to habitat enhancement, increase covered plant abundance through population introduction, augmentation, and relocation.

- Introduction is the establishment of a new population in suitable habitat.
- Augmentation is addition of more individuals to an existing wild population.
- Relocation involves movement of individuals from an existing wild population to a new site or different existing population.

Augmentation of existing populations by adding individuals will be given highest priority, where possible and appropriate, because it increases the viability of existing populations and targets plantings to areas where the habitat is known to be appropriate. Introductions into areas currently unoccupied by the Covered Species will be used to recreate a lost population at a suitable site. Relocations of existing populations will occur in circumstances where the covered plant species will be permanently impacted, and may be used as a method of population introduction or augmentation.

The following protocols[4] outline how plant introduction, relocation and augmentation (hereinafter "Plant Introductions") activities will occur at Prairie Conservation Areas (PCAs). The entity conducting work (collection, transportation, storage, cultivation, etc.), must comply with existing state and federal regulations, and possess any required permits.

## 1.2 General Protocols

Plant introductions will be accomplished by collecting seeds from covered plant species and then planting them directly or cultivating plugs from the seeds, or both, depending upon the species.

[4] Protocols based in part on USFWS Programmatic Formal Consultation on Western Oregon Prairie Restoration Activities, August 14, 2008.

To ensure plant introductions serve to ultimately benefit and not harm the species, such mitigation activities will follow these guidelines. In addition, this work will be performed under the supervision of a qualified specialist. If during the course of the Permit, other treatment options other than those listed in this HCP become available or are identified through the adaptive management process, Benton County will present these options to the USFWS and ODA, and the parties will decide whether the options should be incorporated into these protocols.

## 1.2.0 Target Site Selection

Inappropriate site selection is the most common cause of rare plant introduction failure. To improve the success of plant introductions, target sites shall include habitat appropriate for the Covered Species. Factors to consider include geographic distance from the site of origin, soil type, aspect, elevation, hydrology, and plant community. All target sites shall be in areas within the species' current range and habitat type. The risk of hybridization with closely related species shall be reduced by prioritizing sites with no closely related species (species in the same genus) present. Seeds and other plant materials used in introductions should originate from genetically diverse sources (largest sample sizes possible) and should be from populations as near to the target site as possible, with priority to sites within the same Recovery Zone as defined in the Recovery Plan (USFWS 2010). All sites will be surveyed for presence of listed and/or covered plant and butterfly species using the HCP site survey protocols prior to initiation of plant introduction projects.

## 1.2.1 Plant Material Collection

Seeds and rhizomes of existing covered plant species populations may be collected and used for habitat restoration and enhancement projects. A qualified specialist will determine the number of propagules (seeds and rhizomes) needed for plant introduction objectives based on the number of individuals needed for mitigation or other restoration objectives.

The collection limits for each covered plant species in any single year shall be as follows From USFWS 2008i):

| Species | Populations under 50 individuals | Populations between 50-500 individuals | Populations of >500 individuals | Any population to be permanently impacted by a Covered Activity |
|---|---|---|---|---|
| Bradshaw's lomatium | 50% of seeds | 15% of seeds | 25% seeds | 100% of seeds and plants |
| Kincaid's lupine | 50 % of seeds | 15% of seeds | 25% of seeds | 100% of seeds and plants |
| Nelson's checkermallow | 50% of seeds, 2% of rhizome biomass | 15% seeds, 2% of rhizome biomass | 25% of seeds, 2% of rhizome biomass | 100% of seeds, plants and rhizome biomass |
| Peacock larkspur | 50% of seeds | 15% of seeds | 25% of seeds | 100% of seeds and plants |
| Willamette daisy | 50% of seeds, 2% of rhizome biomass | 15% of seeds, 2% of rhizome biomass | 25% of seeds, 2% of rhizome biomass | 100% of seeds, plants and rhizome biomass |

**Seeds**

Persons collecting seeds may gather loose seeds or seed pods, capsules, or heads. Seeds pods, capsules, or heads may be removed by hand or by using cutting devices. Mesh bags may be tied over stems with developing fruits to capture seeds, a technique especially useful for species whose seeds disperse when seed pods snap open, such as Kincaid's lupine. Collectors should avoid damage to the plants by minimizing trampling, removing as little tissue as possible from the plants during seed collection (unless the plants are already senescent), and removing seeds in a manner that does not result in plants being pulled from the ground. Loose seed from the plant or the ground may be gathered by hand or with hand-held harvesting devices, such as flails or hoppers, a method most appropriate when collecting seeds from large populations. In general and as possible, collections should be made from twenty or more individuals and avoid obtaining a large proportion of seeds from any single individual to minimize genetic drift from uneven sampling.

#### 1.2.1.0 Rhizomes

Rhizomes from mature plants shall be exposed by careful hand digging to avoid harm to the plants or exposing plant roots. Any exposed rhizomes shall be reburied. Rhizomes shall be taken from throughout the population to maximize genetic diversity.

#### 1.2.1.1 Relocated Plants

Where the entire plant will be relocated, care shall be taken to avoid damage to any parts of the plants, including the roots.

## 1.2.2 Transport

Seeds shall be cleaned by hand, sieve, or blower as appropriate to the species prior to transfer to storage containers. Rhizomes shall be stored in cool moist conditions until transferred to potting medium or to the new site. Transport will be completed as quickly as possible. During transport, propagules shall be protected from temperature and moisture extremes.

Containers will be labeled with name of plant, place of collection, and date of collection. Propagules from individual plants may be placed in separate containers, if appropriate.

## 1.2.3 Storage

Propagules will be cleaned and properly stored prior to cultivation or outplanting. Diseased propagules will be removed and discarded. Seeds shall be thoroughly dried before long-term storage.

Seeds shall be stored in airtight and moisture proof containers to maintain their viability. A drying agent, such as silica gel, dry wood ash, diatomaceous earth, dry charcoal, lime, or paper may be used to help absorb moisture in the container. Seed

material may only be stored for up to two years before cultivating or outplanting, unless placed in a cold-storage facility.

Rhizomes shall be stored under cool, moist conditions with a suitable medium to keep them alive and viable until cultivation.

Plants to be relocated shall be stored under cool, moist conditions with sufficient soil and water to keep them alive and viable until transplantation.

## 1.2.4 Cultivation

Propagules will be grown in a greenhouse or nursery facility where genetic contamination of any produced seeds through cross pollination will be prevented, unless intentional to increase genetic diversity. Mixing of source populations through captive breeding may be conducted when the source population(s) are small or genetic evidence suggests inbreeding depression, genetic drift or other issues may cause progeny to have low fitness. Suitable growing medium, soils, fertilizer, or other chemical additives will be used, as necessary, to prevent algal, fungal, or insect infestations.

Seed and rhizome material and their F1 progeny may be cultivated for plant enhancement activities. Under greenhouse conditions, propagules and their progeny from F1 and F2 generations may be used for introduction and augmentation into prairie habitat. Only F1 generation will be used for subsequent propagation. F2 generation propagules and plant plugs may be outplanted, but further greenhouse or agricultural generation is discouraged unless necessary to produce sufficient propagules for successful establishment of individuals.

## 1.2.5 Outplanting

Field personnel shall take measures to avoid trampling any Covered Species. Dead and living vegetation, except for listed or Covered Species present, may be cleared away from the immediate planting site to expose the soil. Existing rhizomes of Covered Species will not be disturbed. Any site preparation activities will minimize negative environmental impacts and follow the habitat management guidelines in Appendix J: Prairie Habitat Vegetation Management Guidelines.

Seeds may be sown by either hand-broadcasting or no-till drill. Drilling may be used if soil is dry enough to support vehicle weight without substantial soil compaction and no covered or other listed species are present. Harrowing may be used if no other method is feasible and harrow equipment is operated at least 2 m (6 ft) from existing listed or covered plant species.

Rhizomes or plugs, and if possible, relocated plants, will be planted when soils are saturated by rain – generally November through April (see below for specific timeframes

for the various covered plant species) or when irrigation can be ensured and plants will not be exposed to intense heat. Also, the growing cycles of introduced covered plants should match those growing in the field. Soil will be excavated to the depth and width of the plug or rhizome. Plugs will be inserted directly into the soil or amended soils containing mulch or fertilizer so the rim of the plug is level with the surrounding soil. To reduce desiccation, a small amount of native soil may be added over the plug.

Equipment used during plantings should be cleaned prior to use and disturbance at the target site shall be minimized to avoid spreading non-native plant species.

### 1.2.6 Timing of Planting or Seeding

Plant introduction projects shall be planned so collection and planting occur at the appropriate time of year. For example, rhizome collection should be targeted for the period when plants are dormant, or when donor-plants will not be killed by the collection procedure. Outplanting of seeds and/or cultivated plugs shall occur within the correct time frame (described for each species below). Relocations shall take place either soon after plants begin growing for the year or after the peak growing season, preferably during cool and moist conditions.

### 1.2.7 Monitoring

Plant introduction projects will be monitored to determine plant establishment and difference in planting methods (to inform adaptive management). Propagules will be planted in a manner that facilitates subsequent monitoring. To assist with post-planting monitoring, mapped grids, metal tags, or flags will be used to indicate planted areas.

## 1.3 Species Specific Protocols for Cultivation and Introduction Using Seeds or Cultivated Plant Materials

Research into factors that affect introduction of these species was conducted by Kaye and Brandt (2004) for Bradshaw's Lomatium, Willamette daisy, and Kincaid's lupine. General review of propagation and reintroduction protocols for Covered Plant Species is available in Gisler (2004). Recommendations provided here are largely derived from these sources.

### 1.3.0 Bradshaw's lomatium

#### 1.3.0.0 Target sites

Plant introduction projects at PCAs will occur in wet prairies. Optimal microhabitats include small depressions or seasonal channels with open, exposed soils (USFWS 1993a) and broad, flat areas of soils with wetland hydrology.

#### 1.3.0.1 Collection

Seeds may be collected for off-site cultivation. Bradshaw's lomatium seeds may be collected by hand off the exposed terminal ends of the flower structure (umbels), and usually are mature in June.

#### 1.3.0.2 Cultivation

Direct seeding and transplanting plugs have both resulted in successful introductions, and both methods may be used in introduction efforts. To break seed dormancy for cultivation in a greenhouse, Bradshaw's lomatium seeds need cold stratification- moist conditions at ~5° C (40°F) for at least eight weeks, followed by warm conditions such as alternating 10°/20°C (50°F/68°F). Once seeds have germinated, they may be potted with a standard soil mix, watered daily, and fertilized bi-weekly.

#### 1.3.0.3 Outplanting

Direct seeding into field sites may be accomplished in the late fall, when seeds can be sown on the ground, either directly on the soil surface, or into areas prepared by raking or light tilling, or other activity that creates bare soil. Seed burial is not necessary for this species. Any soil preparation will avoid impacts to existing Covered Species.

Field planting of cultivated plugs may be conducted in spring or fall when the soil is moist. Fertilizer is not recommended for this species except during fall plantings in areas with little competing vegetation.

### 1.3.1 Kincaid's lupine

#### 1.3.1.0 Target sites

Plantings will prioritize sites with grassland vegetation with a diversity of forb species, and near Fender's blue butterfly populations and associated butterfly nectar plants. Soils for the lupine are typically well drained but the species does not appear to prefer any single or small group of soil series. Instead, Kincaid's lupine tends to occur on a variety of upland soils and grows poorly in wetland soils. Sites with minimal encroachment of trees and shrubs may be preferred.

#### 1.3.1.1 Collection

Seeds will be collected for off-site cultivation or direct seeding at target sites. Seed is best collected by tying mesh bags over developing fruit clusters and harvesting the bags after the seed pods have snapped open. Bagging is best done in early June and seeds are generally mature in July. Precise dates vary from year to year and site to site.

#### 1.3.1.2 Cultivation

Kincaid's lupine can be successfully cultivated from seed. Seed dormancy may be broken by scarifiying seed (abrading the seed coat) followed by cold stratification at

~5ºC (40ºF) for 4 to 8 weeks. After these procedures, seed will germinate under warm conditions, such as alternating temperatures of 10°/20°C (50°/68° F), either on germination paper or in pots with a suitable soil mix, watered when the soil surface has dried (~twice weekly), and fertilized monthly with 20-20-20 liquid fertilizer. Survival rates of Kincaid's lupine seedlings grown from several seed sources vary from 58% - 100%. Plant health and subsequent growth after planting may be improved by adding nodulating bacteria (e.g., *Bradyrhizobium lupinii*) to the germinating seed or during potting.

#### 1.3.1.3 Outplanting

Direct seeding may use either scarified or non-scarified seeds in the fall and winter, although seedings in winter may be most successful if seeds are scarified. Non-scarified seeds should be direct-seeded at project sites from October to January; while scarified seeds may be planted October through March. Seeds should be sown without fertilizer onto soil, raked ground, or lightly tilled soils, either on the soil surface or buried to a depth of 0.25-1.0 cm [1/8 to $^1/_2$ in]). Invasive species will be cleared to the extent practicable prior to seeding.

Field planting of cultivated plugs may occur in late fall, late winter, or early spring. Plugs can be planted by hand into pre-excavated soil pits suitable to accommodate the plug along with soil amendments, if necessary (including mix of planting or native soils). Nitrogen fertilizer should not be used, but phosphorus and micronutrient fertilizers may provide the species with advantages over non-leguminous competing vegetation.

### 1.3.2 Nelson's checkermallow

#### 1.3.2.0 Target site

Planting sites should contain at least one of the following: remnant native wet prairies, wetlands, ash swales, riparian areas, or small clearings with hydric soils and edges with fairly open canopy. None of the areas should have persistent flooding into later spring, although saturated soils during the raining season (inundation for several weeks or longer) or flooded soils mid-November through mid-April is acceptable (Gisler 2004, Bartels & Wilson 2003).

#### 1.3.2.1 Collection

Seeds and rhizome cuttings will be collected for off-site cultivation of plugs needed for seed increase, plant increase, and introductions. Seed capsules or loose seeds may be collected. Seeds generally mature in July-August. A maximum of two 8 cm (3 in) long rhizomes segments per plant may be collected, or up to 2% of a single plant.

#### 1.3.2.2 Cultivation

Nelson's checkermallow can be cultivated using both seeds and rhizome cuttings. Some seed may need to be cold stratified for 8-12 weeks at ~5° C (~40° F) to break

dormancy, followed by exposure to warm conditions such as room temperature. Seeds can be germinated in flats; transferred to pots containing appropriate soil such as bark, compost, peat, vermiculite, and Phillips Pre-mix (Gisler 2004); then transferred to larger outdoor beds before introduction to a target site.

Large plants can be divided to generate more individuals for planting, although plantings should ensure that genetic diversity is maximized by, for example, including individuals derived from sexual reproduction. Large, reproductively mature individuals are possible within two-three months of planting using divisions, and within three-five months using seeds, when they are supplied with ample light, warm temperatures, irrigation, and fertilization.

Rhizomes can be cultivated under greenhouse conditions or in field beds. No special soil mixtures, symbionts, or special growing conditions are necessary to achieve growth so long as pest infestations are prevented (Gisler 2004).

To minimize the risk of hybridization, different *Sidalcea* species should not be cultivated closely together.

#### 1.3.2.3 Outplanting

Planting greenhouse-grown container stock has proven most effective to date, but direct seeding may be a useful technique at some sites and if ample seeds are available, such as through a seed increase program. Plugs can be transplanted by hand into pre-excavated soil pits suitable to accommodate the plug and soil amendments (including mix of planting or native soils) after the arrival of the fall rains and before June.

Plantings will not occur at sites south of the natural southern range limit of the species, which is approximately McFarland Road in southern Benton County.

## 1.3.3 Peacock larkspur

#### 1.3.3.0 Target Site

Sites for peacock larkspur introduction shall contain appropriate habitat. Peacock larkspur habitat includes native wet and upland prairie communities (often the slightly higher, drier, more well-drained microsites within and adjacent to wetlands), shady Oregon ash and Oregon white oak woodland edges (forest clearings), native prairie grasslands, and in floodplains on well-drained mounds (Finley and Ingersoll 1994). Previous research has found peacock larkspur to occur at elevations ranging from 46 to 122 m (150 to 400 ft) (Gisler 2004), in shallow, slightly acidic soils (5.38 pH), with low organic matter (11.28%), and mostly sand and silt soil particles (Goodrich 1983). Additional evaluations could broaden these observations. Peacock larkspur tolerates seasonal inundation.

#### 1.3.3.1 Collection

Seeds for cultivation and restoration projects will be collected initially from wild populations. Fruits on the lower portions of fruiting stems tend to produce the greatest numbers of seed per fruit. Seeds generally mature in June.

#### 1.3.3.2 Cultivation

Peacock larkspur can be successfully cultivated in a greenhouse or in outdoor beds, and does not require specialized soil amendments or soil symbionts. The larkspur can be cultivated using seeds. Seeds may need to be cold stratified in a refrigerator at ~5°C [~40°F] for 12-16 weeks to break dormancy, after which they may be placed in pots with standard sterilized potting mixture, and watered and fertilized as needed.

#### 1.3.3.3 Outplanting

Peacock larkspur seeds, plugs or tubers may be planted upon arrival of fall rains. To date there have been no published studies evaluating methods or success of direct seeding, transplanting or introducing this species, although tubers have been successfully transplanted. Once planted, seedlings require up to five years or more to become reproductively mature, although some individuals appear to grow and flower rapidly.

Hybridization with other *Delphinium* species is a concern. To minimize the risk of hybridization, different *Delphinium* species will not be cultivated closely together, and outplanting sites should be checked for the presence of other *Delphinium* species and plantings should occur no closer than 100 m from any resident populations of different species.

### 1.3.4 Willamette daisy

#### 1.3.4.0 Target Site

Willamette daisy is found in both wetland and upland habitats in the Willamette Valley, including bottomland grasslands consisting of flat, open, seasonally flooded prairie especially those with some bare soil and little litter layer between the large bunches of grasses (Kagan & Yamamoto 1987), and upland prairie sites having moderate to well-drained soils and a mix of native bunchgrasses such as *Festuca roemeri* (Roemer's fescue), *Bromus carinatus* (California brome), and *Elymus glaucus* (blue wild rye) (Clark 2000).

#### 1.3.4.1 Collection

Both seeds and rhizome cuttings may be collected for off-site cultivation of plugs for use in plant introduction projects. Seed heads or loose seed may be gathered. Seeds generally mature in mid to late July. Rhizomes of approximately 2.5 cm (1 in) length may be harvested from individual plants, but this should be performed only on larger individuals and no more than two rhizome segments should collected per plant.

### 1.3.4.2 Cultivation

To maximize germination rates, seeds need to be cold stratified at ~5°C (~41ºF) for 10-16 weeks followed by alternating 10°/20°C (50°/68° F) temperatures. Seeds may also be scarified at the pappus end or removed from the achene to break dormancy, but this procedure is very labor intensive. Germination rates of 40-78% can be expected within 2-11 days of placement in warm conditions, although germination rates of seeds collected from smaller populations may be low, possibly due to inbreeding depression. After germination, seeds may be planted in pots containing a standard commercial potting mix.

Cultivation of rhizomes may occur under greenhouse conditions or in outside beds. Rhizomes may be dipped in a rooting hormone to stimulate root development and planted 1-2 cm (0.5 - 1.0 in) deep in soil-filled pots. Plants should be rooted within 811 weeks, and may be transferred to larger pots or beds.

### 1.3.4.3 Outplanting

Outplanting of container plants and direct seeding maybe used as techniques to establish plants at field sites. Previous experiments have shown that direct seeding results in relatively low rates (~1%) of plant establishment, so large numbers of seeds may be needed to support this technique, which may require a seed increase program to produce the necessary quantity of seeds. Seeding should be conducted in the fall to provide seeds with a sufficient cold period to stimulate germination.

Plugs may be planted when soils are moist, generally between October and May. Fertilizer should not be used during outplanting. Plugs should be planted primarily in high quality, native prairies with minimal non-native plant cover. To prevent inbreeding depression, individuals should be planted in large patches to maximize opportunities for outcrossing. A 33% survival rate may be expected using rhizome cuttings, although this will vary from year to year, site to site, and among source populations of Willamette daisy.

# *Appendix 5. Action Area Noise Analysis*

## TERRESTRIAL NOISE

| | D (feet) | D (miles) | $D_O$ (feet) | Construction Noise* | Ambient Sound Level** | α |
|---|---|---|---|---|---|---|
| **Impact pile driving** | | | | | | |
| At West Fork Bridge | 4560.1 | 0.86 | 50 | 106 | 66.8 | 20 |
| At Middle Fork Bridge | 4560.1 | 0.86 | 50 | 106 | 66.8 | 20 |
| At Coyote Creek | 4560.1 | 0.86 | 50 | 106 | 66.8 | 20 |
| Bridge over RR | 1655.7 | 0.31 | 50 | 106 | 68 | 25 |
| **Roadway Construction Equipment** | | | | | | |
| Location 1 (East End) | 4082.9 | 0.77 | 50 | 102 | 54.2 | 25 |
| Location 2 | 6352.9 | 1.20 | 50 | 102 | 49.4 | 25 |
| Location 3 | 1145.4 | 0.22 | 50 | 102 | 68 | 25 |
| Location 4 | 6123.1 | 1.16 | 50 | 102 | 49.8 | 25 |
| Location 5 | 4775.0 | 0.90 | 50 | 102 | 52.5 | 25 |
| Location 6 | 853.0 | 0.16 | 50 | 102 | 71.2 | 25 |
| Location 7 | 1458.7 | 0.28 | 50 | 102 | 72.7 | 20 |
| Location 8 | 2877.2 | 0.54 | 50 | 102 | 66.8 | 20 |
| Location 9 | 1972.3 | 0.37 | 50 | 102 | 62.1 | 25 |
| Location 10 (West End) | 4197.3 | 0.79 | 50 | 102 | 53.9 | 25 |

$D=D_O*10^{((construction\ noise-ambient\ sound)/\alpha)}$

α = 25 for soft ground, 20 for hard ground)

*Construction noise calculated using the rules for combining noise levels and the loudest equipment anticipated to be used at each location.

**Ambient sound level from HMMH's February 2021 Draft Project Noise Technical Report. Used closest receiver location.

## UNDERWATER NOISE

R1=R2*10^((TL)/15))

R1=range or distance at which transmission loss is estimated

R2=range or distance of the known or measured sound level

TL=transmission loss=difference between source sound level and background sound level at some distance

Peak level for 24-inch pile w/impact hammer in Lake WA - 204dB

Peak levels are generally 10 to 20 dB higher than RMS levels. To convert from peak to RMS, subtract 10 dB.

RMS = 204dB--10dB=194dB

Underwater background noise level for daytime only- Lake Keechelus (most similar to project site)=117.0

Bubble curtain attenuation - for SR520 test pile (most similar to project site)=11dB

194-11=183=source sound level

R1=R2*10^((183-117)/15)) 25118.86

R1=10*135935.6 251188.6

R1 = 251188.6 meters 156.08 miles