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Greg Delwiche
Environment, Fish and Wildlife
Bonneville Power Administration
905 NE 11th Avenue
Portland, OR 97232

Dear Mr. Delwiche,

This document transmits the Oregon Fish and Wildlife Office's (OFWO) biological opinion (BO), pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.), on Bonneville Power Administration's (BPA) proposed transmission line rebuild for the Albany-Burnt Woods and Santiam-Toledo transmission lines. The project includes maintenance activities that will improve reliability of service and function of the transmission lines and habitat restoration that will offset the impacts to listed and candidate species. Replacement of poles and other maintenance will adversely affect the endangered Fender's blue butterfly (*Icaricia icarioides fenderi*), threatened Kincaid's lupine (*Lupinus sulphureus* var. *kincaidii*) and their designated critical habitat. Proposed activities will also impact the candidate, Taylor's checkerspot butterfly (*Euphydryas editha taylori*).

After reviewing the current status of the species, the environmental baseline for known populations, the effects of pole replacement and road maintenance activities, offsetting measures to occur inside and outside the right-of-way (ROW), and the cumulative effects, we conclude that these activities will not jeopardize the continued existence of Fender's blue butterfly or Kincaid's lupine, nor will it destroy or adversely modify designated critical habitat for Fender's blue butterfly or Kincaid's lupine. Additional voluntary conservation measures included in the project description are anticipated to assist in precluding the listing of the candidate, Taylor's checkerspot butterfly. This biological opinion is based on information provided in the December 10, 2008, Biological Assessment (BA); the August 4, 2009, Amendment to the Biological Assessment; numerous follow-up conversations and email communications; available recovery plans; and file information and reference material located at the OFWO.

Consultation History

U.S. Fish and Wildlife Service (Service) and BPA staff worked together in March 2008, to determine what species would be impacted by the proposed actions. Site visits and

conversations ensued which resulted in a collaborative BA being submitted to the OFWO on December 10, 2008. On January 24, 2009, BPA staff met with Willamette Valley National Wildlife Refuge Complex staff and members of the Institute for Applied Ecology (IAE) to discuss the project proposal and visit the project site. Throughout February 2009, ongoing conversations about possible amendments to the BA occurred. BPA staff stated in an email dated March 13, 2009, that no amendments to the BA would be forthcoming and that the BO could be completed based upon the BA that was provided in December 2008. Formal consultation was initiated at this time.

Construction began in spring 2009 in areas of the ROW that were not occupied by listed or candidate species. In June 2009, several newly-discovered Kincaid's lupine plants were damaged during pole replacement activities west of Wren, Oregon, along the Santiam-Toledo transmission line between towers 44/6¹ and 45/1 (BPA 2009a). On August 4, 2009, BPA amended the BA to include offsetting measures for the damage to these newly discovered populations (BPA 2009b). These measures include reseeded the impacted areas with native seed and conducting additional weed management in this area and in Kincaid's lupine and Fender's blue butterfly critical habitat.

BIOLOGICAL OPINION

1. Proposed Action

The proposed project is to rebuild BPA's Albany-Burnt Woods and Santiam-Toledo transmission lines. The project includes replacement of the wood poles supporting the electrical conductor and associated hardware, access road improvements, staging areas, and habitat restoration actions. The following is summarized from BPA's Biological Assessment on Kincaid's lupine, Fender's blue butterfly, and Taylor's checkerspot butterfly for the Santiam-Toledo and Albany-Burnt Woods Line Rebuilt Project (2008).

1.1. Action Area

The Albany-Burnt Woods and Santiam-Toledo transmission lines are located in Linn and Benton Counties in the Willamette Valley of Oregon (Figures 1 and 2). The action area includes:

- BPA's ROW for the Albany-Burnt Woods transmission line from the Albany Substation to the Burnt Woods Substation, approximately 26 miles;
- BPA's ROW for the Santiam-Toledo transmission line from towers 28/6 to 49/3, approximately 21 miles;
- all access roads and staging areas used for construction (not located within the ROW);
- and the conservation easement area (see map and legal description in Appendix 1).

¹ "BPA transmission structures each have individual numbers (e.g., 1/1, 1/2, etc.). The first number in the pair represents the line-mile number; the second number indicates whether the structure is the first, second, third, etc. structure in that mile." BPA Environmental Assessment, Albany-Burnt Woods and Santiam-Toledo Pole Replacement Project, March 2009.

Figure 1. Albany - Burnt Woods Transmission Line Rebuild Project

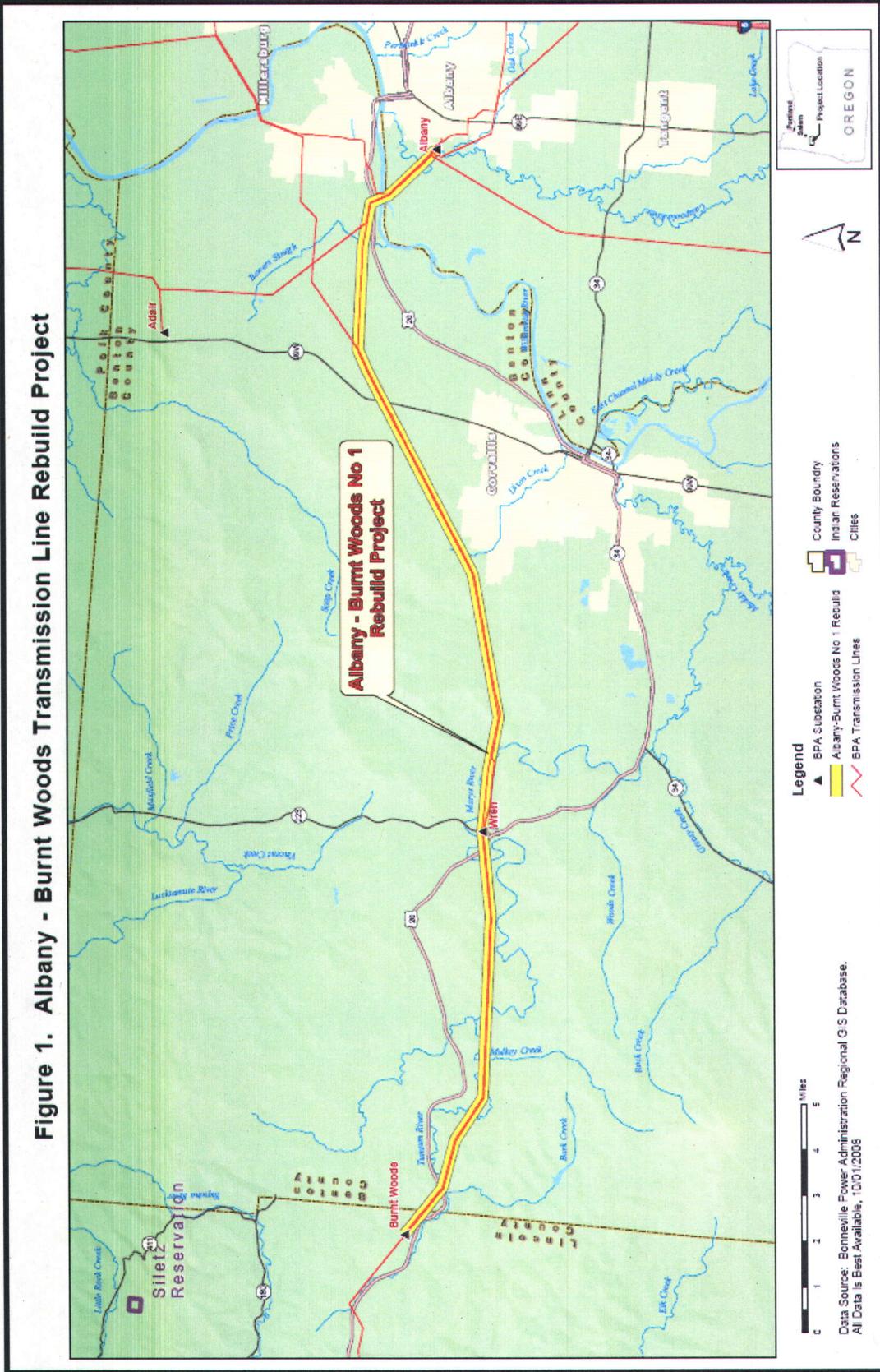


Figure 1.

Figure 2. Santiam - Toledo Transmission Line Rebuild Project

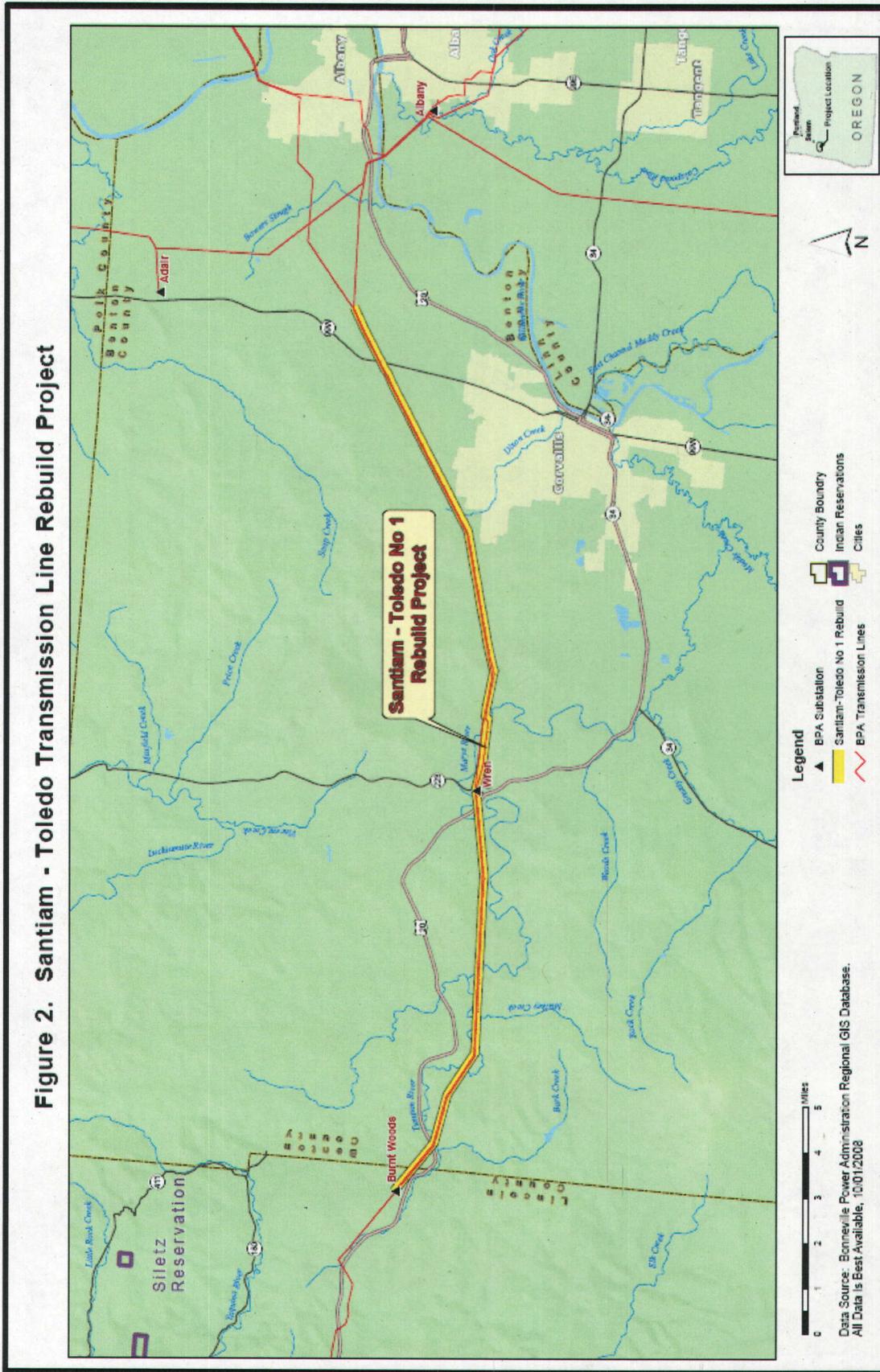


Figure 2.

Fender's blue butterfly and Kincaid's lupine occur in the Albany-Burnt Woods ROW from towers 13/2 to 17/1, and in the Santiam-Toledo ROW from towers 41/3 to 42/1; this area is also within critical habitat for both species. Kincaid's lupine occur in the Santiam-Toledo ROW from towers 44/6 to 45/1; it is unknown if Fender's blue butterfly occurs in this area as the Kincaid's lupine population was recently discovered and the site has not been surveyed for Fender's blue butterfly. Kincaid's lupine also occur on access road ACT-12-AR-2 near Oak Creek Road and Albany-Burnt Woods tower 12/5. Taylor's checkerspot butterfly habitat is found in the ROW from Albany-Burnt Woods transmission towers 13/2 to 15/5 and Santiam-Toledo transmission towers 38/3 to 40/6.

The property where the transmission towers are located is a mix of private and state-owned lands; BPA has easement rights to operate and maintain the transmission lines. The easement width ranges from 125 to 238 feet.

1.2. Replacement of Existing Poles.

The majority of the towers consist of two wooden poles connected by a wooden cross member (H-frame). Dead-end structures, consisting of three wooden poles connected by a wooden cross member, also occur in the two transmission lines. Approximately 704 wood poles will be replaced. The associated hardware including cross arms, insulators, and guy wires will also be replaced, if necessary. Boom crane trucks will be used to support the cross arms as the poles are replaced. The holes will be cleaned out and re-augured approximately 2 feet deeper in order to comply with current depth of set standards. At most structure sites the soil removed by the auger will be spread around the structures. At any site determined to be sensitive the augured soil would be removed from the site and disposed of at an appropriate location. The new poles will then be placed into the holes and material will be backfilled around them.

The construction footprint at most towers will be 100 feet by 100 feet (0.2 acre) around the base of the structure. The footprint may be larger at three-pole structures or where guy wires need to be replaced. In habitat for Fender's blue butterfly, Kincaid's lupine, and Taylor's checkerspot butterfly, the footprint will be reduced to 50 feet by 50 feet (0.06 acre) with a 100 foot by 100 foot (0.2 acre) disturbance area at 3 pole structures or structures with guy wires.

Work will take place along the transmission line in phases with construction occurring on more than one structure at a time in different portions of the project area.

1.3. Access road work

Access to tower sites for construction and maintenance will be via existing access roads. Improvements will be made to existing roads, including blading, shaping, and compacting where necessary. Access gates will be replaced and new culverts will be installed in ditches or intermittent streams. Some sections of road may require crushed rock. Equipment that may be used includes a dozer or road grader, dump trucks, a compactor, a backhoe for ditch cleaning and a water truck if needed. In sensitive areas (for example, wetlands or threatened or endangered species habitats), carsonite stakes may be installed where needed to keep traffic to designated routes.

Approximately 3.5 acres of access road is within Kincaid's lupine and Fender's blue butterfly critical habitat (including access roads on both Santiam-Toledo and Albany-Burnt Woods). No rocking and blading will occur within critical habitat for either species. The access road between Santiam-Toledo transmission towers 41/5 and 41/10 is not well defined, and not improved with rock or other substrate. In this area, several populations of lupine exist in the dirt track that serves as the access road. Overall, the road bed within these areas is sparsely occupied with lupine (compared to areas adjacent to the road) and driving along the existing road bed will be the least impactful. Adjacent populations of Kincaid's lupine will be fenced off during construction. Two sections of access road will be relocated to completely avoid areas where lupines are present within the existing road bed. Impact to lupine populations will be approximately 0.17 acres. Five culverts would be placed within critical habitat.

1.4. Staging Areas

Staging areas are used to stockpile and store the structure pieces, arms, and other equipment during construction. The staging area is located in the community of Wren, outside of the right-of-way and listed species habitats.

1.5. Impact Avoidance and Minimization Measures

The impact avoidance and minimization measures detailed below are specifically for the parts of the action area where sensitive species and habitats occur. Some of these measures will be used in other parts of the action area as well.

- The construction footprint from Albany-Burnt Woods towers 13/2 to 17/1 and Santiam-Toledo towers 38/3 to 42/1 will be minimized to 0.06 acre for two-pole wood structures and 0.2 acre for three-pole wood structures.
- No work will occur outside the 0.06 or 0.2 acre construction footprint, and vehicles and equipment will not travel off access roads between wood pole structures.
- All construction work will occur after September 1 in Taylor's checkerspot, Kincaid's lupine and Fender's blue butterfly habitat.
- Prior to construction, Kincaid's lupine patches found in spring 2009 surveys that are within 10 feet of access roads or 20 feet of the construction footprint at a wood pole will be surrounded with temporary high-visibility fencing to alert crews to avoid these areas. A no-construction buffer will be placed around these areas.
- A monitor will be present for all construction in designated critical habitat to ensure that impact avoidance and minimization measures are followed and disturbance to sensitive species minimized.
- When possible, equipment and vehicles used for construction in designated critical habitat and between Albany-Burnt Woods towers 14/1 to 14/4 and Santiam-Toledo towers 39/1 to 39/5 will have rubber track tires to reduce ground disturbance and reduce soil compaction.
- As much as possible, the access road between Santiam-Toledo towers 41/5 and 41/7 will be rerouted to avoid Kincaid's lupine plants, based on spring 2009 surveys.
- Blading and rocking within sensitive habitats will be minimized and restricted to areas where the road is impassable.
- Ground disturbance during pole replacement and road maintenance will be minimized to prevent expansion of false brome, Scot's broom, knapweed, and other noxious weed

populations. Disturbed areas within Fender's blue butterfly and Kincaid's lupine critical habitat will be monitored for three years post construction for spread of noxious weeds, and any infestations will be controlled using the measures described in section 1.7 of this BO.

- All equipment will be cleaned prior to entering ROW to reduce the potential spread or introduction of noxious weeds or other exotic species.
- Erosion and sedimentation control measures will be developed and implemented for all projects requiring clearing, vegetation removal, grading, ditching, filling, embankment compaction, or excavation. The BMPs in these plans will be used to control sediments from all vegetation-disturbing and ground-disturbing activities.
- All standard erosion practices will be used for ground disturbance or road maintenance (e.g. silt fences, straw bales).
- If necessary, water will be sprayed on roads to reduce fugitive dust from construction activities.
- No fuel trucks or refueling will be located or performed within 200 ft of any rivers, streams, or creeks. When not in use, equipment will be stored outside the designated critical habitat in a staging area. The staging area will be located on level ground at least 200 ft from any stream and will be surrounded by an earthen berm to prevent any materials from leaving the site.
- A spill prevention plan will be developed and implemented to minimize the potential for spills of fuels, oils, or other potentially hazardous materials to reach the seasonal perched water table or surface bodies. Fully stocked spill containment and cleanup kits will also be located at the staging area and the work area in case of accidental spills. Mobile equipment will be checked for any leaks or drips prior to entering the work area and regularly thereafter. If any drips or leaks are noted, the equipment will be immediately removed from the work area (if possible) and repaired. All heavy equipment will have a fully stocked spill containment and cleanup kit on board.
- At any site determined to be sensitive (such as designated critical habitat and wetlands) any augured soil would be removed from the site.

1.6. Offsetting Measures

- To offset impacts to Taylor's checkerspot butterfly habitat, BPA planned to protect and restore habitat at a 2:1 ratio on private land adjacent to the ROW. However, no willing landowners were found, so BPA will provide \$50,000 to Benton County for Taylor's checkerspot butterfly recovery. The first priority for this funding is to secure a conservation easement on property already supporting the species. The second priority is to restore or expand a protected area that already supports the species. The Service will have approval authority over how the funds are used. The OFWO has reviewed a draft Memorandum of Agreement (MOA) between BPA and Benton county regarding these funds. Due to time constraints, this MOA will be finalized after consultation is completed.
- Loss of Kincaid's lupine and Fender's blue butterfly will occur along the access road between Santiam-Toledo towers 41/5 and 41/7 where Kincaid's lupine are currently growing within the access road. However, based on 2008 and 2009 survey data, it is unlikely that habitat loss in this area will exceed 0.17 acre (400 feet of access road by 18 feet disturbance width). BPA has voluntarily agreed to mitigate damage that may occur to Kincaid's lupine plants and critical habitat due to access road use at a 3:1 ratio on a permanently protected site. Based on the calculations above, the maximum amount of habitat that would need to be

replaced would be 0.51 acre. In addition, approximately 0.60 acre of critical habitat will be disturbed during wood pole replacement. The disturbed area will be replaced at a 2:1 ratio. The mitigation will occur on 2 acres of private land which is owned by Arin and Julia Rain and is adjacent to the ROW. The 2-acre site will be restored in accordance with the activities described in Section 1.7 of this BO. A conservation easement will be placed on the Rain property (see the map and legal description, Appendix 1). The easement will be held by Benton County and the habitat will be restored and/or enhanced to support Kincaid's lupine, Fender's blue butterfly, and other native prairie species. The OFWO has reviewed a draft Memorandum of Agreement (MOA) between BPA and Benton county. Due to time constraints, this MOA will be finalized after consultation is completed. BPA expects to contract with the Institute of Applied Ecology (IAE) to restore this habitat and monitor it for ten years.

- A three-year plan will be developed to reseed areas disturbed by pole replacement and road maintenance activities within Fender's blue butterfly, Kincaid's lupine critical habitat and the area which supports Taylor's checkerspot butterfly located between Albany-Burnt Woods transmission towers 13/2 and 15/5 and Santiam-Toledo transmission towers 38/3 and 40/6. These disturbed areas will be reseeded with native plants and nectar source species in accordance with the activities described in section 1.7 of this BO. BPA will also include in this plan the areas of Kincaid's lupine habitat outside of critical habitat that were damaged in June 2009. The plan will include site pre-treatment, seeding, and vegetation monitoring and maintenance (including noxious weed removal). At a minimum, sites will be restored to pre-existing conditions.
- Additionally, the three-year plan will include intensive weed management within the entire width of the ROW in Kincaid's lupine and Fender's blue butterfly critical habitat and the area of the newly identified Kincaid's lupine populations between Santiam-Toledo transmission towers 44/6 and 45/1, extending to the 0.5-kilometer area on either side of these two areas (excluding the area between Albany-Burnt Woods towers 15/7 and 16/1 if it is currently in agricultural production). Weed management will follow the activities as described in section 1.7 of this BO. An outside contractor with experience in native prairie restoration will be used to perform the work. A native prairie seed matrix approved by the U.S. Fish and Wildlife Service will be used.

1.7. Habitat Restoration and Weed Management

The goal of the restoration and weed management activities is to enhance populations of Kincaid's lupine and native nectar plants used by Fender's blue butterfly and pollinators of Kincaid's lupine, and to manage non-native and invasive vegetation. Habitat management will be accomplished using manual and mechanical treatments, prescribed burning and limited use of herbicides. Contractors must be approved by the U.S. Fish and Wildlife Service prior to treatment application. The IAE has been selected by BPA to conduct the habitat restoration and weed management described herein. Benton County may also conduct habitat restoration and weed management activities. For the purpose of this consultation, the IAE and Benton County are approved to perform the following treatments:

1.7.1. Manual and Mechanical Treatments

The purpose of the various management treatments described in this section is to control competing invasive non-native plant species in prairie habitats. Treatments may reduce the

cover of non-native grasses or shrubs, prevent seed set or eliminate invading woody species that are encroaching into the prairie.

Mowing

Prairie sites may be mowed using tractor mowers or hand-held mowers (e.g., rotary line trimmers). Mowing will generally be implemented in the fall and winter, after Kincaid's lupine have senesced for the season (generally after August 15 through February). Tractor mowers should be rubber-tracked and the mowing deck should be set sufficiently high to avoid soil gouging (generally 15 centimeters [cm]) (6 inches).

Spring mowing with tractor mowers or hand-held mowers may occur where necessary to control overwhelming weed infestations, except at sites with Fender's blue butterflies. Spring mowing at sites with Kincaid's lupine will maintain a buffer of 2 m (6 feet) from the nearest Kincaid's lupine.

If the site has Fender's blue butterflies, mowing may only occur under these limitations:

- Spring tractor mowing will not be allowed at sites with Fender's blue butterflies.
- After the butterfly flight season but before Kincaid's lupine senescence (generally June 30 through August 15), tractor mowing may occur no closer than 2 meters (m) (6 feet) from the nearest Kincaid's lupine plants.
- Mowing with hand-held mowers may be implemented during Fender's blue butterfly flight season (generally May 1 to June 30) as long as a buffer of at least 8 m (25 feet) is maintained between the mower and any individual of a Kincaid's lupine plant.
- Mowing may be conducted throughout sites with Fender's blue butterflies after Kincaid's lupine senescence and before Kincaid's lupine re-emergence (generally August 15 to March 1).
- Tractor mower decks will be set a minimum of 15 cm (6 inches) above ground to reduce impacts to butterfly larvae.

Manual Invasive Plant Removal

Invasive plants may be removed using a variety of manual methods and hand tools, including hoeing, grubbing, pulling, clipping or digging. Tools that may be used include shovel, hoe, weed wrench, lopping shears, and trowel. Removal of non-native plants using these methods may occur year-round, as long as precautions are taken to prevent negative effects to listed species. All plant material will be removed off-site.

Cutting/Thinning/Removing Tree Stumps

Handheld power tools may be used to cut down woody vegetation, control and remove invasive woody plants, and reduce tree density by thinning woody plants. In highly degraded sites, low impact vehicle-mounted tree shears may be used to thin woody vegetation. Tree stumps and their root systems may be removed manually or mechanically using vehicle-supported machinery to prevent re-sprouting. The extent of cutting or thinning will depend on review of site records, including aerial photographs, and percent cover thresholds for the habitat types (e.g., wet prairie or oak savanna). Cutting and thinning may be implemented either at times of the year when Kincaid's lupine is dormant, or in the case of selective manual methods where workers enter the site on foot, in such a way as to avoid trampling of

any Kincaid's lupine. If herbicides (e.g., Triclopyr; see further discussion under Chemical Treatments, below) will be used to treat freshly-cut stumps, trees must be felled in the late summer/early fall dry season to coincide with timing restrictions for chemical use. Vehicle-supported stump removal will be restricted to dry periods if Kincaid's lupine are present. All cut material will be piled or chipped and spread away from populations of Kincaid's lupine or hauled off-site for disposal or burning. In cases where work is done during the wet season, cut debris may be temporarily piled on-site, but away from Kincaid's lupine and butterflies, until the dry season when equipment can access the work area to remove debris.

Girdling Trees

Girdling is the removal of a ring of bark near the base of a tree with an axe or chainsaw. Girdling eventually kills the tree and is done to control and remove invasive woody plants. Girdling may be applied at any time of the year; workers will enter the site on foot, and take care to avoid trampling of Kincaid's lupine. Depending upon management objectives, girdled trees may remain on site or be removed during the dry season.

Raking

Raking may be used to reduce thatch build-up at the Rain property conservation easement. If Fender's blue butterfly begin to occupy this site, the extent of raking will be limited to one-third of the site. Rakes may be tractor-mounted or hand-held, and can help to gather and loosen thatch and leaf litter. Thatch that exceeds 10 to 20 percent cover can reduce native plant species diversity or rare plant habitat availability, and may also increase small mammal populations that damage native plants. Raking will occur after Kincaid's lupine have senesced for the season. Efforts will be made to avoid disturbing underlying soil. Tractors shall be equipped with rubber tracks to minimize soil compaction. Thatch and leaf litter will be removed off-site.

Shade Cloth

Use of shade cloth is a technique to control monotypic weed infestations. Dark cloth is fastened to the ground with stakes; the plants under the cloth die, and the cloth is subsequently removed after two years. Shade cloth will be installed during the growing season, but will not be used within 20 m (65 feet) of Kincaid's lupine plants, to prevent inadvertent impacts to Fender's blue butterflies.

Sod Rolling

This technique is used to control invasive plant species. A bulldozer is used to roll away the top layer of soil and plant material, leaving a relatively intact soil layer beneath. The bulldozer pushes the vegetative mat and deposits the mat into windrows at the edge of the site. The invasive plant and sod windrows are composted in place, killing the invasive plant seeds and root material. Afterward, remaining soil can be re-used on site for site restoration activities. This technique will not be used where Kincaid's lupine or butterflies are present but is suitable in adjacent habitat no closer than 10 m (30 feet) to listed species and for site preparation prior to reintroduction or augmentation.

Solarization

This is another technique used to kill monotypic weed patches. Solarization may be used after tilling (described below). A site will be covered with plastic sheeting; the plastic remains in place for at least three months during the subsequent growing season, during which elevated temperatures under the plastic kill most of the plant life. Once the plastic is removed, follow-up weeding may be necessary. This technique will not be used where Kincaid's lupine are present or in remnant prairie patches but is suitable in adjacent habitat no closer than 10 m (30 feet) to listed species and for site preparation prior to reintroduction or augmentation.

Tilling/Disking

A tractor with a tiller/disk attachment will be used to turn up the soil to a depth of no more than 30 cm (12 inches) at the target site. This action disturbs the root system of the weeds and exposes them to sunlight, killing the weeds. Tilling/disking operations will, to the extent practicable, be implemented along existing ground contours, and will not occur during the wet season, to minimize alterations to site hydrology and destruction of soil structure. Tilling and disking must be followed immediately with introduction of a native plant species groundcover, via seeding or outplanting, unless further weed eradication in the form of herbicide, burning, or repeat disking is scheduled to take place. The groundcover will greatly reduce the potential for sediment movement that could occur during late fall and winter rain events. Tilling and disking will not be used within 10 m (30 feet) of known populations of Kincaid's lupine or butterflies.

1.7.2. Prescribed Burning

Prescribed burning is the measured application of fire to control invasive woody plants, remove thatch and invigorate native plant populations in upland prairie systems. The technique involves the hand application of fire via drip torches; a 15-m (50-foot) vegetative buffer will be maintained adjacent to any fish-bearing stream. Burn plans will be required, and will vary by management objective and site conditions. As a rule, prescribed fire for sites with Kincaid's lupine and remnant prairie vegetation will be of low intensity; prescribed burns should therefore target cool, cloudy days later in the dry season to ensure low intensity fire conditions. To encourage lower intensity fires in certain situations, woody vegetation may also be removed from the treatment area prior to burning. Prescribed fires will occur after August 15 to allow for most native plants to have set and released their seeds and begun to senesce, and, if Fender's blue butterfly is present, to avoid the flight season of adults.

Limits will be imposed on the extent of annual burning to protect listed species. All burns will comply with State of Oregon regulations and protocols to minimize the possibility of uncontrolled burns. Fire control will be accomplished with the use of disk lines or pre-burn hose lays and wet-lining the burn perimeter prior to and during the burn. Fire retardant chemicals should be used sparingly near listed plant populations, and must not be used within 37 m (120 feet) of a watercourse. An area 3 to 6 m (10 to 20 feet) wide may also be mowed around the outside boundary of the burn area to help assure fire control. Fire management vehicles will be restricted to adjacent non-native or resilient vegetation. Human movement in the prescribed burn area will be managed to minimize impacts on Kincaid's lupine and the native prairie community, except as needed for human safety.

At sites supporting adult Fender's blue butterflies, the size of the burn unit will be no more than one third of the occupied habitat actively used by butterflies. The center of the burn unit must be within 100 meters of unburned occupied habitat, which can serve as a recolonization source. Where site conditions allow, butterfly refugia within burn units may be protected with a fire break or by watering down prior to a prescribed burn.

1.7.3. Chemical Treatments

Chemical treatments will be used for site preparation and non-native vegetation management. Herbicides will be applied by licensed applicators, using appropriate equipment and best management practices to minimize or eliminate potential herbicide exposure to non-target habitats and native species (especially federally listed species) associated with drift, surface runoff or leaching to groundwater.

Chemicals

A limited number of herbicides will be used: triclopyr, glyphosate, 2,4-D amine, clethodim, sethoxydim, and fluazifop-P-butyl. Herbicides were selected based upon best available scientific information regarding efficacy and EPA abbreviated risk assessments that considered potential effects to federally listed aquatic and terrestrial species.

All herbicide label specifications (e.g., allowable application rates for specific invasives) will be followed in accordance with the Federal Insecticide, Fungicide and Rodenticide Act. Herbicide treatments will be conducted using a limited number of techniques to reduce potential for chemical drift or runoff. The following are specific application methods and practices for herbicides necessary for dry prairie restoration within the Willamette Valley.

At sites supporting adult Fender's blue butterflies, the size of the area treated with herbicides will be no more than one third of the occupied habitat actively used by butterflies.

Triclopyr (Garlon 3A only) will be used to control woody species and broadleaf weeds. For woody species control, it will be hand painted or directly wicked onto fresh cut stumps within 24 hours of cutting; no spraying is allowed. For broadleaf weed control, it will be applied primarily via spot foliar application using a hand-held wand or mounted on an all-terrain vehicle.

- Wipe-on type application will be allowed February 1 - August 15 to allow for control of tall invasives while protecting native plants.
- Spray and wipe-on application will be permitted August 15 - October 31 when native plants and listed species are dormant.
- At sites with Fender's blue butterflies where diapaused butterfly larvae may be present, additional protective measures will apply (see "Protecting Fender's blue butterfly during chemical treatment," below).

Glyphosate (including Rodeo, Roundup, Aqua-Master and Accord) with vegetative-based surfactant will be used to treat grasses and broadleaf woody and herbaceous species. It will be applied primarily via spot foliar application using a hand-held wand or mounted on an all-terrain vehicle.

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- Spray and wipe-on application will be permitted August 15 - October 31 when native plants and listed species are dormant.
- At sites with Fender's blue butterflies where diapaused butterfly larvae may be present, additional protective measures will apply (see "Protecting Fender's blue butterfly during chemical treatment," below).

2, 4-D amine (including Weedar 64) with vegetative-based surfactant will be used for treating broadleaf species. It will be applied primarily via spot foliar application using a hand-held wand or mounted on an all-terrain vehicle.

- Wipe-on type application will be allowed February 1 - August 15 to allow for control of tall invasives while protecting native plants.
- Spray and wipe-on application will be permitted August 15 - October 31 when native plants and listed species are dormant.
- At sites with Fender's blue butterflies where diapaused butterfly larvae may be present, additional protective measures will apply (see "Protecting Fender's blue butterfly during chemical treatment," below).

Clethodim (Envoy only) with vegetative-based surfactant will be used to treat non-native grass species.

- Application timing is limited to June 1-October 25 at upland prairie sites. Applications during this period will allow for residual chemical to break down prior to fall rains.
- It will be applied primarily via spot foliar application using a hand-held wand or mounted on an all-terrain vehicle. If using a weed wiper to apply clethodim near Kincaid's lupine during the growing season, the herbicide will be applied at a height to target upper grass stems, and avoid lower-stature Kincaid's lupine.
- At sites with Fender's blue butterflies where diapaused butterfly larvae may be present, additional protective measures will apply (see "Protecting Fender's blue butterfly during chemical treatment," below).

Sethoxydim (Poast only) with vegetative-based surfactant will be used for treating grass species. It will be applied primarily via spot foliar application using a hand-held wand or mounted on an all-terrain vehicle.

- Early season application will be allowed (February 15 - May 15).
- All other applications will be limited to later in the year (June 1-October 25 at upland prairie sites and August 1 - October 25 at wet prairie sites). Applications during this period will allow for residual chemical to break down prior to fall rains.
- If using a weed wiper to apply sethoxydim near Kincaid's lupine during the growing season, the herbicide will be applied at a height to target upper grass stems, and avoid lower-stature Kincaid's lupine.
- At sites with Fender's blue butterflies where diapaused butterfly larvae may be present, additional protective measures will apply (see "Protecting Fender's blue butterfly during chemical treatment," below).

Fluazifop-P-butyl (Fusilade II) with vegetative-based surfactant will be used for treating grass species. It will be applied primarily via spot foliar application using a hand-held wand or mounted on an all-terrain vehicle.

- Early season application will be allowed (February 15 - May 15).
- All other applications will be limited to later in the year (June 1 - October 25 at upland prairie sites and August 1 - October 25 at wet prairie sites). Applications during this period will allow for residual chemical to break down prior to fall rains.
- If using a weed wiper to apply fluazifop-P-butyl near Kincaid's lupine during the growing season, the herbicide will be applied at a height to target upper grass stems, and avoid lower-stature Kincaid's lupine.
- At sites with Fender's blue butterflies where diapaused butterfly larvae may be present, additional protective measures will apply (see "Protecting Fender's blue butterfly during chemical treatment," below).

Best Management Practices for Chemical Treatments

Vegetative buffers: Herbicide treatments for upland and wet prairie restoration sites will not be applied within 37 m (120 feet) of any ephemeral or perennial watercourse.

Protecting Fender's blue butterfly during chemical treatment: Fender's blue butterfly larvae may be adversely affected by herbicides. At sites likely to have diapaused butterfly larvae, the treatment method will be fall application through all-terrain vehicle-mounted boom sprayer or spot treatment of target plants. Research with herbicides in sites with Fender's blue butterfly found that fall application of glyphosate, fluazifop, Surflan or Pendulum alone or in combination had no detectable effect on larval abundance compared to unsprayed controls, either because larvae were resistant to these chemicals or because they were protected by existing vegetation that covered them (Clark et al. 2004). Given these results, the measures above apply to herbicide applications at all sites with Fender's blue butterfly populations.

Controlling drift of chemicals:

- At upland prairie sites, chemical applications will not occur within 24 hours of predicted precipitation.
- Use lowest effective nozzle pressure recommended by nozzle manufacturer.
- Use minimum effective nozzle height recommended by nozzle manufacturer.
- Apply large droplet size (median diameter no less than 500 microns).
- Spray only in low wind conditions (< 11 kph [7 mph], or more restrictive label directions) with moderate temperatures (typically less than 30 C [85° F], in the morning on calm days, or more restrictive label directions).
- Do not spray if an inversion is occurring.
- Drift retardant adjuvants may only be used for boom sprayer applications. Drift retardant adjuvants must be non-toxic, and applied with the other strict application requirements and restrictions described above in the Chemical Treatments section.
- Dyes may be used for all applications to ensure complete and uniform treatment of invasive plants as well as to immediately indicate drift issues.

1.7.4. Population augmentation and reintroduction.

Increasing the size and number of rare plant populations is essential to the recovery of Kincaid's lupine. Augmentation of existing populations may be accomplished by sowing seeds or planting propagules of Kincaid's lupine to increase the population size. Reintroduction (via seeds or propagules) into an unoccupied site may be used to create new populations or to recreate a lost one at suitable sites. To minimize the potential for outbreeding depression, the source of seeds or propagules used in augmentation and reintroduction projects should be populations that are nearby or which occupy similar habitat as the restoration site. Management tasks to implement augmentation and reintroduction are provided below.

Seeding Augmentation or Restoration Sites

If necessary to prepare the seed bed, soil may be prepared for sowing by shallow-depth hand- or (where Kincaid's lupine are not present) equipment tilling the site. Seed will be sown in the ground either by no-till drill if soil is dry enough to support vehicle weight without soil compaction, or by hand-sowing into the soil. Harrowing may be used if all other methods are unfeasible, and harrow equipment is operated at least 2 m (6 feet) from Kincaid's lupine. Seed will be sown in a manner that conforms to the density and spacing of the source populations, taking into consideration that significant pre-establishment mortality may occur and planting in higher densities may compensate for loss.

Seed will be planted in a manner to facilitate subsequent monitoring efforts. Mapped grids, metal tags or flags will be used to indicate the planted areas. This will assist with post-planting monitoring of introduction efforts.

Kincaid's lupine will be directly seeded at upland prairie reintroduction sites. Non-scarified seed may be planted October to January, and scarified seed may be planted October to March. Seed will be sown without fertilizer into existing habitat, raked ground, or lightly tilled soil. Seed will be sown on the soil surface or inserted (or covered) to a depth of 0.25-1 cm (1/8-1/2 inches). Invasive vegetation will be cleared to the extent practicable at augmentation and reintroduction sites prior to seeding.

Outplanting Augmentation or Restoration Sites

When outplanting into prairie sites with existing populations of Fender's blue butterflies or Kincaid's lupine, field personnel will take care to avoid trampling Kincaid's lupine. Propagules will be outplanted when soil is saturated by rain (generally November through April). Propagules should be planted when growing cycles of individual plants in the greenhouse or nursery match that of plants growing in the field (e.g., do not outplant an actively growing plug when wild plants are dormant). Propagules from native sources or grown from seed will be prepared for outplanting at the project site by first clearing away existing dead and living vegetation to expose soil. Avoid disturbing existing rhizomes. The soil will be excavated to the approximate depth and width of the plug. The plug will be inserted directly into the soil or with amended soils containing mulch or fertilizer so that the rim of the plug is level with the surrounding soil. A small amount of native soil should be added over the plug to reduce desiccation.

Propagules will be planted in a manner that conforms to the density and spacing of the source populations, taking into consideration that some pre-establishment mortality will occur and planting in higher densities may compensate for loss. Propagules will be planted in habitat conditions (soil, topography, etc.) similar to the propagule's source habitat.

Propagules will be planted in a manner to facilitate subsequent monitoring efforts. Mapped grids, metal tags or flags will be used to indicate the planted areas. This will assist with post-planting monitoring of introduction efforts.

Kincaid's lupine plugs will be transplanted by hand during fall and winter in upland prairie into pre-excavated soil pits suitable to accommodate the plug along with soil amendments (including mix of planting or native soils). Use of fertilizer is discouraged because it may benefit competing vegetation; use of nitrogen-fixing *Bradyrhizobium inoculum* to promote root nodules is encouraged. Plants will be transplanted only in well-restored native prairie with minimal cover of weeds, especially grasses and aggressive non-native plant species.

Outplanting of Non-listed Native Plants

An essential part of restoring populations of rare species is the restoration of native prairie structure and function. A variety of native forbs, including nectar species for Fender's blue butterfly, and grasses will be augmented or introduced as part of the prairie restoration efforts addressed in this biological opinion. Seed collection, propagation and outplanting of these non-listed species are not restricted by the Endangered Species Act, however, these activities could have some effects to listed species. If listed species occur at a site where collection of seeds or plant parts of non-listed plants is to take place, care will be taken to avoid trampling or otherwise harming Kincaid's lupine.

1.7.5. Surveys and monitoring

Surveys

Surveys for target species are an integral part of restoration activities. All surveys for the listed species covered in this program, other than those requiring a permit under section 10(a)(1)(A)² of the Endangered Species Act, will be covered here. For plants, any type of count method is covered.

Monitoring

All prairie habitat restoration projects covered in this program will be monitored after implementation. Monitoring will address which activities were completed, whether projects achieved their objectives, and will include evaluation of whether non-native and invasive plants were successfully controlled or removed. Monitoring should document any impact on or benefits to listed species and the area of prairie acreage restored.

² Any survey method that entails capture or collection of Fender's blue butterfly adults, larvae or eggs would require a permit under section 10(a)(1)(A), and will be covered in a separate consultation. Collection of listed plants on non-Federal lands does not require a permit under section 10(a)(1)(A).

General Project Design Criteria

The following project design criteria will be integrated into all prairie habitat restoration and weed management activities, unless specifically excluded in the descriptions of the management tasks above:

1. All sites will be surveyed for presence of Kincaid's lupine and butterflies (during the appropriate time frames) prior to initiation of habitat restoration work or butterfly occupancy will be assumed in all suitable habitat within 2 km of known occupied habitat.
2. If project activities expose soils to run-off into an adjacent watercourse, projects will include a 15-meter (50-foot) vegetative buffer between the project site and the watercourse to ensure project-derived sediments are not delivered by surface run-off to watercourses. Examples of activities for which watercourse buffers will be required are prescribed burns, sod rolling and tilling/disking.
3. Herbicide treatments for upland and wet prairie restoration sites will not be applied within 37 m (120 feet) of any ephemeral or perennial watercourse. All chemical applications will include a vegetative buffer of at least 37 m (120 feet) between the project site and the watercourse to limit the possibility of weed control chemicals entering the stream.
4. Soil-disturbing farm equipment (harrow, till, and disk equipment) will not be used within 2 meters (6 feet) of known locations of Kincaid's lupine and butterflies.
5. During the growing season of the Kincaid's lupine (February to August), heavy machinery will not be operated within 2 meters (6 feet) of known locations of Kincaid's lupine.
6. Habitat treatments applied to sites with listed species will generally take place after the Kincaid's lupine have senesced for the season.
7. No more than one habitat treatment for which areal limits have been imposed (e.g., not more than one-third of the occupied habitat for prescribed burning, raking, or herbicides) will be implemented in the same calendar year at the same site.
8. Work will be supervised by a botanist or biologist, when possible.
9. To prevent the spread of noxious weeds and non-native plants, all vehicles and heavy construction equipment will be cleaned to remove mud, debris, and vegetation prior to entering the project area.
10. Human activities, including walking in areas occupied by listed species, will be limited to minimize potential negative effects to listed species.
11. Access routes for work vehicles will be planned ahead of time to minimize potential adverse effects to listed species.
12. Vehicle use will be minimized to reduce damage or mortality to Kincaid's lupine and butterflies.

Reporting

A report will be provided to the Service to track each project's implementation and compliance with the program described in this biological opinion. The report will document the activities implemented and the manner in which the relevant terms and conditions from the biological opinion were applied. The report must also document the degree to which the project objectives were achieved, any follow-up treatments and reintroductions needed, the impact on or benefits to listed species, and document incidental take of Fender's blue

butterflies. The report shall be submitted after the first growing season following completion of the project.

2. Status of the Species

2.1. Fender's blue butterfly (*Icaricia icarioides fenderi*)

Listing Status and Critical Habitat

Fender's blue butterfly was listed as endangered, without critical habitat, on January 25, 2000 (U.S. Fish and Wildlife Service 2000a). A draft recovery plan for five prairie species, including Fender's blue butterfly, was published in September 2008 (U.S. Fish and Wildlife Service 2008a).

Critical habitat for the Fender's blue butterfly was designated on October 6, 2006 (U.S. Fish and Wildlife Service 2006a). Critical habitat units have been designated in Benton, Lane, Polk and Yamhill Counties, Oregon. The primary constituent elements of critical habitat for the Fender's blue butterfly are the habitat components that provide: (1) early seral upland 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 allowing access to sunlight needed to seek nectar and search for mates; (2) larval host-plants: Kincaid's lupine, *L. arbustus* (longspur lupine), or *L. albicaulis* (sickle-keeled lupine); (3) adult nectar sources, such as: *Allium acuminatum* (tapertip onion), *Allium amplexans* (narrow-leaved onion), *Calochortus tolmiei* (Tolmie's mariposa lily), *Camassia quamash* (common camas), *Cryptantha intermedia* (clearwater cryptantha), *Eriophyllum lanatum* (common woolly sunflower), *Geranium oregonum* (Oregon geranium), *Iris tenax* (Oregon iris), *Linum angustifolium* (pale flax), *Linum perenne* (blue flax), *Sidalcea campestris* (meadow checker-mallow), *Sidalcea malviflora ssp. virgata* (rose checker-mallow), *Vicia cracca* (bird vetch), *V. sativa* (common vetch) and *V. hirsute* (tiny vetch); and (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 Kincaid's lupine patches (about 2 km [1.2 miles]), necessary for dispersal, connectivity, population growth, and, ultimately, viability. 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

The historic distribution of Fender's blue butterfly is not precisely known due to the limited information collected on this species prior to its description in 1931. 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 Fender's blue on May 23, 1937, in Benton County, Oregon (Hammond and Wilson 1992). Uncertainty regarding the butterfly's host plant caused researchers to focus their survey efforts on common Kincaid's lupine species known to occur in the vicinity of Macy's collections. Fifty years passed before the butterfly was found again.

Fender's blue butterfly was rediscovered in 1989 at the McDonald Research Forest, Benton County, Oregon; it was found to be associated primarily with Kincaid's lupine, and occasionally

longspur lupine or sickle-keeled lupine (Hammond and Wilson 1993). Recent surveys have determined that Fender's blue butterfly is endemic to the Willamette Valley and persists at about 30 sites on remnant prairies in Yamhill, Polk, Benton, and Lane counties (Hammond and Wilson 1993, Schultz 1996, Schultz et al. 2003, U.S. Fish and Wildlife Service unpublished data). Fender's blue butterfly populations occur on upland prairies characterized by native bunch grasses (*Festuca* spp.) The association of Fender's blue butterfly with upland prairie is mostly a result of its dependence on Kincaid's lupine, although Fender's blue butterfly often uses wet prairies for nectaring and dispersal habitat. Sites occupied by Fender's blue butterfly are predominantly located on the western side of the Willamette Valley, within 33 km (21 miles) of the Willamette River. A synthesis of existing data found the rangewide number of butterflies to be about 3,000 to 5,000 individuals (Schultz et al. 2003). The most recent data estimates the rangewide population to be about 5,500 to 5,600 individuals with fewer than ten sites with populations of 100 adult butterflies or more (Table 1).

Life History and Ecology

Adult Fender's blue butterflies live approximately 10 to 15 days and apparently rarely travel farther than 2 km (1.2 miles) over their entire life span (Schultz 1998). Although only limited observations have been made of the early life stages of Fender's blue butterfly, the life cycle of the species likely is similar to other subspecies of *Icaricia icarioides* (Hammond and Wilson 1993). The life cycle of Fender's blue butterfly may be completed in one year. An adult Fender's blue butterfly may lay approximately 350 eggs over her 10 to 15-day lifespan, of which perhaps fewer than two will survive to adulthood (Schultz 1998, Schultz et al. 2003). Females lay their eggs on perennial lupine (Kincaid's lupine, longspur lupine or occasionally sickle-keeled lupine), which are the larval food plants during May and June (Ballmer and Pratt 1988). Newly hatched larvae feed for a short time, reaching their second instar in the early summer, at which point they enter an extended diapause. When the Kincaid's lupine plant senesces, diapausing larvae remain in the leaf litter at or near the base of the host plant through the fall and winter. Larvae become active again in March or April of the following year, although some larvae may be able to extend diapause for more than one season depending upon the individual and environmental conditions. Once diapause is broken, the larvae feed and grow through three to four additional instars, enter their pupal stage, and, after about two weeks, emerge as adult butterflies in May and June (Schultz et al. 2003).

Fender's blue butterflies have limited dispersal ability. Adult butterflies may remain within 2 km (1.2 miles) of their natal Kincaid's lupine patch (Schultz 1998), although anecdotal evidence exists of adult Fender's blue butterflies dispersing as far as 5 to 6 km (3.1 to 3.7 miles) (Hammond and Wilson 1992, Schultz 1998); dispersal of this magnitude is not likely anymore because of habitat fragmentation. At large patches like the main area at Willow Creek in Lane County, 95 percent of adult Fender's blue butterflies are found within 10 m (33 feet) of Kincaid's lupine patches (Schultz 1998).

Habitat Characteristics

Habitat requirements for Fender's blue butterfly include lupine host plants (Kincaid's lupine, longspur lupine and occasionally sickle-keeled lupine) for larval food and oviposition sites and native wildflowers for adult nectar food sources. Nectar sources used most frequently include narrow-leaved onion, Tolmie's mariposa lily, rose checkermallow, common woolly sunflower,

and Oregon geranium (Wilson et al. 1997, York 2002, Schultz et al. 2003). Non-native vetches (*Vicia sativa* and *V. hirsuta*) are also frequently used as nectar sources, although they are inferior to the native nectar sources (Schultz et al. 2003). Population size of Fender's blue butterfly has been found to correlate directly with the abundance of native nectar sources (Schultz et al. 2003). At least 5 ha (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); most prairies in the region are degraded and of low quality, and thus a much larger area is likely required to support a viable butterfly population.

Kincaid's lupine is the preferred larval host plant at most known Fender's blue butterfly populations. At two sites, Coburg Ridge and Baskett Butte, Fender's blue butterfly feeds primarily on longspur lupine, even though Kincaid's lupine is present (Schultz et al. 2003). A third lupine, sickle-keeled lupine, is used by Fender's blue butterfly where it occurs in poorer quality habitats (Schultz et al. 2003). It is interesting to note that Fender's blue butterfly has not been found to use *Lupinus latifolius* (broadleaf lupine), a plant commonly eaten by other subspecies of Fender's blue butterfly, even though it occurs in habitats occupied by the butterfly (Schultz et al. 2003).

Reasons for Listing

Habitat loss, encroachment into prairie habitats by shrubs and trees due to fire suppression, fragmentation, invasion by non-native plants and elimination of natural disturbance regimes all threaten the survival of Fender's blue butterfly. Few populations occur on protected lands; most occur on private lands which are not managed to maintain native prairie habitats. These populations are at high risk of loss to development or continuing habitat degradation (U.S. Fish and Wildlife Service 2000a).

The prairies of western Oregon and southwestern Washington have been overtaken by non-native plants, which shade out or crowd out important native species. Fast growing non-native shrubs (*Rubus armeniacus* [Armenian blackberry] and *Cytisus scoparius* [Scotch broom]), non-native grasses such as *Arrhenatherum elatius* (tall oatgrass) and *Agrostis* spp. (bentgrasses), and non-native forbs, such as *Centaurea x pratensis* (meadow knapweed), can virtually take over the prairies, inhibiting the growth of the Kincaid's lupine larval host plants and native nectar sources (Hammond 1996, Schultz et al. 2003, Service 2008c). When these highly invasive non-native plants become dominant, they can effectively preclude butterflies from using the native plant species they need to survive and reproduce (Hammond 1996). In the absence of a regular disturbance regime, native trees and shrubs also threaten to overtake prairie habitats; common native species found to encroach on undisturbed prairies include *Pseudotsuga menziesii* (Douglas-fir), *Quercus garryana* (Oregon white oak), *Fraxinus latifolia* (Oregon ash), *Crataegus douglasii* (Douglas' hawthorn) and *Toxicodendron diversilobum* (poison oak).

Habitat fragmentation has isolated the remaining populations of Fender's blue butterfly to such an extent that butterfly movement among suitable habitat patches may now occur only rarely, which is not expected to maintain the population over time (Schultz 1998). The rarity of host Kincaid's lupine patches and fragmentation of habitat are seen today as the major ecological factors limiting reproduction, dispersal, and subsequent colonization of new habitat (Hammond and Wilson 1992, 1993, Hammond 1994, Schultz 1997, Schultz and Dlugosch 1999).

Extirpation of remaining small populations is expected from localized events and probable low genetic diversity associated with small populations (Schultz and Hammond 2003).

Recent population viability analyses have determined that the Fender's blue butterfly is at high risk of extinction throughout most of its range (Schultz and Hammond 2003). Even the largest populations have a poor chance of survival over the next 100 years (Schultz et al. 2003).

Conservation Measures

Biologists from Federal and state agencies and private conservation organizations are engaged in active research and monitoring programs to improve the status of Fender's blue butterfly. Recent research has focused on population viability analyses (Schultz and Hammond 2003), metapopulation dynamics and the effects of habitat fragmentation (Schultz 1998), population response to habitat restoration (Wilson and Clark 1997, Kaye and Cramer 2003, Schultz et al. 2003), and developing protocols for captive rearing (Shepherdson and Schultz 2004).

Recent studies have shown that Fender's blue butterfly populations respond positively to habitat restoration. Mowing, burning and mechanical removal of weeds have all resulted in increasing Fender's blue butterfly populations. At two sites in the West Eugene Wetlands (The Nature Conservancy's Willow Creek Natural Area and the Bureau of Land Management's Fir Butte site), both adults and larval Fender's blue butterflies have increased in number following mowing to reduce the stature of herbaceous non-native vegetation, although the response to habitat restoration is often complicated by other confounding factors, such as weather fluctuations (Schultz and Dlugosch 1999, Fitzpatrick 2005, Kaye and Benfield 2005a). Wilson and Clark (1997) conducted a study on the effects of fire and mowing on Fender's blue butterfly and its native upland prairie at Baskett Slough National Wildlife Refuge in the Willamette Valley. Although fire killed all larvae in burned patches, female Fender's blue butterflies from the nearby unburned source patch were able to colonize the entire burned area, including Kincaid's lupine patches that were 107 m (350 feet) from the unburned source plants. They found that Fender's blue butterfly eggs were 10 to 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.

Fender's blue butterfly population trends have been correlated with Kincaid's lupine vigor; high leaf growth appears to produce larger butterfly populations. At the U.S. Army Corps of Engineers' Fern Ridge Reservoir, the Fender's blue butterfly population has increased dramatically since fall mowing of Kincaid's lupine patches has been implemented. The abundance of Fender's blue butterfly eggs was found to be correlated with the abundance of Kincaid's lupine leaves at a number of study sites (Kaye and Cramer 2003); egg abundance increased substantially at sites which had been treated to control non-native weeds (Schultz et al. 2003).

Fender's blue butterfly populations occur on public lands or lands that are managed by a conservation organization at the U.S. Fish and Wildlife Service's Baskett Slough National Wildlife Refuge, the Army Corps of Engineers' Fern Ridge Reservoir, the Bureau of Land Management's West Eugene Wetlands, The Nature Conservancy's Willow Creek Preserve and Coburg Ridge easement, and on a small portion of Oregon State University's Butterfly Meadows

Table 1. Fender's blue butterfly: estimated population size at surveyed sites, 2000 – 2007.

Site	County	Year							
		2000	2001	2002	2003	2004	2005	2006	2007
Henkle Way	Benton	ns	ns	ns	ns	1	2	20	20
McDonald State Forest	Benton	667	494	451	425	509	84	98	370
Oak Creek Rd.	Benton	3	2	1	1	2	ns	ns	ns
West Hills Road	Benton	ns	103	132	211	307	216	370	235
Wren	Benton	ns	ns	ns	75	484	180	800+*	1280*
Big Spires	Lane	ns	5	2	0	0	ns	3	ns
Coburg Ridge	Lane	ns	ns	ns	154	236	23	221	355
Eaton Lane (N & S)	Lane	18	36	ns	60	257	98	59	100
Fir Butte	Lane	82	ns	ns	289	446	60	120	159
Fir Grove (previously Burn Area)	Lane	ns	ns	32	71	128	6	46	20
Fisher Butte	Lane	ns	0	ns	0	15	3	6	4
N. Green Oaks	Lane	2	8	ns	36	107	118	101	162
S. Green Oaks	Lane	3	6	ns	39	53	28	33	23
Oxbow West	Lane	ns (701 eggs)	ns	ns	122	79	4	17	30
Royal Amazon	Lane	0	0	0	0	0	0	0	0
Shore Lane	Lane	0	7	ns	138	246	133	91	189
Spires Lane (E & W)	Lane	75	76	ns	111	223	35	40	88
Willow Creek Bailey Hill	Lane	169	47	ns	343	418	22	324	165
Willow Creek Main	Lane	1147	467	ns	843	725	129	337	354
Willow Creek North Area	Lane	123	63	ns	79	129	17	98	105
Oak Basin	Linn	-	-	-	-	-	-	23	ns
Baskett Butte	Polk	922	223	753	1236	1615	768	1416	1385
Baskett Butte North	Polk	ns	ns	ns	18	ns	46	ns	60
Dallas	Polk	50	ns	ns	ns	ns	ns	ns	40-60
Fern Corner	Polk	6	7	14	0	0	0	0	0
McTimmonds Valley	Polk	12	24	19	18	24	10	ns	10
Mill Creek	Polk	25	22	48	50	43	20	?	12
Monmouth - Falls City	Polk	6	0	6	200?	200?	100?	ns	100?
Deer Creek Park	Yamhill	0	0	0	1	0	2	0	2
Gopher Valley	Yamhill	12	7	22	20	10	10	20	80-100*
Oak Ridge	Yamhill	168	192	293	240	259	96	100?	240*

Key

ns = not surveyed; - = population not known to exist; ? = rough estimate obtained without using Hammond's protocol

* = count includes newly identified sites that were not previously counted during population estimates

in the McDonald State Forest. All of these parcels have some level of management for native prairie habitat values. The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program works with private landowners to restore wildlife habitats; native prairie restoration and Fender's blue butterfly recovery are key focus areas of the program in the Willamette Valley.

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

Listing Status and Critical Habitat

Kincaid's lupine was listed as threatened, without critical habitat, on January 25, 2000 (U.S. Fish and Wildlife Service 2000a). A recovery outline for the species was published in 2006 (U.S. Fish and Wildlife Service 2006b). A draft recovery plan for five prairie species, including Kincaid's lupine, was published in 2008 (U.S. Fish and Wildlife Service 2008a).

Critical habitat was designated on October 6, 2006 (U.S. Fish and Wildlife Service 2006a). Critical habitat units for Kincaid's lupine have been designated in Benton, Lane, Polk and Yamhill Counties, Oregon, and Lewis County, Washington. The primary constituent elements of critical habitat are the habitat components that provide: (1) early seral upland 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; and (2) the presence of insect pollinators, such as bumblebees (*Bombus mixtus* and *B. californicus*), with unrestricted movement between existing Kincaid's lupine patches, critical for successful Kincaid's lupine reproduction. 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

Kincaid's lupine 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. 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). Kincaid's lupine is currently known at about 57 sites, comprising about 160 ha (395 acres) of total coverage (Kaye and Kuykendall 1993, Wilson et al. 2003). Until the summer of 2004, Kincaid's lupine was known from just two extant populations in Washington, in the Boistfort Valley in Lewis County, more than 160 km (100 miles) from the nearest population in the Willamette Valley. In 2004, two small populations were found at Drew's Prairie and Lacamas Prairie to the east of the Boistfort Valley in Lewis County; only one plant was observed at Drew's Prairie, and more than 40 plants were found at Lacamas Prairie (Caplow and Miller 2004; Ted Thomas 2006, pers. comm.). Before Euro-American settlement of the region, Kincaid's lupine was likely well distributed throughout the prairies of western Oregon and southwestern Washington; today, habitat fragmentation has resulted in existing populations that are widely separated by expanses of unsuitable habitat.

Monitoring the size of Kincaid's lupine populations is challenging because its pattern of vegetative growth renders it difficult to distinguish individuals (Wilson et al. 2003). Instead of counting plants, most monitoring for this species relies on counting the number of leaves per unit

area, partly because there is a strong correlation between Fender's blue butterfly egg numbers and Kincaid's lupine leaf density (Schultz 1998, Kaye and Thorpe 2006). Leaf counts are time consuming, however, and recent evaluations have shown that Kincaid's lupine cover estimates are highly correlated with leaf counts, much faster to perform, and useful for detecting population trends (Kaye and Benfield 2005a).

Life History and Ecology

Flowering begins in April and extends through June. As the summer dry season arrives, Kincaid's lupine 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).

Kincaid's lupine 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 m (33 feet) or more apart can be interconnected by below-ground stems, and that clones can exceed 10 m (33 feet) across (Wilson et al. 2003). As part of a genetic evaluation, collections taken from small populations of Kincaid's lupine 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).

Kincaid's lupine 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, Schultz 1995). The vegetative structures of Kincaid's lupine support a variety of insect herbivores, including root borers, sap suckers and defoliators (Wilson et al. 2003). Kincaid's lupine 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 Kincaid's lupine 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). Kincaid's lupine, like other members of the genus *Lupinus*, is unpalatable to vertebrate grazers. Kincaid's lupine 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

In the Willamette Valley and southwestern Washington, Kincaid's lupine 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. Common native species typically associated with Kincaid's lupine include: *Festuca idahoensis* ssp. *roemerii* (Roamer's fescue), *Danthonia californica* (California oatgrass), *Calochortus tolmiei* (Tolmie star-tulip), *Eriophyllum lanatum* (common wooly sunflower), and *Fragaria virginiana* (wild strawberry). 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, Kincaid's lupine 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, in Douglas County, tree and shrub species dominate the sites, 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* (western poison oak).

In contrast to historical ecosystem composition, invasive non-native species are a significant component of Kincaid's lupine habitat today. Common invasives include: *Arrhenatherum elatius* (tall oatgrass), *Brachypodium sylvaticum* (slender false brome), *Dactylis glomerata* (orchard grass), *Festuca arundinacea* (tall fescue), *Rubus armeniacus* (Himalayan blackberry) and *Cytisus scoparius* (Scotch broom)(Wilson et al. 2003). Additionally, bentgrass species (*Agrostis* spp.) are aggressive invaders of wet and upland prairies throughout the Willamette Valley (Service 2008c). In the absence of fire, some native species, such as *Toxicodendron diversilobum* (Western poison oak) and *Pteridium aquilinum* (bracken fern), invade prairies and compete with Kincaid's lupine.

Reasons for Listing

The three major threats to Kincaid's lupine 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 Kincaid's lupine (U.S. Fish and Wildlife Service 2000a). 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 Kincaid's lupine in 2000 at the time listing occurred were on private lands and are at risk of being lost unless conservation actions are implemented (U.S. Fish and Wildlife Service 2000a).

Habitat fragmentation and isolation of small populations may be causing inbreeding depression in Kincaid's lupine. The subspecies was likely wide-spread 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 Kincaid's lupine and longspur lupine has been detected at Baskett Slough National Wildlife Refuge (Liston et al. 1995).

Invasion by a few aggressive plant species is a threat to many prairies and the presence of other non-native species within degraded prairies contributes to lower prairie quality and concomitant reduced population viability of native species, including Kincaid's lupine. 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 Kincaid's lupine by shading out the plants (Wilson et al. 2003).

Most prairie sites require frequent disturbances to hold back the natural succession of trees and shrubs. Before settlement by Euro-Americans, the regular occurrence of fire maintained the open prairie habitats essential to Kincaid's lupine. The loss of a regular disturbance regime, primarily fire, has resulted in the decline of prairie habitats through succession by native trees and shrubs, and has allowed the establishment of numerous non-native grasses and forbs. When this species was listed, we estimated that 83 percent of upland prairie sites were succeeding to forest in the range of Kincaid's lupine (U.S. Fish and Wildlife Service 2000a).

Conservation Measures

Active research efforts have focused on restoring the essential components of Kincaid's lupine 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 Kincaid's lupine 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, Kincaid's lupine has responded with increased leaf and flower production (Wilson et al. 2003). Research has also been conducted on seed germination, propagation and reintroduction of Kincaid's lupine (Kaye and Kuykendall 2001a, 2001b, Kaye and Cramer 2003, Kaye et al. 2003a). 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 Kincaid's lupine 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 2006 Recovery Outline for the species (U.S. Fish and Wildlife Service 2006b).

Populations of Kincaid's lupine 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. The U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program works with private landowners to

restore wildlife habitats; native prairie restoration is a key focus area of the program in the Willamette Valley.

3. ENVIRONMENTAL BASELINE

3.1. Status of the Species and Critical Habitat in the Action Area

3.1.1. Kincaid's lupine and Critical Habitat

Kincaid's lupine occurs within the action area between Albany-Burnt Woods transmission towers 16/3 and 16/7 and Santiam-Toledo transmission towers 41/3 to 41/7. This population occurs within Kincaid's lupine critical habitat which is designated from approximately Albany-Burnt Woods transmission towers 16/2 to 17/1 and Santiam-Toledo transmission towers 41/3 to 42/1 (see map in Appendix 2). BPA conducted surveys for Kincaid's lupine in the action area in May 2008 and 2009. Twenty-five Kincaid's lupine patches were mapped that were either wholly or partially within BPA's ROW; these patches also occur within Kincaid's lupine critical habitat. Patch size ranged from individual plants to 0.6 acres (Figures 4-5), with a total of approximately 4,350 Kincaid's lupine plants.

Several of these patches are located in the ROW between Santiam-Toledo transmission towers 41/5 and 41/7; road maintenance will occur in a portion of this area. The area occupied by Kincaid's lupine between these poles is approximately 0.31 acres. Based on BPA's survey data, the number of lupine plants in this area is estimated to be 2,800 plants.

At Albany-Burnt Woods transmission tower 16/3, which will be replaced, the Kincaid's lupine grows right up to the pole; this patch encompasses 0.02 acres. and contains 79 Kincaid's lupine plants. Kincaid's lupine also occurs adjacent to Santiam-Toledo transmission tower 41/6; however, BPA has determined this tower will not be replaced.

The remaining patches of Kincaid's lupine occur between transmission towers and will not be within the construction footprint for pole replacement or road maintenance activities.

Kincaid's lupine also occurs between Santiam-Toledo transmission towers 44/6 to 45/1. These patches were discovered in 2009 and occupied approximately 0.11 acres with an estimated 70 to 95 lupine plants. An approximately 75 ft² portion of the area occupied by lupine near towers 44/6 and 44/8 was damaged prior to crews being notified that Kincaid's lupine occupied the area. Damage included uprooting or burying plants with fill material during pole replacement at tower 44/6 and crushing from vehicle traffic and equipment storage at both poles. Pole replacement has been completed in this area.

A small roadside population of Kincaid's lupine is also found on Oak Creek Road near a BPA access road. The population has not been surveyed in recent years.

The BPA ROW receives infrequent visitation by private landowners, BPA transmission maintenance crew, and private timber crews. Threats within the ROW include damage from heavy equipment and off-road vehicle use, and encroachment by noxious weeds and woody shrubs.

3.1.2. Fender's Blue Butterfly and Critical Habitat

Fender's blue butterfly critical habitat within the ROW is from approximately Albany-Burnt Woods towers 16/2 to 17/1 and Santiam-Toledo towers 41/3 to 42/1 (see map in Appendix 2), encompassing approximately 15.3 acres. This is the only area within the ROW that Fender's blue butterflies are known to occur. This habitat provides high quality larval host plants, nectar species, and dispersal habitat for Fender's blue butterfly. Only a small portion of the remaining ROW for each transmission line has been surveyed for Fender's blue butterfly and its habitat. Nectar species have been found along other portions of the transmission lines, but the amount of nectar habitat has not been quantified in these areas.

The estimated population size of Fender's blue butterfly in the Wren area was 1,280 individuals in 2007 (USFWS data); the action area includes a portion of this population. The Wren site is one of only two Fender's blue butterfly sites with populations over 1,000 individuals. Several private properties in the Wren area were surveyed in June 2008 for adult Fender's blue butterflies (Ross 2008). The survey was a single count during the peak flight season of Fender's blue butterfly. Butterfly activity was delayed by 2 to 3 weeks and abundance was noted to be lower than normal, potentially due to cooler spring weather. Two of the properties surveyed included separate counts for butterflies within the ROW. The patches of Kincaid's lupine that will be impacted during pole replacement and road maintenance activities occur in the ROW on these two properties.

Santiam-Toledo transmission towers 41/6 and 41/7 are located within the first property; road maintenance will impact lupine populations on this property. The Fender's blue butterfly population in the BPA ROW on this property was estimated to be 28 adults (Ross 2008). Albany-Burnt Woods transmission tower 16/3 is located on the second property; this pole will be replaced resulting in impacts to lupine. The Fender's blue butterfly population in the BPA ROW on this property was estimated to be 4 adults (Ross 2008). Schultz and Crone (1998) found an estimated 5 percent larvae-adult survivorship in Fender's blue butterfly. Given this finding and the adult population estimates for these two properties, it is estimated that the larval populations in 2007 were 560 larvae on the first property (near Santiam-Toledo towers 41/6-7) and 80 larvae on the second property (near Albany-Burnt Woods tower 16/3). While we recognize that these are conservative estimates due to lower than normal abundance and that populations may vary widely from year to year, these are the best available estimates of the larval Fender's blue butterflies on these two properties.

A small roadside population of Fender's blue butterfly is also found on Oak Creek Road near a BPA access road. The population was last surveyed in 2004 and 2 males were identified (Hammond 2004).

The BPA ROW receives infrequent visitation by private landowners, BPA transmission maintenance crew, and private timber crews. Threats within the ROW include damage from heavy equipment, noxious weeds, off-road vehicle use, and woody shrub encroachment.

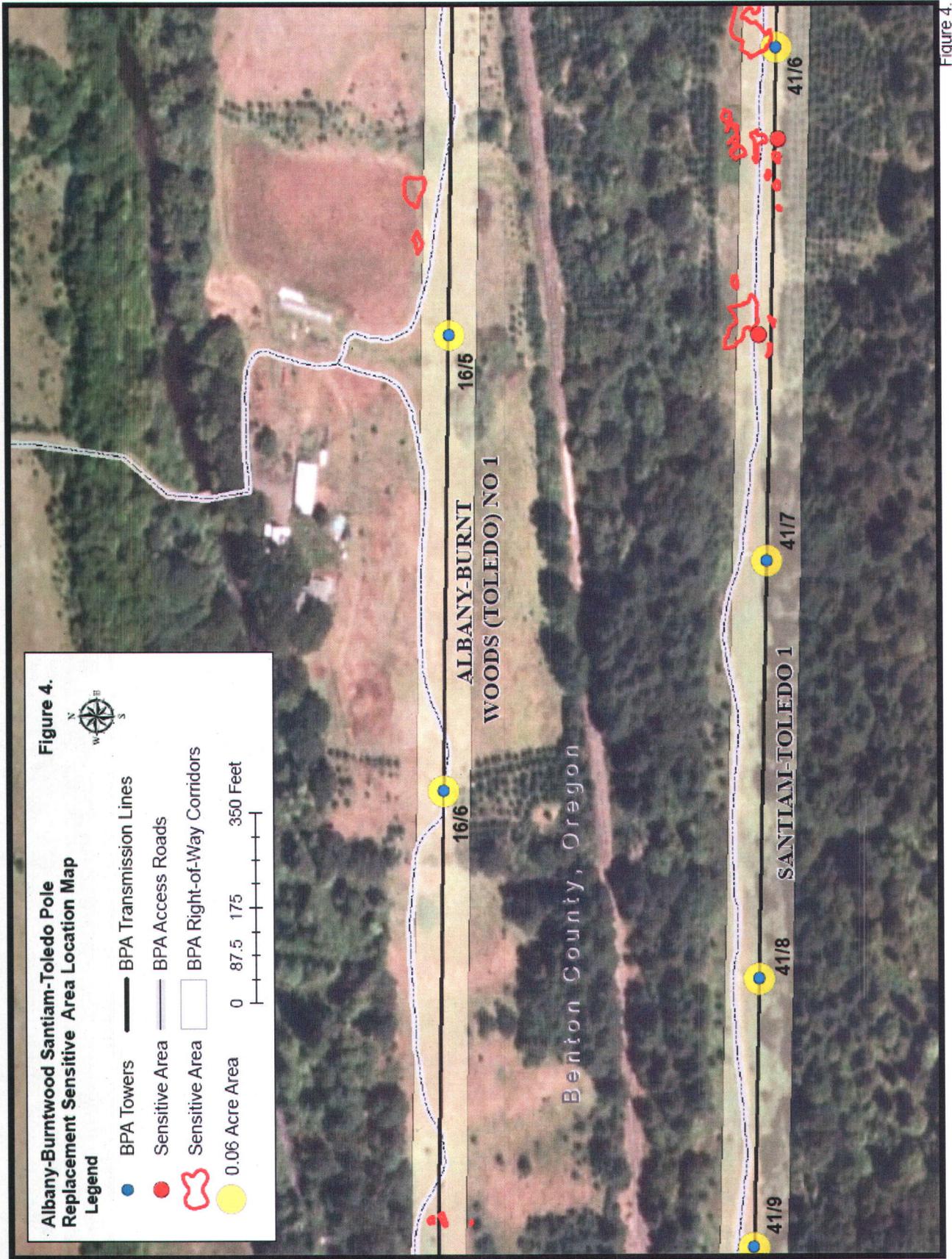


Figure 4.

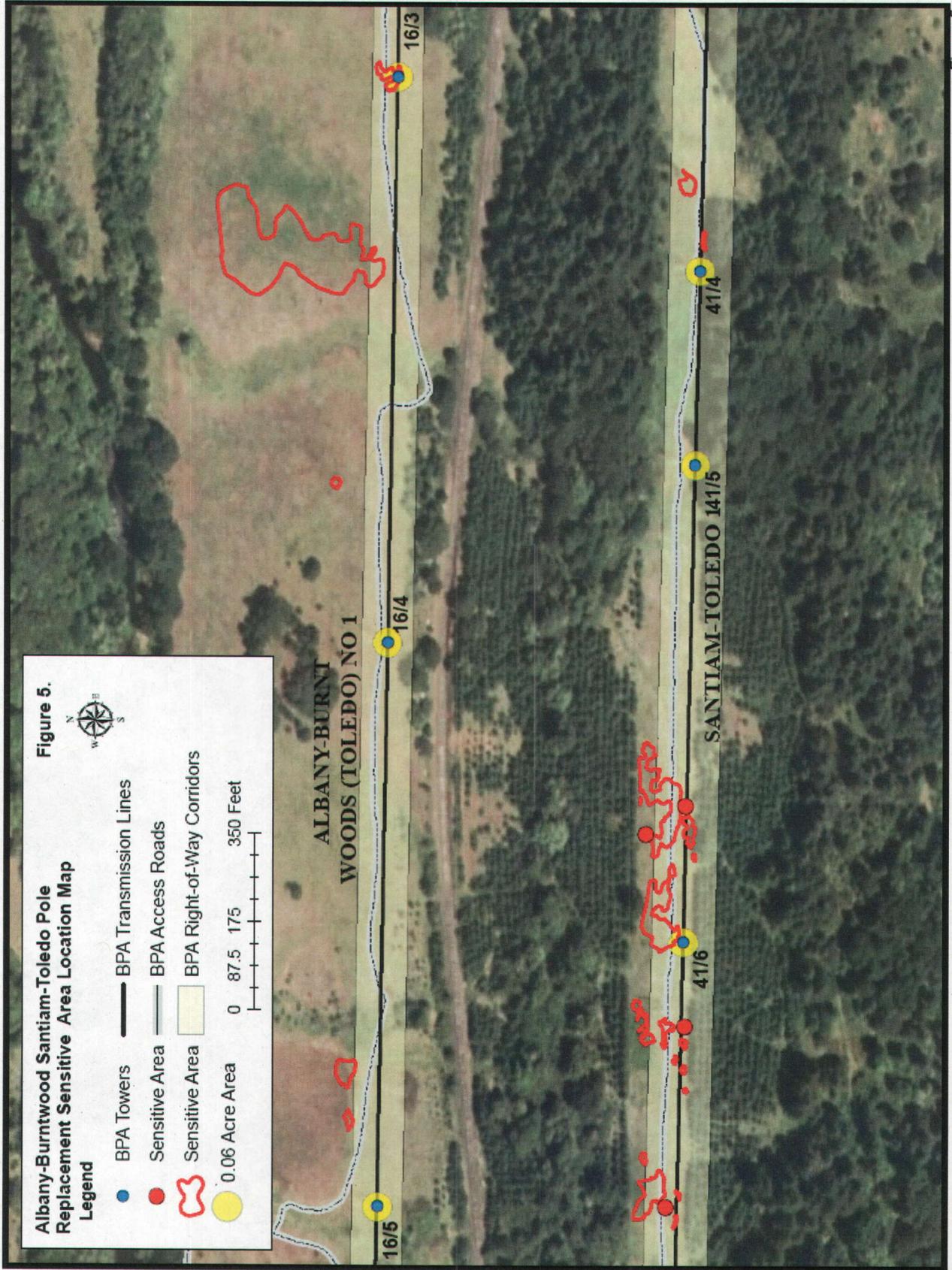


Figure 5.

3.1.3 Taylor's Checkerspot Butterfly

Within the action area, the habitat of the candidate Taylor's checkerspot butterfly is found in BPA's ROW from Albany-Burnt Woods 13/2 to 15/5 and from Santiam-Toledo 38/3 to 40/6.

The proportion of Taylor's checkerspot butterfly on the BPA ROW is about 10 percent of its total known population. The ROW contains nectar species such as wild strawberry and mariposa lily, and the larval host plant *Plantago lanceolata*.

There are currently only two known populations of Taylor's checkerspot butterfly in Oregon, both in the vicinity of Corvallis. The Xerces Society has estimated that as many as 2,000 individuals may be detected at the Oregon sites in any year. In 2005 over 1,200 adults were detected along the BPA ROW. This population is one of the strongest remaining and was discovered in 1999 (Vaughan and Black 2002).

The primary population centers for this population are located on private property about 500 feet off the BPA ROW. The BPA ROW provides larval host plants, nectar species, and dispersal habitat for Taylor's checkerspot butterfly.

The BPA ROW receives infrequent visitation by recreational hikers, bikers, dogs, and horses, which seems to have a low impact on butterflies at the site (Vaughan and Black 2002). Other threats within the ROW include non-native vegetation such as Himalayan blackberry, and Scot's broom.

The BPA has developed a ROW Specialized Management Plan for the Taylor's checkerspot Butterfly (BPA 2005). The intent of the management plan is to help maintain and preserve the Taylor's checkerspot butterfly habitat and population located in BPA's ROW by providing environmental awareness to BPA maintenance crews, developing and implementing conservation measures for ROW maintenance activities, and identifying specific opportunities and management activities that will preserve and enhance habitat in this area. The Service applauds BPA's commitment to conserving this species. Taylor's checkerspot butterfly is a candidate species and does not require section 7 consultation, therefore it will not be addressed in the following sections of this BO.

3.2. Factors Affecting the Species' Environment in the Action Area

The baseline for consultation includes state, tribal, local and private actions already affecting the species or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat. Other Federal actions affecting Fender's blue butterfly, the Kincaid's lupine, or their designated critical habitat that required formal section 7 consultation with our office include: the Service issuance of section 10(a)(1)(A) recovery permits and restoration and species enhancement by the Service. While some of these consultations included short-term adverse effects to Fender's blue butterfly, Kincaid's lupine, and their critical habitat, all were also expected to result in net improvements in species and critical habitat status. None of the completed section 7 consultations reached a jeopardy finding for Fender's blue butterfly or Kincaid's lupine, nor a finding of adverse modification of designated critical habitat for Fender's blue butterfly or Kincaid's lupine.

4. Effects of the Action

The activities described in the BO may adversely affect Kincaid's lupine, Fender's blue butterfly, and their respective critical habitats. A detailed analysis of the effects of the pole replacement, road maintenance, habitat restoration and weed management activities to listed species and their critical habitat follows in the next section. Tables 2 through 4 contain summaries of the Service's analyses of the effects of each action to listed species and critical habitat in the action area.

4.1. Effects of pole replacement and road maintenance activities

4.1.1. Kincaid's lupine

This project has been scheduled to occur in the fall, after Kincaid's lupine have senesced, to minimize the impact to the lupine; however, adverse impacts will occur in limited areas. Kincaid's lupine will be adversely affected by pole replacement activities at Albany-Burnt Woods transmission tower 16/3. This Kincaid's lupine patch surrounds the pole and encompasses approximately 0.019 acres with an estimated 79 plants. The plants at this pole occur within the 0.06 acre construction footprint. Site evaluations by BPA staff estimated that up to five Kincaid's lupine plants may be uprooted during pole replacement. The remainder of the population will be fenced to alert construction crews to avoid working in this area. However, it is possible that construction vehicles will need to access these areas during pole replacement. If this occurs, the soil is likely to be compacted and may reduce reemergence of lupine the following year. Overall, pole replacement activities may result in the loss of up to 79 lupine plants. This is approximately half of the area occupied by Kincaid's lupine within the ROW on this private property and 1.8 percent of the lupine located in the action area within critical habitat.

Kincaid's lupine will also be adversely affected by road maintenance activities between Santiam-Toledo transmission towers 41/5 and 41/7. Approximately 0.31 acres of Kincaid's lupine occurs between these two poles. The access road will be rerouted to avoid as much lupine as possible. However, based on surveys by BPA staff in 2008 and 2009, approximately 0.17 acres of Kincaid's lupine will be impacted (D. Corkran 2009, pers. comm.). Lupine plants may be uprooted or crushed by construction equipment and reemergence of lupine the following spring may be reduced due to soil compaction caused by construction vehicles and equipment. Approximately 2,800 lupine occur between these two poles, and up to 55 percent (approximately 1,540 plants) may be injured or destroyed due to road maintenance activities. This is approximately 44.6 percent of the lupine located in the action area within critical habitat.

4.1.2. Kincaid's lupine critical habitat

PCE #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.

The proposed project would not change the overall habitat type within critical habitat. Twelve poles will be replaced within critical habitat with up to 0.06 acres impacted at each pole, or a total of 0.72 acres. Road maintenance will impact 0.17 acres within critical habitat.

Therefore, approximately 0.89 acres of upland prairie within critical habitat will be temporarily disturbed from pole replacement and road maintenance activities. This is approximately 0.52 percent of the critical habitat designated for Kincaid's lupine critical habitat unit KL-9. All disturbed areas around the wood poles will be reseeded with native vegetation and noxious weeds will be monitored and controlled as necessary. Subsoils in the 0.89 acres may be compacted from movement of vehicles and equipment around the wood pole structures. Soil compaction may affect the ability of plants to reemerge the next spring, increase noxious weed establishment, and negatively affect native plant growth and the ability of seeds to germinate.

PCE #2: The presence of insect outcrossing pollinators, such as *Bombus mixtus* and *B. californicus*, with unrestricted movement between existing lupine patches.

Pole replacement and road maintenance activities will have minimal to no impact on PCE #2. Because lupine will be dormant when the proposed project occurs, pollinators will not be directly affected. Ground disturbance from the project could harm native vegetation and nectar species and indirectly affect the presence of bees. Reseeding with native vegetation afterwards will minimize the impact.

4.1.3. Fender's blue butterfly

Pole replacement and road maintenance activities will only occur in the fall, after September 1, 2009. During this time, Fender's blue butterfly larvae will have entered diapause and will be located in the leaf litter at the base of senesced Kincaid's lupine plants. Adults and eggs will not occur in the action area at this time. The estimated Fender's blue butterfly larval population in the action area is 640 larvae (see section 3.1.2). Based on the location of Kincaid's lupine, it is assumed that the larvae are all located within Fender's blue butterfly critical habitat. Potential adverse effects to Fender's blue butterfly include direct take of larvae, loss of nectar sources, loss of larval host plants, and loss of stepping stone habitat.

Direct take of larvae

Direct take of Fender's blue butterfly larvae could occur within the construction footprint at Albany-Burnt Woods transmission tower 16/3. Kincaid's lupine may be uprooted or crushed during pole replacement at this tower and Fender's blue butterfly larvae in the leaf litter at the base of these plants may be crushed due to the movement of construction vehicles, equipment and foot traffic. An estimated 80 Fender's blue butterfly larvae occur in the ROW on the private property where this pole is located. Approximately half of the area occupied by lupine in the ROW on this property may be crushed or trampled; assuming even distribution of the butterfly larvae in the lupine habitat, up to half of the Fender's blue butterfly larval population (about 40 larvae) may be crushed during the pole replacement at tower 16/3. This is about 6.3 percent of the Fender's blue butterfly larval population located within the action area.

Direct take of Fender's blue butterfly larvae could also occur during road maintenance activities between Santiam-Toledo transmission towers 41/5 and 41/7. Approximately 0.31 acres of Kincaid's lupine with an estimated 2,800 lupine plants occur between these two poles. The estimated Fender's blue butterfly larval population in the ROW on the property where these towers occur is 540 larvae. An estimated 0.17 acres, or 55 percent of the lupine population in the ROW on this property may be destroyed; therefore, up to 55 percent of the

Fender's blue butterfly larval population (about 297 larvae) may be crushed during road maintenance between towers 41/5 and 41/7. This is about 46.4 percent of the Fender's blue butterfly larval population located within the action area.

Fender's blue butterfly in the action area are part of the Wren population of butterflies. Surveys in 2007 estimated 1,280 adult butterflies in the Wren area. Assuming a five percent larval to adult survivorship, the loss of 337 larvae would equate to about 16 butterflies; this is about 1.3 percent of the Wren population. Given the habitat restoration that will take place concurrently with the pole replacement and road maintenance activities, it is expected that the reduction in population numbers of Fender's blue butterfly will be temporary.

Loss of nectar sources

Nectar source plants, such as *Iris tenax* (toughleaf iris), *Lomatium spp.* (common lomatium), *Fragaria virginiana* (broadpetal strawberry), *Sidalcea virgata* (rose checker-mallow), and *Calochortus tolmiei* (Tolmie's mariposa), among others, may be destroyed or damaged by pole replacement and road maintenance activities. The loss of nectar source plants would affect the 2010 Fender's blue population, as Fender's will be in the larval stage during 2009 construction.

Nectar source plants could be impacted if they are removed or crushed; if they are unable to set seed; if soil compaction and disturbance negatively affects the ability of the seeds to germinate in following years; and if construction disturbance causes an increase in noxious weeds. Loss of nectar source plants will be reduced by minimizing the project footprint as much as feasible and by reseeding all disturbed areas within critical habitat with native species, including nectar sources.

A loss of nectar sources due to project construction could affect Fender's blue butterfly by reducing food supplies for adult butterflies in the spring. Population size of Fender's blue butterfly has been found to correlate directly with the abundance of native nectar sources (Schultz et al. 2003). The ROW from Albany-Burnt Woods 13/2 to 15/5 and Santiam-Toledo 38/3 to 40/6 does not currently support Fender's blue butterfly or its host plant but does provide potential stepping-stone habitat and support Fender's blue butterfly nectar sources. Because this habitat also supports Taylor's checkerspot, all disturbed areas will be reseeded with native prairie species, including Fender's nectar sources. There may be a short-term disturbance to Fender's blue moving through the ROW in 2010; however reseeding should replace nectar sources for the long-term. In addition, the potential stepping-stone habitat in the ROW is large compared to the area that will be disturbed. Given that only a few Fender's blue use this habitat, and that plenty of undisturbed nectar sources will remain, it is anticipated that the effect from disturbance in this area on Fender's blue will be insignificant.

Loss of larval host plants

Fender's blue butterfly could also be negatively impacted from project construction through loss of Kincaid's lupine, its primary larval host plant in the action area. Potential impacts to Kincaid's lupine are described in section 4.1.1. Fender's blue butterfly uses Kincaid's lupine for oviposition and larval food. Loss of larval host plants could cause a decline in Fender's blue butterfly populations in the ROW in the short-term as butterflies move to areas outside

the ROW to access lupine; several patches of Kincaid's lupine occur within 1 km of this area. The impact would be most severe in the first years after project construction before lupine had a chance to regenerate in disturbed areas. Minimization and avoidance measures should minimize the number of host plants that are disturbed by project construction. Lupine plants and habitat disturbed by project construction would be replaced as described in section 1.6. Based on the amount of lupine that is anticipated to be impacted during these activities, we estimate that approximately 60 percent of the 2010 adult Fender's blue butterflies in the action area may move outside the ROW. Based on the estimated larval population and a five percent larval/adult survivorship, this would be about 19 Fender's blue butterflies.

Stepping stone habitat loss

Parts of the action area, Albany-Burnt Woods 13/2 to 15/5 and Santiam-Toledo 38/3 to 40/6, do not currently support Fender's blue or its host plant but provides potential stepping-stone habitat and support Fender's blue nectar sources. Because this habitat also supports Taylor's checkerspot, all disturbed areas will be reseeded with native prairie species, including Fender's nectar sources. There may be a short-term disturbance to Fender's blue moving through the ROW in 2010; however reseeded should replace nectar sources for the long-term. In addition, the potential stepping-stone habitat in the ROW is large compared to the area that will be disturbed. Given that only a few Fender's blue use this habitat, and that plenty of undisturbed nectar sources will remain, it is anticipated that the effect from disturbance in this area on Fender's blue will be insignificant.

4.1.4. Fender's blue butterfly critical habitat

PCE #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.

The proposed project would not change the overall habitat type within the action area. Approximately 0.72 acres of upland prairie within critical habitat will be disturbed from pole replacement, and a small amount of upland prairie habitat (0.17 acres) would be lost from access road upgrades near Santiam-Toledo 41/6. However, BPA will create additional habitat for lupine in a nearby area to compensate for the habitat loss from the access road. Subsoils may be compacted from movement of vehicles and equipment around the wood pole structures. As discussed above, soil compaction could affect the ability of plants to reemerge the next spring, increase noxious weed establishment, and negatively affect native plant growth and the ability of seeds to germinate. All disturbance areas around the wood poles will be reseeded with native vegetation and/or replanted with lupine. Noxious weeds will be monitored and controlled as necessary in disturbed areas.

PCE #2: Larval host plants Kincaid's lupine, longspur lupine, or sickle-keeled lupine.

As discussed above, the larval host plant Kincaid's lupine is present within the action area. Pole replacement and access road work may destroy some lupine plants, and disturb the soil of other dormant lupine plants. The mitigation described above will reduce the impact of these disturbances in the long-term; however it is possible that for the first year or two after the project implementation there may be a reduction in the number of larval host plants at some lupine patches within the action area.

PCE #3: Adult nectar sources, such as: *Allium acuminatum* (tapertip onion), *Allium amplexans* (narrowleaf onion), *Calochortus tolmiei* (Tolmie's mariposa lily), *Camassia quamash* (small camas), *Cryptantha intermedia* (Clearwater cryptantha), *Eriophyllum lanatum* (wooly sunflower), *Geranium oreganum* (Oregon geranium), *Iris tenax* (toughleaf iris), *Linum angustifolium* (pale flax), *Linum perenne* (blue flax), *Sidalcea campestris* (Meadow checkermallow), *Sidalcea virgata* (rose checkermallow), *Vicia cracca* (bird vetch), *V. sativa* (common vetch), and *V. hirsute* (tiny vetch).

Many of these adult nectar sources are present in the action area including Tolmie's mariposa lily, toughleaf iris, and small camas. Fender's blue will be in the dormant phase when the proposed project occurs, and not actively seeking nectar sources. Losses of or disturbance to nectar sources will impact emerging butterflies in the spring of 2010. Nectar sources currently growing within the section of the Santiam-Toledo access road that will be upgraded will be temporarily lost. Mitigation nearby will replace the lost nectar sources. Nectar sources within the disturbance footprint for the wood pole structures will be impacted by the movement of vehicles and equipment. A small number of plants may be uprooted but most will be affected by soil compaction and crushing. Reseeding within the disturbance areas will help promote the growth of native nectar species and minimize the loss of nectar sources to Fender's blue.

PCE #4: Stepping-stone habitat, consisting of undeveloped open areas with the physical characteristics appropriate for supporting the short-stature prairie oak savanna plant community (well drained soils), within 1.2 miles (~2 km) of natal lupine patches.

The action area within critical habitat is not generally considered stepping-stone habitat as described in the PCE (Mikki Collins 2009, pers. comm.).

4.2. Effects of habitat restoration and weed management activities

The effects of the habitat restoration and weed management activities to the Fender's blue butterfly and Kincaid's lupine and their critical habitat designations are discussed below. The primary constituent elements of critical habitat for Fender's blue butterfly are the habitat components that provide early seral upland prairie or oak savanna habitat, larval host-plants, adult nectar sources and stepping stone habitat. The primary constituent elements of critical habitat for Kincaid's lupine are the habitat components that provide early seral upland prairie or oak savanna habitat, with an absence of dense canopy vegetation, protection from competitive invasive species and the presence of insect pollinators.

4.2.1. Manual and Mechanical Treatments

Mowing

There are likely to be short-term adverse effects of mowing, however the long-term effects of mowing have been shown to be almost exclusively beneficial. Extensive research has been conducted in the last decade on the effects of various mowing regimes on rare species; these studies have shown that mowing is an important tool for restoring native prairies and increasing populations of Fender's blue butterfly and listed prairie plants.

Mowing in habitat patches with eggs or larvae of Fender's blue butterfly at any time during the year may crush or otherwise kill a small number of individuals of these life stages of the butterfly. Studies in the southern Willamette Valley have found that both adult and larval

Fender's blue butterflies increased in number following mowing to reduce the stature of herbaceous non-native vegetation, (Fitzpatrick 2005, Kaye and Benfield 2005). A study on the effects of fire and mowing on Fender's blue butterfly and native upland prairie at Baskett Slough National Wildlife Refuge found that Fender's blue butterfly eggs were 10 to 14 times more abundant in plots that were mowed or burned compared to undisturbed, control plots; woody plants were reduced 66 percent with mowing (Wilson and Clark 1997). At the U.S. Army Corps of Engineers' Fern Ridge Reservoir, the Fender's blue butterfly population has increased dramatically since fall mowing of Kincaid's lupine patches has been implemented (Messinger 2006). Fender's blue butterfly population trends have been correlated with Kincaid's lupine vigor; high leaf growth appears to produce larger butterfly populations. The abundance of Fender's blue butterfly eggs was found to be correlated with the abundance of Kincaid's lupine leaves at a number of study sites (Kaye and Cramer 2003); egg abundance increased substantially at sites which had been treated to control non-native weeds (Schultz et al. 2003)

Spring mowing within patches of Kincaid's lupine may inadvertently remove much of the above ground growing parts of the plants, which would reduce growth and reproductive success for that year. However, this is unlikely due to the required 6 ft buffer around Kincaid's lupine plants. Mowing during the flight season of Fender's blue butterfly adults may harass individuals and cause them to move to other areas of habitat; the effects of this are expected to be insignificant. Fall mowing is not likely to have any adverse effects to Kincaid's lupine, as the above ground portions of the plants will have senesced. Research on prairie management techniques has shown that mowing is an effective method for reducing non-native plants, with generally positive effects to native prairie species. Annual fall mowing has significant positive effects, including increased leaf, flower and foliar cover, on Kincaid's lupine (Kaye and Thorpe 2006).

Soil compaction by mowing equipment may adversely affect Kincaid's lupine and Fender's blue butterfly larvae. The likelihood of this effect is expected to be very small and will be prevented by the use of rubber tracks on tractors used for mowing; we anticipate a loss of fewer than one percent of the Fender's blue butterfly larvae due to soil compaction by mowing.

The effect of mowing on designated critical habitat for Fender's blue butterfly and Kincaid's lupine is a short-term reduction in some PCEs with clear long-term benefits. Spring mowing will temporarily reduce the cover of native prairie species, which would be an adverse effect to that PCE for each species. It may also reduce the cover of larval host plants and reduce the availability of nectar sources for Fender's blue butterfly; however, based on the amount of nectar available nearby and the required 6 ft buffers around Kincaid's lupine, the effects to Fender's blue butterfly will be insignificant. Concomitantly, spring mowing will have beneficial effects to critical habitat as it removes competing non-native plant species. Fall mowing is not likely to have any adverse effects to the PCEs of designed critical habitat for any of the species. Both spring and fall mowing have clear beneficial effects in the long-term; mowing has been shown to be one of the most effective techniques for increasing native prairie species cover and reducing the dominance of competitive invasive species (Kaye and Benfield 2005, Messinger 2006).

Manual Invasive Plant Removal

Targeted manual removal of invasive plants will have no adverse effects to listed species or designated critical habitat. Ultimately, the effects will be beneficial, as it will result in the removal of invasive plants that compete with native plants for light and nutrients.

Cutting/Thinning/Removing Tree Stumps

Removal of woody vegetation will have no adverse effects to listed species or designated critical habitat. The effects will be entirely beneficial, as it will result in the removal of encroaching woody plants that replace native prairie plants.

Girdling Trees

Girdling trees will have no adverse effects to listed species or designated critical habitat. The effects will be entirely beneficial, as it will result in the removal of trees that encroach on prairie habitats, increasing the value of the site for native species.

Raking

Raking to remove thatch build-up will only occur at the Rain property conservation easement site which does not currently support listed species. After Kincaid's lupine is planted at the site, raking will occur after the lupine have senesced for the season when it is unlikely to be adversely affected. Soil compaction by raking equipment may adversely affect Kincaid's lupine; however, the likelihood of this effect is expected to be small and will be prevented by the use of rubber tracks on tractors used for raking. If Fender's blue butterfly begins to occupy the site, only 1/3 of the habitat that supports the butterfly may be raked. In this case, the effects to Fender's blue butterfly are expected to be very small as the site is 2 acres and only 0.67 acres may be mowed each year. Ultimately, the effects of raking will be beneficial to Kincaid's lupine, as reduction in thatch build-up will open habitat for native prairie plants, and may also reduce the abundance of herbivorous rodents.

Shade Cloth

Shade cloth will not be used at sites with listed species, but will be used to restore degraded habitats. Using shade cloth will have no adverse effects to listed species or designated critical habitat. Ultimately, the effects will be beneficial, as it will result in the restoration of degraded prairie habitats, making them available for colonization by listed prairie species.

Sod Rolling

Sod rolling will be used to control invasive species, but will not be used within 10 m (30 feet) of listed species. This technique will have no adverse effects to listed species or designated critical habitat. The long-term effects of this treatment will be entirely beneficial, as it creates enhanced prairie patches that become available for colonization by listed prairie species.

Solarization

Solarization will be used to control weedy vegetation, but will not be used within 10 m (30 feet) of listed species. This technique will have no adverse effects to listed species or designated critical habitat. The long-term effects of this treatment will be entirely beneficial,

as it creates enhanced prairie patches that become available for colonization by listed prairie species.

Tilling/Disking

Tilling/disking will be used to control weedy vegetation, but will not be used within 10 m (30 feet) of listed species. This technique will have no adverse effects to listed species or designated critical habitat. The long-term effects of this treatment will be entirely beneficial, as it creates enhanced prairie patches that become available for colonization by listed prairie species.

4.2.2. Prescribed Burning

There may be short-term adverse effects of burning, however the long-term effects have been shown to be almost exclusively beneficial. Extensive research has been conducted in the last decade on the effects of prescribed burning on native prairie habitats and their associated species; these studies have shown that burning is an important tool for restoring native prairies and increasing populations of Fender's blue butterfly and listed prairie plants.

The immediate effects of fire on Fender's blue butterfly are certainly adverse. Fall burning likely kills all or most of the eggs and larvae in the burned patch. However, burning dramatically improves the habitat quality for the butterflies which move into the burned patch in the following flight season. The limit to burning at sites occupied by Fender's blue butterfly is designed to maximize the positive response of butterflies. The size of the burn unit will be no more than one third of the occupied habitat actively used by butterflies. The center of the burn unit must be within 100 meters of unburned occupied habitat, which can serve as a recolonization source. This limit is supported by a modeling study that determined that burning one third of an occupied site each year resulted in the greatest population growth rate (Schultz and Crone 1998).

Empirical studies have also shown that fire benefits the species. Wilson and Clark (1997) conducted a study on the effects of fire and mowing on Fender's blue butterfly and its native upland prairie at Baskett Slough National Wildlife Refuge in the Willamette Valley. Although fire killed all larvae in burned patches, female Fender's blue butterflies from the nearby unburned source patch were able to colonize the entire burned area, including Kincaid's lupine patches that were 107 m (350 feet) from the unburned source plants. They found that Fender's blue butterfly eggs were 10 to 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.

In any one year, no more than one-third of the occupied butterfly habitat in the ROW may be burned; this number imposes a conservative limit on the potential losses to fire. Based on Fender's blue butterfly larval population estimates, if one third of the occupied habitat in the ROW was burned in one year, 213 larvae could be killed. These losses are likely to be more than offset by the improved habitat quality and increased butterfly populations in the following year.

Prescribed burning under this restoration program will occur after Kincaid's lupine have senesced. Fire is likely to kill seeds found at or near the surface of the soil; below ground structures of these perennial plants are not likely to be destroyed by burning but injury may occur to rhizomes close to the soil surface. Prescribed fire generally results in increased vigor of listed plants. Fall burning has been effective in reducing the cover of invasive non-native plants; following treatments, Kincaid's lupine responds with increased leaf and flower production (Wilson et al. 2003).

Heavy equipment used in prescribed burning may cause soil compaction that could adversely affect the Kincaid's lupine and Fender's blue butterfly larvae. These effects will be minimized by project design criteria that limit the timing of burning to after August 15 when Kincaid's lupine has senesced, requires access route planning to avoid Kincaid's lupine, and restricts fire management vehicles to adjacent non-native or resilient vegetation thereby largely avoiding Fender's blue butterfly larvae.

There are likely to be short-term adverse effects to approximately 1/3, or 5 acres. of designated critical habitat within the ROW each year for three years from prescribed fire, as it will temporarily remove cover of native prairie vegetation, a PCE of critical habitat for Fender's blue butterfly and Kincaid's lupine. This is approximately two percent of Fender's blue butterfly critical habitat unit FBB-8. The long-term effect of burning on critical habitat will be strongly positive.

4.2.3. Chemical Treatments

Six chemical applications are allowed under this program: triclopyr, glyphosate, 2,4-D amine, clethodim, sethoxydim, and fluazifop-P-butyl. These chemicals were selected for their low or non-toxic effects to fish, invertebrates, birds and mammals, as well as their targeted nature in addressing certain categories of invasive plants (i.e., specific to trees, grasses, or broadleaf plants). Additional protections, including buffers, application timing restrictions, environmental conditions and application protocols, are also specified to ensure that the six chemical treatments have no effect to listed fish and their critical habitats.

Areal limits for chemical applications have been specified for sites occupied by Fender's blue butterflies to minimize the short-term loss of available habitat. The size of the area treated with herbicides will be no more than one third of the occupied habitat actively used by butterflies. Herbicides may only be used in the fall after Kincaid's lupine have senesced in areas occupied by Fender's blue butterfly; adult butterflies and eggs will not present during this season. It is expected that the loss of Fender's blue butterfly larvae due to herbicide use and trampling of habitat during application will be less than one percent.

Triclopyr will be applied by hand to freshly cut trees and may be spot-applied or sprayed for broadleaf weed control. Application and timing restrictions will ensure that Kincaid's lupine have senesced for the year and that Fender's blue butterfly larvae are in diapause, thereby minimizing or completely avoiding any adverse effects to Kincaid's lupine and butterfly from triclopyr application. Sucoff et al. (2001) studied the effects of an herbicide containing a combination of glyphosate and triclopyr on the development of Karner blue butterfly (*Lycaeides melissa samuelis*) eggs and larvae, a species similar to Fender's blue, and found

egg hatching was significantly lower in eggs that were drenched in the herbicide, but no discernable reduction in pupation or adult survivorship. Therefore, by limiting triclopyr application to periods of Fender's blue butterfly diapause and listed plant senescent periods, minimal, if any, adverse effects to the species are expected.

Glyphosate is the only chemical included in this program that kills both broadleaf and grass species. Application and timing restrictions will ensure that Kincaid's lupine have senesced for the year and that Fender's blue butterfly larvae are in diapause, thereby minimizing or completely avoiding any adverse effects to Kincaid's lupine and butterfly from glyphosate or oryzalin application. A study in the Willamette Valley of the effects of several herbicides, including glyphosate and fluazifop-P-butyl found no reduction in Kincaid's lupine vigor or Fender's blue butterfly populations following applications, and in most trials, the abundance of those species increased (Clark et al. 2004). A study examining the effects of glyphosate on the development of Karner blue butterfly (*Lycaides melissa samuelis*) eggs and larvae, a species similar to Fender's blue, found small negative effects to eggs that were drenched in the herbicide, but no discernable reduction in pupation or adult survivorship (Sucoff et al. 2001). Therefore, by limiting glyphosate application to periods of Fender's blue butterfly diapause and listed plant senescent periods, minimal, if any, adverse effects to the species are expected.

Timing restrictions for application of 2,4-D amine will ensure that Kincaid's lupine are entirely or semi-senesced, and butterfly larvae are in diapause, thereby minimizing or completely avoiding any adverse effects to Kincaid's lupine and butterflies and their critical habitats from 2,4-D amine application.

Clethodim, sethoxydim and fluazifop-P-butyl will be used in upland areas for treating invasive grass species. Kincaid's lupine is a broadleaf species, therefore no adverse effect from treatments using grass-specific chemicals to Kincaid's lupine or its designated critical habitat will occur. These grass-specific chemicals may have adverse effects to diapaused larvae of Fender's blue butterfly, however, where known populations of Fender's blue butterfly exist, application of clethodim, sethoxydim and fluazifop-P-butyl are limited to spot-spraying by hand or wipers set at high elevation to avoid potential effects to Fender's blue butterfly. Initial studies on the effects of grass-specific herbicides on blue butterflies have been equivocal. In one study on Puget blue butterflies (*Icaricia icarioides blackmorei*), effects of Fusilade sprayed on post-diapause larvae were undetectable; in another small herbicide application, Fusilade and Poast were sprayed on cabbage white butterfly (*Artogeia rapae*) larvae, with resulting survivorship of about 90 percent in control plots, but only 60 percent in those treated with Poast or Fusilade (Russell and Schultz, unpublished data cited in Schultz et al. 2007). These studies suggest that there could be some mortality to Fender's blue butterfly larvae from use of grass-specific herbicides. We cannot calculate the number of larvae that will be killed or injured by incidental exposure to grass-specific herbicides, but expect the actual effect to be very low (less than one percent of the larval population) given the targeted application methods specified.

Soil compaction by foot traffic and vehicles used to administer chemical treatments may adversely affect Kincaid's lupine and Fender's blue butterfly larvae. The likelihood of this

effect is expected to be small and will be minimized by limiting foot and vehicle traffic in the area occupied by Kincaid's lupine and Fender's blue butterfly.

The effect of chemical treatments on designated critical habitat for Fender's blue butterfly and Kincaid's lupine is a short-term reduction in some PCEs with clear long-term benefits. Herbicide treatment may temporarily reduce the cover of native prairie species, which would be an adverse effect to a PCE for each of the two species. It may also reduce the availability of nectar sources for Fender's blue butterfly. In the long-term, use of chemical treatments to restore prairie habitat for the Fender's blue butterfly and Kincaid's lupine will benefit these species and increase the availability of habitat containing PCEs by controlling invasive woody species and non-native plants and providing open areas for native plants and nectar sources for Fender's blue butterfly to become established.

4.2.4. Population Augmentation and Reintroduction

Some of the outplanted individual plants may die in the first season after planting, but these losses are expected to be small relative to the number of seedlings that would die in wild populations. Planting seeds or seedlings into restoration sites could have some adverse effect to existing populations of listed species at those sites, although these effects are likely to be minimal as care will be taken to minimize trampling or other disturbance to Kincaid's lupine. Soil compaction by foot traffic may adversely affect Kincaid's lupine and Fender's blue butterfly larvae and eggs. The likelihood of this effect is expected to be insignificant and will be minimized by limiting foot and vehicle traffic in the area occupied by Kincaid's lupine and Fender's blue butterfly.

The requirement to use only seeds or propagules from nearby populations, or populations from similar habitat types, will preclude adverse effects associated with introducing non-compatible populations of cultivated or wild seed into restoration sites.

In general, the effects of population augmentation and reintroduction will be beneficial to the Kincaid's lupine and Fender's blue butterfly, resulting in larger populations and wider distribution. The effects on designated critical habitat for Fender's blue butterfly and Kincaid's lupine will be entirely beneficial, resulting in increased cover of native prairie species.

Outplanting of Non-listed Native Plants

Planting seeds or seedlings of non-listed prairie plants into restoration sites is unlikely to have any adverse effect to existing populations of listed species at those sites. The effects of planting unlisted native prairie species into restoration sites will be entirely beneficial to the Kincaid's lupine and Fender's blue butterfly, resulting in higher quality prairie habitats. The effects on designated critical habitat for Fender's blue butterfly and Kincaid's lupine will be entirely beneficial, resulting in increased cover of native prairie species.

4.2.5. Surveys and Monitoring

There may be minimal effect to Fender's blue butterfly, Kincaid's lupine, and their critical habitat from monitoring or visual surveys for adults, eggs or larvae. Adult butterflies may be harassed by the presence and movement of monitoring staff; because several patches of

Kincaid's lupine and nectar species are nearby, the effects of this are anticipated to be insignificant. Butterfly larvae, eggs, and adults, and lupine may accidentally be trampled by foot traffic; we anticipate this will affect fewer than one percent of the butterfly larvae, eggs, and adults.

Table 2. Summary of BPA's Transmission Line Rebuild Project effects to Fender's Blue Butterfly		
Activity	Anticipated adverse effects	Anticipated beneficial effects
Pole Replacement	Death of larvae due to crushing or trampling by equipment or foot traffic. Loss of host plant and nectar sources. Increased risk of invasive plants that compete for resources with host plant and nectar sources.	None
Road Maintenance		
Staging Areas	None	None
Mowing	Spring	Improved habitat quality, including availability of nectar sources; increased vigor of host plants and availability of oviposition sites; increased reproduction and recruitment of butterflies.
	Summer	
	Fall/Winter	
Weed Treatment & Woody Species Removal	Manual & power tools	Improved habitat quality, including availability of nectar sources; increased vigor of host plants and availability of oviposition sites; increased reproduction and recruitment of butterflies.
	Triclopyr	
	Glyphosate	
	2, 4-D amine	
	Clethodim	
	Sethoxydim	
	Fluazifop-P-butyl	
	Mechanical (sod rolling, tilling, disking)	
Shade cloth & solarization	Not likely to adversely affect.	
Prescribed burning		Death of all or most and larvae in treatment area.
Raking	Death of larvae due to removal of protective thatch layer.	Improved habitat for host plants and nectar plants.
Augmentation & Reintroduction	Potential loss of larvae or eggs due to trampling.	Increase in number of host plants.
Surveys & Monitoring	Potential loss of larvae or eggs due to trampling. Harassment of a few adult butterflies if during flight season.	Improved management of listed species.

Table 3. Summary of BPA's Transmission Line Rebuild Project effects to Kincaid's lupine			
Activity		Anticipated adverse effects	Anticipated beneficial effects
Pole Replacement		Trampling, crushing, and uprooting plants; soil compaction. Increased risk of invasive plants that compete for resources	None
Road Maintenance			
Staging Areas		None	N/A
Mowing	Spring	Removal of above-ground biomass reducing growth and reproductive success that year	Substantial positive effects (increased vigor, reproduction and recruitment) following removal of competitive invasive plants
	Summer		
	Fall/Winter	Not likely to adversely affect	
Weed Treatment & Woody Species Removal	Manual & power tools	Not likely to adversely affect	Substantial positive effects (increased vigor, reproduction and recruitment) following removal of competitive invasive plants
	Triclopyr	Minimal risk of exposure to herbicide which could kill plants	
	Glyphosate		
	2, 4-D amine		
	Clethodim	No effect	
	Sethoxydim		
	Fluazifop-P-butyl	Not likely to adversely affect	
	Mechanical (sod rolling, tilling, disking)		
Shade cloth & solarization	Likely to kill seeds found at or near the surface of the soil		
Prescribed burning			
Raking		Not likely to adversely affect	Removal of thatch will increase available habitat and have substantial positive effects (increased vigor, reproduction and recruitment)
Augmentation & Reintroduction		Possible trampling of lupine	An increase in survivorship over what would have occurred naturally
Surveys & Monitoring		Possible trampling of lupine	Improved management of listed species

Table 4. Summary of BPA Transmission Line Rebuild Project effects to primary constituent elements (PCE's) in Fender's blue butterfly and Kincaid's lupine critical habitat (+ = entirely beneficial effect, 0 = no effect, - = negative effect)

Activity	Fender's blue butterfly Critical Habitat PCE's				Kincaid's lupine Critical Habitat PCE's		
	1	2	3	4	1	2	
Pole Replacement	-	-	-	0	-	-	
Road Maintenance	-	-	-	0	-	0	
Staging Areas	0	0	0	0	0	0	
Mowing	Spring	-	-	-	0	-	-
	Summer	-	-	-	0	-	-
	Fall/Winter	+	+	+	0	+	+
Weed Treatment & Woody Species Removal	Manual & power tools	+	+	+	0	+	+
	Triclopyr	-	0	-	0	-	-
	Glyphosate	-	0	-	0	-	-
	2, 4-D amine	-	0	-	0	-	-
	Clethodim	-	0	-	0	-	-
	Sethoxydim	-	0	-	0	-	-
	Fluazifop-P-butyl	-	0	-	0	-	-
	Mechanical (sod rolling, tilling, disking)	+	+	+	0	+	+
	Shade cloth & solarization	+	+	+	0	+	+
Prescribed burning	-	-	-	0	-	-	
Raking	+	+	+	0	+	+	
Augmentation & Reintroduction	+	+	+	0	+	+	
Surveys & Monitoring	+	+	+	0	+	+	

5. CUMULATIVE EFFECTS

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

Because land-use is restricted in BPA's ROW easements, land-use changes are not likely within the action area, though they may occur adjacent to it. Future State, tribal, local or private action that are reasonably certain to occur in the action area include: implementation of the Benton County Habitat Conservation Plan (HCP), management of the Fitton Green Natural Area, and private landowner and recreational use of the ROW.

Benton County Habitat Conservation Plan: In 2006, Benton County received a grant from the Service to develop an HCP. The HCP will allow the County to expand upon current conservation efforts by increasing restoration opportunities on County and other private lands, provide long-term protection of sensitive species and habitats, and develop a more economical and ecological approach to species conservation and mitigation. The HCP will allow economic development within the county to continue, while at the same time conserving several listed and candidate upland and wet prairie species. The HCP will cover eight endangered, threatened, or rare species that occur in the prairie ecosystems of the county. The covered species include two butterflies, Fender's blue and Taylor's checkerspot butterfly; one bird - Streaked Horned lark; and five plants - Kincaid's lupine, Nelson's checkermallow, Willamette daisy, the Peacock larkspur, and Bradshaw's lomatium. The habitat conservation plan will describe those activities that are likely to affect the species, the steps that will be taken to avoid, minimize and mitigate for such impacts - i.e., the conservation measures, the funding that will be available to implement the conservation measures, and implementation of the HCP, including monitoring and adaptive management. Private landowners are also liable for take of listed animal species. Therefore, the HCP is being developed so that private landowner development activities will be covered by the permit as well. The private landowner will have the opportunity to obtain protection through the County (through a certificate of inclusion) or by going through the Service and obtaining their own permit. Obtaining incidental take coverage under the County's permit will save the private landowner time and expense. However, the private landowner will need to agree to the conservation measures set forth in the plan (Benton County 2008a).

Private landowner use of ROW: Private landowners within the action area use BPA's ROW for various activities including transportation, movement of logs from private timber operations, ATV and other motorized or non-motorized recreation, grazing, and bee-keeping. Individual property owners may conduct other activities within BPA's ROW, though most property owners are supportive of Service recovery efforts in critical habitat within the ROW (Mikki Collins, pers. comm., 2009).

Recreation: The BPA ROW crosses the Fitton Green Natural Area which receives infrequent visitation by recreational hikers, bikers, dogs, and horses. The Fitton Green Open Space Natural Area Management Plan states that opportunities exist within the natural area to preserve oak savannah habitats. Fitton Green ranks among the top 20-30 high quality remnant upland prairie sites in the Willamette Valley, and among the top 5-6 sites in Benton County (Benton County 2008b).

The Benton County Habitat Conservation Plan and management of the Fitton Green Natural Area are likely to have beneficial effects to Fender's, Kincaid's lupine, and Taylor's checkerspot butterfly populations within the action area by protecting habitat and encouraging management and restoration activities.

6. CONCLUSION

After reviewing the current status of Fender's blue butterfly, Kincaid's lupine, designated critical habitat for Fender's blue butterfly and Kincaid's lupine, the current status of the species in the action area, the effects of the proposed action, and the cumulative effects within the action area, it is the Service's conclusion that the action, as proposed, is not likely to jeopardize the continued existence of Fender's blue butterfly or Kincaid's lupine, and is not likely to adversely modify designated critical habitat for Fender's blue butterfly or Kincaid's lupine. Although the activities

will result in adverse effects to the listed species, additional conservation measures are anticipated to offset the loss of individuals and damage to critical habitat.

6.1. This no jeopardy finding is supported by the following:

- Kincaid's lupine, nectar source plants, and secondary host plants will generally be dormant during pole replacement and road maintenance activities, and thus, adverse impacts to Kincaid's lupine will be minimized.
- Habitat restoration and weed management activities have been designed to avoid or minimize adverse impacts to Fender's blue butterfly and Kincaid's lupine. These activities will improve habitat quality and reduce competition from invasive plants, which will result in larger, more robust populations of the listed species.
- Fender's blue butterfly will be in diapause in the litter layer located under Kincaid's lupine plants during pole replacement activities, therefore harassment and mortality of butterflies is expected to be very low.
- Planting of nectar plants and Kincaid's lupine in the conservation easement will improve habitat and benefit the viability of Fender's blue butterfly populations over time.

6.2. This finding of no adverse modification of designated critical habitat is supported by the following:

- The limited construction footprint of 0.006 acre for 2-pole wood structures and 0.2 acre for 3-pole wood structures will minimize the amount of critical habitat that will be impacted by pole replacement activities.
- Road maintenance activities will only impact a small area of critical habitat between Santiam-Toledo transmission line towers 41/5 and 41/7 (less than .17 acre).
- Weed management will ultimately benefit critical habitat for Fender's blue butterfly and Kincaid's lupine by increasing the availability of stepping stone habitat between natal Kincaid's lupine patches necessary for dispersal and connectivity of Fender's blue butterfly and pollinators of Kincaid's lupine and will reduce the occurrence of invasive plants which compete with Kincaid's lupine and native nectar sources.

7. 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 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 further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which

include, but are not limited to, breeding, feeding or sheltering. 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.

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 regulations or in the course of any violation of a state criminal trespass law.

The measures described below are non-discretionary, and must be undertaken by BPA for the exemption in section 7(o)(2) to apply. In addition, BPA must monitor the impact of incidental take and report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

7.1. Amount or Extent of Take Anticipated

The Service anticipates incidental take of Fender's blue butterfly will be difficult to detect because the presence and number of individuals is difficult to determine within a project area and detecting a dead or impaired specimen is highly unlikely. Although the Service anticipates Fender's blue butterfly will be incidentally harassed and harmed (killed or injured) as a result of pole replacement, road maintenance activities, and conservation actions, accurately quantifying these effects is difficult. For instance, larvae and eggs that are trampled, will be extremely difficult to find in order to quantify incidental take. We anticipate the following maximum incidental take of Fender's blue butterfly associated with these activities to be :

- Pole replacement and road maintenance activities may cause death or injury of up to 52 percent, or 337, of the larvae in the action area due to uprooting of Kincaid's lupine plants, crushing of larvae during soil movement or soil compaction by construction equipment and vehicles, and trampling by foot traffic. This estimated take is based on the amount of lupine that may be uprooted or trampled and assumes that Fender's blue butterfly larvae will be evenly distributed throughout the available lupine habitat.
- Mowing, may cause death or injury of fewer than six (one percent) of the larvae in the action area each year due to crushing during soil compaction by mowers and trampling by foot traffic.
- Chemical treatment activities have been designed to avoid harming butterflies and minimize exposure of larval Fender's blue butterflies to herbicides. We cannot calculate the number of larvae that will be killed or injured by incidental exposure to herbicide but given the targeted applications methods specified and the limitation of herbicide use in only one-third of all occupied habitats in the action area, we expect any death or injury to be less than six (one percent) of larvae each year in the action area.

- Prescribed burning may result in 100 percent mortality of larvae at all burned sites. If one-third of all occupied habitats in the action area were burned in one year, approximately 213 larvae could be killed.

7.2. Effect of the Take

In this BO, the Service has determined that this level of anticipated take is not likely to result in jeopardy to the Fender's blue butterfly.

8. Reasonable and Prudent Measures

The Service believes the Minimization and Avoidance Measures described in the proposed actions, the Best Management Practices for Chemical treatments, and the Project Design Criteria provide all needed measures to minimize take. Therefore, the only reasonable and prudent measure we require is a detailed report on the project's implementation and outcome will assist the Service in ensuring that effects to the Fender's blue butterfly are consistent with the biological opinion.

9. Terms and Conditions

Provide an annual report by January 31 on the extent of restoration and weed management activities implemented. The report will document which treatments were applied, the degree to which the project objectives were achieved, any follow-up treatments and reintroductions needed, and document any incidental take of Fender's blue butterflies. Data collected during monitoring will be included with each report. GIS data obtained during the course of data collection will be provided in conjunction with the written report and shall be in the standard format (Shapefile or Feature Class for ArcGIS). The reports will be submitted after the first growing season following completion of the project to the Fish and Wildlife Service's Oregon Fish and Wildlife Office at the following address:

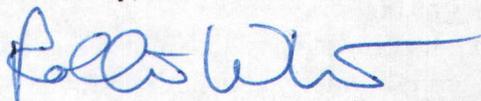
State Supervisor
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, OR 97266

10. REINITIATION –CLOSING STATEMENT

This concludes formal consultation on BPA's proposed rebuild of the Albany-Burnt Woods and Santiam-Toledo transmission lines that may affect Fender's blue butterfly, Kincaid's lupine, and designated critical habitat for Fender's blue butterfly and Kincaid's lupine. As required by 50 CFR Part 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, and operations that are causing such take must be stopped, and formal consultation must be reinitiated.

If you have any further questions regarding this consultation, please contact Kim Garner or Rollie White at (503) 231-6179.

Sincerely,



Acting
for

Paul Henson, Ph.D.
State Supervisor

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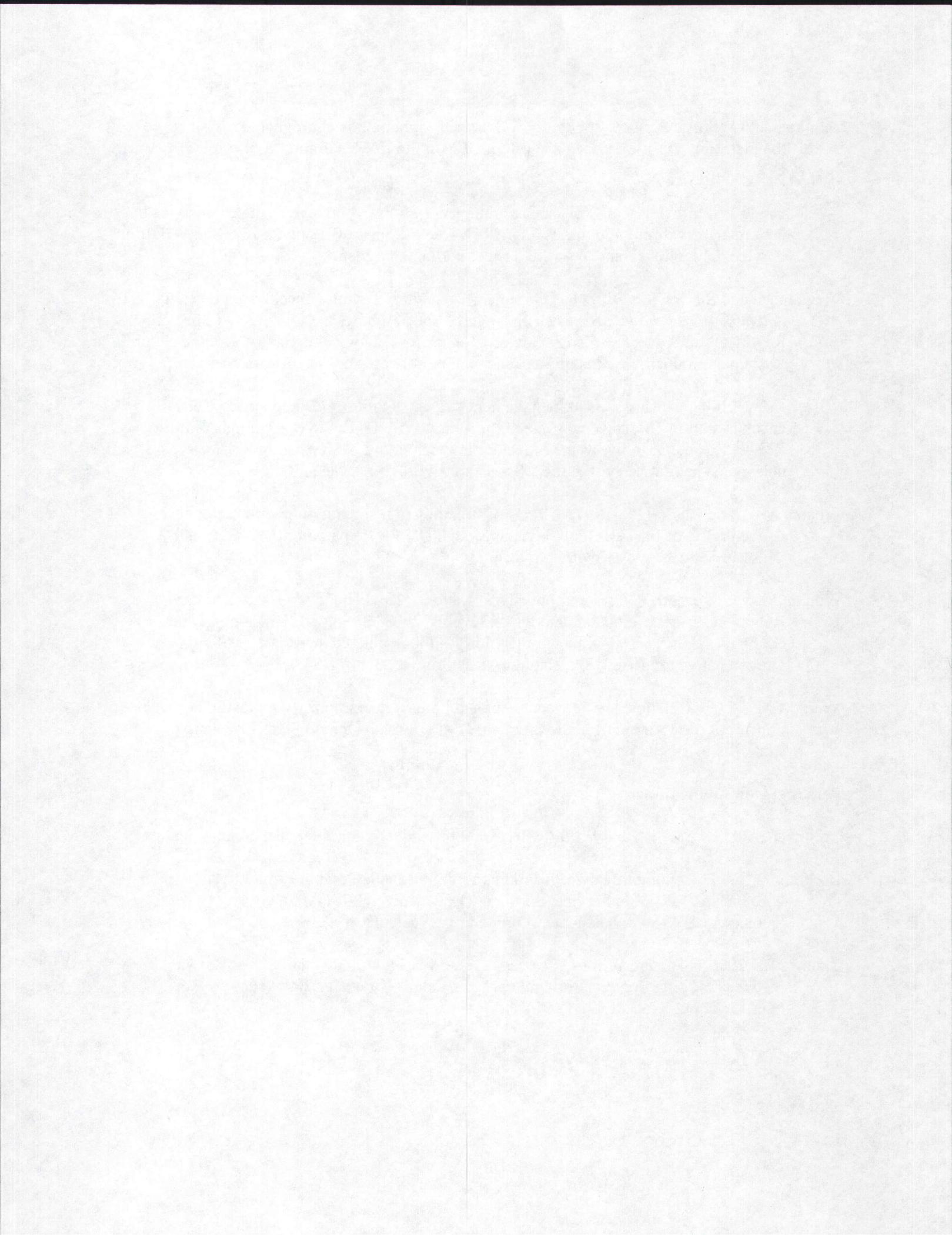
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Appendix 1.

2ACT-41-MIT

A tract of land in the Samuel Huffman Donation Land Claim No. 69,
Township 11 South, Range 6 West of the Willamette Meridian, Benton County,
Oregon described as:

Beginning at the Southwest corner of the Samuel Huffman Donation Land Claim No. 69, evidenced by a 3 inch brass cap, Township 11 South, Range 6 West of the Willamette Meridian, Benton County, Oregon; thence S.89°58'18"E, a distance of 1365.0 feet; thence N.00°39'40"W, a distance of 368.3 feet, to a point on the Northerly right-of-way limit of the Bonneville Power Administration (BPA) Santiam-Toledo Transmission Line easement, acquired and described in Book 162, Page 183, records of said county, and the true point of beginning of the tract herein described; thence along said BPA right of way N.88°03'00"W, a distance of 260.3 feet; thence leaving said BPA right of way N.01°57'00"E, a distance of 333.0 feet to a point on the Southerly right-of-way of the Southern Pacific Railroad; thence N.82°34'41"E, along said Southern Pacific Railroad right-of-way, a distance of 29.9 feet to the beginning of a 3 degree curve to the right; thence along said curve for an arc length of 220.6 feet to a point being N.00°08'35"E, from the true point of beginning; thence leaving said right of way S.00°08'35"W, a distance of 358.5 feet, to the true point of beginning.

Basis of Bearing is the BPA Santiam-Toledo Transmission Line survey, being N.88°03'00"W, as described is said Book 162, page 183. Tract 2ACT-41-MIT contains 2.0 acres more or less.

Appendix 1.

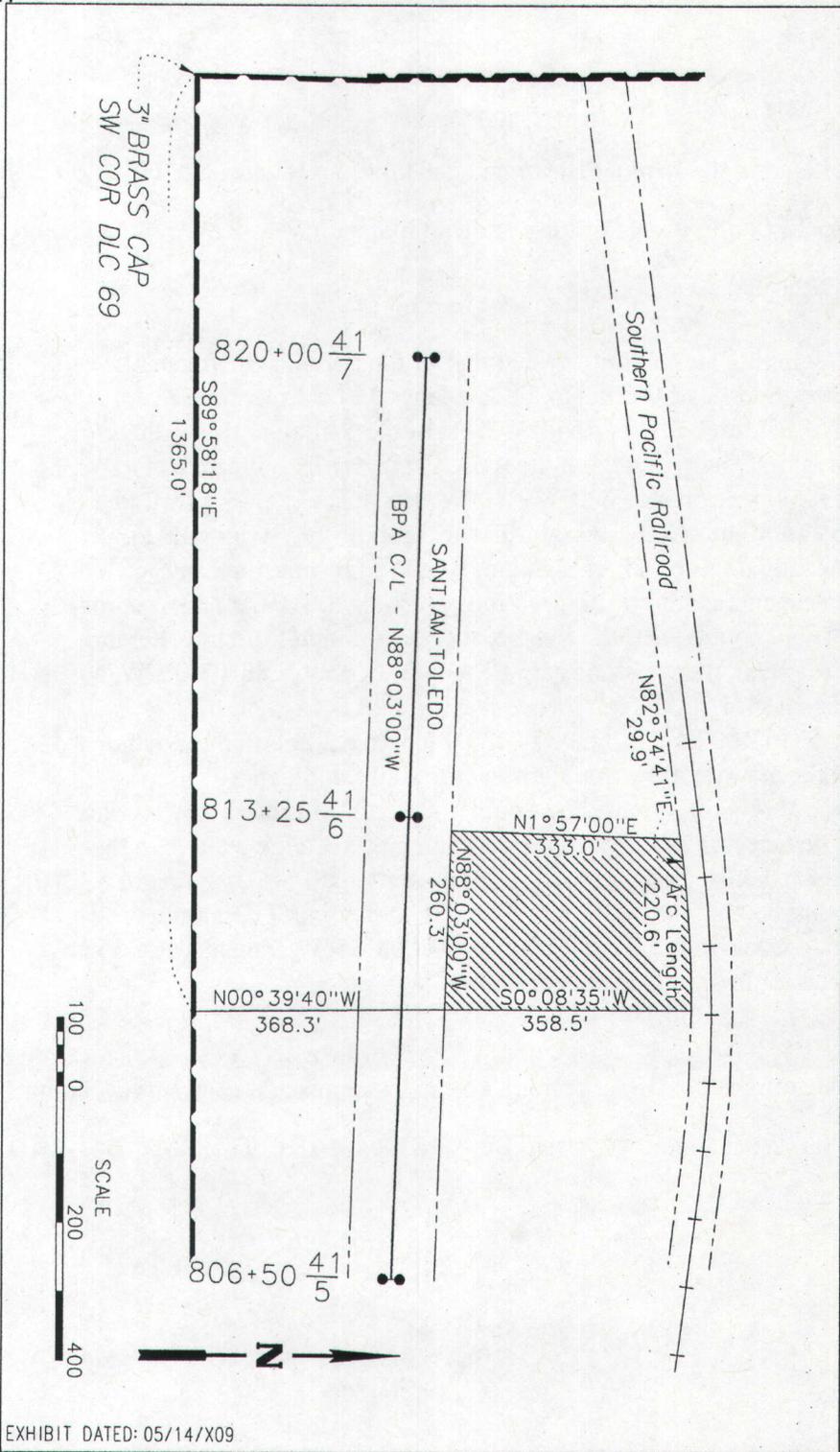


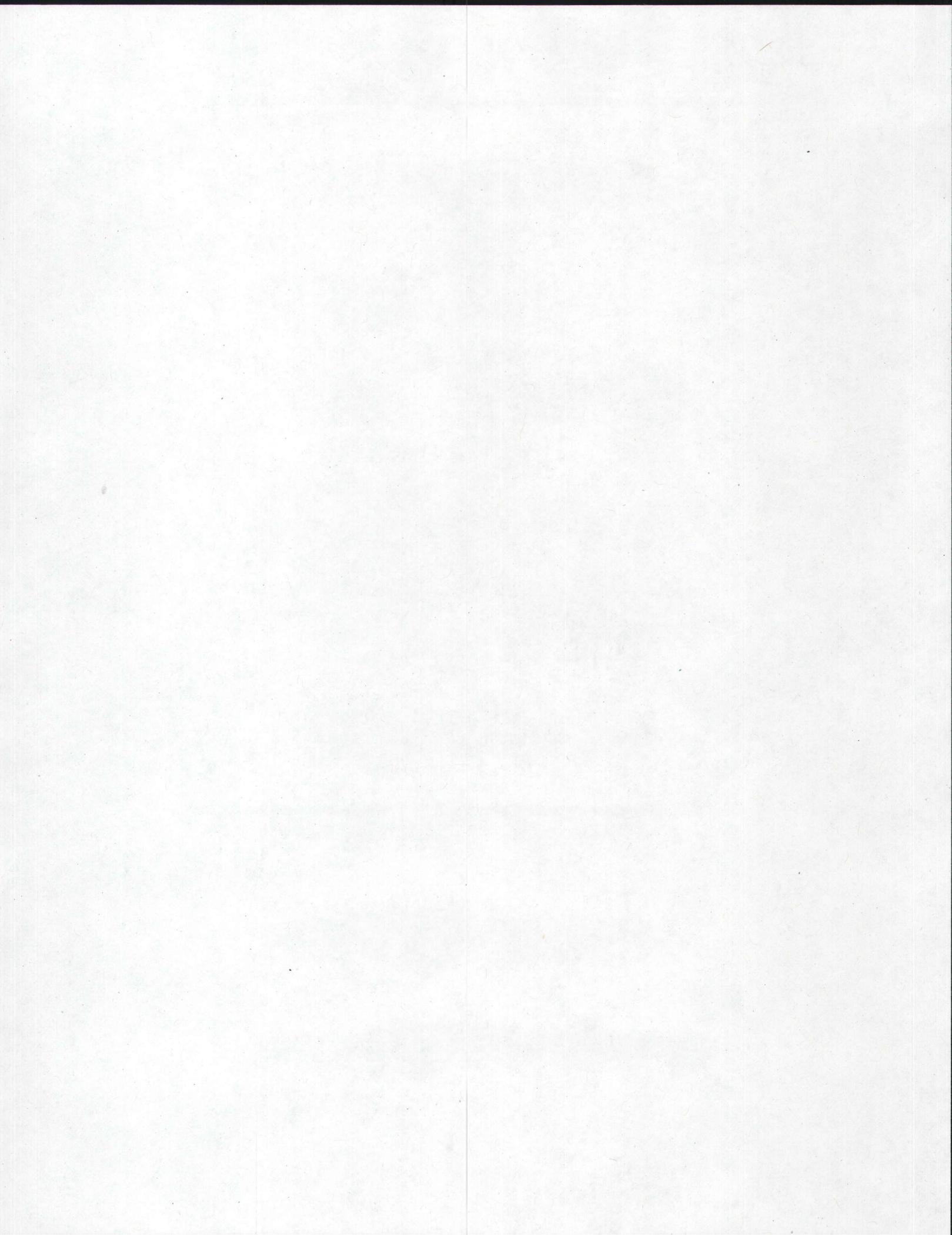
EXHIBIT DATED: 05/14/X09

BONNEVILLE POWER ADMINISTRATION
 ACCESS ACQUISITION EXHIBIT FOR: 2ACT-41-MIT
 SANTIAM-TOLEDO
 SEC 27 TWP 11S RNG 6W WM
 BENTON COUNTY, OREGON

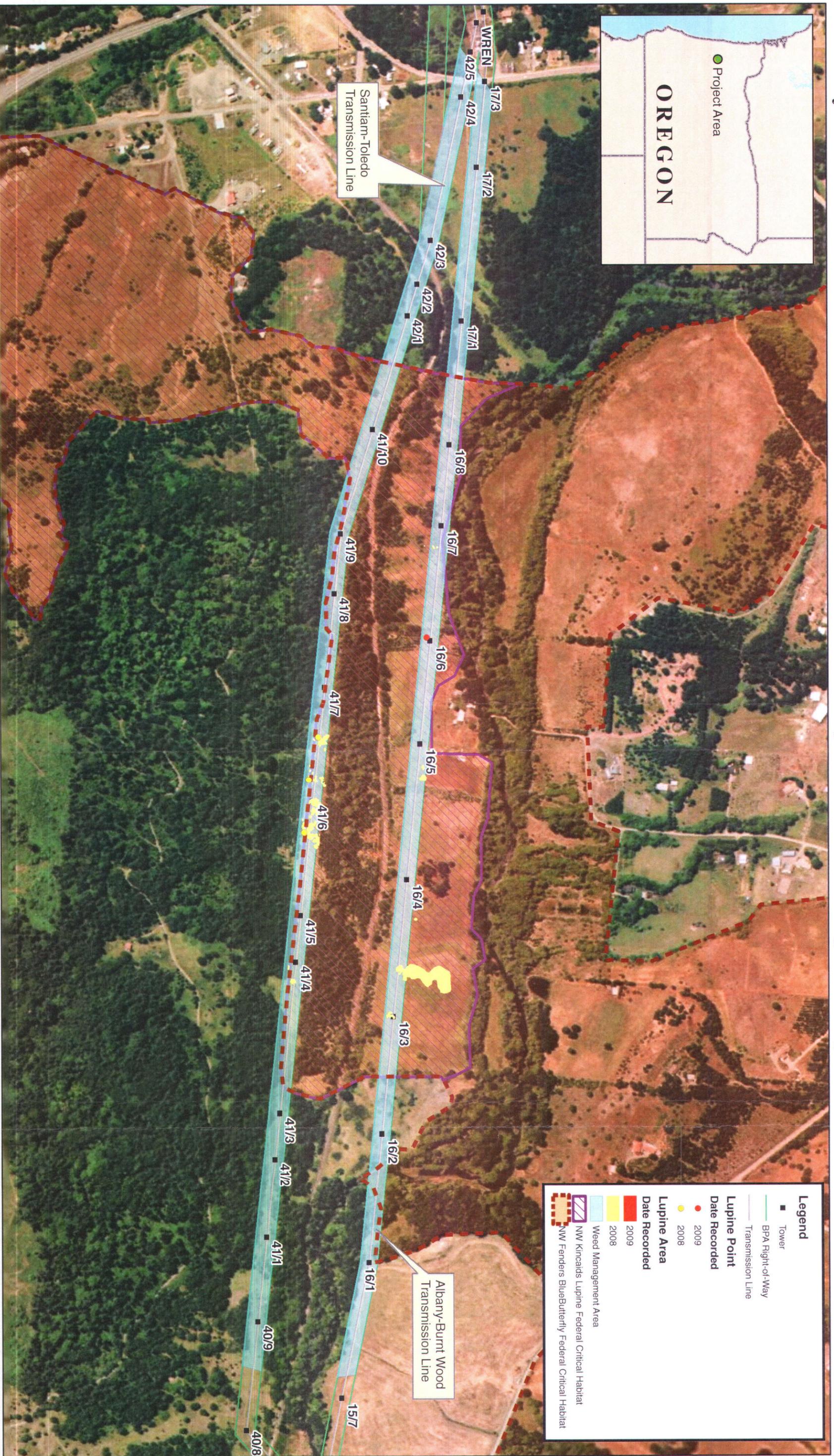
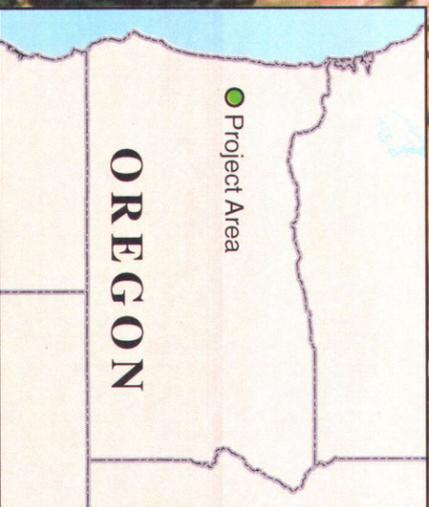
DRAWN: DHB CHECKED: *DAS*

Richard C. Rogers 5/14/09
 SUPERVISOR, SURVEYING AND MAPPING DATE

APPENDIX 2.



Albany-Burnt Wood and Santiam-Toledo Fender's Blue Butterfly and Kincaid's Lupine Mitigation Area Weed Management Map



Legend

- Tower
- BPA Right-of-Way
- Transmission Line

Lupine Point Date Recorded

- 2009
- 2008

Lupine Area Date Recorded

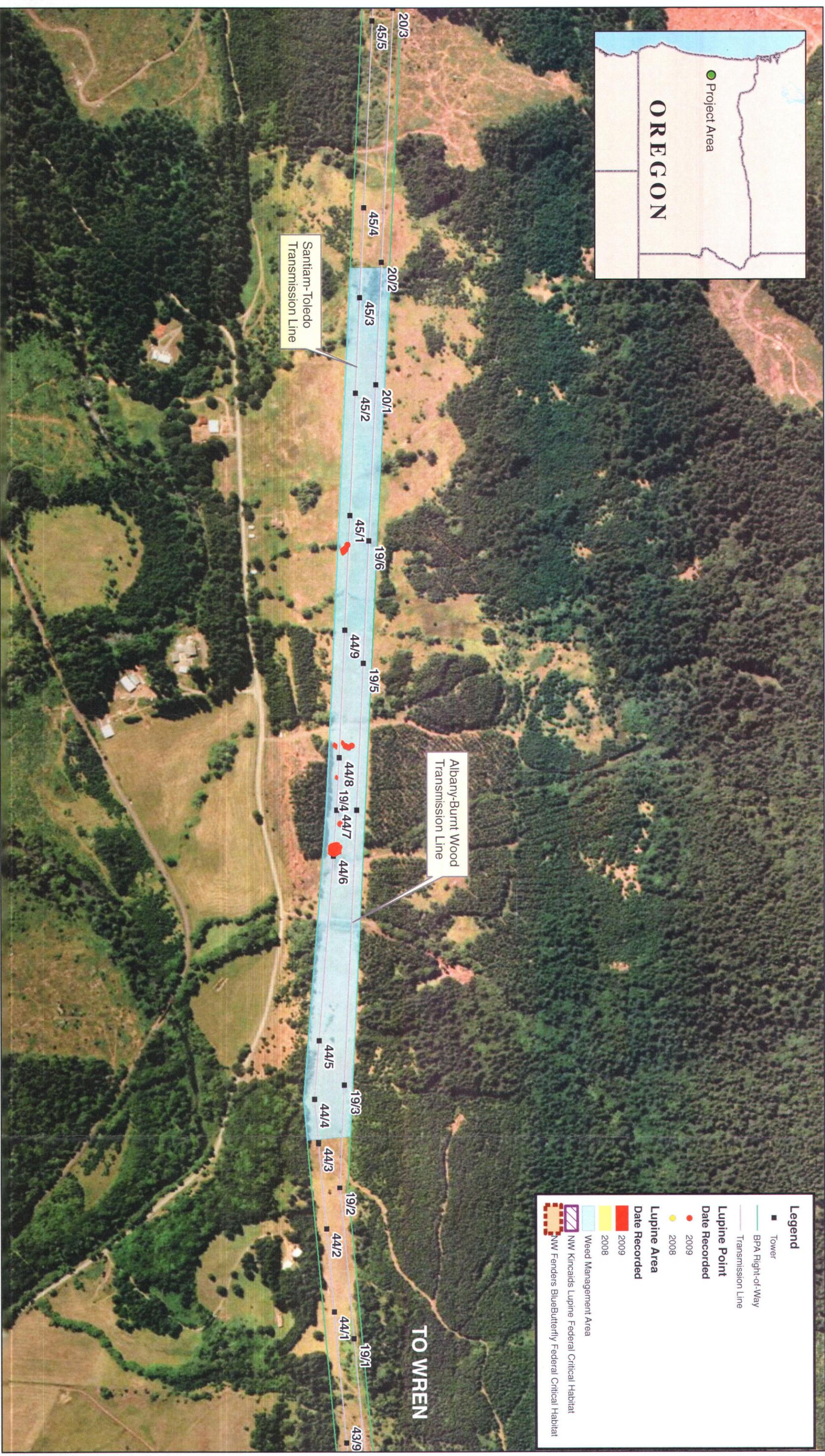
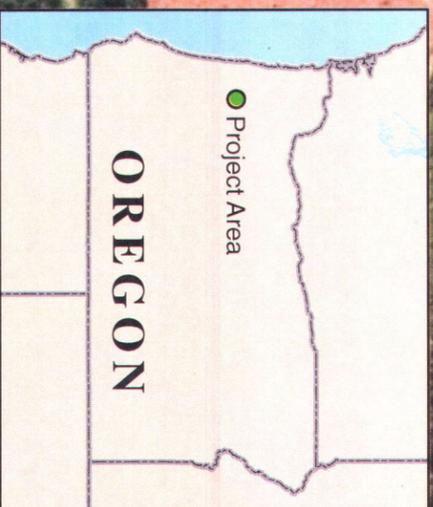
- 2009
- 2008

Weed Management Area

- NW Kincaid's Lupine Federal Critical Habitat
- NW Fender's BlueButterfly Federal Critical Habitat



Albany-Burnt Wood and Santiam-Toledo Fender's Blue Butterfly and Kincaid's Lupine Mitigation Area Weed Management Map



Legend

- Tower
- BPA Right-of-Way
- Transmission Line
- Lupine Point**
- Date Recorded
- 2009
- 2008
- Lupine Area**
- Date Recorded**
- 2009
- 2008
- Weed Management Area
- NW Kincaid's Lupine Federal Critical Habitat
- NW Fender's BlueButterfly Federal Critical Habitat

TO WREN

Santiam-Toledo
Transmission Line

Albany-Burnt Wood
Transmission Line



MAP 2

