Draft Economic Analysis of Critical Habitat Designation for Three Willamette Species

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The purpose of this report is to identify and analyze the potential economic impacts associated with the proposed critical habitat designation (CHD) for the Willamette Valley population of Fender's blue butterfly (*Icaricia icarioides femderi*), Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), and Willamette daisy (*Erigeron decumbens* var. *decumbens*) (hereinafter, FBB, KL, and WD individually, respectively, or "species" collectively).

On January 25, 2000, the U.S. Fish and Wildlife Service (Service) published the final rule listing FBB and WD as endangered and KL as threatened.[1] The rule determined that designation of critical habitat for the species was "prudent," but designation was deferred pursuant to the Listing Priority Guidance to allow the Service to concentrate its limited resources on higher priority critical habitat and other listing actions. A complaint was filed against the Service for failure to designate critical habitat for the species, and in December 2003, a settlement agreement committed the Service to publish a proposed critical habitat rule to the Federal Register by October 15, 2005, and a final rule by October 15, 2006.[2] Following this, the Service published the proposed critical habitat designation ("proposed rule") for the species in the Federal Register on November 2, 2005. The proposed rule is the subject of this report.

In the proposed rule, the Service identified a total of approximately 4,530 acres of critical habitat for the species in Lewis County, Washington, and Yamhill, Polk, Marion, Benton, Linn, Lane, and Douglas counties, Oregon. The proposed rule consists of 3,089 acres, 724 acres, and 718 acres of critical habitat for FBB, KL, and WD, respectively, including approximately 630 acres of overlapping habitat. After accounting for the overlap, the footprint of the proposed CHD is approximately 3,900 acres. The consolidation of units and subunits to remove the overlap is presented in Table 1-1 at the end of Section 1.0. Of the non-overlapping critical habitat acres proposed for designation, 37 percent are Federal lands, two percent are state and local government lands, and the remaining 62 percent are private lands. Map 1 in Appendix D of this report shows the general location of each subunit of the proposed critical habitat.

Figure ES-1 summarizes key findings of the economic analysis. Results are presented in greater detail later in this summary.

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1 U.S. Fish and Wildlife Service, January 25, 2000, "Endangered Status for *Erigeron decumbens* var. *decumbens* (Willamette Daisy) and Fender's Blue Butterfly (*Icaricia icaroides fenderi*) and Threatened Status for *Lupinus sulphereus* ssp. *kincaidii* (Kincaid's Lupine), Final Rule" *Federal Register*, Vol. 65, No. 16, pp. 3875-3890.

2 U.S. Fish and Wildlife Service, November 2, 2005, "Designation of Critical Habitat for the Fender's Blue Butterfly (*Icaricia icarioides fenderi*), *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's Lupine), and *Erigeron decumbens* var. *decumbens* (Willamette Daisy); Proposed Rule" *Federal Register*, Vol. 70, No. 211, p. 66492-66599.

Figure ES-1

KEY FINDINGS[3]

Total impacts: Pre-designation (2000-2006) costs associated with species conservation activities are estimated to range from $5.1 to $9.3 million in 2006 dollars. Potential post-designation (2007-2026) costs are estimated to range between $25.3 and $52.7 million in undiscounted 2006 dollars. In discounted terms, potential economic costs are estimated to be $19.1 to $40.3 million (using a three percent discount rate) and $15.3 to $32.6 million (using a seven percent discount rate). In annualized terms, potential costs are expected to range from $1.3 to $2.7 annually (annualized at three percent) and $1.4 to $3.1 annually (annualized at seven percent).

Activities most impacted: The activities affected by species conservation efforts may include transportation operations, management of public and conservancy lands ("conservation"), development, and the Benton County Habitat Conservation Plan (HCP).

- Transportation Operations: Undiscounted costs are estimated to range between $12.5 and $20.1 million over 20 years, or $9.1 to $14.4 million assuming a three percent discount rate and $6.3 to $9.8 assuming a seven percent discount rate. The amounts are driven by project modification costs associated with the West Eugene Parkway (post-2008) and a new collector street in the City of Dallas (post-2016). These projects comprise more than 75 percent of the transportation-related costs.
- Conservation: Undiscounted costs are estimated to range between $9.1 and $18.7 million over 20 years, or $6.8 to $13.9 million assuming three percent discount rate and $4.8 to $9.9 million assuming a seven percent discount rate. The costs primarily consist of a wetland restoration and enhancement program in west Eugene and brush clearing, mowing, and controlling forest succession and invasive species at Baskett Slough National Wildlife Refuge.
- Development: Undiscounted costs are estimated to range between $1.3 and $11.3 million over 20 years, or $1.3 to $9.9 million assuming three percent discount rate and $2.7 to $11.3 million assuming a seven percent discount rate. The costs consist of losses in land value borne by existing landowners and the impacts will occur immediately after the lands are designated and the development restrictions are announced (in 2006).
- Benton County HCP: Undiscounted costs are estimated at approximately $2.5 million over 20 years, or $2.0 million assuming three percent discount rate and $1.5 million assuming a seven percent discount rate. These include the one-time cost of developing the HCP and the annual cost of managing the HCP.
- **Unit impacts:** Three subunits[4] account for almost 50 percent of total undiscounted high impacts, and seven subunits[5] account for almost 80 percent of total undiscounted high impacts.

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3 Throughout the report, costs are provided in undiscounted 2006 dollars and in present value (PV) and annualized terms using three and seven percent discount rates.

4 The top three subunits include FBB-11D (Turtle Swale, Oxbow West, Balboa, and Isabelle), which contains overlapping habitat with KL-12B (Turtle Swale), KL-12C (West Lawn Cemetery), WD-7B (Vinci, Oxbow West), and WD-8A (West 11, Speedway); the portions of WD-7B that do not overlap with FBB-11D; and FBB-8 (Wren), which includes overlap with KL-9 (also named Wren).

5 The next four most expensive subunits include and FBB-5 (Dallas), which has overlapping habitat with KL-7 (also named Dallas); FBB-10B, which contains overlapping habitat with KL-11D (North Green Oaks) and KL-11E (Fir Butte); FBB-4A (Baskett Butte), which includes overlapping habitat with WD-1A (Baskett Butte North) and WD-1B (Baskett Butte South); and FBB-4B (Baskett Butte).

FRAMEWORK FOR THE ANALYSIS AND REGULATORY ALTERNATIVES CONSIDERED

Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.[6] In addition, this analysis provides information to allow the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[7] This report also complies with direction from the U.S. 10th Circuit Court of Appeals that, when deciding which areas to designate as critical habitat, the economic analysis informing that decision should include "co-extensive" effects.[8]

To comply with the 10th Circuit's direction to include all co-extensive effects, this analysis considers the potential economic impacts of efforts to protect the species and their habitat (hereinafter referred to collectively as "species conservation activities") in potential critical habitat. It does so by taking into account the cost of conservation-related measures that are likely to be associated with future economic activities, which may adversely affect the habitat within the proposed boundaries. Actions undertaken to meet the requirements of other Federal, state, and local laws and policies may afford protection to the species and their habitat, and thus contribute to the efficacy of critical habitat-related conservation and recovery efforts. Thus, the impacts of these activities are relevant for understanding the full impact of the proposed designation.

RESULTS OF THE ANALYSIS

The geographic area of the analysis includes the areas proposed for CHD. The analysis focuses on activities within or affecting these areas, and presents impacts at the lowest level of resolution feasible, given available data. Impacts are reported for each subunit identified in the proposed rule; however, significant overlap occurs between the proposed CHD for FBB, KL, and WD. This overlap creates an accounting issue for the economic analysis, a report for a single rule proposing critical habitat for three species, as economic impacts between overlapping subunits

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6 16 U.S.C. §1533(b)(2).

7 Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001; 5. U.S.C. §§601 *et seq*; and Pub Law No. 104-121.

8 In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

are not always additive. In fact, for this proposed CHD, it is expected that measured impacts in most of the overlapping areas will be joint costs; the resulting impacts will likely be the same, for example, whether one of a pair of overlapping subunits, or both, are added to the existing designation. Where areas of overlapping habitat exist, the economic analysis combines the areas of overlap and reports the costs only once in order to avoid double counting common impacts. The methodology for accounting for the cost of species conservation activities within the areas of overlapping habitat is described in Section 1.2.6.

EFFICIENCY IMPACTS

Efficiency impacts are separated into costs affecting transportation operations, costs to public and conservation land owners and managers, costs associated with land development activities; costs of developing the Benton County HCP, and administrative costs related to the section 7 consultation process. Table ES-1 provides detailed pre- and post-designation cost information for all activities. Pre- and post-designation costs are provided in undiscounted 2006 dollars. Post-designation costs are also provided in present value (PV) and annualized terms using three and seven percent discount rates.

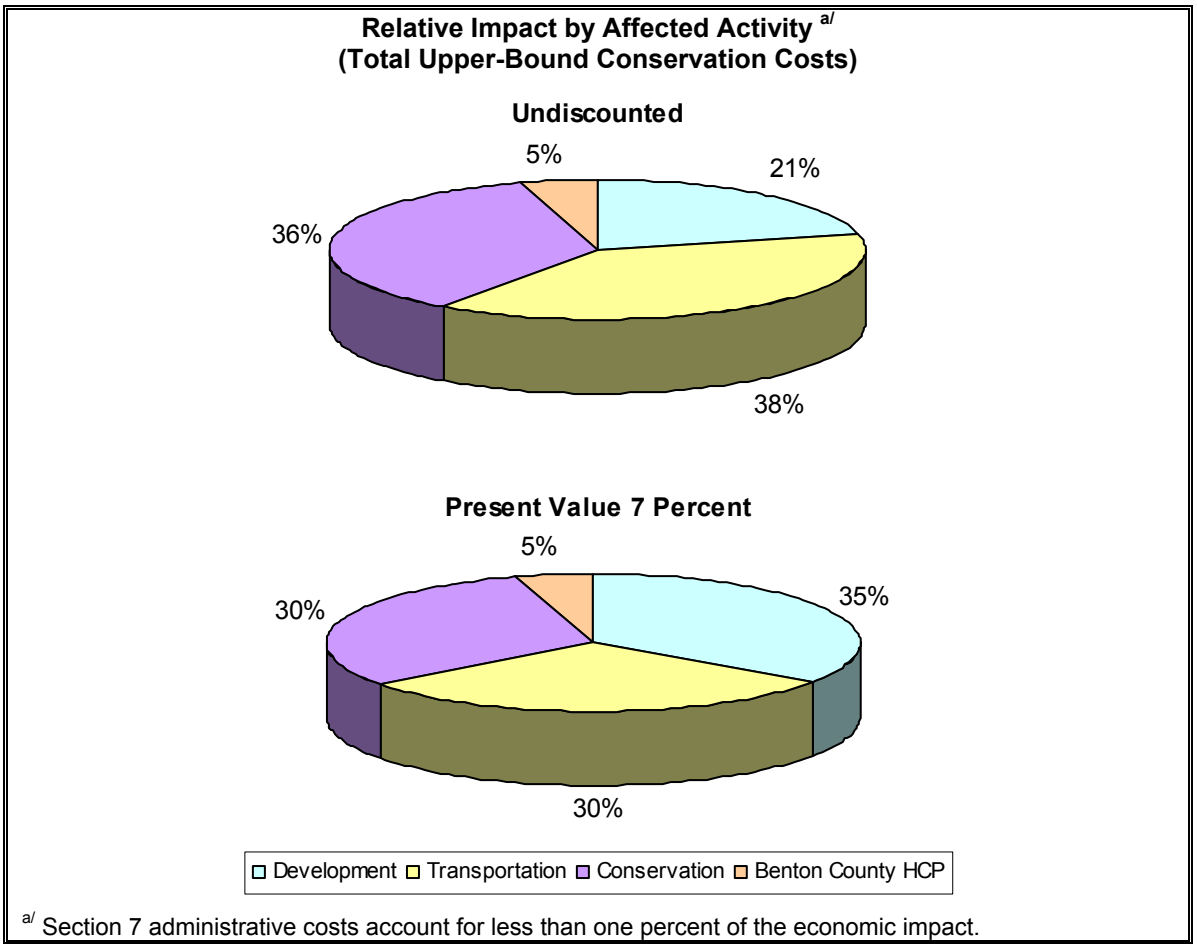
Table ES-1
Summary of Conservation Costs, by Activity ($1,000s)

Activity	Pre-Designation (Total) (2000-2006)	Post-Designation (Total) (2007-2026)			Post-Designation (Annualized)	
		Undiscounted	3%	7%	3%	7%
Transportation	$543 - $787	$12,480 - $20,078	$9,116 - $14,437	$6,319 - $9,815	$612 - $971	$595 - $926
Conservation	$4,022 - $7,744	$9,101 - $18,721	$6,771 - $13,927	$4,825 - $9,917	$454 - $937	$453 - $938
Development	$0	$1,326 - $11,269	$1,326 - $9,879	$2,713 - $11,269	$89 - $667	$256 - $1,064
Benton HCP	$281	$2,399 - $2,530	$1,872 - $1,993	$1,425 - $1,536	$127 - $135	$136 - $145
Section 7 Admin	$276 - $482	$41 - $61	$34 - $51	$29 - $44	$3	$2 - $4
Total	**$5,122 - $9,294**	**$25,347 - $52,659**	**$19,119 - $40,287**	**$15,311 - $32,581**	**$1,285 - $2,710**	**$1,442 - $3,077**

Note: Results are shown in $1,000s. Numbers may not sum due to rounding.

Figure ES-2 illustrates the distribution of efficiency impacts across these activities, presenting the relative impacts by affected activity using the upper-bound future undiscounted cost figures and the PV of upper-bound future cost figures discounted at seven percent.[9] It is important to note that the timing of impacts across activities varies in this analysis. Development impacts are front-loaded over the 20-year forecast period, while transportation and conservation are back-loaded. Thus, as indicated in Figure ES-2, relative impacts by activity vary depending upon whether discounted or undiscounted figures are employed. For example, the relative percentage impacts by activity are as follows for undiscounted, PV three percent, and PV seven percent results, respectively: Transportation (38 percent, 35 percent, and 30 percent); Conservation (36 percent, 35 percent, and 30 percent); Development (21 percent, 25 percent, and 35 percent).

Figure ES-2



a/ Section 7 administrative costs account for less than one percent of the economic impact.

[9] The relative impacts by affected activity using the upper-bound future cost figures discounted at a three percent will fall within the range of percentages bounded by the undiscounted and PV seven percent scenarios.

The relative ranking by unit also changes. For example, the seven highest-impact units change in ranking depending upon which results are used (see Figures ES-3 and ES-4 at the end of the executive summary). Thus, as a result of timing differences, the undiscounted figures "reduce" impacts to "development" relative to other activities (i.e., development moves from 35 percent of total impacts in PV terms at a seven percent discount rate to 21 percent of total impacts in undiscounted terms), and thereby lower the relative rank of units where development impacts predominate. This outcome results from the fact that undiscounted figures effectively place more weight on impacts occurring further out into the future.

Table E-1, located at the beginning of Appendix E, provides detailed pre- and post-designation cost information for all activities on a unit-by-unit basis. Pre- and post-designation costs are provided in undiscounted 2006 dollars. Post-designation costs are also provided in PV and annualized terms using three and seven percent discount rates. The costs are presented by subunit, because this provides the greatest resolution for the decision-maker given the available data used to estimate costs. Maps showing the location of the subunits are provided in Appendix D of this report.

Transportation

The analysis of economic effects of species conservation on transportation operations focuses on the cost of species conservation activities incurred by state transportation departments and affected local (i.e., county and city) governments in implementing transportation projects and conducting ongoing road maintenance activities. Pre-designation costs are estimated at $543,000 to $787,000 in 2006 dollars. Post designation costs are expected to range from $12.5 to $20.1 million in undiscounted 2006 dollars. In PV terms, this range is equivalent to $9.1 to $14.4, assuming a three percent discount rate, and $6.3 to $9.8 million, assuming a seven percent discount rate. The impacts break down is as follows:

- Projects that entail physical improvements to transportation infrastructure include the West Eugene Parkway (WEP) and a new collector road for the City of Dallas (subunit FBB-5, including KL-7). Both cities are evaluating proposed changes to the roadway designs in order to avoid the proposed critical habitat, including roadway relocation and roadway elevation. Future species conservation costs associated with these projects may total between $10.5 and $15.5 million in undiscounted 2006 dollars, accounting for more than 75 percent of all transportation-related costs. The WEP-related costs are allocated proportionally to the affected subunits (FBB-11D, including KL-12B & C, WD-7B and WD-8A, and WD-7B). Other species conservation activities include habitat delineation and plant surveys for three bridge repair and maintenance projects located in the vicinity of the proposed CHD under the Oregon Transportation Investment Act (OTIA) III Statewide Bridge Delivery Program, and plant surveys and potential mitigation or project design changes related to improvements to Green Hill Road near the City of Eugene.

- Species conservation activities could have a minor adverse effect on three categories of routine road maintenance operations. First, the analysis considers the cost of species conservation activities (i.e., habitat maintenance, monitoring, and employee training) incurred by ODOT as part of its Special Management Area Program. Second, the analysis assumes that all jurisdictions that contain proposed critical habitat for FBB will obtain a Section 10(a)(1)(A) Recovery Permit for vegetative maintenance along roadways and estimates the costs of obtaining and following the provisions of the permit. The local jurisdictions affected by this permit include Yamhill, Polk, Benton, and Lane counties and the City of Dallas. Last, the analysis considers the cost of other road maintenance-related species conservation activities, such as signage and employee training, in jurisdictions not covered by a Section 10(a)(1)(A) Recovery Permit. Future species conservation costs associated with road maintenance may total between $2.0 and $4.5 million in undiscounted 2006 dollars, accounting for less than 25 percent of all transportation-related costs.

Conservation

Federal agencies, local governments, non-profit organizations, a university, and private corporations are all performing management activities specifically for the conservation of the species. This analysis attempts to quantify the costs associated with these conservation efforts, which may range from hand-pulling invasive species to purchasing a conservation land easement, but generally entail invasive species eradication, mowing to maintain a short-grass stature, and curbing woody succession.

Federal agencies and local governments are expected to bear approximately 90 percent of total impacts. The Bureau of Land Management (BLM) and the City of Eugene, Oregon, are spending $250,000 to $650,000 annually (approximately 70 percent of the total conservation impacts) on a wetland restoration and enhancement program in west Eugene, and the Service is spending $100,000 to $150,000 annually (approximately 20 percent of total conservation impacts) at Baskett Slough National Wildlife Refuge (BSNWR) on brush clearing, mowing, and controlling forest succession and invasive species. Pre-designation costs are estimated at $4.0 to $7.7 million in 2006 dollars. Post designation costs are expected to range from $9.1 to $18.7 million in undiscounted 2006 dollars. In PV terms, this range is equivalent to $6.8 to $13.9 million, assuming a three percent discount rate, and $4.8 to $9.9 million, assuming a seven percent discount rate.

Development

Species conservation activities may influence land values within the proposed CHD. The owner of a parcel of private land containing the proposed CHD may face certain land use restrictions that preclude, or alter development on some or all of the parcel, leading to a reduction in the value of the property. However, there is uncertainty regarding the extent to which a future development

project would be impacted by species and habitat conservation. Although development-related activities are identified in the proposed rule as having significant impact on the species, there are no development-related section 7 consultations or HCPs on which to base a credible estimate of how such development projects would avoid, compensate, or mitigate for their impact on the species' habitat. Consequently, this economic analysis estimates the economic value of the areas being proposed for critical habitat, absent any conservation-related impacts.

In this economic impact analysis, development impacts are presented based on the assumption that due to the small, tightly defined boundaries of the proposed CHD, it would be difficult for development to proceed without adversely modifying critical habitat. To the extent that development is excluded from the proposed CHD, the impact to the landowner[10] would be the total estimated value of future development.[11] To the extent that development is allowed within the proposed CHD, the estimated impacts are overstated. If development is prohibited on only a portion of a subunit, the cost of the development restriction can be calculated proportionally.

Post designation costs are expected to range from $1.3 to $11.3 million in undiscounted 2006 dollars. In PV terms, this range is equivalent to $1.3 to $9.9 million (assuming a three percent discount rate) and $2.7 to $11.3 million (assuming a seven percent discount rate). The total economic impacts are not uniformly distributed across the habitat subunits. In fact, there is a large variation in economic impacts between subunits that contain privately owned developable land. Land use restrictions are expected to have the greatest economic impact in subunit FBB-8 (Wren), which includes overlap with KL-9 (also named Wren). This subunit includes the largest area of privately owned land (713 acres). Subunit FBB-4B (Baskett Butte) contains the next largest area of private land within the CHD (327 acres). Together, these subunits contain almost 50 percent of the private land within the CHD and account for approximately 45 percent of the development-related economic impacts. In fact, seven subunits comprise almost 80 percent of the estimated impacts to development. These subunits are identified in Figure 4-1 and highlighted in green in Table E-3 in Appendix E. Conversely, the total economic impact of species conservation activities is expected to be zero in subunits FBB-11E, KL-5 (Sheridan), KL-14A (China Ditch), KL-16A (Callahan Ridge), WD-1B (Baskett Butte South), WD-4B (Bald Hill South), WD-6B (East Coyote North), and WD-8E (Willow Creek Bailey Hill), as there is no private land in these subunits.

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[10] In total, 195 private individuals own approximately 2,120 acres in the proposed CHD; 87 individuals in Lane County; 41 in Benton County; 28 in Polk County; 16 in Yamhill County; 13 in Linn County; 5 in Douglas County; 3 in Marion County; and 2 in Lewis County.

[11] The agriculture component of land value (i.e., pasture) represents the baseline land value absent species conservation activities.

Benton County HCP

Benton County, Oregon, is in the process of developing a HCP to protect FBB and its prairie habitat. The HCP will cover future residential development projects, as well as other development activities such as road projects. It is anticipated that work on the HCP will begin in spring 2006 and take about three years to complete.

The HCP-related costs considered in this analysis can be broken down into three component parts: (1) the cost of developing the HCP (approximately $900,000 to $1 million), (2) the cost of acquiring conservation easements (approximately $1 million), and (3) the annual cost of managing the HCP (approximately $100,000 per year). Only the costs associated with developing and managing the HCP are reported in the results of the HCP section of the economic analysis. The cost of acquiring conservation easements is already captured in the results of the development section of the analysis, which estimates the cost of land use restrictions imposed on landowners by conservation efforts associated with the species (i.e., the exclusion of development from the proposed designation). The lost land value estimated in the development section represents the underlying economic value of the conservation easements that the County will purchase under its HCP program.[12] Pre-designation costs are estimated at $281,000 in 2006 dollars. Post designation costs are expected to total approximately $2.5 million in undiscounted 2006 dollars. In PV terms, this is equivalent to $1.9 million, assuming a three percent discount rate, and $1.5 million, assuming a seven percent discount rate.

Section 7 Consultations

Since the listing of the species in 2000, twenty-two formal, six informal, and three technical assistance consultations have been completed regarding the species. Of the thirty-one consultations, eighteen covered restoration actions and research activities that benefit the species (including ten internal consultations on Section 10(a)(1)(A) Recovery Permits), seven involved programmatic consultations, or consultations on broader programs or terms and conditions for programs rather than consultations on specific projects, four were consultations on specific projects (including two formal and two technical assistance consultations), and one involved a bull trout-related consultation. Other consultations expected to take place in 2006, prior to the finalization of the CHD, include a formal consultation with ODOT on the West Eugene Parkway, a programmatic formal consultation with ODOT on its statewide emergency maintenance and repair program (Emergency/Urgency Cut/Fill Program), and five consultations with county and city governments on Section 10(a)(1)(A) Recovery Permits for vegetative maintenance along roadways.

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[12] To account for both the lost land value associated with restricting development from a landowner's property and the cost to the County of purchasing conservation easements to preclude development from that same piece of property would double count the cost of species conservation.

In addition to the seven consultations expected during 2006, three formal consultations are anticipated during 2007-2026; a programmatic consultation with ODOT on the OTIA III Statewide Bridge Delivery Program, a consultation with Benton County on a future HCP, and a consultation with the City of Dallas on a new collector street. Pre-designation costs are estimated at $276,000 to $482,000 in 2006 dollars. Post designation costs are expected to range from $41,000 to $61,000 in undiscounted 2006 dollars. In PV terms, this range is equivalent to $34,000 to $51,000, assuming a three percent discount rate, and $29,000 to $44,000, assuming a seven percent discount rate.

Amenity Values Associated with Critical Habitat Designation

Conservation activities for the three Willamette species may maintain or generate amenity values to adjacent property owners and residents. Amenity values are defined as beneficial impacts arising from with recreational opportunities, open space, visual amenities, and an aesthetically pleasing ecosystem, which the lands being proposed as critical habitat may be able to provide in an unaltered state. In general, amenities values will be greater for critical habitat located in urban areas with considerable development densities as these areas have relatively less open space providing such amenity services. However, the land designated as critical habitat for the three Willamette species is primarily located in rural areas, with abundance of open space and natural amenities. Due to the presence of close substitutes for the designated area, the designation is unlikely to generate any meaningful amenity benefit within the timeframe of this analysis. Thus, we have not quantified amenity value as a component of economic impacts associated with critical habitat designation for the three Willamette species.

Areas Most Likely to Experience Impacts

Figures ES-3 and ES-4 illustrate the distribution of efficiency impacts across proposed CHD subunits, presenting the ranking of proposed CHD subunits by cost using the upper-bound future undiscounted cost figures and the PV of upper-bound cost figures discounted at seven percent. Figures ES-5 and ES-6 then present the location of the seven most costly subunits and the relative impact by affected activity within each of the seven subunits, undiscounted and discounted at seven percent, respectively. Together, these seven subunits account for more than 75 percent of total impacts. As shown, impacts are greatest in three subunits:

1. FBB-11D (Turtle Swale, Oxbow West, Balboa, and Isabelle), which includes overlapping habitat with KL-12B (Turtle Swale), KL-12C (West Lawn Cemetery), WD-7B (Vinci, Oxbow West), and WD-8A (West 11, Speedway). Costs in this subunit are driven by proposed changes to the WEP roadway design in order to avoid critical habitat that intersects the proposed project alignment, and a wetland restoration and enhancement program (conservation activities include, but are not limited to, reducing fuel loads, eradicating invasive and exotic species, and curbing wood succession) implemented by BLM and the City of Eugene.

2. The portions of WD-7B that do not overlap with FBB-11D. Similar to subunit FBB-11D above, costs in this subunit are driven by proposed changes to the WEP roadway design in order to avoid critical habitat that intersects the proposed project alignment and on the wetland restoration and enhancement program implemented by BLM and the City of Eugene.

3. FBB-8 (Wren), which includes overlap with KL-9 (also named Wren). Costs in this subunit are driven by development impacts as this subunit includes the largest area of privately owned agriculture and forest land (713 acres) within the proposed CHD. Considering this subunit also contains almost 90 percent of the proposed CHD land area in Benton County, it is also expected to bear most of the costs of developing the Benton County HCP and most of the costs related to conducting routine road maintenance activities in FBB habitat under Section 10(a)(1)(a) permit guidelines.

These three subunits account for 45 to 60 percent of total impacts. The next four most costly subunits account for another 20 to 30 percent of total impacts. These subunits include:

4. FBB-5 (Dallas), which has overlapping habitat with KL-7 (also named Dallas). Costs in this subunit are driven by changes in roadway design to avoid critical habitat that intersects a proposed new collector street in the City of Dallas.

5. FBB-10B, which contains overlapping habitat with KL-11D (North Green Oaks) and KL-11E (Fir Butte). Costs in this subunit are driven by the wetland restoration and enhancement program implemented by BLM and the City of Eugene and on conservation activities conducted by ACOE, including hand-pulling exotic and invasive species, applying herbicides to invasive species, and annual mowing, on the portions of this subunit located adjacent to the east banks of Fern Ridge Reservoir. Development impacts make up most of the remaining costs, as this subunit contains the fourth largest area of private agriculture and forestland within the proposed CHD (155 acres).

6. FBB-4A (Baskett Butte), which includes overlapping habitat with WD-1A (Baskett Butte North) and WD-1B (Baskett Butte South). Considering this subunit contains more than 85 percent of the proposed CHD land area in the BSNWR, it is expected to bear most of the costs of the Service's management and restoration program for FBB (including brush clearing, mowing, and controlling forest succession and invasive species) at BSNWR. Development impacts make up most of the remaining costs as this subunit contains the third largest area of private agriculture and forest land within the proposed CHD (209 acres).

7. FBB-4B (Baskett Butte). Costs in this subunit are driven by development impacts since it contains the second largest area of private agriculture and forest land within the proposed CHD (327 acres).

Per Acre Costs

Irrespective of whether future costs are discounted or undiscounted, four of the subunits have higher per acre costs relative to the other subunits (see Figures ES-3 and ES-4). The most costly subunit on a per acre basis is FBB-5 (Dallas), which has overlapping habitat with KL-7 (also named Dallas). This subunit is also among the seven most costly subunits. Driving the costs in this small sized subunit (approximately 12.3 acres) is a roadway design to avoid critical habitat that intersects a proposed new collector street in the City of Dallas. The next most costly subunit on a per acre basis is KL-5 (Sheridan). This small subunit (1.7 acres) is owned by ODOT and falls under ODOT's Special Management Area (SMA) program (conservation activities include establishing and maintaining the SMA, signage, monitoring and reporting, and maintenance personnel training) to conserve special-status plant species and other sensitive resources located on lands under the jurisdiction of ODOT.

The two remaining subunits with higher per acre costs relative to the other subunits are FBB-11D (Turtle Swale, Oxbow West, Balboa, and Isabelle), which includes overlapping habitat with KL-12B (Turtle Swale), KL-12C (West Lawn Cemetery), and the portions of WD-7B that do not overlap with FBB-11D. The costs in these subunits are driven by proposed changes to the WEP roadway design to avoid critical habitat that intersects the proposed project alignment and on the wetland restoration and enhancement program implemented by BLM and the City of Eugene. These subunits are also among the seven most costly subunits.

DISTRIBUTIONAL IMPACTS

This study also analyzes whether a particular group or economic sector bears an undue proportion of the impacts. Specifically, Appendix A describes potential impacts to small entities and potential impacts on energy availability.

Figure ES-3
Economic Impacts by Habitat Subunit: Total Costs and Dollars per Acre (2006$)
(Total Upper-Bound Undiscounted Impacts)

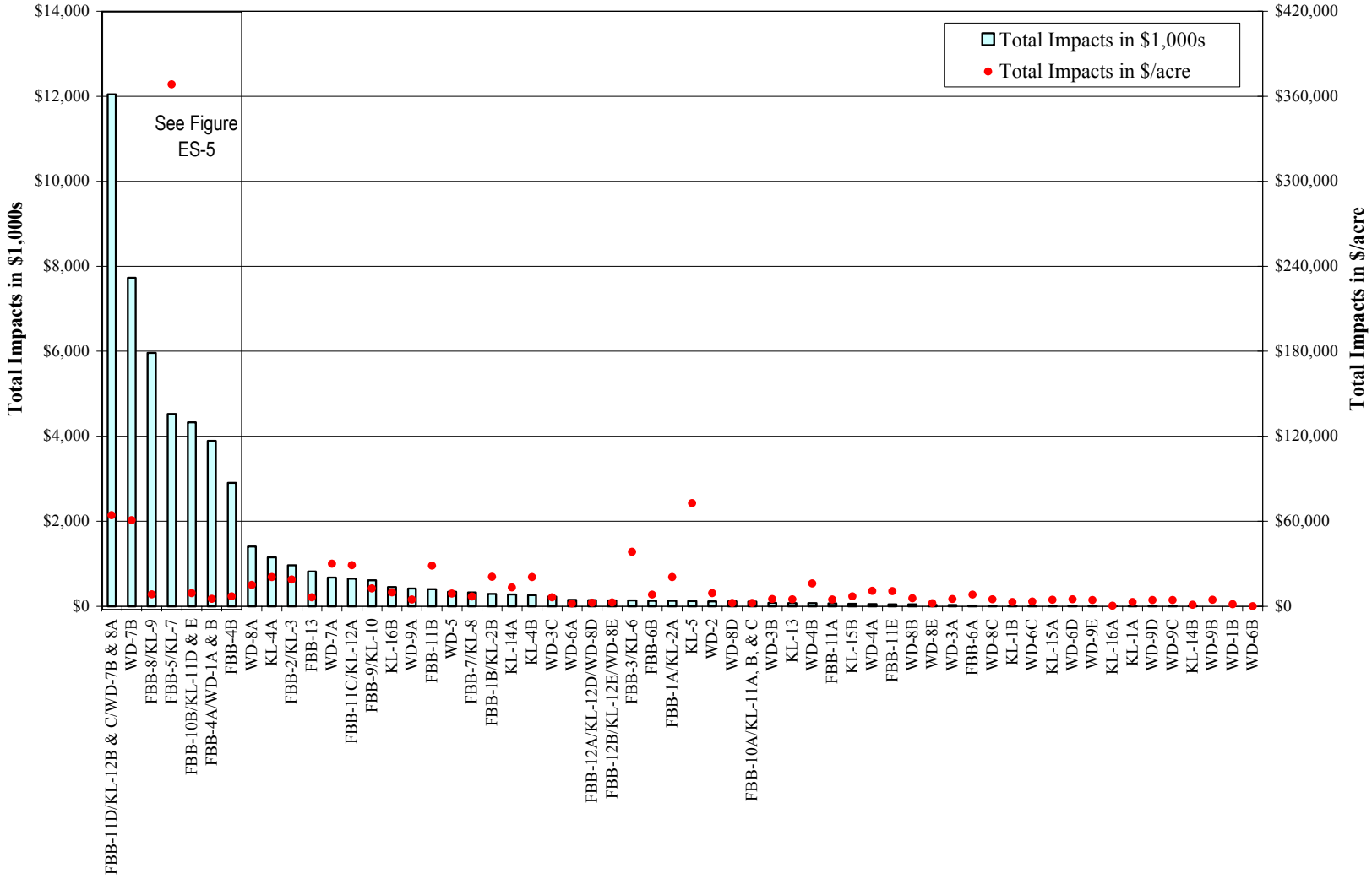
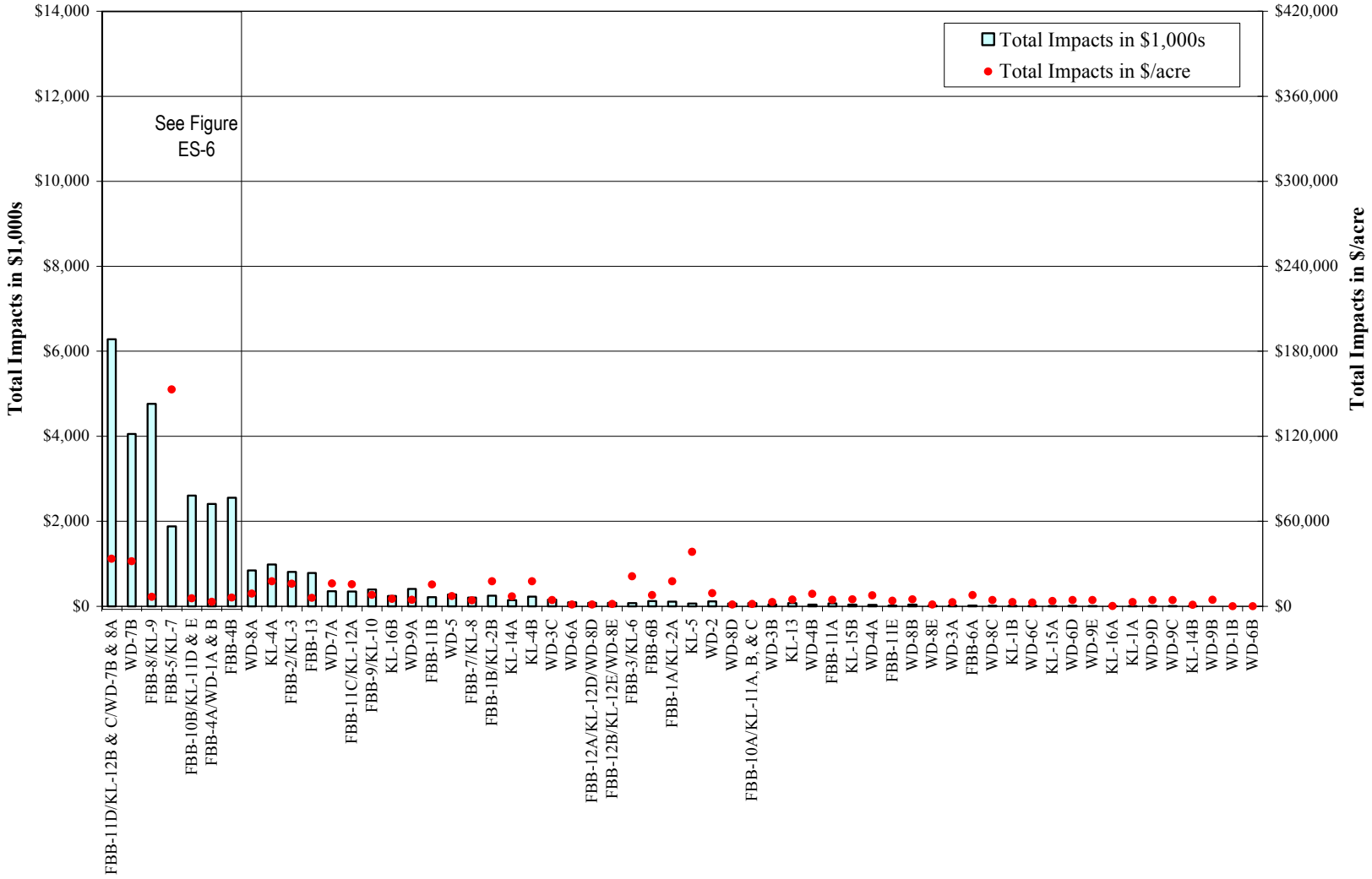


Figure ES-4
Economic Impacts by Habitat Subunit: Total Costs and Dollars per Acre (2006$)
(Total Upper-Bound PV Impacts Assuming a Seven-Percent Discount Rate)



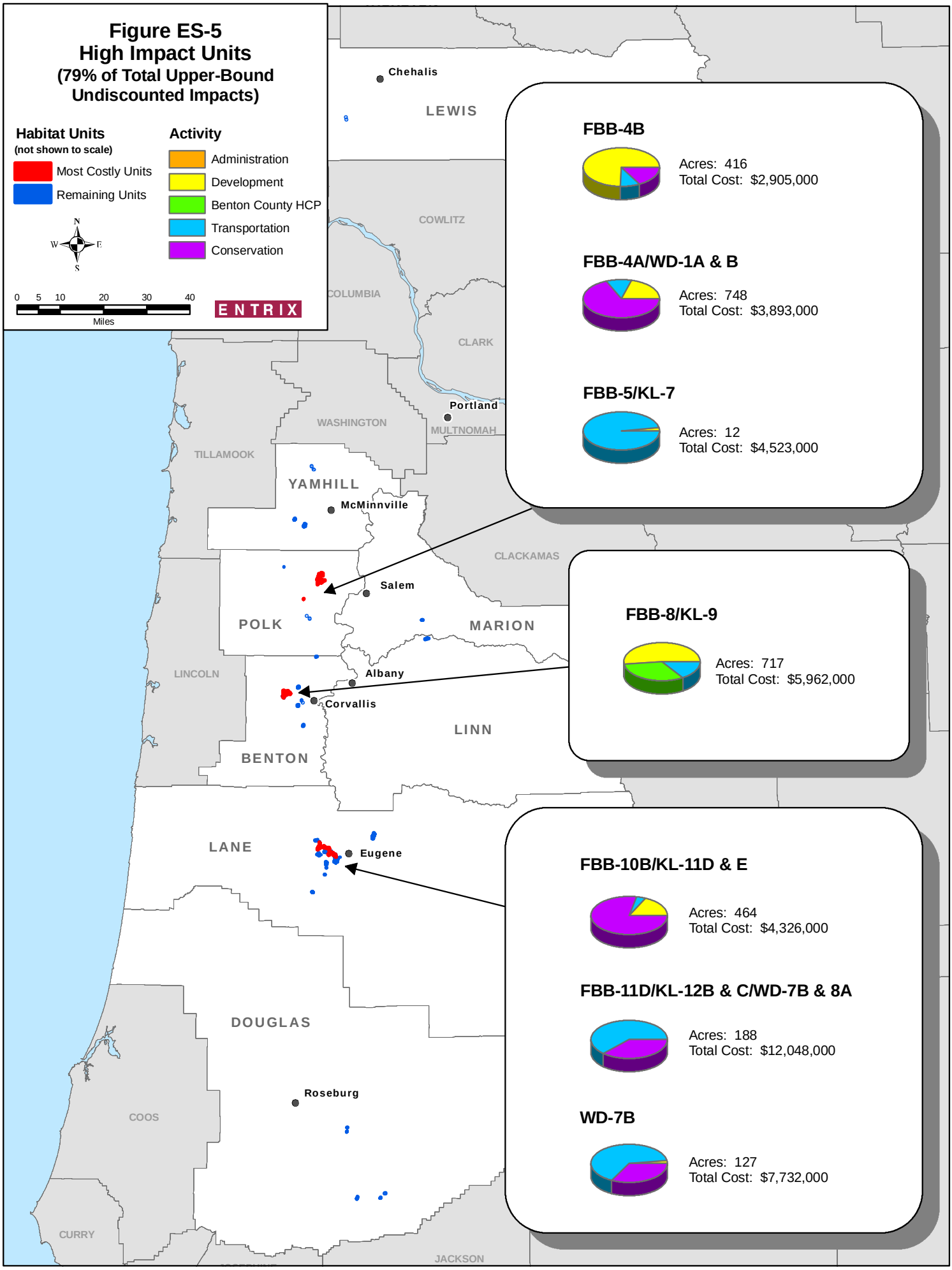


Figure ES-5
High Impact Units
(79% of Total Upper-Bound Undiscounted Impacts)
Habitat Units
(not shown to scale)
Most Costly Units
Remaining Units
Activity
Administration
Development
Benton County HCP
Transportation
Conservation
N
W
E
S
0 5 10 20 30 40
Miles
ENTRIX
Chehalis
LEWIS
COWLITZ
COLUMBIA
CLARK
Portland
WASHINGTON
MULTNOMAH
TILLAMOOK
YAMHILL
McMinnville
CLACKAMAS
Salem
POLK
MARION
LINCOLN
Albany
Corvallis
LINN
BENTON
LANE
Eugene
DOUGLAS
Roseburg
COOS
CURRY
JACKSON
FBB-4B
Acres: 416
Total Cost: $2,905,000
FBB-4A/WD-1A & B
Acres: 748
Total Cost: $3,893,000
FBB-5/KL-7
Acres: 12
Total Cost: $4,523,000
FBB-8/KL-9
Acres: 717
Total Cost: $5,962,000
FBB-10B/KL-11D & E
Acres: 464
Total Cost: $4,326,000
FBB-11D/KL-12B & C/WD-7B & 8A
Acres: 188
Total Cost: $12,048,000
WD-7B
Acres: 127
Total Cost: $7,732,000

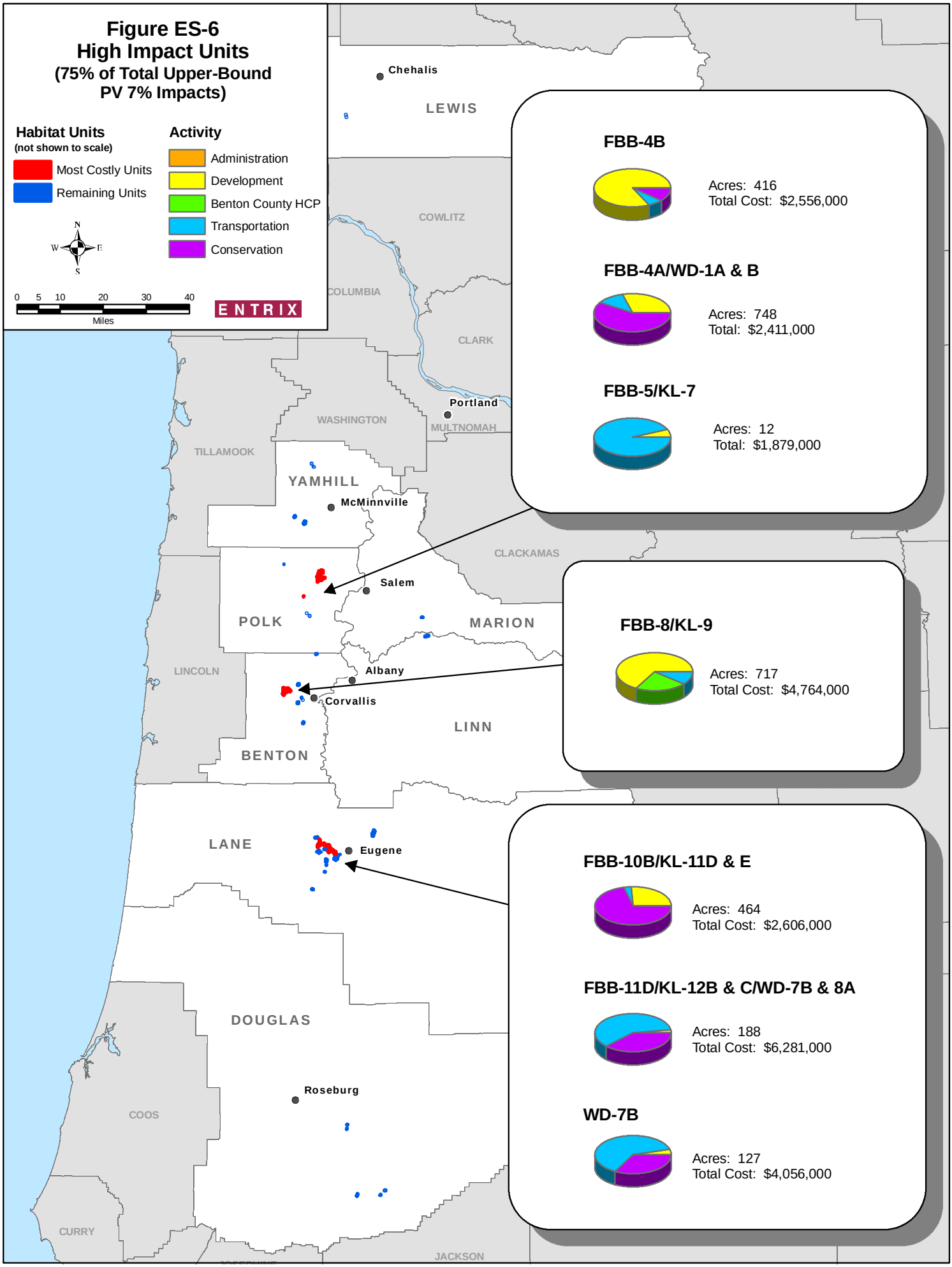


Figure ES-6
High Impact Units
(75% of Total Upper-Bound
PV 7% Impacts)
Habitat Units
(not shown to scale)
Most Costly Units
Remaining Units
Activity
Administration
Development
Benton County HCP
Transportation
Conservation
N
W
E
S
0 5 10 20 30 40
Miles
ENTRIX
Chehalis
LEWIS
COWLITZ
COLUMBIA
CLARK
Portland
WASHINGTON
MULTNOMAH
TILLAMOOK
YAMHILL
McMinnville
CLACKAMAS
Salem
POLK
MARION
LINCOLN
Albany
Corvallis
LINN
BENTON
LANE
Eugene
DOUGLAS
Roseburg
COOS
CURRY
JACKSON
FBB-4B
Acres: 416
Total Cost: $2,556,000
FBB-4A/WD-1A & B
Acres: 748
Total: $2,411,000
FBB-5/KL-7
Acres: 12
Total: $1,879,000
FBB-8/KL-9
Acres: 717
Total Cost: $4,764,000
FBB-10B/KL-11D & E
Acres: 464
Total Cost: $2,606,000
FBB-11D/KL-12B & C/WD-7B & 8A
Acres: 188
Total Cost: $6,281,000
WD-7B
Acres: 127
Total Cost: $4,056,000

1.0
INTRODUCTION AND FRAMEWORK FOR ANALYSIS

The purpose of this report is to estimate the economic impact of actions taken to protect the federally-listed Willamette Valley population of Fender's blue butterfly (*Icaricia icarioides femderi*), Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*), and Willamette daisy (*Erigeron decumbens* var. *decumbens*) (hereinafter, FBB, KL, and WD, respectively, or "species" collectively) and their habitat. It attempts to quantify the economic effects associated with the proposed designation of critical habitat. It does so by taking into account the cost of conservation-related measures that are likely to be associated with future economic activities, which may adversely affect the habitat within the proposed boundaries of the proposed critical habitat designation (CHD). The analysis looks retrospectively at costs incurred since the species were listed, and it attempts to predict future costs likely to occur after the proposed CHD is finalized.

The information presented in this report is intended to assist the Secretary in determining whether the economic benefits of excluding particular areas from the designation outweigh the biological benefits of including those areas in the designation. Additionally, this information allows the U.S. Fish and Wildlife Service (hereafter "Service") to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[13] This report also complies with direction from the U.S. Court of Appeals for the Tenth Circuit that "co-extensive" effects should be included in the economic analysis to inform decision-makers when considering areas to designate as critical habitat.[14]

This section describes the framework for the analysis. First, it describes the general analytic approach to estimating economic effects, including a discussion of both efficiency and distributional effects. Next, this section discusses the scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts. This is followed by a presentation of the analytic time frame used in the report. Finally, this section lists the information sources relied upon in the analysis.

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[13] Executive Order 12866, September 30, 1993, "Regulatory Planning and Review;" Executive Order 13211, May 18, 2001, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use;" 5 U.S.C. § 601 *et seq*; and Pub. Law No. 104-121.

[14] In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n vs. U.S.F.W.S.,* 248 F.3d 1277 (10th Cir. 2001)).

1.1 APPROACH TO ESTIMATING ECONOMIC EFFECTS

This economic analysis considers both the economic efficiency and distributional effects that may result from activities to protect the species and their habitat (hereinafter referred to collectively as "species conservation activities"). Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities on private lands are limited as a result of the designation or presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 of the Endangered Species Act (Act) represent opportunity costs of species conservation activities, given that those resources committed to the consultation process are not available for alternative activities.

The analysis also addresses the distribution of impacts associated with species conservation activities in the areas proposed for critical habitat, including an assessment of any local or regional impacts of species and habitat conservation and the potential effects of species conservation activities on small entities and the energy industry. This information may be used by policymakers to assess whether the effects of species conservation activities unduly burden a particular group or economic sector. For example, while species conservation activities may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.1.1 EFFICIENCY EFFECTS

At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect the species and their habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.[15]

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[15] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., 1990, *A Guide to Benefit-Cost Analysis (2nd Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc.; and U.S. Environmental Protection Agency, September 2000, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html.

In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager, such as the U.S. Army Corps of Engineers (ACOE), may enter into a consultation with the Service to ensure that a particular activity will not adversely modify the critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets – that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price – the measurement of compliance costs provides a reasonable estimate of the change in economic efficiency.

In cases where species and habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the real estate market.

This analysis begins by measuring costs associated with measures taken to protect the species and their habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation activities is expected to significantly impact markets, the analysis will consider changes in consumer and/or producer surplus in affected markets.

1.1.2 Distributional and Regional Economic Effects

Measurements of changes in economic efficiency focus on the net impact of conservation activities across broad aggregates of people (e.g., producers and consumers), without consideration of how certain economic sectors or groups of people (e.g., low income farmers) are affected. As noted above, these distributional or equity effects regarding how efficiency gains or losses are borne may be important to policymakers. In addition, economic efficiency effects do not address issues related to impacts on local or regional economies. Thus, a discussion of efficiency effects alone may miss important distributional considerations, as well as impacts on local economies. OMB encourages Federal agencies to consider these latter effects separately from efficiency effects.[16] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these impacts on local economies or sectors are

[16] U.S. Office of Management and Budget, September 17, 2003, "Circular A-4," http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

fundamentally different measures of economic costs than efficiency effects and, thus, cannot be added to or compared with estimates of changes in economic efficiency.

1.1.2.1 Impacts on Small Entities and Energy Supply, Distribution, and Use

This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the Regulatory Flexibility Act, might be affected by future species conservation activities.[17] Additionally, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation activities on the energy industry and its customers.[18] See Appendix A for an analysis of impacts to small entities and the energy industry.

1.1.2.2 Regional Economic Effects

Regional economic impact analysis can provide an assessment of the potential localized effects of conservation activities. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., expenditures by recreationists) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreationists). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy. These additional impacts are referred to as "secondary impacts."

The use of regional input/output models in an analysis of the impacts of species conservation activities can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy, but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

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17 5 U.S.C. § 601 *et seq.*

18 Executive Order 13211, May 18, 2001, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use."

Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of secondary impacts are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

A regional economic analysis was not performed in this study. While the CHD may reduce the total supply of raw developable land in the affected area, it does not imply that CHD affects the economic welfare as measured by consumer and producer surplus. If households relocate to other housing markets in response to CHD and the cost of relocation is low, CHD will have little impact on consumer surplus. Even if relocation is difficult, the impact on housing markets in the Willamette Valley would be small, as the privately owned portion of the designation (approximately 2,100 acres), which represents the developable land, is small relative to the total quantity of developable land in the Willamette Valley.[19] Thus, the primary cost of species conservation for the units/subunits in the Willamette Valley will be the loss of value of land that can no longer be developed.

1.2 SCOPE OF THE ECONOMIC ANALYSIS

This analysis identifies the economic activities believed to most likely threaten the listed species and its habitat and, where possible, quantifies the economic impact to avoid, mitigate, or compensate for such threats within the boundaries of the CHD. In instances where critical habitat is being proposed after a species is listed, some future impacts may be unavoidable, regardless of the final designation and exclusions under 4(b)(2). However, due to the difficulty in making a credible distinction between listing and critical habitat effects within critical habitat boundaries,

[19] A study funded by the U.S. Environmental Protection Agency (EPA) and conducted by the Pacific Northwest Ecosystem Research Consortium, a group consisting of scientists from EPA, Oregon State University, and the University of Oregon, projected the future landscape in the Willamette River Basin through the year 2050 under three development scenarios: (1) Plan Trend (current policies are implemented as written and recent trends continue), (2) Development 2050 (loosening of current policies to allow freer rein to market forces), and (3) Conservation 2050 (greater emphasis on ecosystem protection). The number of people living in the Basin is expected to nearly double by 2050, and in all scenarios, future urban and rural development was projected to occur predominately on lands now used for agriculture. The estimated effects under the Development 2050 scenario (current land use policies were relaxed and new development was allocated at lower densities over a larger area) included a loss of 24 percent of prime farmland. Source: "Willamette Basin Alternative Futures Analysis, Environmental Assessment Approach that Facilitates Consensus Building," EPA, August 2002, Webpage: http://www.fsl.orst.edu/pnwerc/wrb/proj_summary.pdf (accessed May 16, 2006).

this analysis considers all future conservation-related impacts to be co-extensive with the designation.[20, 21]

Co-extensive effects may also include impacts associated with overlapping protective measures of other Federal, state, and local laws that aid habitat conservation in the areas proposed for designation. In past instances, some of these measures have been precipitated by the listing of the species and impending designation of critical habitat. Because habitat conservation activities affording protection to a listed species likely contribute to the efficacy of the CHD activities, the impacts of these actions are considered relevant for understanding the full effect of the proposed CHD. Enforcement actions taken in response to violations of the Act, however, are not included.

1.2.1 SECTIONS OF THE ACT RELEVANT TO ECONOMIC ANALYSIS

The analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as the CHD. Pursuant to this section, the Secretary is required to list the species as endangered or threatened "solely on the basis of the best scientific and commercial data available."[22] Section 4 also requires the Secretary to designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat."[23]

The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:

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20 In 2001, the U.S. Court of Appeals for the Tenth Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (New Mexico Cattle Growers Assn v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001)).

21 In 2004, the U.S. Ninth Circuit invalidated the Service's regulation defining destruction or adverse modification of critical habitat (Gifford Pinchot Task Force v. United States Fish and Wildlife Service). The Service is currently reviewing the decision to determine what effect it (and to a limited extent Center for Biological Diversity v. Bureau of Land Management (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

22 16 U.S.C. § 1533.

23 Ibid.

Calculating Present Value and Annualized Impacts

For each land use activity, this analysis compares economic impacts incurred in different time periods in present value (PV) terms. The PV presents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of economic impacts of past or future costs to PV terms requires the following: a) past or projected future costs of species conservation activities; and b) the specific years in which these impacts have been, or are expected to be, incurred. With these data, the PV of the past or future stream of impacts (PV_c) of species conservation activities from year t to T is measured in 2006 dollars according to the following standard formula:[a]

$$PV_c = \sum_{t=t_0}^{t=T} \frac{C_t}{(1+r)^{t-2006}}$$

C_t = cost of species conservation activities in year t

r = discount rate[b]

Impacts of conservation activities for each activity in each unit are also expressed as annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, however, all activities employ a forecast period of 20 years, 2007 through 2026. Annualized impacts of future species conservation activities (APV_c) are calculated by the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1-(1+r)^{-(N)}} \right]$$

N = number of years in the forecast period (20 years for this analysis)

[a] To derive the PV of past conservation activities for this analysis, t is 2000 and T is 2006; to derive the PV of future conservation activities, t is 2007 and T is 2026.

[b] To discount and annualize costs, guidance provided by the OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent which, some economists believe, better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.)

- Section 7 of the Act requires Federal agencies to consult with the Service in order to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD.[24]

- Section 9 defines the actions that are prohibited by the Act and, in particular, prohibits the "take" of endangered wildlife. The term "take" means to "harass, harm, pursue, ... or collect, or to attempt to engage in any such conduct."[25] The economic impacts associated with this section manifest themselves in sections 7 and 10. While the prohibition against "take" does not apply to plant species such as KL and WD (i.e., incidental take permits are not issued for plant species), the Service is obligated to ensure that proposed activities adequately minimize the impact to the species.

- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.[26] The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. Although the designation of critical habitat does not require completion of an HCP, it may influence conservation measures provided under HCPs. While HCPs are not developed solely for plant species, if listed plants occur in the area subject to the HCP, the service must consider whether the proposed activities may adversely affect or jeopardize the continued existence of the plant species. No HCP currently includes FBB, KL, and WD as covered species. However, Benton County, Oregon, is in the preliminary stages of developing an HCP to protect wet/dry prairie habitat, which supports FBB, KL, and WD. The estimated date of completion is 2009 (see Section 5.0).

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24 The Service notes, however, that a recent Ninth Circuit judicial opinion, *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, has invalidated the Service's regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

25 16 U.S.C. § 1532.

26 U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," http://endangered.fws.gov/hcp/. Sections 9 and 10 of the Act do not apply to plants.

1.2.2 OTHER RELEVANT PROTECTION EFFORTS

The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as state and local governments, may also seek to protect the natural resources under their jurisdiction.[27] For example, the Oregon Endangered Species Act lists KL as threatened and WD as endangered.[28] As state-listed species, these plants receive protection on state-managed lands (i.e., lands owned or leased by the state or for which the state holds a recorded easement). For the purpose of this analysis, such protective efforts are considered to be co-extensive with the protection offered by critical habitat, and costs associated with these efforts are included in this report. Additionally, under certain circumstances, the CHD may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other state or local laws. In cases where these costs would not have been triggered absent the designation of critical habitat, they are included in this economic analysis.

1.2.3 ADDITIONAL ANALYTIC CONSIDERATIONS

This analysis also considers the potential for other types of economic impacts that can be related to section 7 consultations in general and CHD in particular, including time delay, regulatory uncertainty, and stigma impacts.

1.2.3.1 Time Delay and Regulatory Uncertainty

In addition to direct costs of consultation and project modification associated with species conservation actions, the analysis considers potential indirect impacts, such as may result from project delays. Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the section 7 consultation process and/or compliance with other laws associated with the designation. The need to conduct a section 7 consultation will not necessarily delay a project, as often the consultation may be

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27 For example, the Sikes Improvement Act (Sikes Act) of 1997 requires Department of Defense (DoD) military installations to develop Integrated Natural Resources Management Plans (INRMPs) that provide for the conservation, protection, and management of wildlife resources (16 U.S.C. §§ 670a - 670o). These plans must integrate natural resource management with the other activities, such as training exercises, taking place at the facility.

28 The Oregon Endangered Species Act (OESA) mandates responsibility for threatened and endangered species in the state to two agencies, the Oregon Department of Agriculture (ODA) for plant species and the Oregon Department of Fish and Wildlife (ODFW) for "wildlife" species, and "wildlife" does not include invertebrate animals under the OESA. Therefore, FBB receives no protection under the OESA. FBB is, however, listed as a "priority 1" species (i.e., threatened or endangered throughout their range) by the Oregon Natural Heritage Program on its sensitive species invertebrate list. The program has no regulatory authority, but can assist planning agencies in managing lands for the benefit of FBB.

coordinated with the existing regulatory approval process. However, depending on the schedule of the consultation, a project may experience additional delays, resulting in an unanticipated extension in the time needed to fully realize returns from the planned activity. Delays of this nature were considered in the development of this analysis and it was determined that they may result in an impact that is not likely to materially change the quantitative results of this analysis.

Regulatory uncertainty costs can occur in anticipation of having to modify project parameters, and might include, for example, project proponents retaining outside experts or legal counsel to better understand their responsibilities with regard to CHD.

1.2.3.2 Stigma Effects

Stigma refers to the change in economic value of a particular project or activity due to negative (or positive) perceptions of the role critical habitat will play in developing, implementing, or conducting that project or activity. For example, "stigma effects" could include changes to private property values associated with public attitudes about the limits and costs of implementing a project in critical habitat. Stigma effects are a form of uncertainty that relate more to perceived fluctuations rather than observation, when there is limited information on actual outcomes. There is currently a void of peer-reviewed literature that has successfully identified or attempted to quantify empirical estimates of stigma effects. While stigma impacts are possible in locations where critical habitat is designated, the analysis does not anticipate stigma impacts related to species conservation activities.

1.2.4 BENEFITS

Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[29] OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.[30]

In the context of CHD, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of

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29 Executive Order 12866, September 30,1993, "Regulatory Planning and Review."

30 U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

resources on the implementing agency's part to conduct new research.[31] *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements (PCEs) on which the species depends. To this end, CHD can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

It is often difficult to evaluate the ancillary benefits of CHD. To the extent that the ancillary benefits of the rulemaking may be captured by the market though an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if habitat preserves created and/or managed to protect a species leads to an increase in opportunities for wildlife viewing or hiking within the region, the local economy may experience an associated measurable, positive impact. Where data are available, this analysis attempts to capture the net economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains) of species conservation actions imposed on regulated entities and the regional economy.

1.2.5 Amenity Values Associated With Critical Habitat

Conservation activities for the three Willamette species may maintain or generate amenity values to adjacent property owners and residents. Amenity values are defined as beneficial impacts affiliated with recreational opportunities, open space, visual amenities, and an aesthetically pleasing ecosystem, which the lands being proposed as critical habitat may be able to provide in an unaltered state. In general, amenities values will be greater for critical habitat located in urban areas with considerable development densities as these areas have relatively less open space providing such amenity services. However, the land designated as critical habitat for the three Willamette species is primarily located in rural areas, with abundance of open space and natural amenities. Due to the presence of close substitutes for the designated area, the designation is unlikely to generate any meaningful amenity benefit within the timeframe of this analysis. Thus, we have not quantified amenity value as a component of economic impacts associated with critical habitat designation for the three Willamette species.

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[31] Ibid.

1.2.6 GEOGRAPHIC SCOPE OF THE ANALYSIS

The geographic scope of the analysis includes the areas proposed for CHD. The analysis focuses on activities within or affecting these areas and presents impacts at the lowest level of resolution feasible, given available data. Impacts are reported for each unit/subunit identified in the proposed rule; however, significant overlap occurs between the proposed CHD for FBB, KL, and WD. This overlap creates an accounting issue for the economic analysis, which is a report for a single rule proposing critical habitat for three species, as economic impacts between overlapping units are not always additive. In fact, for this proposed CHD, it is expected that measured impacts in most of the overlapping areas will be joint costs; the resulting impacts will likely be the same, for example, whether one of a pair of overlapping units, or both, are added to the existing designation. Where areas of overlapping habitat exist, the economic analysis combines the areas of overlap and reports the costs only once in order to avoid double counting common impacts. The methodology for accounting for the cost of species conservation activities within the areas of overlapping habitat is described in Section 1.2.6 below.

1.2.7 ACCOUNTING FOR THE COST OF SPECIES CONSERVATION ACTIVITIES IN AREAS OF OVERLAPPING HABITAT

A conceptual issue important in the design and implementation of this economic analysis is the methodology for accounting for the cost of species conservation activities in areas of overlapping habitat. As illustrated in Appendix D, the map attachment to this economic analysis, significant overlap occurs between the FBB and KL proposed CHD, and to a lesser extent, between the proposed CHD for FBB, KL, and the WD.

- Of the 30 subunits for KL (724 acres), nine (272 acres, or 38 percent of the proposed CHD for KL) overlap exactly with FBB subunits. Another nine subunits are contained entirely within a larger subunit of proposed FBB critical habitat (259 acres, or 36 percent of the proposed CHD for KL). The remaining 12 KL subunits (193 acres, or 27 percent of the proposed CHD for KL) share no habitat with FBB subunits.

- Of the 25 subunits for WD (717 acres), one (nine acres, or one percent of the proposed CHD for WD) overlaps exactly with a FBB subunit. Another five subunits (378 acres, or 53 percent of the proposed CHD for WD) overlap partially with FBB and or FBB/KL subunits (some of the WD habitat overlaps with already overlapping FBB and KL habitats). Approximately 90 acres out of the 378 acre area within these subunits (or 13 percent of the proposed CHD for WD) overlap with FBB and or FBB/KL subunits. The remaining 19 WD subunits (331 acres, or 46 percent of the proposed CHD for WD) share no habitat with FBB or FBB/KL subunits.

As described in the proposed CHD rule, FBB and KL have similar habitat requirements and KL serves as the primary host plant for FBB. Because conservation for FBB and KL are considered together (i.e., maintain the open prairie habitat and expand the size of the KL population), the

economic impacts measured by the economic analysis in the areas of FBB and KL habitat overlap are expected to be the same for both species. Readers interested in the details of the habitat requirements are encouraged to consult the proposed CHD rule.

The situation is not the same for habitat overlap between FBB, KL, and WD. Other than having similar PCE and habitat requirement, as KL, WD is not a food source for FBB. WD is only an indicator species of the upland prairie, oak savanna habitat that FBB and KL also inhabit. While management actions, and therefore economic impacts, to conserve the open prairie habitat are expected to be the same within the areas of WD and FBB habitat overlap and WD and FBB/KL habitat overlap, the economic impacts related to expanding the size of the WD population would be in addition to the economic impacts of expanding the population of KL in areas where WD and KL habitat overlap (e.g., see Map 8D in Appendix D).

In order to avoid double counting the economic impacts, the economic analysis reports costs in the overlapping areas in the following manner:

- Combine the units that overlap between FBB and KL (e.g., the costs associated with the overlapping units FBB-1A and KL-2A are reported once as a cost for unit FBB-1A/KL-2A).

- Considering the cost of maintaining the open prairie habitat for FBB and WD is the same, combine the units that overlap between these two species (e.g., the costs associated with the overlapping units FBB-4A and WD-1A are reported once as a cost for unit FBB-4A/WD-1A).

- For the five occurrences of partial overlap between WD and FBB or FBB/KL habitat, assume the economic impacts related to maintaining the prairie habitat are equally distributed across the landscape (i.e., calculate an average $/acre), calculate an impact for the area of overlap, and include that common impact as an impact for the FBB subunit, while excluding the common impact from the impact reported for the WD subunit. This avoids double counting of common impacts. For those economic impacts related to expanding the size of the WD population, the costs are calculated and reported for the entire WD subunit. The consolidation of units, with ownership, is detailed in Table 1-1 at the end of this Section.

1.2.8 Accounting for the Cost of Species Conservation Activities in the Presence of Other Listed Species

Numerous other federally- or state-listed species may exist within or near the proposed critical habitat designation for FBB, KL, and WD. To the extent that these other species require the same protective measures as FBB, KL, and WD, costs incurred that protect FBB, KL, and WD habitat may not be solely attributable to the presence of FBB, KL, and WD. This analysis does not attempt to allocate costs among different species. Instead, all costs of conservation within the

proposed critical habitat designation for FBB, KL, and WD are assumed to be attributable to the presence of FBB, KL, and WD. Other federally-listed species, that may occur within or near the proposed critical habitat designation for FBB, KL, and WD, include Nelson's Checkermallow (*Sidalcea nelsoniana*), Bradshaw's lomatium (*Lomatium bradshawii*), Oregon Chub (*Oregonichthys crameri*), and Bald Eagle (*Haliaeetus leucocephalus*).[32]

1.3 Analytic Time Frame

The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. The analysis estimates economic impacts to activities from 2000 (the year of the final listing for the species) to 2026 (20 years from the year of final designation). Forecasts of economic conditions and other factors beyond the next 20 years would be speculative.

1.4 Information Sources

The analysis contained in this report is based on data and information collected from a wide range of sources. Communications with and data provided by the Service personnel include maps and geographical information system (GIS) data, copies of informal and formal species consultation documents, such as Biological Opinions (BOs), and other material directly related to the proposed designation. Other Federal, state, and local agencies, as well as independent or private sector entities and individuals, provided additional information. The specific sources used to address the effects of species conservation actions are identified within each section, and citations are provided where appropriate.

1.5 Organization of the Report

The remainder of this report is divided into six sections. The following section provides background information on the history of the species listing and proposed critical habitat, including detail on land ownership within the proposed CHD, by critical habitat unit/subunit, for each species.

The next section presents potential administrative costs of actions taken under section 7 of the Act associated with the geographic area of critical habitat for the species. First, this section defines the types of administrative costs likely to be associated with the species critical habitat as well as the per-unit costs of section 7 consultation process. Next, the analysis presents the costs related to the past species-related section 7 consultation efforts, followed by an estimate of the

[32] Personal communication with Service Biologist, February 24, 2006.

costs related to future consultations likely to result from the designation of critical habitat for the species and/or the listing of the species.

This section is followed by four sections that examine the different categories of economic effects. These sections address the effects to private development activities, the Benton County HCP, transportation, and species conservation. Included with the report are five appendices; Appendix A addresses the economic effects of species conservation actions on small entities and the nation's energy supply; Appendix B summarizes the section 7 consultation history for the species; the farmland price model developed by Lin and Wu (2005)[33] to evaluate the effects of the conservation reserve program (CRP) and environmental amenities on the prices of farmland and developed land, and used to estimate impacts to development in this economic analysis is provided in Appendix C; Appendix D contains all maps referenced in the text of this report; and Appendix E presents the detailed pre- and post-designation cost information in total and by activity on a unit-by-unit basis.

[33] Lin, H., and J. Wu. "Conservation Policy and Land Value: The Conservation Reserve Program." Submitted to *Review of Economics and Statistics,* 2005.

Table 1-1
Summary of Combined FBB, KL, and WD Proposed Critical Habitat Units/Subunits, by Landowner (acres)

Unit/Subunit	County	Federal				Private			State			Total
		BLM	USACE	USFS	Service	GB	PV	TNC	ODF	ODOT	ST	
FBB-1 A/KL-2 A							6.24					6.24
FBB-1 B/KL-2 B							14.12					14.12
FBB-2/KL-3							50.99					50.99
FBB-3/KL-6							1.12			2.53		3.66
FBB-4 A/WD-1A & 1B					539.84		208.51					748.35
FBB-4 B					88.72		327.32					416.04
FBB-5/KL-7							12.28					12.28
FBB-6 A							2.42					2.42
FBB-6 B							15.88					15.88
FBB-7/KL-8							42.73				5.58	48.31
FBB-8/KL-9							713.14	3.55				716.69
FBB-9/KL-10						24.59	24.02					48.61
FBB-10 A/KL-11 A, 11 B, & 11 C			42.04				8.42					50.46
FBB-10 B/KL-11 D & 11 E	43.07	73.78	192.48				154.56					463.90
FBB-11 A							15.40					15.40
FBB-11 B		12.94					1.05					13.98
FBB-11 C/KL-12 A		21.08					1.28					22.37
FBB-11 D/KL-12 B & 12 C/WD-7 B & 8 A	14.73	146.60					23.76		2.53			187.62
FBB-11 E	4.40											4.40
FBB-12 A/KL-12 D/WD-8 D							0.18	60.19				60.37
FBB-12 B/KL-12 E/WD-8 E							3.48	50.52				54.00

Unit/Subunit	County	Federal				Private			State			Total
		BLM	USACE	USFS	Service	GB	PV	TNC	ODF	ODOT	ST	
FBB-13							122.99	9.50				132.49
KL-1 A							1.83					1.83
KL-1 B							4.04					4.04
KL-4 A							55.84					55.84
KL-4 B							12.74					12.74
KL-5										1.69		1.69
KL-13							16.23					16.23
KL-14 A		21.16										21.16
KL-14 B							2.92					2.92
KL-15 A		0.21					2.09					2.31
KL-15 B		3.05					5.38					8.43
KL-16 A				19.22								19.22
KL-16 B		34.01		10.50			1.87					46.38
WD-1 B (overlap in FBB-4 A)					0.70							0.70
WD-2							12.23					12.23
WD-3 A							0.39	5.39				5.78
WD-3 B							1.17	14.58				15.75
WD-3 C							21.18	15.58				36.76
WD-4 A	1.20						3.51					4.71
WD-4 B	4.56											4.56
WD-5							38.49					38.49
WD-6 A			75.28				4.44					79.72
WD-6 B			0.22									0.22
WD-6 C			1.58				1.79					3.37
WD-6 D							2.13					2.13

Unit/Subunit	County	Federal				Private			State			Total
		BLM	USACE	USFS	Service	GB	PV	TNC	ODF	ODOT	ST	
WD-7 A		21.91					0.41		0.02			22.34
WD-7 B (overlap in FBB-11 D)		93.90					30.01		3.46			127.38
WD-8 A (overlap in FBB-11 D)		48.07					46.08					94.14
WD-8 B	0.48						7.61					8.09
WD-8 C							2.49					2.49
WD-8 D (overlap in FBB-12 A)							1.54	49.58				51.12
WD-8 E (overlap in FBB-12 B)								14.81				14.81
WD-9 A							89.95					89.95
WD-9 B							0.34					0.34
WD-9 C							0.73					0.73
WD-9 D							1.08					1.08
WD-9 E							1.95					1.95
Total	68.45	476.72	311.60	29.73	629.27	24.59	2,120.34	223.71	6.01	4.23	5.58	3,900.22
Total by Landowner	*68.45*	*1,447.31*				*2,368.65*			*15.81*			
Percent of Total	*1.8%*	*37.1%*				*60.7%*			*0.4%*			

This section provides information on the history of the species listing and proposed critical habitat, including detail on land ownership within the proposed CHD, by critical habitat unit/subunit, for each species.

2.1 BACKGROUND OF THE CRITICAL HABITAT DESIGNATION

On January 25, 2000, the Service published a final rule listing FBB and WD as endangered and KL as threatened.[34] Designation of critical habitat for the species in the final rule was determined "prudent," but deferred pursuant to the Listing Priority Guidance to allow the Service to concentrate its limited resources (i.e., budget) on higher priority critical habitat and other listing actions. On April 23, 2003, a complaint was filed against the Service for failure to designate critical habitat for the species. In December 2003, a settlement agreement committed the Service to publish a proposed critical habitat rule to the Federal Register by October 15, 2005, and a final rule by October 15, 2006.[35] Following this, the Service published the proposed critical habitat designation ("proposed rule") for the species in the Federal Register on November 2, 2005.

2.2 PROPOSED CRITICAL HABITAT DESIGNATION[36]

The Service is proposing 38 units to be designated as critical habitat for the species: 13 units as critical habitat for FBB (see Table 2-1), 16 units for KL (see Table 2-2), and 9 units for WD (see Table 2-3). Except for Unit KL-1, located in Lewis County, Washington, all of the proposed units are located in seven counties in Oregon, Yamhill, Polk, Marion, Benton, Linn, Lane, and Douglas counties. While the Service identified a total of approximately 4,530 acres of critical habitat for the three species, 3,089 acres, 724 acres, and 718 acres for FBB, KL, and WD, respectively, approximately 630 acres of the proposed total CHD consists of overlapping habitat between the species. After accounting for this overlap, the footprint of the proposed CHD is approximately 3,900 acres (see Table 1-1 in Section 1.0).

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34 U.S. Fish and Wildlife Service, January 25, 2000, "Endangered Status for *Erigeron decumbens* var. *decumbens* (Willamette Daisy) and Fender's Blue Butterfly (*Icaricia icaroides fenderi*) and Threatened Status for *Lupinus sulphereus* ssp. *kincaidii* (Kincaid's Lupine), Final Rule" *Federal Register*, Vol. 65, No. 16, pp. 3875-3890.

35 U.S. Fish and Wildlife Service, November 2, 2005, "Designation of Critical Habitat for the Fender's Blue Butterfly (*Icaricia icarioides fenderi*), *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's Lupine), and *Erigeron decumbens* var. *decumbens* (Willamette Daisy); Proposed Rule" *Federal Register*, Vol. 70, No. 211, p. 66492-66599.

36 Information in this section comes from the proposed CHD rule (*Federal Register*, Vol. 70, No. 211, p. 66492-66599).

Table 2-4 provides summary information describing land ownership within proposed critical habitat for the species by county. The same ownership information, by unit, is provided in Table 1-1 in Section 1.0. Appendix D provides maps showing the location of each subunit. The maps also show land ownership for each subunit and illustrate where the habitat overlap between the species occurs.

Table 2-1
Summary of FBB Proposed Critical Habitat Designation, by Landowner (acres)

Unit	Subunit	Name	County	Landowners (Acres)				
				City	Federal	Private	State	Total
FBB-1	A	Oak Ridge North	Yamhill			6.24		6.24
	B	Oak Ridge South	Yamhill			14.12		14.12
FBB-2		Gopher Valley Dupee Road	Yamhill			50.99		50.99
FBB-3		Mill Creek	Polk			1.12	2.53	3.66
FBB-4	A	Baskett Butte	Polk		539.84	208.51		748.35
	B	Baskett Butte	Polk		88.72	327.32		416.04
FBB-5		Dallas	Polk			12.28		12.28
FBB-6	A	Monmouth - Falls City Road (Cooper Hollow)	Polk			2.42		2.42
	B	Monmouth - Falls City Road	Polk			15.88		15.88
FBB-7		Butterfly Meadows	Benton			42.73	5.58	48.31
FBB-8		Wren	Benton			716.69		716.69
FBB-9		West Hills	Benton			48.61		48.61
FBB-10	A	No name	Lane		42.04	8.42		50.46
	B	No name	Lane	43.07	266.26	154.56		463.90
FBB-11	A	Cheryl's North Population	Lane			15.40		15.40
	B	Cheryl's West Population	Lane		12.94	1.05		13.98
	C	No name	Lane		21.08	1.28		22.37
	D	Turtle Swale, Oxbow West, Balboa, Isabelle	Lane	14.73	146.60	23.76	2.53	187.62
	E	No name	Lane	4.40				4.40
FBB-12	A	Willow Creek East	Lane			60.37		60.37
	B	Willow Creek West	Lane			54.00		54.00
FBB-13		Coburg	Lane			132.49		132.49
Total				62.21	1,117.49	1,898.25	10.64	3,088.58
Percent of Total				2.0%	36.2%	61.5%	0.3%	100.0%

Table 2-2
Summary of KL Proposed Critical Habitat Designation, by Landowner (acres)

Unit	Subunit	Name	County	Landowners (Acres)				
				City	Federal	Private	State	Total
KL-1	A	Boistfort North	Lewis			1.83		1.83
	B	Boistfort South	Lewis			4.04		4.04
KL-2	A	Oak Ridge North	Yamhill			6.24		6.24
	B	Oak Ridge South	Yamhill			14.12		14.12
KL-3		Gopher Valley Dupee Road	Yamhill			50.99		50.99
KL-4	A	Berthelsdorf west	Yamhill			55.84		55.84
	B	Berthelsdorf east	Yamhill			12.74		12.74
KL-5		Sheridan	Yamhill			0.23	1.46	1.69
KL-6		Mill Creek	Polk			1.12	2.53	3.66
KL-7		Dallas	Polk			12.28		12.28
KL-8		Butterfly Meadows	Benton			42.73	5.58	48.31
KL-9		Wren	Benton			171.51		171.51
KL-10		West Hills	Benton			17.89		17.89
KL-11	A	Shore Lane	Lane		5.57	0.34		5.92
	B	Spires Lane	Lane		7.05	2.33		9.39
	C	Eaton Lane	Lane		14.16	0.96		15.12
	D	North Green Oaks	Lane		17.14			17.14
	E	Fir Butte	Lane	0.48	12.82	3.92		17.22
KL-12	A	No name	Lane		21.08	1.28		22.37
	B	Turtle Swale	Lane		0.37			0.37
	C	West Lawn Cemetery	Lane			4.04		4.04
	D	Willow Creek East	Lane			60.37		60.37
	E	Willow Creek West	Lane			54.00		54.00
KL-13		Powell	Lane			16.23		16.23
KL-14	A	China Ditch	Douglas		21.16			21.16
	B	Riser	Douglas			2.92		2.92
KL-15	A	Stouts North	Douglas		0.21	2.09		2.31
	B	Stouts South	Douglas		3.05	5.38		8.43
KL-16	A	Callahan Ridge	Douglas		19.22			19.22
	B	Callahan Meadows	Douglas		44.52	1.87		46.38
Total				0.48	166.37	547.29	9.58	723.72
Percent of Total				0.1%	23.0%	75.6%	1.3%	100.0%

Table 2-3
Summary of WD Proposed Critical Habitat Designation, by Landowner (acres)

Unit	Subunit	Name	County	Landowners (Acres)				
				City	Federal	Private	State	Total
WD-1	A	Baskett Butte North	Polk		8.72			8.72
	B	Baskett Butte South	Polk		32.48			32.48
WD-2		Sublimity Grasslands	Marion			12.23		12.23
WD-3	A	Kingston Meadows Preserve West	Linn			5.78		5.78
	B	Kingston Meadows Preserve center	Linn			15.75		15.75
	C	Kingston Meadows Preserve East	Linn			36.76		36.76
WD-4	A	Bald Hill North	Benton	1.20		3.51		4.71
	B	Bald Hill South	Benton	4.56				4.56
WD-5		Muddy Creek	Benton			38.49		38.49
WD-6	A	South Fisher Butte Dike	Lane		75.28	4.44		79.72
	B	East Coyote North	Lane		0.22			0.22
	C	East Coyote South	Lane		1.58	1.79		3.37
	D	Lanel Substation	Lane			2.13		2.13
WD-7	A	North Greenhill	Lane		21.91	0.41	0.02	22.34
	B	Vinci, Oxbow West	Lane		106.35	31.02	5.99	143.36
WD-8	A	West 11, Speedway	Lane		77.60	50.24		127.84
	B	North Willow Creek	Lane	0.48		7.61		8.09
	C	Wallis Street	Lane			2.49		2.49
	D	Willow Creek Daisy	Lane			58.01		58.01
	E	Willow Creek Bailey Hill	Lane			16.74		16.74
WD-9	A	Hazel	Lane			89.95		89.95
	B	Sanford Road West	Lane			0.34		0.34
	C	Sanford Road	Lane			0.73		0.73
	D	Spencer Creek	Lane			1.08		1.08
	E	Spencer Creek	Lane			1.95		1.95
Total					324.13	381.46	6.24	717.84
Percent of Total					45.2%	53.1%	0.01%	100.0%

Table 2-4
Summary of Land Ownership in Proposed Critical Habitat for the Species (acres)

County	Private	City	State	Federal	Total
Benton	850.04	5.76	5.58		861.37
Douglas	12.26			88.17	100.42
Lane	722.51	62.69	6.01	729.88	1,521.08
Lewis (WA)	5.87				5.87
Linn	58.30				58.3
Marion	12.23				12.23
Polk	567.53		2.53	629.27	1,199.33
Yamhill	140.15		1.46		141.61
Total	2,368.88	68.45	15.58	1,447.31	3,900.22

2.3 DESCRIPTION OF THE SPECIES, HABITAT, AND THREATS[37]

2.3.1 FENDER'S BLUE BUTTERFLY

FBB is small, with a wingspan of approximately one inch. On the upper wings, adult males display a brilliant blue color trimmed in black, while adult females fashion a solid brown. The underside of the wings of both sexes is creamy tan, with black spots outlined by a fine white border or halo. The butterfly occupies 32 sites across 408 acres in Benton, Lane, Polk, and Yamhill counties, Oregon. For a detailed description of the butterfly, its reproduction, and life cycle see the final listing rule.

2.3.2 KINCAID'S LUPINE

KL is a low growing, long lived perennial species that bears aromatic, yellowish-cream flowers with ruffled banners that often show shades of blue on the keel. The plant occupies 54 sites across 370 acres, with 48 sites throughout the Willamette Valley, four sites in the Umpqua Valley of Douglas County, Oregon, and two sites in southern Washington (Lewis County). For a detailed description of the plant, its growing season, and reproduction see the final listing rule.

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[37] Information in this section comes from the final listing rule (*Federal Register*, Vol. 65, No. 16, pp. 3875-3890) and proposed CHD rule (*Federal Register*, Vol. 70, No. 211, p. 66492-66599).

2.3.3 WILLAMETTE DAISY

The WD is a low growing herbaceous perennial with flowering stems that produce two to five daisy-like heads with pinkish to pale blue rays and yellow centers. The plant occupies 28 sites across 286 acres in Benton, Linn, Marion, and Polk counties, Oregon. For a detailed description of the plant, its growing season, and reproduction see the final listing rule.

2.3.4 HABITAT

The three species are restricted primarily to Oregon's Willamette Valley, an alluvial floodplain 130 miles long and 20 to 40 miles wide, and a mosaic of grassland, woodland, and forest communities. The species occur in upland and wet prairie habitats. The upland prairie habitat is characterized by short-grass stature, which is mainly dominated by bunch grasses and forbs. These dry, fescue prairies represent the majority of habitat for FBB and KL. The primary habitat for WD is the wet prairie, where low, flat portions of the valley flood seasonally to create anaerobic and strongly reducing soil conditions. All three species occur in prairie remnants, where subsoils (i.e., the soil layer between topsoil and bedrock) have not been disturbed in the last ten years.

Considering the species' habitat requirements and population biology, the Service has identified several primary constituent elements (PCEs) for FBB, KL, and WD relating to appropriate surface/subsurface structural conditions and the presence of larval host plants and adult nectar sources or pollinators. Readers interested in the details of the PCEs are encouraged to consult the proposed CHD rule.

2.3.5 THREATS

Although the proposed critical habitat units are dispersed throughout the Willamette Valley, the threats to the species are similar. These include encroachment of invasive species, trees and shrubs, and urban development, population isolation, small population size, limited availability of food plants, roadside and powerline right-of-way maintenance activities, trail maintenance, livestock grazing and agriculture, and construction of fire breaks for fire protection. Not all of the threats affect each unit or subunit of proposed critical habitat.

This section presents potential administrative costs of actions taken under section 7 of the Act, associated with the geographic area proposed as critical habitat for FBB, KL, and WD. First, this section defines the types of administrative costs likely to be associated with the critical habitat. Next, the analysis presents estimates of the number of technical assistance efforts and consultations likely to result from the designation of critical habitat for the species and/or the listing of the species, as well as the per-unit costs of each of these activities. Based on this analysis, estimates of past and future expected administrative costs are derived.

3.1 CATEGORIES OF ADMINISTRATIVE COSTS

The following section provides an overview of the categories of administrative cost impacts that arise due to the implementation of section 7 in the geographic area proposed as critical habitat.

3.1.1 TECHNICAL ASSISTANCE

Frequently, the Service responds to requests for technical assistance from state agencies, local municipalities, and private landowners and developers who may have questions regarding whether specific activities may affect critical habitat. Technical assistance costs represent the estimated economic costs of informational conversations between these entities and the Service regarding the designation of critical habitat for the species. Most likely, such conversations will occur between municipal or private property owners and the Service regarding lands designated as critical habitat or lands adjacent to critical habitat. The Service's technical assistance activities are voluntary and generally occur in instances where a Federal nexus does not exist.

3.1.2 SECTION 7 CONSULTATIONS

Section 7(a)(2) of the Act requires Federal agencies (Action agencies) to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. Often, consultations will involve the Service and another Federal agency only, such as the ACOE. In some cases, they will also include a third party involved in projects on non-Federal lands with a Federal nexus, such as state agencies and private landowners.

During a consultation, the Service, the Action agency, and the landowner or manager applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity

of concern, and the potential effects to the species and designated critical habitat associated with the proposed activity, the Federal agency, and whether there is a private applicant involved.

Section 7 consultations with the Service may be either informal or formal. *Informal consultation*s consist of discussions between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat, and are designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in a biological opinion of whether the action is likely to jeopardize a species or adversely modify critical habitat, and recommendations to minimize those impacts. The Service also conducts internal formal and informal consultations for beneficial actions that have short-term adverse effects (i.e., Section 10(a)(1)(A) Recovery Permits and Safe Harbor Agreements). Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

3.2 ESTIMATED COSTS OF CONSULTATIONS AND TECHNICAL ASSISTANCE

Estimates of the cost of an individual consultation and technical assistance request were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country conducted in 2002. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

The administrative cost estimates presented in this section take into consideration the level of effort of the Service, the Action agency, and the applicant, as well as the varying complexity of the consultation or the technical assistance request. Costs associated with these consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and the development of a biological opinion. Table 3-1 provides a summary of the estimated administrative cost per consultation and technical assistance and Section 10(a)(1)(A) permit requests.

Table 3-1
Estimated Administrative Cost per Consultation and Technical Assistance and Section 10(a)(1)(A) Permit Requests [a/]

Consultation Type	Service	Action Agency	Third Party	Biological Assessment
Technical Assistance [c/]	$260 - $680	N/A	$600 - $1,500	N/A
Informal Consultation [c/]	$1,000 - $3,100	$1,300 - $3,900	$1,200 - $2,900	$0 - $4,000
Formal Consultation [c/]	$3,100 - $6,100	$3,900 - $6,500	$2,900 - $4,100	$4,000 - $5,600
10(a)(1)(A) Recovery Permit Consultation [b/]	$420 - $540	N/A	$600 - $1,500	N/A

[a/] Low and high estimates primarily reflect variations in staff wages and time involvement by staff.

[b/] Section 10(a)(1)(A) Recovery Permits and Safe Harbor Agreements take approximately 16 hours for a GS-11 Biologist (this includes time to process the permit). 2006 GS rates for a GS-11 Biologist in the Portland-Vancouver-Beaverton area range from $25.93 to $33.71 per hour. Third parties are assumed to incur the same cost as a technical assistance effort. Source: Personal communication with Service Biologist, Portland, Oregon, on November 14, 2005; Office of Personnel and Management, "2006 General Schedule (GS) Locality Pay Tables," Effective January 2006. http://www.opm.gov/oca/06tables/indexGS.asp

[c/] Industrial Economics, Inc., analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, and a review of consultation records from several Service field offices across the country.

3.3 SUMMARY OF PRE-DESIGNATION SECTION 7 CONSULTATIONS

Since the listing of FBB, KL, and WD in 2000, twenty-two formal, six informal, and three technical assistance consultations have been completed on the species (see Appendix B). Of the thirty-one consultations, eighteen covered restoration actions and research activities that benefit the species (including ten internal formal and informal consultations on Section 10(a)(1)(A) Recovery Permits), seven involved programmatic consultations, or consultations on broader programs or terms and conditions for programs rather than consultations on specific projects, and one involved a bull trout-related consultation on the Willamette Project.

Project specific consultations included the following four projects: A formal consultation on a new drainage system for the Fern Ridge embankment dam, another formal consultation on the construction of a four-lane divided highway through west Eugene (West Eugene Parkway), a third formal consultation (and one technical assistance consultation) on the construction of a bike path on Bureau of Land Management (BLM) land in the West Eugene Wetlands, and one technical assistance consultation requesting more information on the proposed Santiam to Bethel Transmission Line project in Linn and Marion counties. Other consultations and Section 10(a)(1)(A) permit actions expected to take place in 2006, prior to the finalization of the CHD include:

- West Eugene Parkway: ODOT is currently preparing a new BA for the West Eugene Parkway that addresses the species and the proposed CHD, specifically Units FBB-11D and WD-7B (see Section 6.1.2.1). The BA is expected to be completed in the summer of 2006 and will cost

ODOT between $30,000 and $35,000.[38] While the project is assigned an equal probability of occurring between the years 2008 and 2026, the economic analysis assumes the formal consultation on the project occurs in 2006, after the BA is completed.

- ODOT Emergency/Urgency Cut/Fill Program: ODOT anticipates drafting a programmatic BA in early 2006 and entering into formal consultation with the Service in late summer 2006 on its Emergency/Urgency Cut/Fill Program, a statewide emergency maintenance and repair program that covers cases of slope failure along state-maintained roadways and bridges (see Section 6.2.1.1). The development of the BA will require several months of ODOT staff time, as well as numerous hours of meetings attended by staff from ODOT, National Oceanic and Atmospheric Administration (NOAA) Fisheries, the Service, and Oregon Department of Fish and Wildlife (ODFW).[39]

- Section 10(a)(1)(A) Recovery Permits: Five county and city governments with proposed critical habitat for FBB may choose to obtain Section 10(a)(1)(A) permits for vegetative maintenance along roadways. A section 7 consultation will not be required because the Service previously completed an Intra-Service programmatic consultation on their issuance of FBB Section 10(a)(1)(a) permits (see Section 6.2). However, there are costs of obtaining and processing the permit and these are included as an administrative cost.

3.4 PROJECTED FUTURE SECTION 7 CONSULTATIONS

In addition to the seven consultations expected during 2006 (see Section 3.3), three project specific consultations are anticipated during 2007-2026.

- Oregon Transportation Investment Act III Statewide Bridge Delivery Program: The proposed CHD for the species will result in the need for ODOT to re-initiate consultation with the Service on the Oregon Transportation Investment Act III Statewide Bridge Delivery Program (Units FBB-3/KL-6 and FBB-8/KL-9). This consultation is expected to take place in 2007. The component of this process attributed to FBB, KL, and WD is considered minor, and is estimated to comprise less than $5,000 of the State's re-consultation costs (see Section 6.1.2.1).[40]

- Benton County HCP: Benton County is in the process of developing a new HCP to protect sensitive prairie habitat and all special-status species which depend on it (including Units FBB-

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38 Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 19, 2006.

39 Personal communication with Chris Maguire, Terrestrial Biology Program Coordinator, Oregon Department of Transportation, January 18, 2006.

40 Personal communication with Zak Toledo, Natural Resources Coordinator, Oregon Bridge Delivery Partners, February 14, 2006.

7/KL-8, FBB-8/KL-9, FBB-9/KL-10, WD-4A, WD-4B, and WD-5). The HCP will take approximately three years to complete, with work expected to begin in spring 2006 (see Section 5.0). The economic analysis assumes a formal consultation on this HCP will occur in 2008.

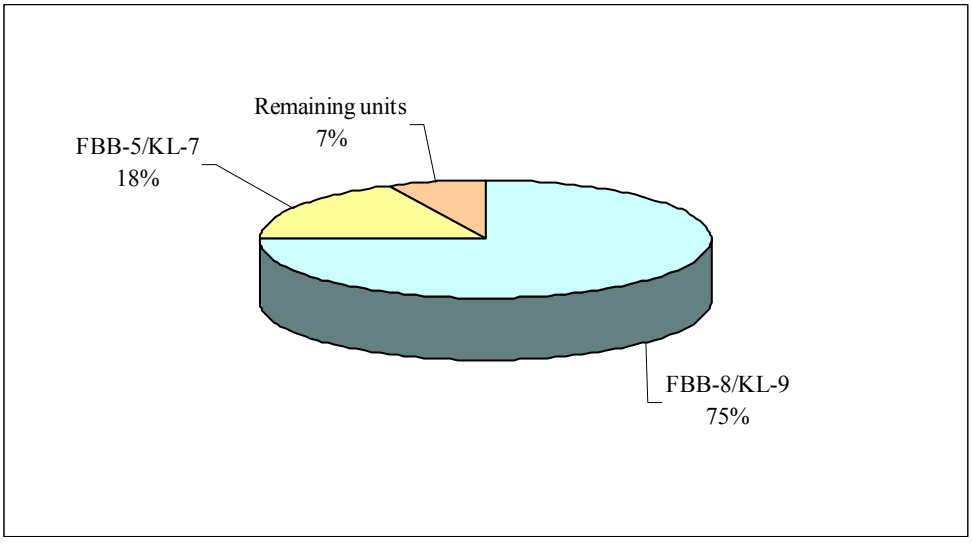
- The City of Dallas is expected to be involved in a formal consultation with the Service and Federal permitting agency (such ACOE) on a new collector street in the vicinity of Unit FBB-5/KL-7 sometime after 2016 (see Section 6.1.3.2).[41]

3.5 SUMMARY OF ADMINISTRATIVE COSTS

Table E-2 in Appendix E provides a summary of administrative costs that have occurred (pre-designation) or are anticipated to occur (post-designation) associated with section 7 consultations and CHD. Since 2000, pre-designation costs are estimated to range from $276,000 to $482,000 (2006 dollars). Pre-designation costs for associated project modifications, if any, are discussed in the relevant activity chapters that follow. After designation, approximately $41,000 to $61,000 in post-designation administrative costs are forecast in undiscounted 2006 dollars, or between $29,000 and $51,000 in present value terms at discount rates of three and seven percent. More than 90 percent of the post-designation administrative costs are forecast to occur in units FBB-8/KL-9 and FBB-5/KL-7 (see Figure 3-1). These units are highlighted in green in Table E-2 in Appendix E. Annualized costs are estimated at approximately $2,000 to $4,000.

Figure 3-1

Relative Economic Impacts Related to Administrative Section 7 Consultation Costs, by Unit (Total Upper-Bound PV Impacts Assuming a Seven-Percent Discount Rate)



[41] Personal communication with Fred Braun, Director, City of Dallas Public Works Department, January 30, 2006.

The owner of a parcel of private land containing a federally-listed species, or designated as critical habitat for a listed species, may face certain land use restrictions that preclude development on some or all of the parcel. Such land use restrictions may reduce the value of the property. In addition, the overall housing market may be impacted if a large area of land is restricted from development, leading to a decrease in the supply of housing. This decline in housing supply, in turn, reduces the amount of consumer and producer surplus in the housing market.

The final rule, listing FBB and WD as endangered and KL as threatened in 2000, describes urban development as one of the major threats to the species.[42] While Federal endangered species laws generally do not apply to listed plants on private lands,[43] much of the KL and WD habitat overlaps with FBB habitat, is classified as wet prairie grassland habitat, or occurs within the boundaries of the future Benton County HCP. Under these situations, privately owned KL and WD habitat will be protected from development activities through conservation actions included in an incidental take permit for FBB, recommended through a section 7 consultation for a section 404 permit, or built into an HCP.

The extent to which a future development project would be impacted by the species and habitat conservation is uncertain.[44] While development is considered a major threat to the species, there are no examples of mitigation/conservation activities or project modifications for a development project within FBB or plant habitat, as no development projects have been consulted on since the species were listed in 2000. However, considering the small size and biological importance of each unit, it appears there is minimal room within a unit/subunit for avoiding impacts from future development activities.[45]

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42 U.S. Fish and Wildlife Service, January 25, 2000, "Endangered Status for *Erigeron decumbens* var. *decumbens* (Willamette Daisy) and Fender's Blue Butterfly (*Icaricia icaroides fenderi*) and Threatened Status for *Lupinus sulphereus* ssp. *kincaidii* (Kincaid's Lupine), Final Rule" *Federal Register*, Vol. 65, No. 16, pp. 3875-3890.

43 As described in Section 1.2.1, unless an activity on private land receives federal funding or federal permitting, federal endangered species laws (sections 7, 9, and 10) do not apply to listed plants on private lands.

44 Project modifications will depend on the type of development project, and future development projects are unknown. Personal communication with Service Biologist, Portland, Oregon, January 10, 2006.

45 As described by a Service Biologist, the Service "…narrowed the designation as much as possible to only those areas essential to conservation. This does have the effect of making any impact to designated critical habitat result in a higher likelihood of an adverse modification call. So, while it reduces the likelihood any one action will trigger a consultation, it increases the likelihood that any one consultation

Example of Potential Development Impacts

The severity of potential species and habitat conservation requirements for a development project is illustrated in a public comment letter from the Service to ACOE regarding a proposed project to construct a Lowe's Home Improvement Store in Subunit WD-8A (approximately 50 acres of private developable land), dated January 6, 2006.[a/] In this letter, the Service states that the habitat impacted by this potential project is classified as "Resource Category 1"[b/] habitat, and the Service's mitigation policy for a Resource Category 1 habitat is protection of existing habitat.[b/]

a/ TS Number: 06-0473 re. Corps of Engineers Public Notice 1996-00006, Delta Management Company.

b/ Definition of Resource Category 1: "The designation criteria for habitat in Resource Category 1 is 'habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the ecoregion section.' The mitigation goal for habitat in Resource Category 1 is 'no loss of existing habitat value.'" http://www.fws.gov/policy/501fw2.html

c/ According to the Service Mitigation Policy, the appropriate mitigation recommendations for Resource Category 1 habitat is to "….recommend that all losses of existing habitat be prevented, as these one-of-a-kind areas cannot be replaced. Insignificant changes that do not result in adverse impacts on habitat value may be acceptable provided they will have no significant cumulative impact." http://www.fws.gov/policy/501fw2.html

Absent specific information on how development projects would mitigate for impacts to FBB, KL, and WD, this economic analysis presents the value derived from potential future development on private lands (excluding lands owned by TNC and Greenbelt Land Trust) within the proposed CHD, including KL and WD habitat.[46] To the extent that development is excluded from the proposed CHD, the estimated impacts accurately represent the non-agriculture component of land value lost by private landowners. To the extent that development is allowed within the proposed CHD, the estimated impacts are overstated.

The remainder of this section is organized as follows. First, the economic framework for modeling the development effects is presented. Then, the method and procedure for measuring the development effects are described. Finally, the estimation results are presented and discussed.

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will result in an adverse modification finding." Personal communication with Service Biologist, Portland, Oregon, January 18, 2006.

46 In total, 195 private individuals own approximately 2,120 acres in the proposed CHD; 87 individuals in Lane County; 41 in Benton County; 28 in Polk County; 16 in Yamhill County; 13 in Linn County; 5 in Douglas County; 3 in Marion County; and 2 in Lewis County.

4.1 FRAMEWORK FOR ESTIMATING COSTS OF DEVELOPMENT RESTRICTIONS

Critical habitat designation may impose two kinds of costs to society if development is prohibited on the designated land. These two costs are:

1. Loss of value of land that can no longer be developed, and

2. Cost to the housing market and consumer surplus

Two types of models are available to evaluate these costs. The first is the "closed city model," while the second is the "open city model." The closed city model assumes that the number of households in a city is fixed and does not respond to market conditions (i.e., migration does not occur when economic conditions change in the city). Thus, if the supply of land is reduced, more people must fit into less space, or must live in less desirable locations in the future. The open city model assumes that the number of households in a particular market is determined in a multi-market equilibrium, and that households will relocate in response to changes in economic conditions. Given that the Willamette Valley features free in- and out-migration the open city model provides a more accurate and realistic description of the development process within the proposed CHD. Based on this premise and technical reviewers' comments on previous economic analyses of CHD, the open city model is considered more appropriate compared to the closed city model for measuring the potential impacts of CHD on development (i.e., cost associated with land use restrictions) for the purposes of this analysis.

Under the open city model assumption, CHD will have little impact on consumer surplus because the households affected by the CHD will relocate to other housing markets in response to the designation. Even if relocation is difficult, the impact on housing markets in the Willamette Valley would be small, as the privately owned portion of the designation (approximately 2,100 acres), which represents the developable land, is small relative to the total quantity of developable land in the Willamette Valley.[47] Thus, the primary cost of species conservation for the units/subunits in the Willamette Valley will be the loss of value of land that can no longer be developed.

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[47] A study funded by the U.S. Environmental Protection Agency (EPA) and conducted by the Pacific Northwest Ecosystem Research Consortium, a group consisting of scientists from EPA, Oregon State University, and the University of Oregon, projected the future landscape in the Willamette River Basin through the year 2050 under three development scenarios: (1) Plan Trend (current policies are implemented as written and recent trends continue), (2) Development 2050 (loosening of current policies to allow freer rein to market forces), and (3) Conservation 2050 (greater emphasis on ecosystem protection). The number of people living in the Basin is expected to nearly double by 2050, and in all scenarios, future urban and rural development was projected to occur predominately on lands now used for agriculture. The estimated effects under the Development 2050 scenario (current land use policies were relaxed and new development was allocated at lower densities over a larger area) included a loss of 24 percent of prime farmland. Source: "Willamette Basin Alternative Futures Analysis, Environmental Assessment Approach that Facilitates Consensus Building," EPA, August 2002, Webpage: http://www.fsl.orst.edu/pnwerc/wrb/proj_summary.pdf (accessed May 16, 2006).

The framework for estimating the loss of land value resulting from restrictions on development is based on the theoretical models developed by Capozza and Li (1994)[48] and Capozza and Helsley (1990).[49] The price of agricultural land at a given location equals the present value of all future rents: the present value of agricultural rents up to the time of conversion plus the present value of urban rents from the time of conversion onward. Assuming that landowners choose the conversion time to maximize the expected value of land Capozza and Helsley (1990) show that the price of agriculture land has three components: 1) the value of agricultural rents (*VA*), 2) the growth premium (*GP*), and 3) the option value of potential development (*OV*). Formally, the price of agriculture land can be written as:

$$\begin{aligned} P^a(t,z) &= VA + GP + OV \\ &= \frac{R^a}{r} + \frac{g}{r^2}e^{-\alpha(z-z^*)} + \frac{r-\alpha g}{\alpha r^2}e^{-\alpha(z-z^*)} \end{aligned} \tag{1}$$

where,

$P^a(t,z)$	=	the price of agriculture land at location *z* at time *t*
R^a	=	the net return to farmland
r	=	the discount rate
z	=	the distance from the parcel to the city center.
z^*	=	the distance from the city boundary to the city center
g	=	the income growth
σ^2	=	the variance of income
α	=	$[(g^2 + 2\sigma^2 r)^{1/2} - g]/\sigma^2$

48 Capozza, D.R. and Yuming Li. "The Intensity and Timing of Investment: The Case of Land." *The American Economic Review*, Vol.84, No. 4 (Sep., 1994):889:904.

49 Capozza, D. R. and R.W. Helsley. "The Stochastic City," *Journal of Urban Economics 2*8(1990):187-203.

The value of agricultural rents represents the value of land as an agricultural input, whereas the growth premium equals the present value of expected increases in land rents after being converted to development, and the option value is the value of land derived from the option of future development. Both the growth premium and the option value decrease as distance from the boundary of the urban area increases and time of development moves further into the future.

If development of a parcel of agriculture land is restricted, it will be worth less than its value in the previously unrestricted state. This loss of value is a cost to the landowner; with the magnitude of loss depending upon the type of land use restriction imposed. Specifically, if a piece of land is restricted from any kind of use, all of its economic value will be lost. However, if the existing agricultural use of a piece of land is unrestricted, and only future development is precluded from the parcel, the loss of land value equals the sum of growth premium and option value.

The growth premium and the option value together may account for a large portion of land value. In a recent study, Lin and Wu (2005)[50] estimate that the value of agricultural rents accounts for only 39 percent of agriculture land value in the United States, while growth premium and option value account for the remaining 61 percent of agriculture land value.

4.2 THE METHOD FOR ESTIMATING DEVELOPMENT EFFECTS

The method for estimating the loss of land value associated with development restrictions imposed by CHD for FBB, KL, and WD is developed based on the theoretical framework presented above. The method consists of three steps. In the first step, region specific land prices are estimated for each unit/subunit in the proposed CHD. The second step comprises estimation of the proportion of land value derived from the growth premium and option value for each unit/subunit. Finally, the loss of land value resulting from the development restriction is estimated by combining results from the first two steps. Each of the three steps is described in detail as follows.

4.2.1 STEP 1: ESTIMATING LAND PRICES

Land prices (P) are estimated for agriculture and forest land in each unit/subunit. Agriculture land and forest land comprise the privately owned developable lands (H) within the boundaries of the proposed CHD. These land prices represent one of the primary inputs into the model of development impacts.

Gap Analysis Program's (GAP) land cover data for the region indicates that approximately 85 percent (i.e., 1,794 acres) of the estimated 2,120 acres of privately owned land is classified as

[50] Lin, H., and J. Wu. "Conservation Policy and Land Value: The Conservation Reserve Program." Submitted to *Review of Economics and Statistics,* 2005.

agricultural land.[51] The remaining 327 acres are classified as various types of forestland; primarily Oregon White Oak Forest. Based on evidence of past and existing land use, the agricultural value of lands in the CHD is as grassland/pasture. Examination of recent aerial photos of the area reveals privately owned agriculture lands as unplowed grassland or pasture.[52] Furthermore, the fact that these agriculture lands are being proposed as CHD indicates that these are open prairie, and not farmed (i.e., plowed) during the past decade.[53] This observation was confirmed during a tour of the habitat on February 17, 2005.[54] The aerial photos show the privately owned forest lands as lightly wooded areas on the fringe agriculture lands, primarily around units/subunits FBB-4A/WD-1A/WD-1B, FBB-4B, FBB-7/KL-8, and FBB-8/KL-9.

Local appraisers were contacted to obtain data on representative agriculture land values in the Willamette Valley. Since the agricultural land in the CHD is used as grassland pasture, agricultural land prices in this study are based on sale values for non-irrigated farmland (also referred to as "dry-crop" or "hayland," depending on the county), since irrigated farmland (with water rights) is not relevant to the proposed critical habitat. Representative forestland data were also obtained for the limited proposed critical habitat that occur in forested areas. Data were collected for each county (and in some cases, sub-county areas) in the study area in order to account for variations in regional land markets.

Table 4-1 presents representative land values in the study area organized by region. The data for Oregon lands are based on actual sale transactions during the period 2000-2005.[55] For Lewis

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51 Kagan, J.S., J.C. Hak, B. Csuti, C.W. Kiilsgaard, and E.P. Gaines. 1999. Oregon Gap Analysis Project Final Report: A geographic approach to planning for biological diversity. Oregon Natural Heritage Program, Portland, Oregon. 72 pp. + appendices, http://oregonstate.edu/ornhic/or-gap.html

52 Oregon aerial photos: 2000 Digital Orthophoto Quadrangles (DOQs) from the Oregon Geospatial Enterprise Office website: http://www.oregon.gov/DAS/IRMD/GEO/data/DOQ_NAPP_2.shtml. 2005 Aerial photos were available for some of the proposed CHD units in Benton County, Oregon, from the Benton County GIS department's website: http://ww2.co.benton.or.us/irm/gis/GISdata/. Washington aerial photos: 1990 USGS Digital Orthophoto Quarter Quadrangles (DOQQ) from the University of Washington's "Washington State Geospatial Data Archive" (WAGDA) website: http://wagda.lib.washington.edu/data/doqs.html

53 "[FBB, KL, and WD]…occur in prairie remnants with undisturbed (not disturbed in the last 10 years) subsoils (the layer of soil between the topsoil and bedrock)." U.S. Fish and Wildlife Service, November 2, 2005, "Designation of Critical Habitat for the Fender's Blue Butterfly (*Icaricia icarioides fenderi*), *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's Lupine), and *Erigeron decumbens* var. *decumbens* (Willamette Daisy); Proposed Rule" *Federal Register*, Vol. 70, No. 211, p. 66494.

54 Field visit with Service Biologists to units/subunits in Lane and Benton counties on February 17, 2005.

55 Personal communication with Ron Moffitt, Agriculture Appraiser, Farm Credit Services, Redmond, Oregon, January 23, 2006.

County, Washington, the modeling relies on the professional judgment of a local appraiser.[56] The table includes information on the number of land sales, range of per-acre land values, and median per-acre land values.[57] The range of land prices was used to estimate the range of total economic impacts to development (see section 4.2.2 for detail).

Table 4-1
Per-Acre Agricultural and Forest Land Values
Farm Credit Services (sales records 2000-2005) *

County Name	Eugene	Land Type	# Sales	Land Value Low	Land Value Median	Land Value High
Benton		A	12	$2,037	$2,801	$5,400
Benton		F	n/a	$400	n/a	$1,000
Douglas		A	42	$950	$2,336	$4,200
Douglas		F	n/a	$400	n/a	$1,000
Lane	North	A	22	$1,574	$2,517	$6,695
Lane	North	F	n/a	$400	n/a	$1,000
Lane	South	A	15	$2,358	$4,000	$5,000
Lane	South	F	n/a	$400	n/a	$1,000
Linn		A	86	$1,880	$2,818	$4,317
Linn		F	n/a	$400	n/a	$1,000
Marion		A	51	$2,037	$4,938	$9,900
Marion		F	n/a	$400	n/a	$1,000
Polk		A	49	$1,650	$2,510	$8,000
Polk		F	n/a	$400	n/a	$1,000
Yamhill		A	37	$2,500	$3,978	$14,816
Yamhill		F	n/a	$400	n/a	$1,000
Lewis		A	n/a	$2,000	n/a	$3,500
Lewis		F	n/a	$400	n/a	$1,000

Source: Personal communication with Ron Moffitt, Agriculture Appraiser, Farm Credit Services, Redmond, Oregon, January 23, 2006; Personal communication with Gordon Jurgensen, Agriculture Appraiser, Farm Credit Services, Chehalis, Washington, January 23, 2006.

* Represents non-irrigated farmland

Generally, land values in the study area are fairly consistent, with median values in Oregon ranging from approximately $2,340 per acre in Douglas County to $4,940 per acre in Marion County.[58] Land values fluctuate between $2,000 and $3,000 per acre in five of the seven regions analyzed in Oregon. In addition to Marion County, areas in Lane County (south of the City of Eugene) and Yamhill County also tend to have higher values (approximately $4,000 per acre). The estimated

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56 Personal communication with Gordon Jurgensen, Agriculture Appraiser, Farm Credit Services, Chehalis, Washington, January 23, 2006.

57 Except for Lewis County, Washington, where these data were not available.

58 Personal communication with Ron Moffitt, Agriculture Appraiser, Farm Credit Services, Redmond, Oregon, January 23, 2006.

range of representative agricultural land values in Lewis County, Washington, is slightly lower than Oregon values at $2,000 to $3,500 per acre. The ranges of agricultural land values in Table 4-1 reflect the influence of flooding potential; land without flooding potential is at the high end of that range, while land with flooding potential is at the lower end.[59]

In terms of forestland, generally the value lies in the commercial value of trees; the underlying land value is relatively insignificant. However, the opposite is true in the case of the proposed CHD units as the common tree species, Oregon White Oak, has little commercial value. It is estimated that the underlying land value ranges from a low of $400 to $500 per acre to a high of $1,000 per acre across Oregon.[60] As the value of trees is insignificant in forestland in the proposed CHD, the total parcel value is roughly equivalent to the underlying value of land.

4.2.2 Step 2: Estimating Land Value Derived From the Growth Premium and Option Value

The proportion of land value derived from the growth premium and option value in each unit/subunit is estimated in this study using equation (1). Specifically, from equation (1), the price of farmland can be written as:

$$P^a = \frac{R^a}{r} + GP + OV \,, \tag{2}$$

where P^a is the price of farmland, R^a is the annual net return to farmland, and r is the farmer's discount rate. From equation (2), the percent of land value derived from the growth premium and option value, denoted by S, can be derived as:

$$S \equiv \frac{GP + OV}{P^a} = 1 - \frac{R^a}{rP^a} \,. \tag{3}$$

Three variables are required to employ this formula for calculating the percent of land value derived from the growth premium and option value. These are farmland price P^a, annual net return to the farmland R^a, and discount rate r. The data sources for land prices are described in Step 1. The annual net return to farmland (R^a) is estimated based on the projected net return to pasture in the Willamette Valley, adjusted by the consumer price index (CPI) to derive the 2006 net return

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59 Personal communication with Gordon Jurgensen, Agriculture Appraiser, Farm Credit Services, Chehalis, Washington, January 23, 2006.

60 Personal communication with Ron Moffitt, Agriculture Appraiser, Farm Credit Services, Redmond, Oregon, January 23, 2006.

($40.69 per acre).[61] The net return to pasture is used because all farmland within the boundaries of the proposed CHD is pasture/grassland. Two discount rates are used in the calculation: three percent and seven percent. Finally, annual net returns to forestland in the habitat units/subunits are assumed to be zero because the tree species in the habitat units/subunits, Oregon White Oak, has little commercial value. Thus, all forestland values are derived from the growth premium and option value.

Example

An example illustrating Step 2 is presented below for unit WD-2 in Marion County. Using the median land value for Marion County from Step 1 ($4,938 per acre), the annual net return to pasture in the Willamette Valley ($40.69 per acre), and discount rates of three and seven percent, the percent of land value derived from the growth premium and option value (*S*) can be derived as follows:

At r = 3 percent, $S = 1 - (\$40.69 \div (3 \text{ percent} * \$4{,}938)) = 73$ percent.

At r = 7 percent, $S = 1 - (\$40.69 \div (7 \text{ percent} * \$4{,}938)) = 88$ percent.

Thus, growth premium (*GP*) and option value (*OV*) account for 73 percent of the farmland value at the three percent discount rate, and 88 percent at the seven percent discount rate.

4.2.3 Step 3: Estimating the Cost of Development Restrictions

The total value of privately owned developable land in each unit/subunit is estimated by multiplying the total acres of privately owned developable land in the habitat unit/subunit (*H*) by the land price in the habitat unit/subunit (*P*), both estimated in the first step. A portion of this land value will be lost if development is precluded from some or all of the units/subunits to conserve the species and their habitats. This loss of land value represents the cost of development restrictions, and is estimated in this economic analysis assuming development is precluded from all land within the proposed CHD; however, the existing agriculture use of the private land within the proposed CHD remains unrestricted. Thus, the loss of land value equals the sum of growth premium and option value. This loss is estimated by multiplying the total value of privately owned developable land in the habitat unit/subunit *(H*P)* by the percent of land value derived from growth premium and option value (*S*) estimated in the second step:

$$\textit{Cost of Development Restriction} = H*P*S \qquad (4)$$

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[61] Taylor, M.L., S. Aldrich-Markham, G.J. Prirelli. Enterprise Budget, Pasture, Willamette Valley Region, Oregon State University Extension Service, EM 8492, January 1992. http://oregonstate.edu/dept/EconInfo/ent_budget/results.cfm?Region=WV

As described in the preceding paragraphs, a key assumption in the modeling of impacts to future development on private lands is the exclusion of development from all private lands within the entire designation, including KL and WD habitat. Thus, this analysis assumes that all privately owned developable land is removed from potential development as a result of development restrictions. If development is prohibited on only a portion of a unit/subunit, the cost of the development restriction can be calculated proportionally.

Example

Using the median land value for Marion County from Step 1 ($4,938 per acre) and the percent of land value derived from the growth premium and option value estimated in Step 2 (73 percent at a three percent discount rate and 88 percent at a seven percent discount rate), the loss of land value resulting from development restrictions in unit WD-2 is calculated as follows:

At r = 3 percent, *Cost of Development Restriction* = 12.23 acres * $4,938 * 73 percent.

At r = 7 percent, *Cost of Development Restriction* = 12.23 acres * $4,938 * 88 percent.

Thus, the cost of development restriction equals $44,086, or approximately $3,605 per acre, at the three percent discount rate and $53,145, or approximately $4,345 per acre, at the seven percent discount rate.

4.3 ESTIMATION RESULTS

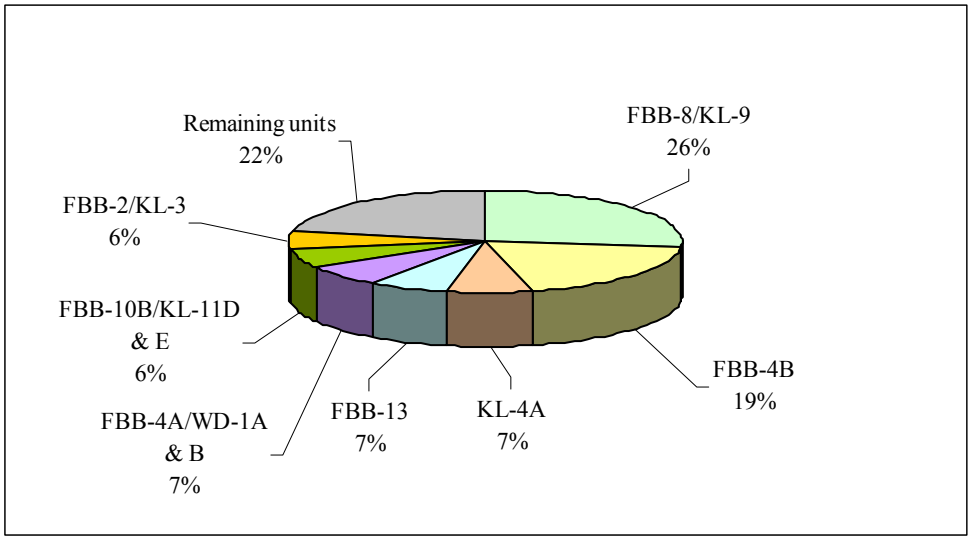
The cost of development restrictions is estimated using the method described in Section 4.2. This method takes into account the difference in land prices across counties as well as the difference in land prices in Lane County, north and south of the City of Eugene. The estimation results are summarized, by unit, in Table E-3 in Appendix E. The table presents the range of economic impacts to private landowners due to development restrictions within the proposed CHD. These impacts will occur immediately after the lands are designated and the development restrictions are announced (in 2006).

The estimated range of total economic impacts depends on the discount rate applied in the model (see the text box in Section 1.2 titled "Calculating Present Value and Annualized Impacts"). Using a three percent discount rate, the estimated total economic impacts to development range from $1.3 to $9.9 million (with a median of $3.3 million). The range of total economic impacts to development is between $2.7 million and $11.3 million when a seven percent discount rate is used (with a median of $4.7 million). The annualized impact ranges from $89,000 to $664,000 at a three percent discount rate (with a median of $225,000) and from $256,000 to $1,064,000 at a seven percent discount rate (with a median of $447,000).

The total economic impacts are not uniformly distributed across the habitat units. In fact, there is a large variation in economic impacts between units/subunits that contain privately owned developable land. Land use restrictions are expected to have the greatest economic impact in habitat unit FBB-8 (including KL-9), followed by unit FBB-4B. Unit FBB-8 (including KL-9) contains the largest area of privately owned agriculture and forest land (713 acres). Unit FBB-4B contains the next largest area of private land within the CHD (327 acres). Together, these units contain almost 50 percent of the private land within the CHD and account for approximately 45 percent of the development-related economic impacts. In fact, seven units comprise almost 80 percent of the estimated impacts to development. These units are identified in Figure 4-1 below and highlighted in green in Table E-3 in Appendix E. Conversely, the total economic impacts of species conservation activities are expected to be zero in units/subunits FBB-11E, KL-5, KL-14A, KL-16A, WD-1B, WD-4B, WD-6B, and WD-8E, as there is no private land in these units/subunits. These subunits are highlighted in yellow in Table E-3.

Figure 4-1

Relative Economic Impacts to Development, by Unit
(Total Upper-Bound PV Impacts Assuming a Seven-Percent Discount Rate)



The estimates of economic loss in this section are overstated. As stated in the introduction, the impact of species and habitat conservation on future development projects is uncertain. Absent specific information on how development projects would mitigate for impacts to FBB, KL, and WD, the economic analysis presents the value derived from potential future development on private lands within the proposed CHD. To the extent that development is excluded from the proposed CHD the estimated impacts accurately represent the non-agriculture component of land value lost by private landowners. To the extent that development is allowed within the proposed CHD the estimated impacts are overstated.

Benton County, Oregon, is in the process of developing a new HCP to protect sensitive prairie habitat and all special-status species that depend on it, including FBB. As described in Section 1.2.1, HCPs do not grant incidental take permits for plant species. However, if a listed plant occurs in an area subject to the HCP, the Service must consider whether the proposed activities may adversely affect or jeopardize the continued existence of the plant. Thus, the HCP will also consider and provide protective measures for KL and WD. The HCP is being developed in response to development pressure, in particular rural residential development, which is threatening the viability of the local prairie ecosystem. The goal is to provide adequate habitat protection to offset the effects of future development. In addition, Benton County already implements an active open space preservation program, whereby land is being protected on a voluntary basis; these efforts will be integrated with the proposed HCP. The following section summarizes information pertaining to the timing, effort, and cost of developing the Benton County HCP.

Currently, the Benton County HCP is in the early pre-planning phase. Benton County was awarded a grant from the Service in January 2006 to commence the project, and it is anticipated that work will begin in spring 2006. The project is organized into phases, with Phase I consisting of mapping, habitat assessment and inventory, and initial public outreach (e.g., public meetings) informing local landowners about the process, and Phase II representing the development and finalization of the HCP, including proposed conservation strategies and monitoring and management considerations. It is anticipated that Phase I will take about one to two years and ultimate completion of the HCP will take about three years. The planning horizon for the HCP is 50 years.

The HCP will cover future residential development projects, as well as other development activity such as road projects. Regulated activities under the HCP will be closely linked to local planning efforts that direct and guide future development, such as the current update of the Benton County Comprehensive Plan, as well as local city plans. These land use plans will allow Benton County to identify where potential conflicts between development and habitat may exist, so that they can be addressed in the HCP.

It is envisioned that the Benton County HCP will include an active land acquisition program. At this point, however, there are no specific goals as to the targeted amount of land preservation. Future land preservation under the HCP will be coordinated with existing preservation efforts undertaken by Benton County, where about 1,000 acres have been acquired to date. The HCP will help identify where the gaps in land preservation are located, so that these areas can be targeted for acquisition. The land acquisition program will be voluntary, i.e., involving willing sellers, and it will rely heavily on conservation easements (as opposed to fee-title acquisition).

The costs of the proposed HCP are estimated based on Benton County's grant application to the Service to develop the HCP. The County estimated the total cost of the HCP to be $904,875, which includes $260,375 in "in-kind" contributions that represent the value of services that will be provided by the County, volunteers, and project partners.[62] The difference in these amounts ($644,500) represents the amount of the initial grant funding request; of that amount, Benton County was awarded $574,583, which is not expected to be sufficient to cover the full costs of the HCP.[63] These grant funds will be used primarily for pre-planning efforts conducted under Phase I. The difference in the grant request amount and the awarded amount, roughly $70,000, represents the minimum amount that will be required to carry the HCP through completion.[64] At the high end of the range, estimates by the Service indicate that an additional $200,000 may be necessary to complete the HCP.[65] There will be a subsequent grant application to the Service to fund the remainder of the program; there is a high probability of receiving future funding.

In addition to the costs associated with developing the HCP, there will be other costs associated with the HCP implementation, such as land acquisition and ongoing monitoring and management, which will be the responsibility of Benton County. Future costs are difficult to predict because there is no established recovery plan available for the targeted species and, therefore, no clear picture of what the County is expected to accomplish via the HCP. It is believed that the main cost of implementation will be land acquisition. It is estimated that land acquisition will roughly cost a total of at least $1 million.[66] Further, ongoing management is expected to cost about $100,000 annually.[67] Due to the rapid increase in land acquisition costs, there will be pressure to start acquiring land as soon as possible. It is likely that developer fees will be used to help fund long-term acquisition and management.

Pre-designation costs are estimated at $281,000 in 2006 dollars. Potential post-designation (2006-2026) costs are estimated to range between $2.4 and $2.5 million (in constant 2006 dollars). In discounted terms, potential economic costs related to the Benton County HCP are estimated to be

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62 Personal communication with Jerry Davis, Benton County Natural Areas and Parks Director, February 1, 2006.

63 Personal communication with Jerry Davis, Benton County Natural Areas and Parks Director, February 1, 2006.

64 Personal communication with Jerry Davis, Benton County Natural Areas and Parks Director, February 1, 2006.

65 Personal communication with Service Biologist, January 27, 2006; Personal communication with Jerry Davis, Benton County Natural Areas and Parks Director, February 1, 2006.

66 Personal communication with Service Biologist, January 27, 2006; Personal communication with Jerry Davis, Benton County Natural Areas and Parks Director, February 1, 2006.

67 Personal communication with Service Biologist, January 27, 2006; Personal communication with Jerry Davis, Benton County Natural Areas and Parks Director, February 1, 2006.

$1.9 to $2.0 million (using a three percent discount rate) and $1.4 to $1.5 million (using a seven percent discount rate). In annualized terms, potential costs are expected to range from $127,000 to $135,000 annually (annualized at three percent) and $136,000 to $145,000 annually (annualized at seven percent). The estimated impacts are based on the following assumptions:

- Since the Service grant ($574,583) will be used primarily on Phase I mapping, habitat assessment and inventory, and initial public outreach, the economic analysis assumes that all of the grant monies are used for Phase I. In addition, because Phase I is expected to take up to two years to complete, costs are allocated over the two year period. Because the HCP is in its early pre-planning phase, the timing of costs is uncertain, so the economic analysis allocates costs equally over the time period for Phase I, or $287,292 per year, beginning in the spring of 2006. Furthermore, because work is expected to begin in the spring of 2006, the economic analysis allocates 75 percent of the first year's costs in 2006 (9 months of work), a full year of costs in 2007 (12 months of work), and 25 percent of the annual costs in 2008 (3 months of work).

- The "in-kind" contributions from Benton County and project partners ($260,375) are assumed to be spent over the three-year HCP development period, covering Phase I and Phase II activities. Because the timing of these expenditures is not known, they are allocated evenly over the three-year period, or $86,792 per year, beginning in the spring of 2006. Furthermore, because work is expected to begin in the spring of 2006, the economic analysis allocates 75 percent of the first year's costs in 2006 (9 months of work), a full year of costs in 2007 and 2008 (12 months of work each year), and 25 percent of the annual costs in 2009 (3 months of work).

- The economic analysis then assumes the remaining $69,917 to $200,000 represents the amount of funding required to develop and finalize the HCP as part of Phase II. Because Phase II is anticipated to last one year and occur in the final year of the project, these annual costs are allocated to Year 3 of the project, commencing in the spring of 2008. Thus, 75 percent of these costs will occur in 2008 (9 months of work) and 25 percent of the annual costs will occur in 2009 (3 months of work).

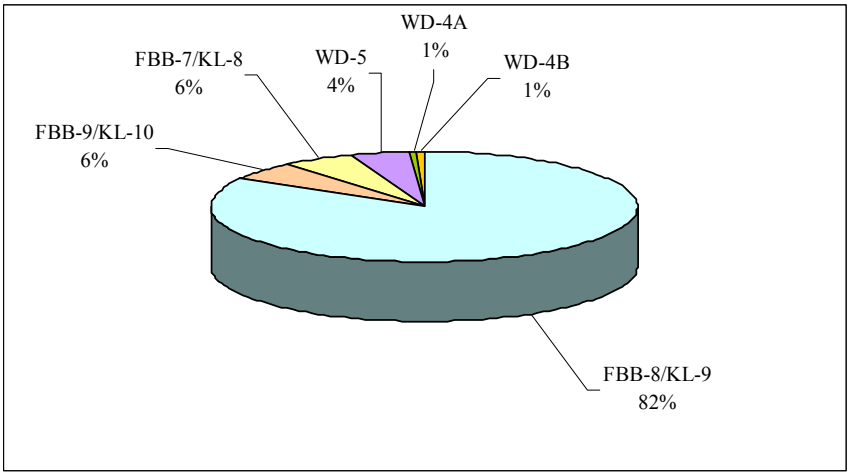
- Given that the HCP is expected to take three years to develop, the economic analysis assumes annual management, costing $100,000, begins in 2009, after the HCP is completed. Thus, only 75 percent of the first year's costs will occur in 2009 (9 months of work).

Considering the Benton County HCP is being developed specifically for the conservation of wet/dry prairie habitat, which supports FBB, KL, and WD, the economic analysis allocates all costs related to the HCP to the 822 acres of proposed FBB, KL, and WD critical habitat in Benton County (units/subunits FBB-7/KL-8, FBB-8/KL-9, FBB-9/KL-10, WD-4A, WD-4B, and WD-5). Almost 90 percent of the proposed CHD land area in Benton County falls within

unit FBB-8/KL-9, thus this unit is expected to bear most of the costs ($1.3 million). This unit is identified in Figure 5-1 below and highlighted in green in Table E-4 in Appendix E.

Figure 5-1

Relative Economic Impacts Related to the Benton County HCP, by Unit
(Total Upper-Bound PV Impacts Assuming a Seven-Percent Discount Rate)



Attributing all the HCP's development costs to the proposed critical habitat units in the County will overestimate the overall costs of species conservation efforts within the proposed CHD, as the HCP will also protect the species (FBB, KL, and WD) and their habitat outside the bounds of the proposed CHD, as well as other special status-species and their habitats in the County.

As described above, HCP-related costs break down into three component parts: (1) the cost of developing the HCP (approximately $904,875 to $1,034,958), (2) the cost of acquiring conservation easements (approximately $1 million), and (3) the annual cost of managing the HCP (approximately $100,000 per year). Only the costs associated with developing and managing the HCP are reported in final results of this section of the economic analysis. The cost of acquiring conservation easements is already captured in Section 4.0, Economic Effects on Development, which estimates the cost of land use restrictions imposed on landowners by conservation efforts associated with the species (i.e., the exclusion of development from the designation). The lost land value (i.e., growth premium and option value) calculated in Section 4.0 represents the underlying value of the conservation easements that the County will purchase under its HCP program. Thus, to account for both the lost land value associated with restricting development from a landowner's property and the cost to the County of purchasing conservation easements to preclude development from that same piece of property would double count the cost of species conservation.[68]

[68] The development model results for Benton County are in line with the land acquisition costs estimated for the Benton County HCP. The model results for the FBB, KL, and WD critical habitat in Benton County indicate the lost of land value due to development restrictions is expected to range from $500,000 to $3.4 million (see Table E-5 in Appendix E), with a median impact of $1.1 to $1.6 million.

The analysis of economic effects of FBB, KL, and WD conservation on transportation-related activities focuses on the cost of species and habitat protection (i.e., "species conservation activities") incurred by state transportation departments and affected local governments in implementing transportation projects and conducting ongoing road maintenance activities. At the state level, potential economic effects are incurred by the Oregon Department of Transportation (ODOT) and Washington State Department of Transportation (WSDOT). Potential effects at the local government level are borne by the various county and city public works departments that implement local road projects and maintain road right-of-way (ROW). The local governments considered here are: Lewis County in the State of Washington; Yamhill, Polk, Marion, Linn, Benton, Lane, and Douglas counties in the State of Oregon; and the cities of Dallas and Eugene in Oregon. Each jurisdiction was contacted to obtain information regarding the manner, in which the presence of the species and/or the CHD had affected past,[69] current, and future road projects, as well as ongoing road maintenance activities. Related estimates of costs, where provided, are included in this analysis. In other cases, assumptions are made to quantify costs based on the expected actions of these jurisdictions in response to regulatory requirements and/or costs have been extrapolated from information collected from other jurisdictions. Costs are then allocated to the appropriate critical habitat unit across the analysis period (2000-2026). Due to the temporal aspect of the analysis, the cost estimates are also discounted using a three and seven percent discount rate. Total costs and breakdown of costs across critical habitat units are presented in Section 6.3.

6.1 EFFECTS ON ROAD AND OTHER TRANSPORTATION PROJECTS

This section evaluates the economic effects of species conservation activities on road and transportation projects within the bounds of the proposed CHD. The focus is on projects that entail physical improvements to transportation infrastructure, such as the development of new roads or improvements to existing ones. The section organizes economic effects based on the timing of the project, with separate discussions of past, current, and foreseeable future projects. Projects are further organized by implementation jurisdiction.

The consultation record indicates that there have been three formal consultations for transportation projects since the species were listed in 2000, all of which were initiated by ODOT. Since these projects are not complete, these are discussed in the context of current projects in Section 6.1.2.

[69] The analysis of past projects extends back to 2000, the year the species were listed under the Act.

6.1.1 Effects on Past Projects

Past projects refer to efforts that have been implemented since the time the species were listed (2000), and which are complete. Although critical habitat was proposed in 2005, and is expected to be finalized in 2006, for the purposes of this analysis, past costs are estimated for the critical habitat units that would have been affected if critical habitat was designated at the time the project occurred.

6.1.1.1 Benton County

Only one transportation project has been completed in the vicinity of the CHD since the species listings. In 2004, the Benton County Public Works Department replaced a culvert under a bridge crossing close to the intersection of Blakesley Creek Road and Hidden Valley Road, near Unit FBB-8/KL-9. A pre-construction biological survey was conducted for the project. None of the species were documented at the project site, and no changes or modifications to the project were necessary. Although project-specific costs were not available, according to the County staff, typical survey costs for these types of projects run about $10,000 to $15,000.[70] Based on available mapping, it is difficult to determine whether this project is located within the boundary of FBB-8/KL-9. Nevertheless, past survey costs are included in the economic analysis and are allocated entirely to FBB-8/KL-9.

6.1.1.2 All Other Jurisdictions

Based on discussions with staff from other potentially-affected jurisdictions,[71] no other road projects have been completed since listing within the area of the proposed CHD. As such, no costs have been incurred by these jurisdictions for species conservation activities related to past transportation projects.

6.1.2 Effects on Current Projects

Current projects include projects that are in the planning stages or in the process of being implemented. The only entity with current transportation projects affected by species conservation activities is ODOT. These projects, which have been subject to formal consultation with the Service, are described below.

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[70] Personal communication with Gordon Kurtz, Associate Engineer, Benton County Public Works Department, January 26, 2006.

[71] Personal communications with: Steve Gisler, Biologist, Oregon Department of Transportation, January 18 and 30, 2006; Paul Wagner, Biology Branch Manager, Washington State Department of Transportation, February 6, 2006; Debbie Knecht, Engineering Technician-Environmental Compliance, Lewis County Public Works Department, January 26, 2006; Susan Mundy, Yamhill County Public Works Department, February 3 and 7, 2006; Aaron Geisler, Polk County Public Works Department, January 31, 2006; Tonya Beard, Marion County Public Works Department, January 25, 2006; Chuck Knoll, Engineer, Linn County Road Department, February 7, 2006; Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26 and February , 2006; Mike Luttrell, Douglas County Public Works Department, February 1, 2006; Fred Braun, Director, City of Dallas Public Works Department, January 30 and 31 and February 10, 2006; and Mark Schoening, Engineer, City of Eugene Public Works Department, February 14, 2006.

6.1.2.1 Oregon Department of Transportation

OTIA III Statewide Bridge Delivery Program

ODOT is in the process of implementing a statewide bridge repair/replacement program funded by the Oregon Transportation Improvement Act (OTIA), a comprehensive ten-year, $3 billion funding program authorized through State legislation. In 2003, the Oregon Legislature enacted the third Oregon Transportation Investment Act, or OTIA III, which includes $1.3 billion for bridge projects on the State highway system. The objective of the Statewide Bridge Delivery Program is to repair or replace hundreds of aging State and local bridges on major corridors throughout Oregon over the next eight to ten years.

In 2004, ODOT initiated formal consultation with the Service for all potentially-affected special-status species, including KL, WD, and FBB. As part of that process, ODOT prepared a BA that identifies species and habitats that may be affected by the bridge program, assesses potential impacts, and addresses how those impacts would be avoided or mitigated. Based on the BA, the Service and National Oceanic and Atmospheric Administration (NOAA) Fisheries issued a BO that specifies the conditions under which the proposed bridge projects can take place. To satisfy these conditions, a range of key protective measures have been included in the BA/BO, referred to as environmental performance standards (EPS). The EPS program defines the acceptable level of impact that a project activity may have on the environment, and limits or avoids impacts to the environment through the use of proper design and construction-related practices. Collectively, these standards address all phases of the OTIA III program, including program administration, bridge design, bridge construction, and post-construction mitigation. At the core of the EPS program, particularly in the context of FBB, KL, and WD, are species and habitat avoidance measures.

The proposed CHD for the species in 2005 has resulted in the need for ODOT to re-initiate consultation with the Service.[72] Based on available mapping, there are three proposed bridge projects that could be affected by species conservation activities. They are:

- Bridge #01756A – Unit FBB-3/KL-6 (Polk County).
- Bridge #02015 – Unit FBB-3/KL-6 (Polk County).
- Bridge #01205A – Unit FBB-8/KL-9 (Benton County).

There are administrative costs associated with multiple consultations with the Service, including both the initial consultation and the re-consultation attributed to the proposed CHD. In addition to addressing FBB, KL, and WD, included in this new consultation process are over a dozen salmon evolutionary significant units, at least a half dozen other species protected by the Service, as well as various

[72] Personal communication with Zak Toledo, Natural Resources Coordinator, Oregon Bridge Delivery Partners, February 1, 2006.

administrative elements of the program. The component of this process attributed to FBB, KL, and WD is considered minor, and is estimated to comprise less than $5,000 of the re-consultation costs.[73] The administrative costs of the consultation process, including the development of the BA/BO, are addressed in Section 3.0.

As part of the development of the BA, rare plant surveys were conducted in 2005 that helped in developing a set of environmental baseline reports, which identify potential environmental constraints to each surveyed bridge project, and more specifically, areas to avoid during program implementation. Surveys were conducted for only the projects in the initial stages of the program, for a total of 30 bridges/surveys.[74] These surveys did not include the three bridge projects potentially affected by FBB, KL, and WD conservation activities referenced above. Surveys for these projects will be conducted prior to construction based on the program schedule outlined below. The estimated cost of the rare plant surveys conducted to date is $139,000, which represents an average survey cost of approximately $4,630 per bridge project.[75]

Only bridge #01205A (see Figure 6-1) is expected to be completed as part of the first five stages of the project (included in Stage 4). Construction of this project is expected to occur between 2008 and 2010.[76] It is, therefore, assumed that rare plant surveys will be conducted in 2007, the year prior to project implementation. The two remaining bridge projects (#01756A and #02015, see Figure 6-2) are included in Stage 6, which are not currently funded and have no planned timetable for construction. For the purposes of this analysis, it is assumed that Stage 6 projects would not commence until after Stage 5 is complete (year 2011), and have an equal probability of occurring between 2012 and 2026. The average survey cost of $4,630 is allocated as a one-time cost among the proposed CHD units in proximity to the three potentially affected bridge projects based on the anticipated timing of the surveys.[77]

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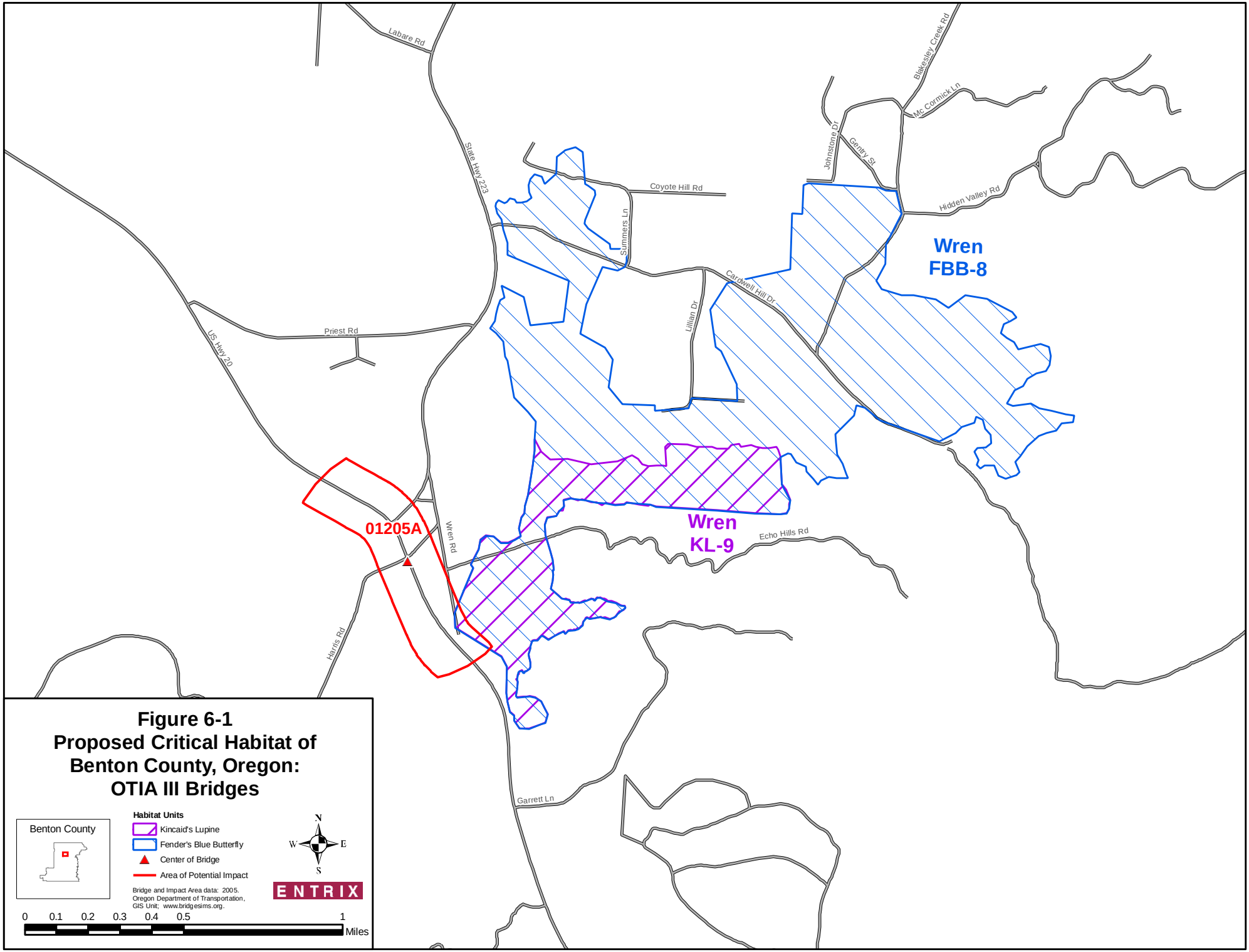
73 Personal communication with Zak Toledo, Natural Resources Coordinator, Oregon Bridge Delivery Partners, February 14, 2006.

74 No rare plants, including KL or WD, were found in the footprint of these bridge projects; no surveys were conducted specifically for FBB.

75 Personal communication with Bill Ryan, Environmental Program Support Manager, Oregon Department of Transportation, February 1, 2006.

76 Oregon Bridge Delivery Partners website, http://www.obdp.org/dashboard/projects/regions/two/, accessed on February 15, 2006.

77 Although bridge projects #01756A and #02015 are both potentially affected by the same proposed critical habitat unit (FBB-3/KL-6), it is conservatively assumed that these two projects would occur independently from one another, and therefore, potential costs would be incurred twice.


Labare Rd
Blakesley Creek Rd
Mc Cormick Ln
Johnstone Dr
Gentry St
State Hwy 223
Coyote Hill Rd
Summers Ln
Hidden Valley Rd
Wren
FBB-8
Cardwell Hill Dr
Lillian Dr
US Hwy 20
Priest Rd
01205A
Wren Rd
Wren
KL-9
Echo Hills Rd
Harris Rd
Garrett Ln
Figure 6-1
Proposed Critical Habitat of
Benton County, Oregon:
OTIA III Bridges
Benton County
Habitat Units
Kincaid's Lupine
Fender's Blue Butterfly
Center of Bridge
Area of Potential Impact
Bridge and Impact Area data: 2005.
Oregon Department of Transportation,
GIS Unit; www.bridgesims.org.
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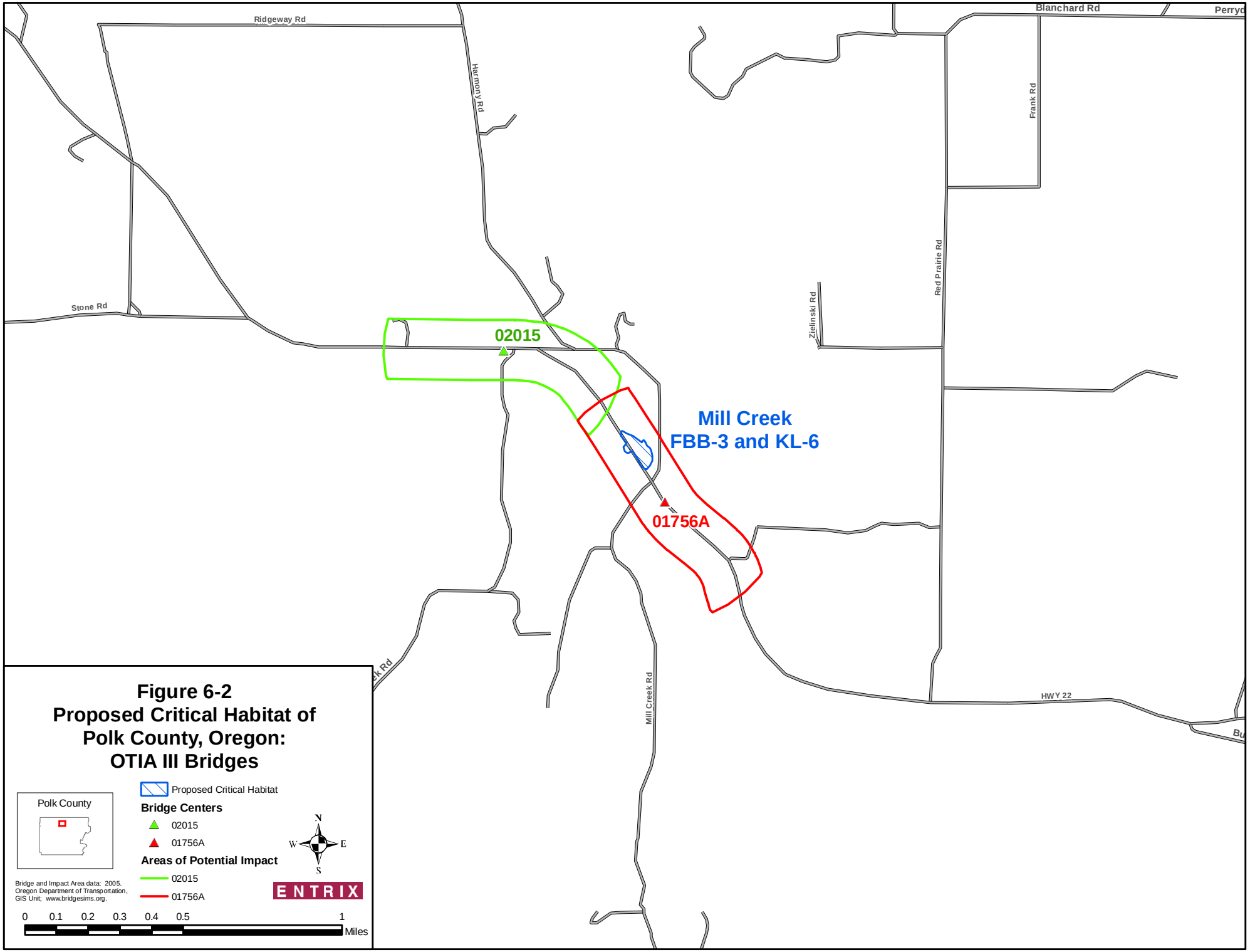
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles


Ridgeway Rd
Harmony Rd
Blanchard Rd
Frank Rd
Red Prairie Rd
Zielinski Rd
Stone Rd
02015
Mill Creek
FBB-3 and KL-6
01756A
Mill Creek Rd
HWY 22
Figure 6-2
Proposed Critical Habitat of
Polk County, Oregon:
OTIA III Bridges
Polk County
Proposed Critical Habitat
Bridge Centers
02015
01756A
Areas of Potential Impact
02015
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Bridge and Impact Area data: 2005.
Oregon Department of Transportation,
GIS Unit; www.bridgesims.org.
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Other than the administrative costs of consultation and survey costs, ODOT anticipates that the economic costs associated with species conservation activities related to the Statewide Bridge Delivery Program would be minor.[78] There have been no special provisions or design modifications resulting from the presence of the species or the proposed CHD for any bridge project that will be implemented under this program. Based on the avoidance measures prescribed in the BA/BO, there would be no direct effect on the species in the proposed CHD and no additional measures are expected to be required due to the designation of critical habitat. All sensitive habitat, including the CHD, are defined as no-work zones through the use of protective fencing, with fencing costs estimated to be several hundred dollars per site.[79] Therefore, a one-time fencing cost of $200 is allocated to each unit affected by the bridge projects based on anticipated timing of the projects. Because no adverse effects to these species are anticipated within the proposed CHD, no *additional* mitigation and/or restoration efforts are expected to be required.[80]

WEST EUGENE PARKWAY

The West Eugene Parkway (WEP) is a 5.8-mile, east/west, urban arterial road proposed in the City of Eugene (see Figure 6-3). This proposed four-lane road connecting State Highway 99 (OR 99 W) to State Highway 126 (OR 126) is a product of over 20 years of planning, public involvement, environmental analysis, and engineering, conducted jointly by ODOT, the City of Eugene, and Lane County, to solve the growing traffic congestion in west Eugene. Based on its current design (proposed alignment north of the railroad grade), it is estimated that the WEP would cost approximately $169 million.[81] Due to its extensive history and substantial costs involved, it is not known whether or when the WEP will ultimately be constructed. From a regulatory perspective, the goal is to complete the NEPA process with a signed Record of Decision (ROD) by the end of 2006; however, the project would still need to secure additional permits from ACOE prior to construction.[82]

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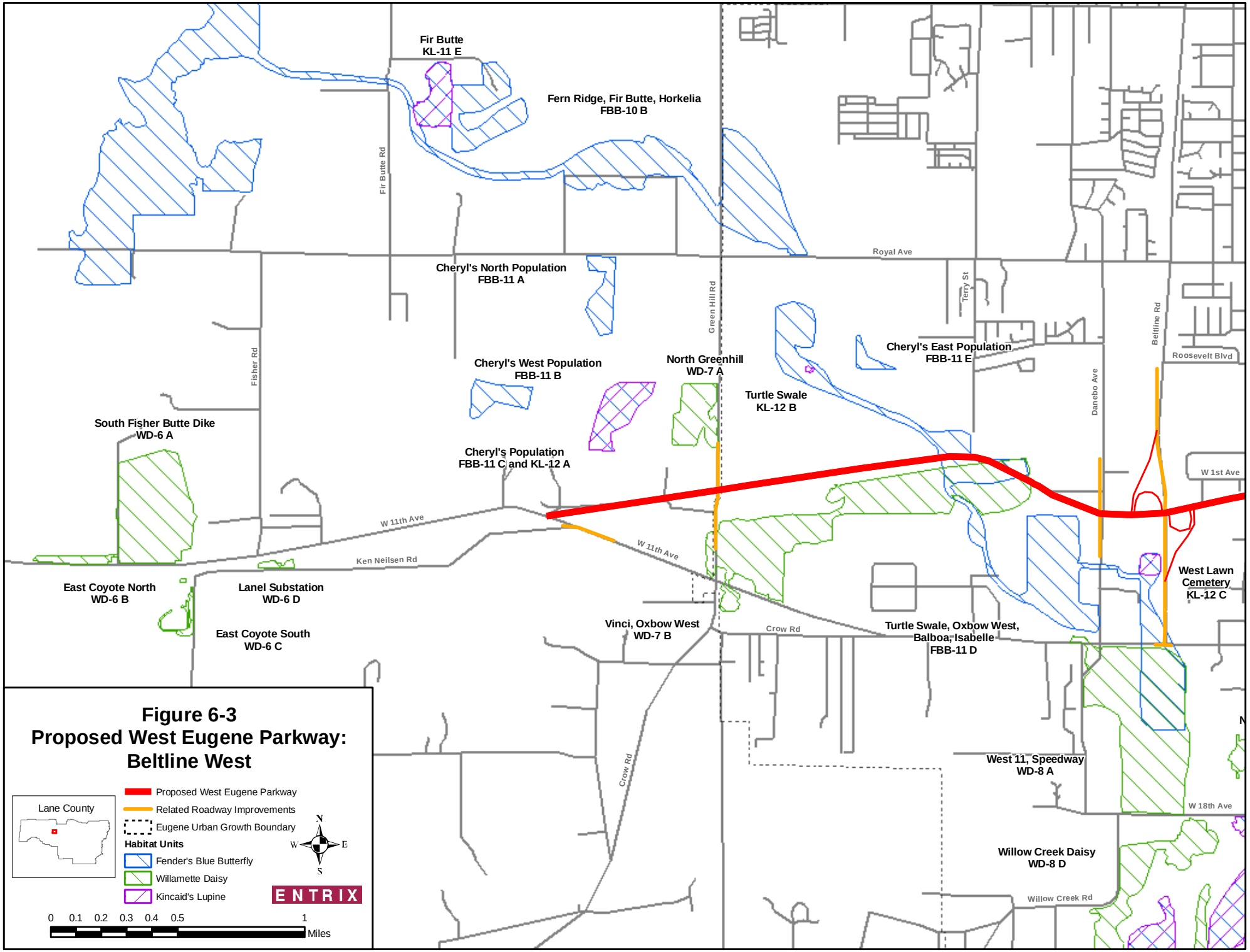
78 Personal communication with Zak Toledo, Natural Resources Coordinator, Oregon Bridge Delivery Partners, February 1, 2006.

79 Personal communication with Zak Toledo, Natural Resources Coordinator, Oregon Bridge Delivery Partners, February 14, 2006.

80 Personal communication with Zak Toledo, Natural Resources Coordinator, Oregon Bridge Delivery Partners, February 14, 2006.

81 Oregon Department of Transportation, West Eugene Parkway Fact Sheet, http://www.oregon.gov/ODOT/HWY/REGION2/wep.shtml#Fact_Sheet, accessed on January 31, 2006.

82 Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 30, 2006.


Fir Butte
KL-11 E
Fern Ridge, Fir Butte, Horkelia
FBB-10 B
Fir Butte Rd
Royal Ave
Cheryl's North Population
FBB-11 A
Green Hill Rd
Terry St
Beltline Rd
Roosevelt Blvd
Fisher Rd
Cheryl's West Population
FBB-11 B
North Greenhill
WD-7 A
Cheryl's East Population
FBB-11 E
Turtle Swale
KL-12 B
Danebo Ave
South Fisher Butte Dike
WD-6 A
Cheryl's Population
FBB-11 C and KL-12 A
W 1st Ave
W 11th Ave
W 11th Ave
Ken Neilsen Rd
East Coyote North
WD-6 B
Lanel Substation
WD-6 D
West Lawn
Cemetery
KL-12 C
East Coyote South
WD-6 C
Vinci, Oxbow West
WD-7 B
Crow Rd
Turtle Swale, Oxbow West,
Balboa, Isabelle
FBB-11 D
Crow Rd
West 11, Speedway
WD-8 A
W 18th Ave
Willow Creek Daisy
WD-8 D
Willow Creek Rd
Figure 6-3
Proposed West Eugene Parkway:
Beltline West
Lane County
Proposed West Eugene Parkway
Related Roadway Improvements
Eugene Urban Growth Boundary
Habitat Units
Fender's Blue Butterfly
Willamette Daisy
Kincaid's Lupine
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ODOT initiated formal consultation with the Service for the WEP in 2000, and is currently preparing a BA that addresses the species and proposed CHD, specifically Units FBB-11D and WD-7B. Although numerous studies and biological reports have been completed for the project since its inception, the current BA is the only one that has been prepared since the listing of the species; it is expected to be completed in the summer of 2006 and cost between $30,000 and $35,000.[83] These costs, which are captured in the summary of administrative costs in Section 3.0, are allocated proportionally to Units FBB-11D and WD-7B across years 2005 and 2006. These costs are in addition to related field survey and mapping efforts. Extensive surveys have been conducted for the project since 2003. In fact, ten rounds of protocol-level surveys have been conducted for the WEP at a total cost of $130,000, or an average cost of $13,000 per survey.[84] However, not all of the surveys covered FBB and WD. The total cost of surveys that included FBB and WD is estimated at $78,000.[85] All surveys have been completed, and no future surveys are anticipated.[86] For the purposes of this analysis, these survey costs ($78,000) are allocated proportionally to Units FBB-11D and WD-7B across years 2003, 2004, and 2005.

In terms of WEP project design, the options available to ODOT to address FBB and WD include avoidance, minimization of impacts, and/or mitigation. The most expensive option would be avoidance through changes in project design. Currently, ODOT is evaluating proposed changes to the roadway design that will avoid the proposed critical habitat which intersects the proposed project alignment. Specifically, ODOT is considering elevating sections of the highway to span the proposed CHD, which would avoid the species and maintain habitat connectivity. When compared to an at-grade roadway, this option would be considerably more costly. At this time, the best estimate of *additional* costs associated with potentially elevating the section of highway spanning the proposed CHD is $10 to $12 million.[87] These costs are allocated proportionally to Units FBB-11D and WD-7B. However, because the timing of the project is unknown (it will commence no earlier than 2008, based on anticipated dates for environmental compliance and permitting), the project is assigned an equal probability of occurring between years 2008 and 2026.

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[83] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 19, 2006.

[84] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, February 21, 2006.

[85] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, February 21, 2006.

[86] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 30, 2006.

[87] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 20, 2006.

WILLAMINA-GRAND RONDE CORRIDOR PROJECT – HIGHWAY 18

The Willamina-Grand Ronde Corridor Project is a multi-phase road-widening project along State Highway 18 in Yamhill County. The current phase of the project (OR18: Fort Hill-Wallace Bridge Project) is expected to extend into year 2007. Two to three more phases are planned, but the timeline for the completion of the entire corridor project is undefined; however, it is estimated that it will be at least a decade or two before completion of final phases.[88]

ODOT prepared an initial BA for the project and entered into formal consultation with the Service in 2001, which covered multiple species including WD. Biological surveys were conducted mainly in the mid-1990's (prior to the listing), but there has been only one survey effort since listing in 2000. Additional plant surveys will be conducted as each phase of the project is eventually developed. Although the WD was included in the original consultation for this project, the species is not known to presently occur within the project area based on field surveys, and none of the proposed CHD occurs along the corridor route. Further, no special actions (e.g., changes in project design) have been taken with respect to the WD. ODOT plans to re-initiate consultation with the Service in 2006, and is currently revising the BA due to changes in the purpose and need for the project and the need to address additional species.[89] The revised BA and new consultation will not directly evaluate potential effects on FBB, KL, and WD; however, language will be included in the BA that specifies that if any of the species are found, they will be avoided, and if they cannot be avoided, ODOT will be required to re-initiate consultation.

Because no part of the proposed critical habitat is located along the project corridor, none of the administrative costs associated with consultation with the Service, nor any of the survey costs, are included in the economic analysis.

6.1.2.2 All Other Jurisdictions

Based on discussions with staff from other potentially-affected jurisdictions,[90] there are no other current road projects located within the area of the proposed CHD. Therefore, no costs have been incurred by these jurisdictions for species conservation activities related to current road projects.

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88 Personal communication with Steve Gisler, Biologist, Oregon Department of Transportation, January 18, 2006.

89 Personal communication with Steve Gisler, Biologist, Oregon Department of Transportation, January 30, 2006.

90 Personal communications with: Paul Wagner, Biology Branch Manager, Washington State Department of Transportation, February 6, 2006; Debbie Knecht, Engineering Technician-Environmental Compliance, Lewis County Public Works Department, January 26, 2006; Susan Mundy, Yamhill County Public Works Department, February 3 and 7, 2006; Aaron Geisler, Polk County Public Works Department, January 31, 2006; Tonya Beard, Marion County Public Works Department, January 25, 2006; Chuck Knoll, Engineer, Linn County Road Department, February 7, 2006; Gordon Kurtz, Associate Engineer, Benton County Public Works Department, January 26, 2006; Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26 and February , 2006; Mike Luttrell, Douglas County Public Works Department, February 1, 2006; Fred Braun, Director, City of Dallas Public Works Department, January 30 and 31 and

6.1.3 EFFECTS ON FORESEEABLE FUTURE PROJECTS

Foreseeable future projects are those identified in local transportation system plans, but are not being planned actively and/or do not have an established timeline for implementation. The only entities that have plans for future road projects that may be affected by species conservation activities are Lane County and the City of Dallas.

6.1.3.1 Lane County

None of the planned projects under Lane County's 2006-2011 Capitol Improvement Program (CIP) would be affected by the presence of the species and their proposed CHD. However, there is one potentially-affected future road project that could be constructed after 2011, contingent upon funding – improvements to Green Hill Road near the City of Eugene.[91] This project was removed from the 2006-2011 CIP planning cycle due to inadequate funding. The project is planned north of the junction of Green Hill Road and Royal Avenue, and would be potentially affected by species conservation activities in Unit FBB-10B. Lane County has indicated that it would like to extend the project south to West 11th Avenue, which in turn would also affect Units WD-7A and WD-7B; however, this portion of the project is not planned yet.[92] Potential cost implications associated with the presence of the species and CHD have not been evaluated at this time. It is, however, possible to infer potential costs from other projects and past experiences dealing with these types of issues. Costs would typically include survey efforts, potential road design changes, and/or mitigation expenses (if "take" is permitted for the planned project design). According to Lane County, it is estimated that potential costs attributed to species conservation activities could range from less than $10,000 (if no mitigation or project design changes are required) and up to a maximum of $100,000 (if mitigation and/or design changes are required).[93] Because current plans for this project are only affected by Unit FBB-10B, all potential costs are allocated to this unit. Also, because the timing of this project is unknown, it is assigned an equal probability of occurring between 2011 (the start of the next CIP planning cycle) and 2026.

February 10, 2006; and Mark Schoening, Engineer, City of Eugene Public Works Department, February 14, 2006.

91 Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26, 2006.

92 Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, February 6, 2006.

93 Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26, 2006.

6.1.3.2 City of Dallas

The City of Dallas is planning a new collector street that would be directly affected by species conservation activities in Unit FBB-5/KL-7.[94] The proposed project is planned as part of the City's future transportation system as identified in the 1998 Comprehensive Plan and 2005 Transportation System Plan (TSP). The project is not expected to be carried out for ten or more years, and the duration of construction is expected to be about one year.[95] According to the City, several options are available to address the presence of FBB and KL. The roadway could either be relocated to the south (and the proposed critical habitat purchased as undevelopable open space) or elevated over the proposed critical habitat to avoid impacts.[96] The estimated cost to relocate the roadway and purchase the land as open space is $500,000, and the estimated cost to elevate the roadway is $3.5 million.[97] The funding for this project has not yet been identified, but it will likely be a combination of developer funds and City and/or grant funds. City funds would likely come from System Development Charges (SDC), which applies to new development within the City. The range of costs presented above is allocated entirely to Unit FBB-5/KL-7. Because the timeline for this project is unknown (but is not expected to be developed prior to 2016), costs are allocated based on an equal probability of the project occurring during the years 2016 through 2026.[98]

6.1.3.3 All Other Jurisdictions

Based on discussions with staff from other potentially-affected jurisdictions,[99] there are no other foreseeable road projects located within the area of the proposed CHD. Therefore, no costs are expected to be incurred by these jurisdictions for species conservation activities related to future projects.

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94 Personal communication with Fred Braun, Director, City of Dallas Public Works Department, January 30, 2006.

95 Personal communication with Fred Braun, Director, City of Dallas Public Works Department, January 30 and 31, 2006.

96 Personal communication with Fred Braun, Director, City of Dallas Public Works Department, January 30, 2006.

97 Personal communication with Fred Braun, Director, City of Dallas Public Works Department, January 30, 2006

98 Should the City require a FBB take permit to implement this project, they would be required to complete an HCP on the project. However, considering the uncertainty associated with this project, the analysis assumes the cost of developing a HCP would be captured within the range of costs presented in the analysis.

99 Personal communications with: Steve Gisler, Biologist, Oregon Department of Transportation, January 18 and 30, 2006; Paul Wagner, Biology Branch Manager, Washington State Department of Transportation, February 6, 2006; Debbie Knecht, Engineering Technician-Environmental Compliance, Lewis County Public Works Department, January 26, 2006; Susan Mundy, Yamhill County Public Works Department, February 3 and 7, 2006; Aaron Geisler, Polk County Public Works Department, January 31, 2006; Tonya Beard, Marion County Public Works Department, January 25, 2006; Chuck Knoll, Engineer, Linn County Road Department, February 7, 2006; Gordon Kurtz, Associate Engineer, Benton County Public Works Department, January 26, 2006; Mike

6.2 EFFECTS ON ROAD MAINTENANCE ACTIVITIES

In order to evaluate the economic effects that species and habitat conservation may have on ongoing road maintenance activities, it is important to understand the regulatory implications the Act has on state and local road maintenance activities. If state/local actions are Federally-funded, the Federal agency involved is required to enter into consultation with the Service. However, routine road maintenance activities are not usually Federally-funded, and without a Federal nexus, WD and KL would not affect routine road maintenance activities undertaken by state/local jurisdictions, because the Act does not account for "take" of listed plant species. On the other hand, the presence of FBB (a listed animal species) would require that routine road maintenance activities undertaken by state/local jurisdictions not result in "take" of FBB regardless of Federal nexus. In the case of FBB, state/local jurisdictions can usually avoid take by adjusting the timing of their transportation projects and road maintenance activities. More commonly, however, these jurisdictions simply avoid working in areas where FBB and its habitat is known to occur. These areas are typically delineated with signage, so that maintenance crews can identify areas to avoid. The lack of management and maintenance in these areas is not perceived to be beneficial to FBB, as well as KL and WD, but it is not a violation of the Act either.[100]

To conduct routine road maintenance activities in areas of FBB habitat, state/local jurisdictions need to obtain a Section 10(a)(1)(a) permit from the Service. The Section 10(a)(1)(a) permit is a direct take permit for activities that enhance the survival of these species. Vegetative maintenance along roadways is considered enhancement because it controls weeds and overgrowth of vegetation that could adversely affect protected species. The Service completed an Intra-Service programmatic consultation on the issuance of Section 10(a)(1)(A) permits for the FBB. The costs of the internal consultation are addressed in Section 3.0. As part of that consultation process, the Service developed standard guidelines for roadside maintenance activities, which include two main requirements: (1) no maintenance and/or mowing during restricted periods and (2) limits on the use of certain pesticides. To date, only ODOT has secured a Section 10(a)(1)(a) permit for its Special Management Area program (described below); no local jurisdiction has applied for or obtained the permit.[101] As the Service becomes aware of local jurisdictions implementing activities that may be impacting FBB, the Service will discuss with these jurisdictions ways to reduce or avoid impacts and potentially provide a benefit to the species. If the local jurisdiction is interested in obtaining a Section 10(a)(1)(A) permit to conduct appropriate management activities, the Service will assist them with obtaining the permit.[102] For the purposes of this analysis, it is assumed that all jurisdictions that contain proposed critical habitat for FBB will obtain a Section 10(a)(1)(a) permit and follow the provisions of the permit.

Luttrell, Douglas County Public Works Department, February 1, 2006; and Mark Schoening, Engineer, City of Eugene Public Works Department, February 14, 2006.

[100] Personal communication with Service Biologist, Portland, Oregon, February 3, 2006.

[101] Personal communication with Service Biologist, Portland, Oregon, February 3, 2006.

[102] Personal communication with Service, Biologist, Portland, Oregon, April 13, 2006.

There are various costs associated with the Section 10(a)(1)(a) permit process. First, there are nominal costs associated with completing the permit. The permit application states that four hours are needed to fill it out, but according to ODOT, the cost to complete the application in a scientifically meaningful way is estimated to be about $500, in addition to the $100 application fee.[103] There are also additional costs associated with deferred maintenance activities. These costs are attributed to the time and expense required to bring back equipment and maintenance crews to protected areas. The best estimates of these costs come from Lane County, which stated that it currently incurs between $10,200 and $15,500 in deferred maintenance expenses annually.[104] The costs associated with adjusting chemicals treatments are assumed to be negligible. Many jurisdictions also incur training costs associated with educating maintenance staff about the presence of sensitive species and how to address them during maintenance activities. Based on information collected from the various jurisdictions, training costs can range from $778 (ODOT) to $30,000 (Yamhill County), annually. These standard cost estimates presented above will be applied to all jurisdictions that are assumed to secure a Section 10(a)(1)(a) permit, unless more applicable, local information is available. Below is a discussion of road maintenance activities organized by jurisdiction.

6.2.1 Oregon Department of Transportation

ODOT is actively engaged in conservation activities for FBB, KL, and WD and their habitat in the context of ongoing road maintenance activities. These efforts are undertaken as part of ODOT's Special Management Area (SMA) program. The SMA program is an ongoing statewide program that covers all state- and federally-listed plant species, including KL and WD; the program also covers wetlands and archaeology sites. The objective of the SMA program is to conserve special-status plant species and other sensitive resources located on lands under the jurisdiction of ODOT. Because the SMA program extends indefinitely into the future, the costs described below will be allocated uniformly across the period of analysis (2000-2026).

There are approximately sixty SMAs throughout the State, of which there are six for KL and FBB; there are no SMAs for WD. Although there are six SMAs of concern here, only two proposed critical habitat units are affected: KL-5 and FBB-3/KL-6. Both of these SMAs are on lands currently owned by ODOT. ODOT maintains another SMA for KL on Kings Valley Highway in Benton County, but this area is not included in the proposed CHD.[105] Accordingly, costs associated with the SMA program will be allocated to Units KL-5 and FBB-3/KL-6 only.

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[103] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 20, 2006.

[104] Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26, 2006.

[105] Personal communication with Steve Gisler, Biologist, Oregon Department of Transportation, January 18, 2006.

The SMA program consists of several features, each with associated costs. First, there are costs associated with establishing each SMA, which is estimated to range between $250 to $500 dollars.[106] One key feature of establishing each SMA is demarcating the site with signs, which provides management guidance (or instructions) to ODOT maintenance crews. Typical maintenance actions prescribed on the signs include no spraying of herbicides, mowing restrictions (e.g., fall mowing to allow seed set, but no overgrowth of trees and brush), and blading restrictions (e.g., confined to the existing road shoulder and front of ditch). Signs cost approximately $25 each, and each site has between 2 and 4 signs, representing an additional establishment cost of $50 to $100.[107] Total establishment costs ($300 to $600) are allocated to both KL-5 and FBB-3/KL-6 as one-time costs assumed to occur at the time the species were listed (2000).

Once an SMA is established, it is monitored by ODOT biennially (i.e., every other year). About half (or thirty) of the SMAs are evaluated on an annual basis. This process consists of a site survey by ODOT biologists, during which affected resources are mapped and counted and threats are identified. In conjunction with the survey, a written report is prepared, which summarizes the finding of the survey and outlines recommended management actions. On average sixteen hours are required to monitor each SMA and prepare the report.[108] Using an estimated average salary for an ODOT biologist,[109] it is estimated that monitoring and reporting activities for each SMA site costs about $415 to $539 biennially. These biennial costs are allocated to Units KL-5 and FBB-3/KL-6 every other year during the entire period of analysis (2000-2026) starting in 2000.

Based on the results of the monitoring and reporting effort, recommended management actions are implemented on a site-by-site basis. Costs associated with these actions typically range from $500 to $2,000 annually, up to a maximum of $5,000 in extreme circumstances (e.g., if vegetation on the site is severely overgrown).[110] These costs, with a range of $500 to $5,000, are allocated to both Units KL-5 and FBB-3/KL-6 annually between years 2000 and 2026.

Lastly, ongoing training costs for maintenance personnel must also be considered in the economic analysis. ODOT implements both formal training programs and informal training activities (e.g., routine

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[106] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 20, 2006.

[107] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 20, 2006.

[108] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, .January 20, 2006.

[109] Average salary data are based on 2006 federal GS rates for a GS-11 Biologist in the Portland-Vancouver-Beaverton area, which range from $25.93 to $33.71 per hour. Source: Office of Personnel and Management, "2006 General Schedule (GS) Locality Pay Tables," http://www.opm.gov/oca/06tables/indexGS.asp.

[110] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 30, 2006.

interaction with district maintenance staff). The annual cost for the training program, in terms of staff time, is approximately ten hours per biologist per year.[111] The six SMAs in question here are all located in Region 2, which has three full-time biologists. Therefore, it is estimated that the training costs associated with these SMAs are represented by thirty hours of workload per year. Using the average salary for an ODOT biologist,[112] it is estimated that training costs for the six SMA sites range between $778 and $1,011 annually. These costs are allocated proportionally to Units KL-5 and FBB-3/KL-6 on an annual basis between 2000 and 2026.

To date, ODOT is the only transportation department that has secured a Section 10(a)(1)(a) permit from the Service for FBB, which covers activities undertaken as part of its SMA program. As described above, the cost of securing the permit is estimated to be $600. Because the permit covers FBB only, this cost is allocated entirely to Unit FBB-3/KL-6 as a one-time cost occurring in 2005, the year the permit was acquired.

6.2.1.1 Programmatic BA/BO for ODOT Maintenance (Emergency/Urgency Cut/Fill)

Aside from ongoing maintenance activities, ODOT also implements a statewide emergency maintenance and repair program in cases of slope failure along State-maintained roadways and bridges. The current programmatic BA/BO for the Emergency/Urgency Cut/Fill Program covers federally-listed aquatic species[113] on the west side of Oregon; it expires in 2007. ODOT is currently working on a reauthorization of the program that will cover the entire State, and will address both NOAA Fisheries- and Service-listed species that may be affected by emergency road work; the KL, WD, and FBB will all be covered under the reauthorization. The current programmatic BA/BO includes an extensive list of best management practices (BMPs) to be implemented in emergency situations that address and minimize potentially adverse effects to listed species. ODOT anticipates having a draft programmatic BA completed in early 2006 and to enter into formal consultation with the Service in late summer of the same year (2006).[114] The administrative costs associated with this forthcoming consultation are covered in Section 3.0, and include the costs associated with the development of the BA, which consist of several

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[111] Personal communication with Nicholas Testa, Biologist, Oregon Department of Transportation, January 30, 2006.

[112] Average salary data are based on 2006 federal GS rates for a GS-11 Biologist in the Portland-Vancouver-Beaverton area, which range from $25.93 to $33.71 per hour. Source: Office of Personnel and Management, "2006 General Schedule (GS) Locality Pay Tables," http://www.opm.gov/oca/06tables/indexGS.asp.

[113] Species listed by NOAA Fisheries.

[114] Personal communication with Chris Maguire, Terrestrial Biology Program Coordinator, Oregon Department of Transportation, January 30, 2006.

months of ODOT staff time and numerous hours of meetings attended by staff from ODOT, NOAA Fisheries, the Service, and Oregon Department of Fish and Wildlife (ODFW).[115]

In the case of emergency actions, there are also potential costs associated with implementing the range of BMPs developed in the BA/BO. However, these costs cannot be quantified at this time due to the uncertainty associated with these events, including if or when an emergency action will occur, the nature of each emergency, the frequency of emergencies, the location of such emergencies (and, therefore, which critical habitat units would be affected), and exactly which BMPs would be implemented. Due to these uncertainties, none of these potential costs are allocated to proposed critical habitat units for the purposes of this analysis.

6.2.2 WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

WSDOT does not maintain any road ROW in the proximity of the proposed critical habitat units in Washington.[116] Therefore, there would be no effect on road maintenance activities, and no costs incurred.

6.2.3 LEWIS COUNTY

The occurrence of KL and its proposed critical habitat does affect routine maintenance activities conducted by the Lewis County Public Works Department. One of the proposed critical habitat units (KL-1A) is located partly within the County ROW along Boistfort Road; KL-1B is located on private property outside the ROW. In areas known to contain KL, no routine maintenance, ditching, spraying or mowing is conducted.[117] Although these areas have not been signed, a vicinity map with locations, estimated acreage, and pictures of the species was sent to all Area Maintenance Supervisors and the Vegetation Supervisor in November 2005, instructing them to avoid any maintenance activities within these areas. The cost associated with this one-time training effort is negligible and not incorporated into the analysis. Because Lewis County currently elects not to conduct maintenance activities in these areas, and based on the assumption that the County would continue to avoid these areas in the future, there are no costs incurred by Lewis County attributed to KL conservation (Costs associated with obtaining a Section 10(a)(1)(a) permit are not applicable in Lewis County because there are no FBB units present.).

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[115] Personal communication with Chris Maguire, Terrestrial Biology Program Coordinator, Oregon Department of Transportation, January 18, 2006.

[116] Personal communication with Paul Wagner, Biology Branch Manager, Washington State Department of Transportation, February 6, 2006.

[117] Personal communication with Debbie Knecht, Engineering Technician-Environmental Compliance, Lewis County Public Works Department, January 26, 2006.

6.2.4 YAMHILL COUNTY

Based on available mapping, proposed critical habitat units in Yamhill County are potentially affected by road maintenance activities. Generally, Yamhill County avoids conducting any type of routine road maintenance activities in sensitive biological areas due to the lack of resources needed to comply with regulatory requirements.[118] In the case of vegetation management activities, the County tries to sign sensitive biological areas so that maintenance crews can avoid them.[119] The costs associated with delineating (i.e., signing) sensitive biological areas were not provided by Yamhill County; therefore, estimates of signing costs from ODOT, which range from $50 to $100 per site, were applied to each of the six proposed critical habitat units in Yamhill County and allocated to the year the species were listed (2000).

Yamhill County has also expressed concern about its liability if maintenance crews were to mistakenly conduct maintenance (e.g., roadside spraying, mowing, brush cutting, ditching, etc.) at a time when sensitive species are dormant. Therefore, the County strives to educate department personnel about avoidance practices and continues to track and map sensitive biological resources. The County currently has an employee with a spray license who tracks information related to sensitive biological resources. Based on the annual wage of this employee and other training costs, Yamhill County estimates that the total annual training costs associated with avoiding sensitive habitat during road maintenance is approximately $30,000 per year.[120] Since it is not possible to separate costs specifically for FBB and KL (no WD proposed critical habitat in the County) from other species, it is assumed that all of these costs are attributed to FBB and KL. Because all six proposed critical habitat units are covered by these training efforts, these costs are allocated proportionally to each of the units on an annual basis over the entire period of analysis (2000-2026).

In addition, since Yamhill County contains FBB habitat, it is assumed that it will obtain a Section 10(a)(1)(a) permit from the Service and will begin comprehensively maintaining road ROW, including areas within/near proposed critical habitat. As described earlier, the related costs are attributed to completing the permit application (one-time $600 cost assumed to occur in 2006) and deferred maintenance ($10,200 to $15,500 annually between 2006 and 2026). Permit costs are allocated only to proposed critical habitat units containing FBB habitat, while deferred maintenance costs are assumed to apply to all proposed critical habitat units, including KL, in the County.

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[118] Personal communication with Susan Mundy, Yamhill County Public Works Department, February 3, 2006.

[119] Personal communication with Susan Mundy, Yamhill County Public Works Department, February 3, 2006.

[120] Personal communication with Susan Mundy, Yamhill County Public Works Department, February 7, 2006.

6.2.5 POLK COUNTY

The proposed CHD in Polk County, most of which includes FBB habitat, has the potential to affect County-maintained ROW. In addition, there are other potentially-affected habitat sites for FBB, KL, and WD found on County resource maps that are not represented as proposed critical habitat.[121] Based on a review of available mapping, Polk County Public Works Department indicated that it was not aware of the proposed CHD sites and, therefore, it has not affected their road maintenance practices and no related costs have been incurred.[122] However, because ROW in Polk County contains FBB habitat, it is assumed that it will obtain a Section 10(a)(1)(a) permit from the Service and will begin maintaining FBB critical habitat according to permit guidelines. The one-time costs associated with the permit ($600) are allocated proportionally across each of the FBB units located in Polk County. Anticipated deferred maintenance costs of $10,200 to $15,500 annually are allocated proportionally across all of the proposed critical habitat units in the County between 2006 and 2026.

In addition, training of road maintenance staff would also likely be an indirect, but essential, component of the permit compliance process. Therefore, it is assumed that Polk County will implement a training program at a cost of $778 to $30,000 annually (based on representative costs in other jurisdictions), which would be allocated proportionally across all proposed critical habitat units between 2006 and 2026.

6.2.6 MARION COUNTY

The proposed critical habitat for WD in Marion County is not located near any County-maintained roadway, and as such, there would be no effect on road maintenance activities and no costs incurred.[123] Further, costs associated with obtaining a Section 10(a)(1)(a) permit are not applicable in Marion County because there are no FBB units present.

6.2.7 LINN COUNTY

Several of the proposed critical habitat units for WD in Linn County are located along County-maintained roadways, namely Kingston Lyons Drive, in the northern portion of the County. According to the County Public Works Department, the presence of WD has only minimally affected road maintenance activities. Maintenance crews continue to control vegetation through mowing and herbicide spraying throughout the summer. County road maintenance crews are instructed to look for WD when maintaining ROW and to avoid it if encountered.[124] It is difficult, though, for maintenance crews to identify WD because it is only

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[121] Personal communication with Aaron Geisler, Polk County Public Works Department, January 31, 2006.

[122] Personal communication with Aaron Geisler, Polk County Public Works Department, January 31, 2006.

[123] Personal communication with Tonya Beard, Marion County Public Works Department, January 25, 2006.

[124] Personal communication with Chuck Knoll, Engineer, Linn County Road Department, February 7, 2006.

discernible during certain times of the year when the plant is flowering. Because there are no costs associated with avoidance of WD during maintenance activities, and based on the assumption that the County would continue to avoid these areas, no costs are allocated to the proposed critical habitat units in Linn County. There are, however, training costs incurred by the County associated with educating maintenance personnel about the presence of WD and how to identify the species. Maintenance crews regularly attend training conferences that often present information on protected plants. There are also monthly crew meetings that address these issues. It is estimated that these training costs are less than $10,000 annually.[125] These costs are allocated proportionally between all proposed critical habitat units for WD in Linn County across the entire period of analysis (2000-2026).

Because there is no proposed critical habitat for FBB in Linn County, there is no issue of "take", and the County would not need to secure a Section 10(a)(1)(a) permit from the Service. No other costs would be incurred.

6.2.8 BENTON COUNTY

Benton County implements an extensive herbicide spraying program to control weeds along County-maintained ROW. According to the County Public Works Department, if the proposed FBB, KL, and WD critical habitat were designated, the County would re-evaluate their spraying program and likely stop spraying in the areas of critical habitat;[126] related costs are unknown. However, for the purposes of this analysis, and based on the presence of critical habitat for FBB, it is assumed that the County would obtain a Section 10(a)(1)(a) permit from the Service and will maintain FBB critical habitat according to permit guidelines. The one-time costs associated with the Section 10 permit ($600) are allocated only to FBB units in the County. The deferred maintenance costs ($10,200 to $15,500 annually between 2006 and 2026) are allocated proportionally to all proposed critical habitat units. Training of maintenance personnel is also assumed to be implemented at a cost of $778 to $30,000 annually, which would be allocated proportionally to all proposed critical habitat units on an annual basis between 2006 and 2026.

6.2.9 LANE COUNTY

There are known occurrences of FBB, KL, and WD in proposed critical habitat within Lane County ROW. The County inventoried threatened and endangered species within the ROW in 1990. Thirty-five sites were recorded in total, of which there were no occurrences of KL and three occurrences of WD; FBB was not surveyed because it is assumed to be concurrent with KL. The overall cost for this effort was $167,730, which included $125,330 for the survey and inventory and an additional $42,400 for

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[125] Personal communication with Chuck Knoll, Engineer, Linn County Road Department, February 7, 2006.

[126] Personal communication with Gordon Kurtz, Associate Engineer, Benton County Public Works Department, January 26, 2006.

digitizing and mapping.[127] However, because these costs were incurred prior to the listing of the species, they are not factored into the economic analysis.

The presence of the species and the proposed CHD does affect ongoing road maintenance activities along the approximately 5.2 miles (or 26,400 linear feet) of roadway within the proposed CHD.[128] Specifically, Lane County implements mowing restrictions, including restrictions on any activities that uproot sensitive species, such as ditching or scalping, and the times of the year when it can mow. The County also placards all sensitive biological sites. As described above, the main cost regarding mowing restrictions is associated with deferred maintenance, i.e., the need to skip areas and return during the appropriate season, resulting in the need to bring back staff and equipment. The estimated cost of deferred maintenance activities ranges from $10,200 to $15,500 annually in Lane County,[129] which is allocated proportionally to all proposed critical habitat units in the County, across the entire period of analysis (2000-2026). There are also minor costs associated with signage of sensitive areas; typical signage costs derived from ODOT range from $50 to $100 per site, which are allocated to each critical habitat unit in the County as a one-time cost occurring at the time the species were listed (2000). Lane County also regularly trains its maintenance crews, which carries an associated cost related to staff time. It is estimated that annual training costs range from $2,400 to $4,000;[130] these costs are allocated proportionally to all proposed critical habitat units in Lane County across the entire period of analysis (2000-2026).

Finally, based on the presence of proposed critical habitat for FBB, it is also assumed that Lane County will obtain a Section 10(a)(1)(a) permit from the Service and will begin maintaining the FBB proposed critical habitat according to permit guidelines. The costs associated with the permit consist of the time required to complete the permit and the application fee totaling $600. This one-time cost is assumed to occur in 2006 and is allocated proportionally to FBB units only. Deferred maintenance and training costs that would be implemented under the provisions of the permit are already covered above.

6.2.10 DOUGLAS COUNTY

The proposed critical habitat units for KL in Douglas County are mainly on private lands and/or not in County-maintained ROW, and as such, there would be no effect on road maintenance activities, and no

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[127] Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26, 2006.

[128] Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26, 2006.

[129] Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26, 2006.

[130] Personal communication with Orin Schumacher, Vegetation Management Coordinator, Lane County Public Works Department, January 26, 2006.

costs would be incurred by Douglas County.[131] Further, because there is no FBB habitat in Douglas County, it would not need to obtain a Section 10(a)(1)(a) permit, and none of the related costs will be incurred.

6.2.11 CITY OF DALLAS

The presence of proposed critical habitat for FBB and KL, specifically Unit FBB-5/KL-7, affects routine maintenance activities in the City of Dallas. The City implements a weed abatement program to minimize the fire hazard to the community, but because of FBB and KL and the proposed critical habitat, mowing in affected areas cannot be conducted until later during the fire season – a delay of two to three months.[132] According to the City Public Works Department, there are no increased costs to defer this maintenance;[133] however, the City indicated that there is an increased fire hazard during the period when the City defers maintenance, and a wildfire, if it occurs, could result in the loss in an estimated ten to twelve homes in the vicinity.[134] Because it is not possible to quantify the probability of fire events, damages from potential fire events are excluded from the cost estimates.

For the purposes of this analysis and based on the presence of proposed critical habitat for FBB, it is assumed that the City of Dallas will obtain a Section 10(a)(1)(a) permit from the Service and will begin maintaining the FBB proposed critical habitat according to permit guidelines. The City would then incur the costs associated with the permit, which include the $600 one-time application costs and deferred maintenance costs of $10,200 to $15,500 annually[135] from the time the permit is obtained through the end of the analysis period (2006-2026). It is also assumed that training of maintenance personnel would also be carried out, costing from $778 to $30,000 annually. All costs are allocated to Unit FBB-5/KL-7.

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131 Personal communication with Mike Luttrell, Douglas County Public Works Department, February 1, 2006.

132 Personal communication with Fred Braun, Director, City of Dallas Public Works Department, February 10, 2006.

133 Personal communication with Fred Braun, Director, City of Dallas Public Works Department, January 30, 2006.

134 Personal communication with Fred Braun, Director, City of Dallas Public Works Department, January 30, 2006.

135 Although the City indicated that there are no costs associated with deferred maintenance, typical cost estimates applied to other jurisdictions are also applied to the City of Dallas for consistency purposes. Further, by including these costs, the analysis represents a conservative estimate of potential costs.

6.2.12 CITY OF EUGENE

According to the City of Eugene, the presence of the species and their proposed critical habitat would not affect any of the City's pavement preservation projects.[136] No costs would be incurred related to routine road maintenance activities.

6.3 SUMMARY OF COSTS

A summary of the estimated costs associated with transportation-related activities is presented in Table E-5-1 in Appendix E. Total pre-designation (2000-2006) costs are estimated to range between $543,000 and $787,000 (in 2006 dollars). These costs primarily represent ongoing training efforts by local public works departments in addressing the identification and protection/avoidance of special-status species, including FBB, KL, and WD along road ROW. Other, more minor, historic costs consist of signing sensitive areas. There have been no major past road projects in the proximity to the proposed CHD for the species.

Potential post-designation (2006-2026) costs are substantially higher. These costs are estimated to range between $12.5 million and $20.1 million (in constant 2006 dollars). In discounted terms, potential economic costs related to transportation activities are estimated to be $9.1 to $14.4 million (using a three percent discount rate) and $6.3 to $9.8 million (using a seven percent discount rate). In annualized terms, potential costs are expected to range from $612,000 to $971,000 annually (annualized at three percent) and $595,000 to $926,000 annually (annualized at seven percent).

At the unit level, more than 80 percent of the costs are attributed to Units FBB-5/KL-7, FBB-11D,[137] and WD-7B. These units are identified in Figure 6-4 below and highlighted in green in Table E-5 in Appendix E. FBB-5/KL-7 is located in the City of Dallas, where a proposed new collector street would transect the unit. In total, costs attributed to this unit range from $720,000 to $4.4 million (undiscounted 2006 dollars). The single largest source of costs would occur in FBB-11D, where the design of the proposed West Eugene Parkway is being substantially affected by the proposed CHD. Total species conservation costs in FBB-11D are estimated to range between $6.0 million and $7.2 million (undiscounted 2006 dollars). The WEP would also be affected, to a slightly lesser degree, by Unit WD-7B, where costs are estimated at $4.1 to $4.9 million (undiscounted 2006 dollars).

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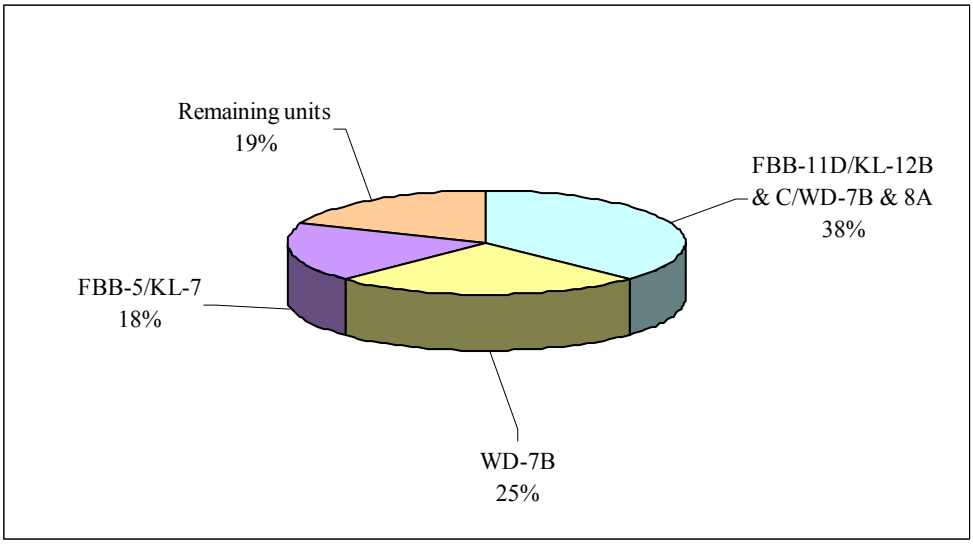
[136] Personal communication with Mark Schoening, Engineer, City of Eugene Public Works Department, February 14, 2006.

[137] This unit is grouped as FBB-11D/KL-12B&C/WD-7B&8A for reporting purposes.

Figure 6-4

Relative Economic Impacts Related to Transportation Activities, by Unit
(Total Upper-Bound PV Impacts Assuming a Seven-Percent Discount Rate)



Federal agencies, local governments, non-government organizations (NGOs), a university, and private corporations are all involved in management activities specifically for the conservation of the species on public and conservancy lands. This section presents the pre- and post-designation costs associated with these conservation efforts, which may range from hand-pulling invasive species to purchasing a conservation land easement, but generally entail invasive species eradication, mowing to maintain a short-grass stature, and reducing woody succession.

Conservation spending estimates are primarily obtained through interviews with owners and managers of land proposed for CHD. Some estimates in this section are overstated because the estimates provided by interviewees reflect spending for the management of all threatened and endangered species that occur on their lands and not solely for FBB, WD, and KL. The interviewees were not able to itemize the conservation costs by species, thus, this analysis does not attempt to allocate costs among different species. Instead, all costs of conservation within FBB, KL, and WD habitat are assumed to be attributable to the presence of FBB, KL, and WD.

This section is organized by first presenting total conservation spending estimates for all proposed critical habitat units, followed by a cost breakdown by sector and party.

7.1 TOTAL CONSERVATION SPENDING

Table 7-1 illustrates the total conservation spending by sector and party. Federal agencies and local governments are expected to bear approximately 90 percent of total post-designation impacts. The Bureau of Land Management (BLM) and the City of Eugene are spending $250,000 to $650,000 annually (approximately 70 percent of the total conservation impacts) on a wetland restoration and enhancement program in west Eugene, while the Service is spending $100,000 to $150,000 annually (approximately 20 percent of total conservation impacts) at Baskett Slough National Wildlife Refuge (BSNWR) on brush clearing, mowing, and controlling forest succession and invasive species. A summary of the estimated costs associated with species conservation activities on public and conservancy lands, by subunit, is presented in Table E-6 in Appendix E.

- The BLM and City of Eugene's species conservation costs in west Eugene occur in subunits FBB-10B/KL-11D & E, FBB-11B, FBB-11C/KL-12A, FBB-11D/KL-12B & C/WD-7B & 8A, FBB-11E, WD-7A, WD-8B, and the portions of WD-7B and WD-8A that do not overlap with FBB-11D. These subunits are highlighted in green in Table E-6. Approximately 80 percent of the BLM and City costs occur in the three subunits with the largest amount of BLM- and City-managed acres of critical habitat, FBB-11D/KL-12B & C/WD-7B & 8A (35 percent), FBB-10B/KL-11D & E (25 percent), and WD-7B (20 percent).

Table 7-1
Summary of Conservation Costs on Public and Conservancy Lands, by Organization ($1,000s)

		Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
				Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Sector	Party	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
NGO	Greenbelt	$511	$528	$218	$302	$164	$226	$119	$163	$11	$15	$11	$15
	TNC	$158	$178	$424	$480	$315	$357	$225	$255	$20	$24	$20	$24
	IAE	$109	$223	$298	$602	$224	$447	$158	$319	$16	$29	$16	$29
	Sub-Total	$778	$929	$940	$1,384	$703	$1,030	$502	$737	$47	$68	$47	$68
Federal	BLM	$1,001	$1,373	$2,699	$3,699	$2,009	$2,754	$1,429	$1,959	$136	$186	$136	$186
	ACOE	$112	$149	$370	$469	$274	$349	$194	$247	$17	$23	$17	$23
	USFS	$3	$3	$10	$10	$8	$8	$5	$5	$0	$0	$0	$0
	Service	$759	$1,129	$2,000	$3,000	$1,488	$2,232	$1,060	$1,589	$100	$150	$100	$150
	Sub-Total	$1,862	$2,642	$5,047	$7,146	$3,749	$5,313	$2,661	$3,774	$251	$357	$251	$357
State	OSU	$96	$103	$10	$30	$7	$22	$5	$16	$1	$2	$1	$2
Local Govt.	Eugene Total	$1,112	$3,710	$2,999	$10,000	$2,231	$7,438	$1,589	$5,297	$151	$501	$150	$501
	Corvallis Total	$100	$107	$50	$70	$37	$52	$27	$37	$3	$4	$3	$4
	Sub-Total	$1,212	$3,817	$3,049	$10,070	$2,268	$7,490	$1,616	$5,334	$154	$505	$153	$505
Private	WeyCo.	$52	$220	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Starker Inc.	$7	$22	$20	$60	$15	$45	$11	$32	$1	$3	$1	$3
	Sub-Total	$59	$242	$20	$60	$15	$45	$11	$32	$1	$3	$1	$3
Grand Total		$4,022	$7,744	$9,101	$18,721	$6,771	$13,927	$4,825	$9,917	$454	$937	$453	$938

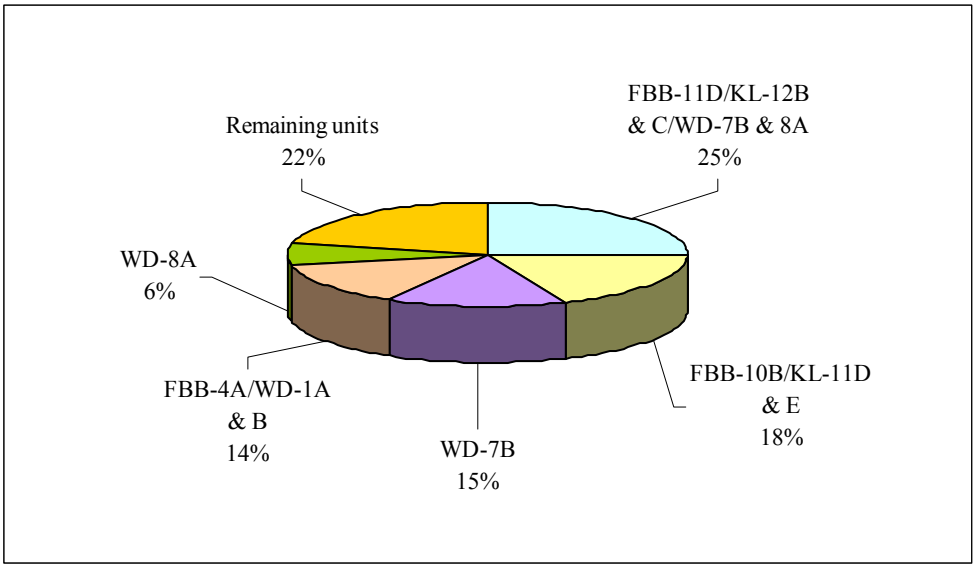
- The Service's species conservation costs at BSNWR occur in subunits FBB-4A/WD-1A & B and FBB-4B, highlighted in yellow in Table E-6. More than 85 percent of the Service's costs occur in the subunit with the most BSNWR acres, FBB-4A/WD-1A & B.

Pre-designation costs are estimated at $4.0 to $7.7 million in 2006 dollars. Potential post-designation (2006-2026) costs are estimated to range between $9.1 and $18.7 million (in constant 2006 dollars). In discounted terms, potential economic costs related to conservation spending are estimated to be $6.8 to $13.9 million (using a three percent discount rate) and $4.8 to $9.9 million (using a seven percent discount rate). In annualized terms, potential costs are expected to range from $454,000 to $937,000 annually (annualized at three percent) and $453,000 to $938,000 annually (annualized at seven percent).

At the unit level, almost 80 percent of the costs are attributed to Units FBB-11D/KL-12B & C/WD-7B & 8A, FBB-10B/KL-11D & E, WD-7B, FBB-4A/WD-1A & B, and WD-8A. These units are identified in Figure 7-1 below.

Figure 7-1

Relative Economic Impacts Related to Public and Conservancy Lands, by Unit (Total Upper-Bound PV Impacts Assuming a Seven-Percent Discount Rate)



7.2 FEDERAL SPENDING

Federal agencies provide approximately half of the total spending on conservation-related activities. Between 2000 and 2006, Federal agencies spent $1.9 to $2.6 million on management programs for, or including, the species. The Federal agencies involved in species conservation and management include BLM, ACOE, the Service, and U.S. Forest Service (USFS). The Service and BLM spending constitutes more than 90 percent of total Federal spending. These

Federal agencies also manage more than 75 percent of the proposed CHD acreage on Federal property.

7.2.1 BUREAU OF LAND MANAGEMENT

BLM manages proposed critical habitat in Lane and Douglas counties, Oregon. The BLM lands are located in both urban and rural areas; BLM lands in Lane County are located west of Eugene (urban), while in Douglas County, these lands are located in a rural part of the County. Total BLM conservation-related spending ranges from approximately $135,000 to $185,000 annually, with $100,000 to $150,000 attributed to habitat management in Lane County and $35,000 to habitat management in Douglas County.[138]

In Lane County, BLM manages about 420 acres of proposed critical habitat located within subunits FBB-10B/KL-11D & E, FBB-11B, FBB-11C/KL-12A, FBB-11D/KL-12B & C/WD-7B & 8A, WD-7A, and the portions of WD-7B and WD-8A that do not overlap with FBB-11D. BLM has a contractual agreement with the City of Eugene to enhance and restore wetland habitats on BLM lands in the western portion of the City, including the proposed CHD. This arrangement entails conservation efforts for all threatened and endangered species occurring in the wetlands, including FBB, KL, and WD. Species conservation activities consist of, but are not limited to, reducing fuel loads, eradicating invasive and exotic species, and curbing woody succession.[139] The contractual agreement totals $1 million annually, and BLM estimates that approximately 10 to 15 percent of this funding is dedicated specifically to threatened and endangered species management.[140] Therefore, this analysis assumes that BLM pays the City between $100,000 and $150,000 annually for FBB, KL, and WD conservation-related activities in west Eugene. This estimate is overstated as the wetland restoration program targets species other than FBB, KL, and WD and lands other than the proposed CHD.

BLM also manages about 60 acres of proposed CHD located within four KL habitat subunits in Douglas County, KL-14A, KL-15A, KL-15B, and KL-16B. Management activities include mowing, hand-pulling invasive species, and annual monitoring of the species. Total annual spending for these activities is $35,000 and the source of funding is BLM's statewide programmatic threatened and endangered species conservation initiative. Of these subunits, only one (KL-16B) has been managed by BLM for the species since 2000; KL plants were discovered within the three remaining subunits in 2003 and have been actively managed and monitored

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138 Personal communications with Susan Carter, BLM District Botanist, Roseburg, Oregon, January 11 and February 23, 2006; Sally Villegas, BLM Forester, Eugene, Oregon, January 9, 2006; and Eric Wold, Wetlands Restoration Manager for the City of Eugene, Oregon, January 10, 2006.

139 Bureau of Land Management, October 2005, "Environmental Assessment, West Eugene Wetland Schedule."

140 Personal communications with Sally Villegas, BLM Forester, Eugene, Oregon, January 9, 2006.

since. Firebreaks and grazing were listed as secondary threats to this habitat in the proposed rule, but livestock grazing does not occur within the units and BLM does not intend to construct firebreaks in this area.[141, 142]

7.2.2 ARMY CORPS OF ENGINEERS

The ACOE manages more than 300 acres of proposed critical habitat located adjacent to the east banks of Fern Ridge Reservoir, west of the City of Eugene. The ACOE-owned portion of the proposed CHD is located within subunits FBB-10A/KL-11A, B, & C, FBB-10B/KL-11D & E, WD-6A, B, & C. Species conservation activities conducted by ACOE include hand-pulling exotic and invasive species, applying herbicides to invasive species, and annual mowing. Additionally, the Agency plans to implement a burning program in the near future. ACOE also manages the conservation of the species on its lands located outside of the proposed CHD. ACOE has managed for FBB, KL, and WD prior to the species listing in 2000 and has spent, and will continue to spend, approximately $15,000 to $20,000 annually on species conservation efforts. The Agency will spend an additional $10,000 every third year after the commencement of the prescribed burning program.[143] Although ACOE manages for species other than FBB, KL, and WD throughout their property, these estimates are representative of the activities specific to the conservation of KL, WD, and FBB. This analysis assumes ACOE maintains current management practices and begins a prescribed burning program in 2008.

7.2.3 FISH AND WILDLIFE SERVICE

Nearly 630 acres of the proposed CHD is located on the 2,500 acre Baskett Slough National Wildlife Refuge (BSNWR) within subunits FBB-4A/WD-1A & B and FBB-4B. BSNWR was originally established in 1965 as a refuge for migrating waterfowl, particularly the dusky Canada goose. In addition to fowl, the Service also manages for FBB and WD in the Refuge. BSNWR's conservation initiative regarding FBB and WD is to expand and restore the wet and upland prairie and oak savannah habitats.

The Service has managed for FBB and WD prior to the species listing in 2000 and has spent, and will continue to spend, approximately $100,000 to $150,000 annually on FBB and WD

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141 U.S. Fish and Wildlife Service, November 2, 2005, "Designation of Critical Habitat for Fender's blue butterfly, Kincaid's lupine and Willamette daisy, *Proposed* Rule," *Federal Register*, Vol. 70, No. 211.

142 Personal communication with Jay Carlson, Director, BLM Roseburg District, January 11, 2006.

143 Personal communications with Wes Messinger, Botanist, ACOE Fern Ridge Office, January 9 and February 22, 2006.

conservation efforts.[144] The agency also spent $10,000 on a habitat management plan for the species in 2000. Species conservation activities conducted by the Service include clearing brush, mowing, curbing conifer succession, and "weed-wiping" invasive species. The Service also intends to incorporate a prescribed burning program into its management scheme in the future, but the timing and extent of this program is uncertain. Considering this uncertainty, the economic analysis does not include a cost for the prescribed burning program in its estimate of impacts.

In addition to conserving habitat for species, such as FBB and WD, the Refuge also provides recreational and educational opportunities for the public. Approximately 145,000 people visited BSNWR in 2005, primarily to hike and observe wildlife. Unfortunately the visitor data are not broken down by species and the annual number of individuals that visit the Refuge specifically to see FBB and WD is not known.[145] However, since 2004, the Service has organized an event where elementary school students visit the Refuge specifically to observe FBB. The Refuge estimates that about 300 students and teachers participate in the event annually, which represents an educational benefit attributable to the presence and conservation of FBB.[146] BSNWR plans to continue this program for another five years. However, since most of the event's activities carried out by the Refuge staff are part of their normal duties, the additional cost to BSNWR is minimal and, thus, is not included in the economic analysis. While studies to evaluate wildlife-related recreation have been conducted by the Service,[147] National Park Service,[148] as well as others, these net economic benefit and willingness to pay estimates are not applicable to children. This analysis acknowledges the educational and recreational benefits that BSNWR provides, but does not include these values in assessing conservation efforts. Thus, the economic analysis overstates the costs related to species conservation activities.

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144 Personal communications with Service Biologists, January 11 and 12, 2006, and Service Recreation Planner, BSNWR, February 28, 2006.

145 Fish and Wildlife Service, Baskett Slough National Wildlife Refuge, September 2005, "Annual Performance Plan".

146 Fish and Wildlife Service, Baskett Slough National Wildlife Refuge, September 2005, "Annual Performance Plan".

147 U.S. Fish and Wildlife Service, 2001, "Net Economic Values for Wildlife-Related Recreation in 2001: Addendum to the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, Report 2001-3." The study was based on contingent valuation and travel cost questions from the 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

148 Rivers, Trails and Conservation Assistance, National Park Service, 1995, "Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors: A Resource Book," Fourth Edition, Revised. These estimates are average willingness to pay estimates derived from an analysis of numerous peer-reviewed publications on the value of outdoor recreation that used a variety of methods, including the travel cost method and the contingent valuation method. Although these estimates are average willingness to pay estimates and not net economic benefit estimates, since most individuals visiting the Reserve are local, average travel costs are expected to be minimal.

7.2.4 U.S. FOREST SERVICE

Approximately 30 acres of proposed CHD is located in the Umpqua National Forest in Douglas County, Oregon, within subunits KL-16A and KL-16B. Other than monitoring the KL habitat since the plants were discovered on the National Forest lands in 2000, the USFS has not actively managed for KL. According to USFS estimates, it has spent, and will continue to spend, $500 annually for monitoring efforts specific to KL. This amount represents one day of surveying by two USFS biologists.[149]

7.3 STATE SPENDING

Approximately six acres of proposed CHD is located on state owned lands (within subunits FBB-11D and WD-7B) managed by the Oregon Department of Forestry (ODF). However, ODF does not actively manage for FBB or WD on this land.[150] Thus, other than ODOT, which is discussed in Section 6.0 of this report, the only other state level entity actively managing for the species is Oregon State University (OSU). OSU owns much of McDonald-Dunn Forest in north-central Benton County, including approximately six acres of the proposed CHD located within subunits FBB-7/KL-8.[151] This property was willed to OSU by Mary McDonald in 1935 for the specific purpose of performing agricultural and forestry research.[152] OSU jointly manages and owns this property with the Starker Forest Corporation, whose conservation contributions are presented later in this section.

The Forestry department of OSU has been researching and managing for FBB and KL since the early 1990s. Species conservation efforts include conducting herbicide treatments on invasive species (specifically targeting *Brachypodium sylvaticum,* or False Brome) to create a 100 foot buffer in order to deter invasive species encroachment.[153] Additionally, OSU has reduced populations of woody species (specifically *Pseudotsuga menziesii,* or Douglas fir) in the buffer zone. Since the species listing, the University has spent, and will continue to spend, approximately $500 to $1,500 annually on these FBB and KL conservation activities. In 2003, OSU also received an $87,000 grant from the Oregon State Weed Board (Department of

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149 Personal communication with Richard Hallowell, USFS Biologist, February 23, 2006.

150 Personal communications with: Dan Borg, State Forest Supervisor, ODF, February 23, 2006; and Art McCoy, State Forest Supervisor for the Eugene area, February 24, 2006.

151 U.S. Fish and Wildlife Service, November 2, 2005, "Designation of Critical Habitat for Fender's blue butterfly, Kincaid's lupine and Willamette daisy*, Proposed* Rule," *Federal Register*, Vol. 70, No. 211, pp. 66510, 66514.

152 Historical information obtained from Oregon State University's Forestry Department webpage, http://www.cof.orst.edu/cf/forests/mcdonald/.

153 Oregon State Weed Board, Grant Program Proposal.

Agriculture) to study the most effective methods of False Brome eradication as a means of prairie restoration at Butterfly Meadows (subunits FBB-7/KL-8).[154]

7.4 LOCAL GOVERNMENT SPENDING

The cities of Eugene and Corvallis, Oregon, are actively engaged in habitat management for the species. Local government spending represented nearly one-third to one-half of total pre-designation conservation spending, and similar estimates are anticipated for post-designation spending. The City of Eugene is the primary contributor to conservation spending at the local government level, constituting more than 95 percent of total local government spending on species conservation activities and 30 to 50 percent of total impacts.

7.4.1 CITY OF EUGENE

The portion of the proposed CHD owned by the City of Eugene totals more than 60 acres located within subunits FBB-10B/KL-11D & E, FBB-11D/KL-12B & C/WD-7B & 8A, FBB-11E, and WD-8B. The City conducts an extensive habitat restoration program in the western portion of the City. This program aims to enhance both upland and wetland prairie ecosystems, and includes conservation efforts for threatened and endangered species such as FBB, WD, and KL. Conservation activities include, but are not limited to, reducing fuel loads, eradicating invasive and exotic species, and curbing woody succession. Other than performing the "on-the-ground" conservation activities, the City acts as coordinator between Federal agencies, local NGOs, and other parties involved in habitat management in this area. For example, BLM contracts the City to perform conservation activities on BLM land in west Eugene.

The director of Eugene's wetland restoration initiative estimates the City spends between $150,000 and $500,000 annually to conduct this program.[155] The program has been operating since the mid-1990s, and is anticipated to continue for at least the next ten years on a similar funding schedule. Considering the program may continue beyond the next ten year period, this analysis assumes the restoration program will last through 2027. This estimate is overstated as the wetland restoration program targets species other than FBB, KL, and WD and lands other than the proposed CHD.

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[154] Personal communication with Deborah Johnson, OSU's Forestry Information Manager, March 9, 2006.

[155] Personal communications with Eric Wold, Wetlands Restoration Manager for the City of Eugene, January 10 and February 22, 2006.

7.4.2 CITY OF CORVALLIS

Approximately six acres of proposed CHD (subunits WD-4A and WD-4B) are located in Bald Hill Park, which is owned and managed by the City of Corvallis. The City's conservation efforts are focused on controlling invasive species and woody succession. The City budgets $2,500 to $3,500 annually for habitat maintenance in Bald Hill Park, however, funding for past conservation activities has come from a variety of sources.[156] In 2000, Partners of Fish and Wildlife (PFW) contributed a $25,000 grant for the conservation of WD, as well as other species. The PFW provided an additional $5,000 in 2001. Then, in 2002, a private donation provided $10,000 to initiate a park outreach and education program that focused on the conservation of threatened and endangered species. In 2003, the Service allocated $15,000 to support Bald Hill Park conservation programs, and in 2004, the American Bird Conservancy donated $10,000 to promote prairie habitats for fowl. Although this grant was specifically intended to improve bird habitat, prairie enhancement benefited WD populations and efforts included measures to foster WD populations. Finally, in 2005, the Park received $10,000 from Oregon Watershed Enhancement Board to better manage wetland habitats, WD's preferred ecosystem.

Considering the continuing trend of external grants and donations is uncertain, the annual City budget of $2,500 to $3,500 for habitat and species management in Bald Hill Park is the only cost item estimated in this economic analysis. Should Bald Hill Park continue to enjoy success in obtaining external funding and grants for conservation efforts, the economic analysis would understate the costs related to species conservation activities.

7.5 NON-GOVERNMENTAL ORGANIZATION (NGO) SPENDING

The Nature Conservancy (TNC), Greenbelt Land Trust Organization (Greenbelt), and Institute for Applied Ecology (IAE) are NGOs that own and/or manage lands within the proposed CHD. The NGO sector spent between $778,000 and $929,000 on species conservation activities during the pre-designation period (undiscounted 2006 dollars), and anticipated costs are expected to range from $940,000 to $1.4 million (undiscounted 2006 dollars) during the post-designation period. Estimates submitted by TNC and Greenbelt are calculated using a spending per acre approach. This approach is based on the assumption that TNC and Greenbelt apply the same management techniques evenly throughout their managed properties, including the proposed CHD, allowing for a constant per acre estimate.[157]

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[156] Personal communications with Steve Deghetto, Park Planner, January 9 and February 22, 2006.

[157] Personal communications with Greg Fitzpatrick, Wildlife Biologist for TNC's Willamette Valley office, February 16 and 22, 2006.

7.5.1 THE NATURE CONSERVANCY

Approximately 215 acres of proposed CHD are located on lands in Linn, Lane, and Benton counties owned and managed by TNC, including land in subunits FBB-8/KL-9, FBB-12A/KL-12D/WD-8D, FBB-12B/KL-12E/WD-8E, FBB-13, WD-7A, and the portion of WD-7B that does not overlap with FBB-11D. TNC owns more than 640 acres in these counties and exercises the same management techniques on each of its properties, i.e., eradicating invasive species, maintaining a short-grass stature, and curbing woody succession. TNC estimates that it spends between $61,500 and $70,500 (2006 dollars) annually on conservation activities for the species on all of its lands. These conservation activities have occurred since the species were listed, and are expected to continue into the future at a similar level of funding[158] Species conservation costs vary by property and break down as follows:

- TNC owns and manages 35 acres in three subunits located in northern Linn County (WD-3A, 3B, and 3C). This is part of a larger 154-acre property. TNC estimates that it spends $9,500 to $11,500 annually on species conservation activities at the larger property.

- TNC owns and manages 3.5 acres in a subunit in central Benton County (FBB-8/KL-9). This is part of a larger 10-acre property. TNC estimates that it spends $2,000 to $4,000 annually on species conservation activities at the larger property.

- TNC owns and manages a 446-acre property in the Eugene area (Lane County), which contains 166 acres of the proposed CHD within subunits FBB-12A/KL-12D/WD-8D, FBB-12B/KL-12E/WD-8E, and the portions of WD-8D and 8E that do not overlap with FBB-12A and 12B. TNC estimates that it spends $46,000 to $49,000 annually on species conservation activities at the larger property.

- TNC owns and manages a 33-acre property north of Eugene, which contains 9.5 acres of the proposed CHD within subunit FBB-13. TNC estimates that it spends $4,000 to $6,000 annually on species conservation activities at the larger property.

This analysis is concerned with species conservation activities performed only on the 215 acres of proposed critical habitat owned and managed by TNC, and does not include the entire 640 acres. It attempts to isolate spending specific to this area by calculating per acre spending, by property, and multiplying by acres of proposed critical habitat owned and managed by TNC, also by property. Applying this approach, it is estimated that TNC spends approximately $21,000 to $24,000 annually on species conservation activities within the proposed CHD. Table 7-2

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[158] Personal communications with: Jason Knuckles, Wildlife Biologist for TNC's Willamette Valley office, January 10, 2006; and Greg Fitzpatrick, Wildlife Biologist for TNC's Willamette Valley office, February 16 and 22, 2006.

summarizes the estimated annual pre- and post-designation cost of TNC's species conservation activities.

Table 7-2
Estimated TNC Annual Pre- and Post-Designation Species Conservation Activities

Unit	TNC Acreage	Annual Spending Estimate		Annual Spending per Acre		Annual TNC CHD Estimate		
		Low	High	Low	High	CHD Acreage	Low	High
WD-3A						5.39	$332	$401
WD-3B	154.4	$9,500	$11,500	$61.53	$74.48	14.58	$897	$1,086
WD-3C						15.58	$959	$1,160
FBB-12A/KL-12D						60.19	$6,209	$6,614
FBB-12B/KL-12E	445.9	$46,000	$49,000	$103.16	$109.89	50.52	$5,212	$5,552
WD-8D						42.69	$4,404	$4,691
WD-8E						12.88	$1,329	$1,415
FBB-13	32.86	$4,000	$6,000	$121.73	$182.59	9.5	$1,156	$1,735
FBB-8/KL-9	10.33	$2,000	$4,000	$193.61	$387.22	3.55	$687	$1,375
Total	643.49	$61,500	$70,500	N/A	N/A	214.88	$21,185	$24,030

Additionally,, the 33-acre property north of Eugene, which contains subunit FBB-13 (9.5 acres), was donated to TNC by the Weyerhaeuser Corporation in June 2001 and designated as a conservation easement.[159] This transaction is considered a conservation effort by a private party (the Weyerhaeuser Corporation), and is not attributed to TNC's conservation efforts. The cost of this private conservation effort is presented later in this section.

7.5.2 GREENBELT LAND TRUST ORGANIZATION

The Greenbelt Land Trust (GLT) purchased a conservation easement on a 59-acre property in 2005, but has actively managed for the FBB and KL at this site since 2003. Greenbelt paid $460,000 for the conservation easement, which contains approximately 25 acres of proposed critical habitat in subunit FBB-9/KL-10.[160] Greenbelt estimates that it spends between $30,000 and $40,000 annually on hand-pulling of invasive species, mowing, invasive species herbicide

[159] Personal communication with Jana Setzler, Property Acquisition Manager for TNC's Portland office, February 21, 2006.

[160] Personal communication with Karlene McCabe, Executive Director, Greenbelt Land Trust, January 9, 2006.

applications, and reestablishing KL populations.[161] The same analytic approach used to allocate species conservation activity costs on TNC's lands is applied to Greenbelt's property in order to isolate conservation spending on the area of proposed CHD. This analysis estimates that $12,400 to $16,700 is spent annually on species conservation on Greenbelt's land within the proposed CHD. Furthermore, Greenbelt anticipates reducing this annual budget by $5,000 after five years of successful conservation efforts. Thus, this analysis estimates that annual spending for species conservation activities will decrease to $10,400 to $14,600 from 2012 onward.

7.5.3 INSTITUTE FOR APPLIED ECOLOGY (IAE)

IAE is a non-profit organization based in Eugene, Oregon, that was established in 2000 to conduct research and monitoring programs on threatened and endangered species. IAE performs the following species conservation activities for WD, KL, and FBB: 1) conducts an out-planting, repopulation, and habitat expansion program for KL; 2) evaluates WD and KL habitat management and recovery strategies for government agencies; 3) performs population monitoring to detect trends in habitats; and 4) conducts an outreach and education program, where students assist in the propagation and planting of WD and KL. IAE estimates that it spends approximately $15,000 to $30,000 annually on these species conservation activities.[162]

7.6 PRIVATE SPENDING

Two private party conservation efforts are quantified in this analysis, one of which is the donation of 33 acres from the Weyerhaeuser Corporation to TNC. The 33-acre property north of Eugene, which contains subunit FBB-13 (9.5 acres), was donated to TNC by the Weyerhaeuser Corporation in June 2001 and designated as a conservation easement.[163] Based on the land values applied in the development model in Section 4.0 of this report, it is estimated that the value of this donation ranges from $51,700 to $220,000.[164]

The other private party conservation effort involves Starker Forest Corporation (Starker). Starker jointly owns and manages McDonald-Dunn Forest with OSU, which includes proposed critical habitat in subunit KL-8/FBB-7. Starker has managed for FBB and KL since 2000, eradicating invasive species and hindering woody succession. Starker estimates that these conservation activities cost between $1,000 and $3,000 annually. However, Starker anticipates that spending

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161 Personal communications with Claire Fiegener, Program Coordinator, Greenbelt Land Trust, January 20 and February 22, 2006.

162 Personal communication with Tom Kaye, Executive Director of IAE, February 22, 2006.

163 Personal communication with Jana Setzler, Property Acquisition Manager for TNC's Portland office, February 21, 2006.

164 Recent sales values in northern Lane County ranged from $1,574 to $6,695 per acre.

on species conservation activities will increase once the company establishes long-term conservation goals for the species. However, these long-term conservation goals have not been determined. Due to the uncertainty of knowing what the additional long-term conservation efforts will entail, this analysis only considers the existing $1,000 to $3,000 in annual species conservation activities in the calculation of post-designation impacts.

Some additional private landowners with proposed critical habitat on their property have contacted the Service for guidance on how to best manage for the species, but there is no indication that these are significant efforts.

This appendix contains an examination of the extent to which the analytic results presented in the main report reflect impacts to small entities. The analysis of the effect on small entities is conducted pursuant to the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. The appendix also contains an analysis of the effects of the rulemaking on energy markets, as required by Executive Order No. 13211.

POTENTIAL EFFECTS ON SMALL ENTITIES

Under the RFA (as amended by SBREFA), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities. However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.[165] SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. To assist in this process, the following represents a screening level analysis of the potential effects of conservation efforts for FBB, KL, and WD on small entities due to the rulemaking. This analysis is intended to facilitate determination of (1) whether this CHD potentially affects a "substantial number" of small entities in counties and/or supporting critical habitat areas; and (2) the probable number of small entities that are likely to experience a "significant effect."

DEFINITION OF SMALL ENTITIES

Small entities include small businesses, small governments, or small organizations, as defined by the U.S. Small Business Administration (SBA) size standards for small businesses that are established for different types of economic activity or industry within the North American Industry Classification System (NAICS), and are commonly expressed in terms of the number of employees or annual receipts. For most industries, the size standard is based upon annual revenue for the business. The SBA publishes a table of current small business size standards on

[165] Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" *and* a threshold for a "substantial number of small entities." See 5 U.S.C. § 605(b).

their website (www.sba.gov/size).[166] These size standards were most recently published by the SBA in "Table of Small Business Size Standards Matched to North American Industry Classification System Codes," effective January 5, 2006. Small organizations are defined as "any non-profit enterprise … which is independently owned and operated and not dominant in its field."[167] These may include organizations such as irrigation districts, water associations, public utilities, or agricultural co-ops. A small government is defined as any government serving populations of 50,000 or less, and might include county, city, town, or school district governments. For the purposes of the RFA, States and tribal governments are not considered small governments but rather as independent sovereigns.

Federal courts have held that an RFA analysis should be limited to impacts on entities subject to the requirements of the regulation (i.e., participants in the section 7 consultation process).[168] These entities include participants in the section 7 consultation process, but not entities suffering the downstream effects of consultation outcomes. In spite of these rulings, in its guidance to Federal agencies on conducting screening analyses, the SBA recommends considering impacts to entities that may be indirectly affected by the proposed regulation.[169]

IDENTIFICATION OF ACTIVITIES THAT MAY INVOLVE SMALL ENTITIES

The analysis in the main report determined that costs involving conservation efforts for FBB, KL, and WD would be incurred by owners of agriculture land (i.e., farmers) and forest land. This section considers the extent to which the costs presented in the main report reflect impacts to small entities.

Forestry

Starker Forests, Inc. is a family-owned business that owns, grows, and manages forest land in Benton, Lincoln, Lane, and Polk counties, Oregon. The company jointly owns and manages the McDonald-Dunn Forest with Oregon State University, which includes subunit FBB-7/KL-8 (Butterfly Meadows). Species conservation activities cost the company about $1,000 to $3,000 annually. While the size of the company, in terms of annual revenues, is unknown, Starker

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166 U.S. Small Business Administration, "Small Business Size Standards matched to North American Industry Classification System," effective January 5, 2006, http://www.sba.gov/size/sizetable2002.html, accessed on February 7, 2006.

167 5 U.S.C. § 601 *et seq*.

168 U.S. Small Business Administration, Office of Advocacy, May 2003, "A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act," pp. 69-70.

169 U.S. Small Business Administration, Office of Advocacy, May 2003, "A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act."

Forests owns approximately 60,000 acres of forest land.[170] Starker Forests, Inc. is one of 494 forestry and logging businesses that operate in the eight counties that encompass the proposed CHD.[171]

Agriculture

Based on the results reported in the economic analysis (i.e., loss of development opportunity on private agriculture lands), small businesses potentially affected by conservation measures to protect FBB, KL, and WD and/or their habitat include agriculture operations. SBA's small business size standard for farming and ranching is annual sales of $750,000.[172] Recent county-level farm sales data from the NASS 2002 Agriculture Census is used to determine the number of small agri-businesses operating within the proposed CHD.[173] Unfortunately, the largest reported category of sales information reported in the 2002 Agriculture Census data is for the number of operations with annual farm sales greater than $500,000, which is $250,000 less than the SBA small business threshold. Nevertheless, the 2002 Agriculture Census data does indicate that 97 percent of the farmers and ranchers (i.e., 15,730 individuals) operating within the eight counties that encompass the proposed CHD have annual sales less than $500,000; the remaining three percent (i.e., 473 individuals) account for 71 percent of the annual farm sales in the eight counties, or $1.9 million per operation on average (see Table A-1). These data indicate that farming and ranching businesses in the area surrounding the proposed CHD tend to be small. For the purpose of this small business analysis, considering a high percentage of the farming and ranching operations in the area surrounding the proposed CHD have annual sales below $500,000, all agriculture operations forecast to be impacted by conservation efforts for FBB, KL, and WD are considered small.

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170 Starker Forests, Inc., http://www.starkerforests.com/History.htm.

171 U.S. Census Bureau, 2003 County Business Patterns (NAICS), using NAICS code 113, Forestry and Logging, which includes businesses that grow and harvest timber on a long production cycle (i.e., of 10 years or more). Industries in this subsector specialize in different stages of the production cycle, http://censtats.census.gov/cbpnaic/cbpnaic.shtml.

172 U.S. Small Business Administration, "Small Business Size Standards matched to North American Industry Classification System," effective January 5, 2006, http://www.sba.gov/size/sizetable2002.html, accessed on February 7, 2006.

173 Quick Stats: Agricultural Statistics Data Base, 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, State - County Data, Table 2. Market Value of Agricultural Products Sold Including Direct and Organic: 2002 and 1997, http://151.121.3.33:8080/QuickStats/, accessed on February 7, 2006.

Approximately 195 small agriculture operations could be impacted by conservation measures for FBB, KL, and WD.[174] These agriculture operations represent approximately 1.2 percent of the number of small farms and ranches operating within the eight counties that encompass the proposed CHD (see Table A-1). The percent of small agriculture operations impacted ranges from a low of approximately 0.1 percent in Marion and Lewis counties to a high of 4.6 percent in Benton County.

The conservation measures for FBB, KL, and WD are not expected to impact the profitability of these small agriculture operations, as the existing agriculture use of the privately owned lands that encompass the proposed CHD is not likely to be impacted. Approximately 85 percent (i.e., 1,794 acres) of the estimated 2,120 acres of privately owned land within the proposed CHD is classified as agriculture land.[175] The remaining 327 acres is classified as various types of forest land; primarily White Oak forest, which has no commercial value.[176] Examination of recent aerial photos shows the privately owned forest lands as lightly wooded areas on the fringe agriculture lands, primarily around Units FBB-4A/WD-1A/WD-1B, FBB-4B, FBB-7/KL-8, and FBB-8/KL-9, and the privately owned agriculture lands as unplowed grassland or pasture.[177] In fact, considering these privately owned agriculture lands are being proposed as critical habitat for these species indicates these lands have not been farmed (i.e., plowed) during the past decade.[178]

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174 Landownership information obtained from the Service indicates 190 private individuals own land within the boundaries of the proposed CHD. The data does not include landownership for the units in Douglas County. County Assessor's maps for Douglas County show that private lands in the six units in this County fall under five tax lots. To be conservative (i.e., to avoid underestimating the number of small agriculture operations for the small business impacts analysis), the economic analysis assumes that each tax lot is owned by a separate individual. Sources: Personal communication with Service Biologist, Portland, Oregon (February 6, 2007) and Lacy, Washington (January 31, 2006). The Oregon Map, a statewide property tax parcel base map that is digital, publicly accessible, and continually maintained, http://www.ormap.org/, accessed on February 6, 2006.

175 Kagan, J.S., J.C. Hak, B. Csuti, C.W. Kiilsgaard, and E.P. Gaines. 1999. Oregon Gap Analysis Project Final Report: A geographic approach to planning for biological diversity. Oregon Natural Heritage Program, Portland, Oregon. 72 pp. + appendices, http://oregonstate.edu/ornhic/or-gap.html.

176 Personal communication with Ron Moffitt, Farm Credit Services, January 23, 2006.

177 Oregon aerial photos: 2000 Digital Orthophoto Quadrangles (DOQs) from the Oregon Geospatial Enterprise Office website, http://www.oregon.gov/DAS/IRMD/GEO/data/DOQ_NAPP_2.shtml. 2005 Aerial photos were available for some of the proposed CHD units in Benton County, Oregon, from the Benton County GIS department's website, http://ww2.co.benton.or.us/irm/gis/GISdata/. Washington aerial photos: 1990 USGS Digital Orthophoto Quarter Quadrangles (DOQQ) from the University of Washington's "Washington State Geospatial Data Archive" (WAGDA) website, http://wagda.lib.washington.edu/data/doqs.html.

178 "[FBB, KL, and WD]…occur in prairie remnants with undisturbed (not disturbed in the last 10 years) subsoils (the layer of soil between the topsoil and bedrock)." U.S. Fish and Wildlife Service, November 2, 2005, "Designation of Critical Habitat for the Fender's Blue Butterfly (*Icaricia icarioides fenderi*), *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's Lupine), and *Erigeron decumbens* var. *decumbens* (Willamette Daisy); Proposed Rule" *Federal Register*, Vol. 70, No. 211, p. 66494.

Based on the past and existing land use, it appears the agriculture value of these lands is as grassland/pasture, and livestock grazing, if not intensive, would not further degrade or destroy the prairie habitat.[179]

While farm profits are not expected to be affected by species conservation, impacted small agriculture businesses are expected to lose between $383 (Douglas County) and $118,785 (Yamhill County) in land value due to species conservation (see Table A-1). Considering the average market value of a farm's assets (i.e., land, buildings, machinery, and equipment) in the affected counties ranges from approximately $375,000 (Lewis County) to $650,000 (Marion, Polk, Yamhill, and Linn counties), the economic impacts of species conservation to the small agriculture operator is expected to range from as little as 0.1 percent (Douglas and Linn counties) of the value of an operator's farm assets to as much as 18.2 percent (Yamhill County) of a the operator's farm assets (see Table A-1).

The 16 small agriculture operators in Yamhill County are expected to bear the greatest impacts (1.5 to 18.2 percent of the value of farm assets) followed by the 28 operators in Polk County (1.0 to 17.1 percent of the value of farm assets), the 41 operators in Benton County (2.0 to 13.4 percent of the value of farm assets), the 87 operators in Lane County (1.2 to 6.8 percent of the value of farm assets), and then the 3 operators in Marion County (0.4 to 5.8 percent of the value of farm assets). Impacts to the remaining 20 small agriculture operators in Douglas, Linn, and Lewis counties are estimated at less than approximately two percent of the value of an operator's farm assets.

Note that, given the small number of farming operations expected to be impacted by this designation, and the variability of farm size, in terms of land acreage, buildings, and machinery and equipment inventory, actual impacts will likely vary from these estimates.

Small Governments

The boundaries of five city governments encompass the proposed CHD: Eugene (estimated population in 2005 of 146,160), Corvallis (estimated population in 2005 of 53,165), Dallas (estimated population in 2005 of 14,040), Philomath (estimated population in 2005 of 4,400), and Sheridan (estimated population in 2005 of 5,740).[180] Eugene and Corvallis exceed the criteria

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[179] U.S. Fish and Wildlife Service, November 2, 2005, "Designation of Critical Habitat for the Fender's Blue Butterfly (*Icaricia icarioides fenderi*), *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's Lupine), and *Erigeron decumbens* var. *decumbens* (Willamette Daisy); Proposed Rule" *Federal Register*, Vol. 70, No. 211, p. 66520.

[180] Geographic Data Technology, Inc. (GDT), Department of Commerce, Census Bureau, Geography Division, ESRI, 20040301, U.S. Populated Place Areas: ESRI ® Data & Maps 2004, ESRI, Redlands, California, USA, and Portland State University, Population Research Center: 2005 Certified Population Estimates, http://www.pdx.edu/prc/, accessed on February 8, 2006.

(service population of 50,000 or less) for "small entity." Of the three "small" governments, Dallas is the only small government entity potentially impacted by FBB, KL, and WD conservation activities (see Sections 6.1.3.2 and 6.2.11).

In fiscal year 2005-06, the City's annual budget is approximately $36 million.[181] The analysis estimates that potential future FBB and KL conservation activities (related to a planned collector street and the one-time application costs and annual deferred maintenance and personnel training costs associated with a Section 10(a)(1)(A) Recovery Permit) may cost the City between $28,000 (low range assuming a seven percent discount rate) and $197,000 (high range assuming a three percent discount rate) on an annualized basis. These costs represent approximately 0.08 percent to 0.5 percent of the City's annual expenditures.

Small Organizations

Land within the proposed CHD is owned and/or managed by several nonprofit organizations, including The Nature conservancy (TNC),[182] Greenbelt Land Trust Organization (Greenbelt),[183] and the Institute for Applied Ecology (IAE).[184] Considering the missions of these nonprofit organizations is to preserve, restore, and protect the species and their habitat, as well as other species and habitats, the impact of species conservation activities on these organizations is not considered in this small business impacts analysis.

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181 Personal communication with Marcia Baragary, Director of Finance, City of Dallas, February 23, 2006.

182 The mission of TNC "…is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive," http://nature.org/aboutus/.

183 Greenbelt "…is a non-profit organization whose goal is to enhance and protect the open space amenities essential to preserving our quality of life in the Mid-Willamette Valley," http://www.greenbeltlandtrust.org/aboutus.html.

184 IAE's mission statement is "[t]o conserve native ecosystems through restoration, research and education," http://www.appliedeco.org/mission.htm.

Table A-1
Agriculture Statistics and Small Business Analysis, by County (2006$[d/])

	Benton		Douglas		Lane		Linn	
Item	**Low**	**High**	**Low**	**High**	**Low**	**High**	**Low**	**High**
Number of Small Farmers Impacted								
Number of farms [a/]	912		2,110		2,577		2,346	
Total sales ($1,000s) [a/]	$91,826		$40,350		$95,342		$164,813	
Farms with sales <$500,000 [a/]	883		2,096		2,537		2,269	
Percent of farms with sales <$500,000	97%		99%		98%		97%	
Total sales from farms with sales <$500,000 ($1,000s) [a/]	$18,925		$27,400		$39,173		$60,661	
Percent of sales from farms with sales <$500,000	21%		68%		41%		37%	
Average sales per farm with sales <$500,000 ($)	$21,433		$13,072		$15,441		$26,735	
Farms with sales >$500,000 [a/]	29		14		40		77	
Percent of farms with sales >$500,000	3%		1%		2%		3%	
Total sales from farms with sales >$500,000 ($1,000s) [a/]	$72,900		$12,950		$56,169		$104,152	
Percent of sales from farms with sales >$500,000	79%		32%		59%		63%	
Average sales per farm with sales >$500,000 ($)	$2,513,808		$925,011		$1,404,228		$1,352,619	
Approximate number of small farms impacted by conservation activities	41		5		87		13	
Percent of small farms impacted	4.6%		0.2%		3.4%		0.6%	
Value of Impact to Small Farmer								
Total cost of designation to small farmers and ranchers ($)	$517,717	$3,392,847	$1,915	$31,816	$442,842	$2,587,893	$11,907	$84,945
Average cost per small farm impacted by the CHD ($)	$12,627	$82,752	$383	$6,363	$5,090	$29,746	$916	$6,534
Average estimated market value of land and buildings, per farm ($) [b/]	$550,795		$375,809		$394,222		$560,468	
Average estimated market value of all machinery and equipment, per farm ($) [c/]	$68,324		$39,920		$41,906		$70,909	
Average estimated market value of land, buildings, machinery, and equipment, per farm ($)	$619,118		$415,728		$436,128		$631,377	
Average cost of designation as a percent of average market value of land, buildings, machinery, and equipment, per farm ($)	2.0%	13.4%	0.1%	1.5%	1.2%	6.8%	0.1%	1.0%

a/ Quick Stats: Agricultural Statistics Data Base, 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, State - County Data, Table 2. Market Value of Agricultural Products Sold Including Direct and Organic: 2002 and 1997, http://151.121.3.33:8080/QuickStats/, accessed on February 7, 2006.

b/ Quick Stats: Agricultural Statistics Data Base, 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, State - County Data, Table 8. Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2002 and 1997, http://151.121.3.33:8080/QuickStats/, accessed on February 7, 2006.

c/ Quick Stats: Agricultural Statistics Data Base, 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, State - County Data, Table 38. Machinery and Equipment on Operation: 2002 and 1997, http://151.121.3.33:8080/QuickStats/, accessed on February 7, 2006.

d/ 2002 Agriculture Census data converted to 2005$ U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Price Index – All Urban Consumers," (Series ID: CUUROOOOSAO Not Seasonally Adjusted).

Table A-1 (continued)
Agriculture Statistics and Small Business Analysis, by County (2006$[d/])

Item	Marion		Polk		Yamhill		Lewis		TOTAL
	Low	High	Low	High	Low	High	Low	High	
Number of Small Farmers Impacted									
Number of farms [a/]	3,203		1,324		2,329		1,402		16,203
Total sales ($1,000s) [a/]	$467,532		$97,255		$226,411		$97,107		$1,280,636
Farms with sales <$500,000 [a/]	3,021		1,285		2,273		1,366		15,730
Percent of farms with sales <$500,000	94%		97%		98%		97%		97%
Total sales from farms with sales <$500,000 ($1,000s) [a/]	$107,682		$30,732		$53,552		$31,830		$369,955
Percent of sales from farms with sales <$500,000	23%		32%		24%		33%		29%
Average sales per farm with sales <$500,000 ($)	$35,645		$23,916		$23,560		$23,302		$23,519
Farms with sales >$500,000 [a/]	182		39		56		36		473
Percent of farms with sales >$500,000	6%		3%		2%		3%		3%
Total sales from farms with sales >$500,000 ($1,000s) [a/]	$359,850		$66,523		$172,859		$65,277		$910,681
Percent of sales from farms with sales >$500,000	77%		68%		76%		67%		71%
Average sales per farm with sales >$500,000 ($)	$1,977,199		$1,705,705		$3,086,777		$1,813,259		$1,925,330
Approximate number of small farms impacted by conservation activities	3		28		16		2		195
Percent of small farms impacted	0.1%		2.2%		0.7%		0.1%		1.2%
Value of Impact to Small Farmer									
Total cost of designation to small farmers and ranchers ($)	$8,323	$113,944	$184,395	$3,139,969	$154,900	$1,900,558	$3,780	$17,140	
Average cost per small farm impacted by the CHD ($)	$2,774	$37,981	$6,586	$112,142	$9,681	$118,785	$1,890	$8,570	
Average estimated market value of land and buildings, per farm ($) [b/]	$554,537		$595,517		$588,327		$334,323		
Average estimated market value of all machinery and equipment, per farm ($) [c/]	$94,780		$61,449		$63,914		$37,503		
Average estimated market value of land, buildings, machinery, and equipment, per farm ($)	$649,317		$656,967		$652,241		$371,827		
Average cost of designation as a percent of average market value of land, buildings, machinery, and equipment, per farm ($)	0.4%	5.8%	1.0%	17.1%	1.5%	18.2%	0.5%	2.3%	

a/ Quick Stats: Agricultural Statistics Data Base, 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, State - County Data, Table 2. Market Value of Agricultural Products Sold Including Direct and Organic: 2002 and 1997, http://151.121.3.33:8080/QuickStats/, accessed on February 7, 2006.

b/ Quick Stats: Agricultural Statistics Data Base, 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, State - County Data, Table 8. Farms, Land in Farms, Value of Land and Buildings, and Land Use: 2002 and 1997, http://151.121.3.33:8080/QuickStats/, accessed on February 7, 2006.

c/ Quick Stats: Agricultural Statistics Data Base, 2002 Census of Agriculture - Volume 1 Geographic Area Series Census, State - County Data, Table 38. Machinery and Equipment on Operation: 2002 and 1997, http://151.121.3.33:8080/QuickStats/, accessed on February 7, 2006.

d/ 2002 Agriculture Census data converted to 2005$ U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Price Index – All Urban Consumers," (Series ID: CUUROOOOSAO Not Seasonally Adjusted).

POTENTIAL EFFECTS ON ENERGY SUPPLY

Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, requires Federal agencies to submit a "Statement of Energy Effects" for all "significant energy actions" in order to present consideration of the impacts of a regulation on the supply, distribution, and use of energy.[185] Significant adverse effects are defined in the EO by the OMB according to the following criteria:

Reductions in crude oil supply in excess of 10,000 barrels per day;

1. Reductions in fuel production in excess of 4,000 barrels per day;
2. Reductions in coal production in excess of five million tons per year;
3. Reductions in natural gas production in excess of 25 million mcf (one thousand cubic feet) per year;
4. Reductions in electricity production in excess of one billion kilowatt-hours (kWh) per year or in excess of 500 megawatts (MW) of installed capacity;
5. Increases in energy use required by the regulatory action that exceed any of the thresholds above;
6. Increases in the cost of energy production in excess of one percent;
7. Increases in the cost of energy distribution in excess of one percent; or
8. Other similarly adverse outcomes.

The CHD is expected to have minimal impacts on the energy industry. There is a very small likelihood of energy-related impacts occurring in essential habitat of the size established by the criteria.

[185] Daniels, Mitchel E., July 13, 2001, "Memorandum for Heads of Executive Departments and Agencies, and Independent Regulatory Agencies," M-01-27, http://www.whitehouse.gov/omb/memoranda/m01-27.html.

Table B-1
Section 7 Consultation History for Fender's Blue Butterfly, Kincaid's Lupine and Willamette Daisy

Service Log #	Date	Action Agency	Critical Habitat Unit #	Project Description	Species and Habitat Conservation
Formal Consultations					
1-7-05-F-0291	03/21/05	Service	FBB-7, KL-8	Reinitiation of formal consultation on the issuance of 10(a)(1)(A) Recovery Permit TE-061146-1 for Oregon State University for an additional year of research at Butterfly Meadows. The activities proposed for 2004 (BO 1-7-04-0589 dated 10-14-04) were not conducted (original BO 1-7-02-F-348 dated 10-22-02), including incidental take of FBB.	Project design includes: (1) avoid trampling or damaging KL or any flowering nectar plants FBB might use, (2) herbicide application conducted during KL and FBB dormancy periods, and (3) treatment areas can be accessed without having to walk through surrounding KL habitat. RPMs, TOCs, and Conservation Recommendations include: (1) minimize activities that could result in injury or mortality to FBB eggs, larvae, and adults, (2) minimize soil and plant disturbance to FBB habitats, (3) monitor & report, (4) minimize visits to KL sites during FBB flight (between April 15 and June 15) and KL blooming periods, (5) avoid trampling or injuring KL plants, (5) apply herbicide with backpack sprayers after KL and FBB are predominantly dormant, (6) clean clothing and equipment prior to arriving at KL sites, and (7) minimize soil compaction, restrict visits to periods when soil is dry.
1-7-05-0330	05/06/05	Service	KL-12E & D, FBB-12, FBB-4	10(a)(1)(A) Recovery Permit for Washington State University to research and monitor FBB and KL populations in 2005 at the Willow Creek Natural Area and Baskett Slough National Wildlife Refuge, including incidental take of FBB.	RPMs, TOCs, and Conservation Recommendations include: (1) minimize access to sites during FBB flight and KL growth periods, (2) minimize injury and mortality to FBB and impacts to FBB habitat, (3) monitor & report, (4) only specific individuals are authorized, (5) avoid stepping on plants that have eggs or larvae on them, (6) capture shall be by netting, (7) minimize handling time of FBB, and (8) limit trampling and damage to KL plants to less than 10% of cover during growing season.
1-7-05-F-0281	04/19/05	Service	All FBB units	Reinitiation of programmatic formal consultation on monitoring and managing populations of KL and FBB (original consultation 1-7-03-F-0436 on 5-28-03). Recovery permits permitting monitoring of KL and FBB, maintaining and restoring habitat through using manual, mechanical, and revegetation techniques; prescribed fire; herbicides; solarization; and infrared radiation.	Activities include: (1) avoid trampling KL plants and FBB larvae, (2) avoid trampling or damaging any FBB flowering nectar plants, (3) cease activity if more than 5% of KL or flowering nectar plants are trampled, (4) clean clothing prior to arriving at KL sites, (5) monitoring and reporting, (6) conduct manual and mechanical maintenance between mid-August and February, (7) minimum mower blade height between 4 to 6", (8) spot treatment using herbicide after mid-August, (9) solarization and infrared treatment in unoccupied habitat only, (10), prescribed burning will occur mid-August to November, (11) vehicles will be restricted to adjacent non-native pasture, and (12) fire suppression accomplished with pre-burn hose lays, wet-lining, and/or fire retardant foam. RPMs, TOCs, and Conservation Recommendations include: (1) minimize access to sites during FBB flight and KL growth periods, (2) minimize injury and mortality to FBB and impacts to FBB habitat, (3) monitor & report.

Service Log #	Date	Action Agency	Critical Habitat Unit #	Project Description	Species and Habitat Conservation
1-7-05-F-0328	04/14/05	ACOE	FBB-10	Construction of new drainage system for the Fern Ridge embankment dam (May-November 2005).	Project design includes: (1) reduce vehicle speeds when in proximity of known colonies, (2) monitor for FBB at site, (3) restrict use of haul road until after egg-laying has been completed (mid-June), (4) paving or daily watering of access road to preclude dust issues.
1-7-04-F-0133	11/22/04	Service	All Units	Programmatic Intra-Service consultation on the Coastal, Greenspaces, Jobs in the Woods, Partners for Fish and Wildlife and Private Stewardship Grants Programs (Restoration Program), 2004 to 2009, to restore native habitats to benefit native fish and wildlife species.	Project design standards (PDS) will be implemented as part of the proposed action to avoid or minimize adverse effects which may result in harm to a listed species. In addition to general PDS for all restoration projects, PDS for FBB include: (1) survey during mid-May to early July, (2) mechanical activities conducted when KL and nectar plants have completed seed production and FBB are in diapause (i.e., August 15 to February 28, (3) mower blade height restrictions, (4) no mowing from March 1 to May 15 if KL present, (5) prescribed burning will only occur September 1 to November 30, (6) vehicles will be restricted from area, and (7) fire suppression accomplished with pre-burn hose lays, wet-lining, or fire retardant foam. PDS for WD include: (1) Prescribed burns will not be conducted on sites occupied by WD. PDS for KL include: (1) Prescribed burns on KL sites when plants are dormant and seeds have been dispersed. RPMs, TOCs and Conservation Recommendations include: (1) Complete an electronic database for all restoration programs that tracks beneficial and adverse affects to listed species, (2) reporting.
1-7-04-0589	10/14/04	Service	FBB-7, KL-8	Reinitiation of formal consultation on the issuance of 10(a)(1)(A) Recovery Permit TE-061146-0 for Oregon State University for an additional year of research and permit modifications to allow spot spraying with herbicides on 0.75 acres with high native plant cover and 0.50 acres of low native plant cover at Butterfly Meadows (original BO 1-7-02-F-348 dated 10-22-02), including incidental take of FBB.	Project was not conducted. However, the project design included: (1) avoid trampling or damaging KL or any flowering nectar plants FBB might use, (2) herbicide application conducted during KL and FBB dormancy periods, and (3) treatment areas can be accessed without having to walk through surrounding KL habitat. RPMs, TOCs, and Conservation Recommendations include: (1) minimize activities that could result in injury or mortality to FBB eggs, larvae, and adults, (2) minimize soil and plant disturbance to FBB habitats, (3) monitor & report, (4) minimize visits to KL sites during FBB flight (between April 15 and June 15) and KL blooming periods, (5) avoid trampling or injuring KL plants, (5) apply herbicide with backpack sprayers after KL and FBB are predominantly dormant, (6) clean clothing and equipment prior to arriving at KL sites, and (7) minimize soil compaction, restrict visits to periods when soil is dry.

Service Log #	Date	Action Agency	Critical Habitat Unit #	Project Description	Species and Habitat Conservation
1-7-04-F-0464	08/20/04	BLM	WD-7A	Proposed treatments to enhance rare plant populations at West Greenhill and the Long Tom Area of Critical Environmental Concern (ACEC). Proposed actions include the use of shade cloth, weed cutting, and prescribed burning on the West Greenhill site and the use of weed cutting and prescribed burning on the Long Tom ACEC.	Project design includes: (1) botanist or natural resource specialist to direct implementation of shade cloth, direct weed cutting, and prescribed burning (2) weed cutting will occur only after all listed plant species have senesced for the season (late September), (3) cutting will occur only once annually, (4) flag all rare plants, (5) prescribed burning will occur after late august, (6) monitoring (through 2008), (6) duration of burn less than 1 hour, (7) most cut material will be removed from the site, (8) vehicles will be restricted to adjacent non-native pasture, and (9) fire suppression accomplished with pre-burn hose lays, wet-lining, and/or fire retardant foam. Conservation Recommendations include: (1) minimize soil compaction; do not conduct activities when soils are saturated or wet, (2) limit trampling and damage to WD to less than 10% of cover annually, and (3) monitor & report.
1-7-04-F-0351	06/08/04	Service	FBB-12, KL-12E & D	10(a)(1)(A) Recovery Permit to TNC (in accordance to the programmatic BO 1-7-03-F-0436 dated 5-28-03) for monitoring FBB and KL (Willow Creek, Coburg Ridge, and West Eugene Wetlands), maintaining and restoring FBB and KL habitat (Willow Creek and Coburg Ridge), and collecting KL plant material (Willow Creek) on sites in Lane County for the years 2004 to 2007, including incidental take of FBB	RPMs, TOCs, and Conservation Recommendations include: (1) minimize access to sites during FBB flight and KL blooming periods, (2) minimize injury and mortality to FBB and impacts to FBB habitat, (3) monitor & report, (4) no activities during FBB flight period (April 15-July 1), (5) no activities until KL has senesced (~ July 1), (6) any hand treatment during KL growing season by TNC qualified staff, (7) limit trampling and damage to KL to less than 10% during growing season, (8), minimum mower blade height of 6", (9) restrict herbicide to a single formation and application after FBB flight period, (10) collect no more than 5% of seed, (11) minimize visits during FBB flight and KL blooming periods, and (12) clean equipment and clothing prior to arriving at KL sites.
1-7-04-F-0019	11/07/03	Service	FBB-7, KL-8	Reinitiation of formal consultation on the issuance of 10(a)(1)(A) Recovery Permit TE-061146-0 for Oregon State University for an additional year of research and permit modifications to allow the use of the herbicide "Surflan," increase herbicide application rates, change in timing of herbicide applications, and change in the size of the treated area at Butterfly Meadows (original BO 1-7-02-F-348 dated 10-22-02), including incidental take of FBB.	Project design is similar to that described in 2002 and includes: (1) avoid trampling or damaging KL or any flowering nectar plants FBB might use, and (2) herbicide application conducted in August and October during plant dormancy periods. RPMs, TOCs, and Conservation Recommendations include: (1) minimize activities that could result in injury or mortality to FBB eggs, larvae, and adults, (2) minimize soil and plant disturbance to FBB habitats, (3) monitor & report, (4) minimize visits to KL sites during FBB flight (between April 15 and June 15) and KL blooming periods, (5) avoid trampling or injuring KL plants, (5) apply herbicide with backpack sprayers after KL and FBB are predominately dormant, (6) clean clothing and equipment prior to arriving at KL sites, and (7) minimize soil compaction, restrict visits to periods when soil is dry.
1-7-03-F-0390	10/03/03	ACOE, BPA, & BOR	KL-11A-D FBB-10, WD-6	Revised Preliminary Draft Jeopardy BO on Willamette Project	Inquiry of Conflicting Conservation Projects

Service Log #	Date	Action Agency	Critical Habitat Unit #	Project Description	Species and Habitat Conservation
1-7-03-F-0437	06/18/03	Service	FBB-12, KL-12D & E	10(a)(1)(A) Recovery Permit to TNC (in accordance to programmatic BO 1-7-03-F-0436 dated 5-28-03) for monitoring and managing populations of KL and FBB (Willow Creek and Coburg Ridge), including incidental take of FBB.	RPMs, TOCs, and Conservation Recommendations include: (1) minimize access to sites during FBB flight and KL blooming periods, (2) minimize injury and mortality to FBB and impacts to FBB habitat, (3) monitor & report, (4) no activities during FBB flight period (April 15-July 1), (5) no activities until KL has senesced (~ July 1), (6) limit trampling and damage to KL to less than 10% during growing season, (7), minimum mower blade height of 6", (8) mowing, hand treatments, and burning will occur after September 1, or after KL senesces, (9) any hand treatment during KL growing season by TNC qualified staff, (10) collect no more than 5% of seed, (11) minimize visits during FBB flight and KL blooming periods and when soils are moist, and (12) clean equipment and clothing prior to arriving at KL sites.
1-7-03-F-0448	06/12/03	Service	WD-1, WD-6, WD-7, WD-8	Terms and conditions for permits authorizing seed collection of WD on Federal (Service, BLM, ACOE, and USFS) lands.	TOCs and Conservation Recommendations include: (1) collect no more than 5% of annual seed production, (2) minimize visits to WD sites during growing season and when soils are moist, (3) avoid trampling and injuring WD, clean equipment and clothing prior to arriving at WD sites, and (4) monitor & report.
1-7-03-F-0436	05/28/03	Service	All FBB units and KL-2 to KL-13	Programmatic formal consultation on monitoring and managing populations of KL and FBB. Recovery permits permitting monitoring of KL and FBB, maintaining and restoring habitat through the use of mowing, prescribed burning, herbicides, and manual methods.	Activities will avoid: (1) trampling KL plants and FBB larvae, (2) clean clothing prior to arriving at KL sites, and (3) monitoring and reporting.
1-7-02-F-0886	11/07/02	Service	FBB-4, WD-1	Intra-Service section 7 consultation for proposed native prairie management and Oregon chub transplanting within the Willamette Valley National Wildlife Refuge complex, including incidental take of FBB.	RPMs, TOCs, and Conservation Recommendations: (1) on-sight monitoring by biologist during monitoring, maintenance, and enhancement activities to insure minimization of trampling and other impacts, (2) monitor and report, (3) burning and mowing after listed plants have set seed and gone dormant, (4) minimize likelihood of mortality associated with mowing or burning of FBB habitat, and (5) clean mowing equipment prior to arriving at project site.
1-7-02-F-348	10/22/02	Service	FBB-7, KL-8	10(a)(1)(A) Recovery Permit for Oregon State University to conduct two small-scale studies to see if herbicide application to control false-brome will have any unanticipated adverse effects on FBB, KL, and other plants used by FBB for nectar gathering in Butterfly Meadows, including incidental take of FBB.	Project design includes: (1) avoid trampling or damaging KL or any flowering nectar plants FBB might use, (2) herbicide application conducted during KL and FBB dormancy periods, and (3) treatment areas can be accessed without having to walk through surrounding KL habitat. RPMs, TOCs, and Conservation Recommendations include: (1) minimize activities that could result in injury or mortality to FBB eggs, larvae, and adults, (2) minimize soil and plant disturbance to FBB habitats, (3) monitor & report, (4) avoid trampling or injuring KL plants, (5) apply herbicide with backpack sprayers during September 1 to March 1, (6) minimize visits to KL sites during FBB flight and KL blooming periods, (7) clean clothing and equipment prior to arriving at KL sites, and (8) minimize soil compaction, restrict visits to periods when soil is dry.

Service Log #	Date	Action Agency	Critical Habitat Unit #	Project Description	Species and Habitat Conservation
1-7-02-F-0961	10/01/02	BLM	FBB-10B, FBB-11C & D, KL-11E, KL-12A-C	BLM management activities to protect and enhance FBB, KL, and WD at the Balboa, Oxbow West, Fir Butte, and Coble Sites of the West Eugene Wetlands.	RPMs, TOCs, and Conservation Recommendations include: (1) minimize injury and trampling of FBB and KL during FBB flight and KL growth periods, (2) minimize mortality to FBB, (3) monitor (through 2008) & report, (4) maintain habitat of occupied sites, (5) no activities during FBB flight period (April 15-July 1), (6) no activities until KL and WD have senesced (~ July 1), (7) limit trampling and damage to KL to less than 10% during growing season, (8), on-site monitoring by biologist, (9) minimum mower blade height of 6", (10) mowing only once annually, (11) limits to size of treatment area and mowing, hand treatments, and burning will occur after September 1, or after KL senesces, (12) minimize soil compaction, do not conduct activities when soils are saturated or moist, (13) limit trampling and damage to actively growing KL to less than 10% of cover annually, and (14) clean equipment and clothing prior to arriving at project sites.
1-7-02-F-787	07/09/02	Service	FBB-4, FBB-10, KL-11	Leaf, flower, and raceme collection of KL by Oregon State University on Federal lands (ACOE and Service) and incidental take permit for FBB.	Project design includes: (1) collect flowers outside of FBB flight period, (2) avoid trampling KL plants and FBB larvae, (3) do not trample more than 5% of KL plants or foliage in any one location, and (4) clothing will be cleaned prior to arriving at KL sites. RPMs, TOCs, and Conservation Recommendations include: (1) minimize access during FBB flight and KL growth periods, (2) minimize trampling of KL plants, (3) minimize introduction of pathogens and exotic species to sites, (4) conduct research as per application and TOCs, (5) report findings, (6) collect flowers outside of FBB flight period (~ April 15-June 15), (7) minimize trampling of KL plants, (8) monitoring by biologist, (9) do not trample more than 5% of KL plants or foliage in any one location, (10) clean equipment and clothing prior to arriving at KL sites, (11) limits to numbers of flower, racemes and leaves collected, (12) collect flowers outside of FBB flight period, (13) report results.
1-7-02-F-0494	05/20/02	ACOE	FBB-10, KL-11A-D	Proposed monitoring, maintenance, and enhancement of habitat for FBB and KL at the Fern Ridge Project, including incidental take of FBB.	Project design includes: (1) do not destroy more than 5% of annual seed production at sites, (2) KL monitoring activities not to damage more than 10% of KL vegetative cover/reproductive material, (3) KL monitoring after FBB flight season, (4) KL and FBB habitat maintenance outside FBB flight season, (5) minimum mowing blade height 6", (6) mowing after KL senesce, (7) manual control of exotic species as needed, (8) no herbicide application within 3 m buffer from rare plants, and (9) herbicide application during windless days. RPMs, TOCs, and Conservation Recommendations include: (1) minimize access during FBB flight and KL growth periods, (2) minimize trampling of actively growing KL plants to less than 10% of cover, (3) monitor & report, (4) no activities during FBB flight period (April 15-July1), (5) activities after KL senesced (~ July 1), (6) on-site monitoring by biologist and KL and FBB population monitoring, (7) clean mowing equipment prior to arriving at site, and (8) limit compaction of soil by vehicles.

Service Log #	Date	Action Agency	Critical Habitat Unit #	Project Description	Species and Habitat Conservation
1-7-01-F-1009	08/03/01	Service	KL-11A-D, FBB-10	Terms and conditions for two 10(a)(1)(A) Recovery Permits, and future permits, authorizing seed collection of KL on Federal (Service, BLM, ACOE, and USFS) lands, including incidental take of FBB.	RPMs, TOCs, and Conservation Recommendations include: (1) collect no more than 5% of seed, (2) avoid trampling KL, (3) collect seed after FBB lay eggs (July 1), (4) minimize visits during FBB flight and KL blooming periods, (5) clean equipment and clothing prior to arriving at KL sites, (6) minimize soil compaction, (7) monitor & report.
1-7-01-F-650	06/01/01	BLM	FBB-11D, KL-12B, WD-7B	Construction of a bike path on Federal lands through a portion of the 1135 project at West Eugene Wetlands	RPMs, TOCs, and Conservation Recommendations include: (1) minimize soil disturbance, (2) monitor & report, (3) minimize access to site during FBB flight and KL blooming periods, (4) postpone construction until after FBB lay eggs (July 1), (5) no mowing and other maintenance activities during FBB flight period (April 15 - July 1), (6) fence KL area and avoid use and storage of heavy equipment within 30 meters of KL area, (7) do not store materials near KL site, (8) on-site monitoring by biologist during construction, (9) clean heavy equipment prior to arriving at KL sites, (10) minimize soil compaction, (11) implement erosion control and spill prevention (e.g., silt fences), and (12) reinitiate programmatic consultations on the Recreation Access Plan for the West Eugene Wetlands Project area and West Eugene Wetlands Plan.
1-7-00-F-185	06/06/00	FHA/ODOT	WD-7B, FBB-11D	Construction of a four-lane divided highway through west Eugene (West 11th Garfield St. Project; Florence-Eugene Highway). This project will require construction of a new road where there currently is none. Road construction will require removal of vegetation and grading of soils within the road alignment, placement of fill materials, compaction and grading of road-bed materials, installation of culverts, borrow ditches and other drainage features, followed by paving, painting, etc., including incidental take of FBB.	Project has not started, ODOT is preparing a new BA and will re-consult on project. Project modifications included sighting the roadway to reduce impacts to wetland prairie habitat and T&E species. RPMs, TOC, and Conservation Recommendations include: (1) minimize disturbance of plants and introduction of non-natives, (2) maintain existing drainage patterns for seed dispersal using culverts, (3) replace lost wetlands (no net loss), (4), collect native seeds prior to disturbance for replanting on mitigation sites, (5) manage un-impacted wetland prairie habitat on site to improve wetland prairie habitat, (6) fencing to delineate wetland prairie habitat during construction, (7) stage equipment away from high quality habitat and waterways, (8) establish sensitive habitat as no work zones, (9) use seed free straw or equivalent for erosion control, (10) use native species in right-of-way, drainage swales, and mitigation areas, (11) all landscaping will be consistent with a prairie environment, (12) install ODOT Special Management Area signs along parkway, (13) minimize access to FBB and KL during FBB flight and KL blooming periods, (14) time destruction of alternate host plants to minimize impacts to FBB, (15) work after FBB flight period and after KL have senesced (mid-July), (16) remove alternate host plants prior to FBB egg laying (by May 1), (17) monitor & report, (18) establish monitoring program and manage special management areas established along West Eugene Parkway to ensure survival of KL and WD.
1-15-00-F-129	05/03/00	USFS	KL-16A	Three to five year study of KL's response to manual release from competition (i.e., clipping the surrounding grass competition) in six 1 m x 3 m test plots.	Conservation Recommendations include: (1) reduce area trampled by utilizing a bench to keep workers off the ground surrounding the sample plots, and (2) monitor the effects of the trampling on KL stems in the area surrounding the sample plots.

Informal Consultations					
1-7-05-7-0653	09/07/05	USFS	KL-16A	Consultation on program - amendments to the National Forest Land and Resource Management Plans (LRMP) for the Pacific Northwest Region Invasive Plant Program.	The Invasive Plant Program Forest Plan Amendments do not authorize any activities or projects implemented on the ground, future projects will require site specific analysis and section 7 consultation, when applicable, before implementation can occur. Site specific project design for KL would minimize risk of accidental pulling or trampling of KL by techniques such as flagging occupied areas prior to treatments, and careful hand pulling of invasive species close to individuals or populations.
1-7-04-I-0491	08/13/04	BPA	WD-8D & E	Informal consultation request for the Willow Creek Habitat Management Activities. TNC proposed to conduct several habitat management activities to control invasive species at the upland and wet prairie habitats at the Willow Creek site. TNC issued 10(a)(1)(A) permit for FBB take on upland site previously (BO 1-7-04-F-0351 dated 6-8-04).	Actions: (1) Habitat will not be treated until after WD has senesced, (2) avoid trampling WD during implementation of manual techniques, and (3) avoid and minimize extensive grubbing in WD populations.
1-7-05-I-0508	06/17/04	ACOE	All units	Programmatic consultation on State Programmatic General Permit (SPGP) by ACOE to Oregon Department of State Lands (DSL). Projects intended to be covered are generally smaller fills or excavations not to exceed 1/2 acre in an area or 1,000 cubic yards of fill and/or excavation material below the high water mark.	If a project does not meet the screening criteria or can not be made to meet the standard by following the Project Design Criteria (PDC) for listed species contained in the SPGP, it will not be covered under the SPGP and will be subject to individual project consultation. PDCs for FBB include: (1) survey for individuals and habitat by biologist with 10(a)(1)(A) Recovery Permit, (2) flag and map occupied/or suitable habitat within the area of disturbance prior to construction, (3) fence or delineate the occupied, suitable, or critical habitat as a no work zone, (4) ensure equipment, personnel, and associated pollutants do not enter the identified habitats, (5) maintain the necessary hydrologic and microclimatic conditions for the habitat, and (6) establish buffers to protect habitat from indirect effects.
1-7-03-F-0553	02/25/04	EPA	KL-12D & E, WD-2, WD-3, WD-5 to WD-9	Consultation on program - revised Oregon water quality standards for temperature, intergravel dissolved oxygen, and antidegradation implementation methods.	No effect determination for FBB and not likely to adversely affect determination for WD and KL.
1-7-01-I-750	05/25/01	Service	FBB-4	10(a)(1)(A) Recovery Permit for collection of KL seed at Baskett Butte National Wildlife Refuge for the Dallas Oak Restoration Project.	Restrictions include: (1) collect no more than 5% of seed (no more than 750 total seeds), and (2) avoid trampling KL and the area immediately below the plants.
1-7-00-I-550	08/21/00	NRCS	FBB-4	Wetland Restoration Projects (Upland and wet prairie enhancement, wet prairie creation, oak woodland enhancement, and pond repair) within the Willamette River Basin, Oregon (Wainright project).	Not likely to adversely affect FBB, KL, or WD.

Technical Assistance/Information Request					
1-7-04-F-0051	11/21/03	Service	KL-16A	10(a)(1)(A) Recovery Permit (TE-079064-0) covered under existing BO (1-7-01-F-1009 dated 8-3-01) on seed collection of KL, including incidental take of FBB.	TOCs include: (1) collect no more than 5% of seed, (2) avoid trampling KL, (3) collect seed after FBB lay eggs (July 1), (4) minimize visits during FBB flight and KL blooming periods, (5) clean equipment and clothing prior to arriving at KL sites, (6) minimize soil compaction, (7) monitor & report.
1-7-02-TA-48	11/27/01	BPA	WD-2	BPA request for section 7 consultation on 230-kV Transmission Line Project (Santiam to Bethel)	Service request for more information on project.
1-7-01-I-189	02/15/01	BLM	FBB-11D, KL-12B, WD-7B	BLM request for section 7 consultation on construction of bike on Federal lands path through a portion of the 1135 project at West Eugene Wetlands	Service request for more information on project and recommend formal consultation (see 1-7-01-F-650).

Conservation Policy and Land Values: The Conservation Reserve Program

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Conservation Policy and Land Values: The Conservation Reserve Program

Abstract

This paper develops theoretical and empirical models to analyze the effects of the Conservation Reserve Program (CRP) on prices of farmland and developed land. The theoretical model integrates the optimal investment model developed by Capozza and Li (1994) with the optimal bidding behavior model developed by Lohmann and Hamsvoort (1997). Based on the theoretical analysis, empirical models are estimated to quantify the effect of the CRP. Results show that the CRP increases farmland prices by $18-25 per acre, on national average. The effects are largest in the Mountain, Southern Plains, and Northern Plains areas. The CRP also affects developed land prices, but the effects are small. Agricultural returns account for about 40% of farmland prices, and growth premium and option value together account for the remaining 60%. The results are robust to alternative specifications of functional forms and measures of amenities.

Conservation Policy and Land Values: The Conservation Reserve Program

I. Introduction

The Conservation Reserve Program (CRP), the most ambitious conservation effort in U.S. history, was established by the Food Security Act of 1985 and was reauthorized by all subsequent Farm Bills. Under this voluntary program, participants retire highly erodible and environmentally sensitive lands from crop production for a period of 10-15 years. In exchange, the CRP provides participants with annual rental payment, incentive payment, and cost-share assistance. By 2004, over 34 million acres of cropland had been enrolled in the CRP with an annual rental payment of approximately $2 billion (U.S. Department of Agriculture, 2004).

The CRP has generated large environmental and economic benefits (Young and Osborn, 1990; Osborn and Konyar, 1990; Ribaudo et. al., 1990; Sullivan et al., 2004). For example, based on the 33.9 million acres enrolled in signups 1-9, Osborn and Konyar (1990) estimated that the CRP had net economic benefits of $4.2-$9 billion in present value over the life of the program. This included benefits from farm income, timber production, soil productivity, water quality, wild life habitat, and air quality. However, with about 8% of the nation's cropland enrolled into the CRP, the effects of the CRP on farmland prices have received much less attention. Understanding the effect of the CRP on farmland prices is important because farmland is the main asset of the U.S. agricultural sector's balance sheet. The opportunity cost of farmland represents a major production expense from farmers' perspectives (Lence and Mishra, 2003). How farm policy affects agricultural land values is a critical issue in any farm policy debate (Goodwin, Mishra, and Magné, 2003).

The primary objective of this study is to evaluate the effects of the CRP and environmental amenities on the prices of farmland and developed land. To achieve the objective, we first develop a theoretical model to analyze the effect. The theoretical model integrates the optimal investment model developed by Capozza and Li (1994) with the optimal bidding behavior model developed by Lohmann and Hamsvoort (1997). The integration is important in the following ways:

- First, the integrated model endogenizes CRP participation and rental payments, both of which are treated as exogenous variables in previous studies. Ignorance of endogeneity will lead to inconsistent estimates of the CRP impacts.

- Second, the integrated model takes into account the growth premium and option value when evaluating land prices. Growth premium is the present value of expected increases in land rents after development. Option value is the value that farmland derives from the option of delaying or not carrying out a development project in case of low returns to developed land in the future. Both growth premium and option value are identified as important components of the price of

farmland by Capozza and Helsley (1990) and Copozza and Li (1994), but have been ignored in previous studies of the effect of government payments on land values.

- Third, the integrated model relaxes the "featureless assumption" made by previous studies, which allows us to examine the effect of amenities on the prices of farmland and developed land.

Finally, the integrated model provides a solid foundation for our empirical work. As Lence and Mishra (2003) point out, most previous studies include farm payments as explanatory variables of land price without providing a theoretical foundation. Based on the theoretical analysis, we then conduct an empirical analysis to quantify the effect of the CRP on prices for both farmland and developed land.

Several studies have examined the effects of farm programs on farmland prices and found that the government payments are capitalized into farmland values (Just and Miranowski, 1993; Tweeten and Martin, 1976; Melichar, 1979; Herdt and Cochrane, 1966; Barnard et al., 1997). For example, Just and Miranowski (1993) find that government payments account for roughly 15 to 25% of the capitalized value of land. Barnard et al. (1997) examine the effect of eliminating the Agricultural Improvement and Reform Act of 1996 (FAIR) on cropland value, and find that cropland value would be reduced by 12% to 69% in the eight examined regions as a result of eliminating government programs. Limited research examines the effects of the CRP on farmland prices, but produces contradictory results. Lence and Mishra (2003) utilize county-level data from 1996-2000 to examine effects of the CRP and other farm payment programs on cash rental rates in Iowa and find that the CRP has a positive impact on cash rents.[186] Shoemaker (1989) uses the first five CRP sign-up data from 1986 to 1987 to examine the effect of the CRP on farmland prices in the U.S., and finds that the CRP has a minor offsetting (0.5%) effect on the overall decline in land values. Goodwin, Mishra and Magné (2003) apply the traditional present value approach to evaluate the effect of the CRP and other farm programs on farmland price, but find that the CRP has a negative impact on farmland values. No study, to our knowledge, has examined the effect of the CRP on developed land prices.

Numerous hedonic studies have estimated the effect of amenities (or disamenities) on nearby property values. For example, hedonic price models have been applied to estimate the value of proximity to oceans, lakes or rivers (Lansford and Jones, 1995; Leggett and Bockstael, 2000)), parks and forests (Weicher and Zerbst, 1973; Tyrväinen and Miettinen, 2000), wetlands (Mahan, Polasky, and Adams, 2000), and general indicators of open space (Wu, Adams and Plantinga, 2004; Irwin and Bockstael, 2001; Geoghegan, 2002; Irwin, 2003). However, few studies have analyzed the effect of amenities on farmland value. This neglect is surprising given that growth premium and option value are important components of farmland prices (Capozza and Helsley, 1990), both of which are affected by amenities.

186 The effect of the CRP on cash rents is significant when they assume that no spatial autocorrelation exists across the residuals, but insignificant when the spatial autocorrelation is corrected.

II. Theoretical Model

Consider a piece of farmland randomly selected from a county. If the land is ineligible to enroll into the CRP, then the owner will receive an annual net return of A from farming. If the land is eligible to enroll into the CRP, the farmer has to decide if he is going to submit a bid to enroll the land into the CRP. If he decides not to submit a bid, his expected return from farming is A; but if he does submit, he will choose the level of bid to maximize the expected return from the CRP, which is affected by both the submitted bid and the probability of the bid being accepted into the program.

Under the current CRP rules, whether a bid is accepted into the CRP or not depends on its cost-adjusted environmental score, which is calculated based on the six environmental scores (N1-N6) and a cost factor (N7). The environmental scores measure the potential environmental benefits of an offered parcel in wildlife habitat (N1), water quality (N2), soil erosion (N3), enduring benefit (N4), air quality (N5), and conservation priority area (N6) (U.S. Department of Agriculture, 1997). The cost factor (N7) is calculated based on the bid submitted by the farmer. Specifically, the cost-adjusted environmental score has two parts: the environmental score $S = \sum_{i=1}^{6} N_i$, and the cost factor ω / b, where $\omega > 0$ is the weight placed on the cost. The cost-adjusted environmental score equals $S + \omega / b$.

Let $\underline{EBI}$ denote the threshold of the cost-adjusted environmental score, above which a bid will be accepted. Farmers do not know $\underline{EBI}$, but can form their expectation of $\underline{EBI}$ based on the observed program behavior. The probability of a bid being accepted into the CRP equals the probability that the individual cost-adjusted environmental score is greater than the threshold score:

$$p = pr(S + \omega / b \geq \underline{EBI}) = F(S + \omega / b), \tag{1}$$

where F is the farmer's expected cumulative distribution function of $\underline{EBI}$. If the bid is accepted into the CRP, then the landowners' net return will be b; if the bid is rejected, then the bidder's net return will be A. The farmer will choose b to maximize the expected net payoff $bF(S + \omega / b) + A[1 - F(S + \omega / b)]$. This maximization problem implicitly defines the optimal bid b^*:

$$b^* = A + F(S + \omega / b^*) / f(S + \omega / b^*), \tag{2}$$

where f is the density function of $\underline{EBI}$. The optimal bid consists of two components: foregone profit from farming and the information premium, which depends on the bidders' private information on the threshold $\underline{EBI}$. For example, farmers may form their expectation on $\underline{EBI}$ based on information such as past rental rates. Given p and b^*, the expected return from the CRP is $pb^* + (1 - p)A$, and the expected return to a randomly selected parcel of farmland under the CRP can be expressed as

$$R^{CRP} = A(1 - m) + mMax(A, pb^* + (1 - p)A) = Max(A, A(1 - m) + m(pb^* + (1 - p)A), \tag{3}$$

where *m* is the probability that the parcel is eligible for the CRP.

In addition to farming and conservational use, landowners can also convert their land to development. Under the current CRP rules, participants can request an "early-out release" from the program any time without much penalty.[187] When the farmland is developed, the land earns the developed land rent. The price of farmland at time t at location z under the CRP can be written as

$$p^a(t,z) = E\{\int_t^{t+s} R^{CRP} e^{-r(\tau-t)} d\tau + \int_{t+s}^{\infty} R(\tau,z) e^{-r(\tau-t)} d\tau - Ce^{-rs} \mid R(t,z)\}, \quad (4)$$

where $R(\tau,z)$ is the developed land rent at time τ at location *z*, *C* is the cost of converting one acre of farmland to development, *r* is the interest rate, E{} is the expectation operator, and $t+s$ is the time when the land is developed. Equation (4) states that price of farmland equals the present value of the expected returns to farmland (including farming return and government payment) up to the date of conversion plus the present value of the expected returns to developed land, minus the conversion cost. The price of one unit of developed land at location z at time t is

$$p^d(t,z) = E\{\int_t^{\infty} R(\tau,z) e^{-r(\tau-t)} d\tau \mid R(t,z)\}, \quad (5)$$

Extending Capozza and Li (1994), the rent of developed land is specified as $R(t,z) = R(t) + R(z,a(z))$, where the temporal component of the rents, $R(t)$, is specified as following the Brownian motion process with upward drift g and variances σ^2: $R(t) = gt + \sigma B(t)$, $t \geq 0$;[188] and the spatial component of the development land rents $R(z,a(z))$ is determined by the level of amenities $a(z)$ and the transportation cost at location z. Assuming that the landowner chooses the conversion time to maximize the expected value of land, following Capozza and Helsley (1994), we can show that the land is converted to development when the developed land rent is greater than or equal to a reservation rent:

$$R(t,z) \geq R^* \equiv R^{CRP} + rC + (r-\alpha g)/\alpha r, \quad (6)$$

where $\alpha = [(g^2 + 2\sigma^2 r)^{1/2} - g]/\sigma^2$. Without the CRP, the reservation land rent is $A + rC + (r-\alpha g)/\alpha r$, which is lower since A $< R^{CRP}$. Because the CRP increases the hurdle of

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187 This is not a restrictive assumption, given the fact that the Secretary of Agriculture announced two early-out opportunities in December 1994 and March 1996; and the new Federal Agricultural Improvement and Reform Act (1996 Farm Bill) provided authority for producers withdraw most lands from the CRP at anytime, subject to 60-day notice to U.S. Department of Agriculture (USDA) if their contracts were established before January 1, 1995, and have been in effect for at least 5 years.

188 $B(t)$ is a standard Brownian motion with zero drift and variance 1.

conversion, it may cause delay in development and reduce the total developed area. Following Capozza and Helsley (1990), the prices of farmland and developed land can be derived as follows:

$$p^a(t,z) = \frac{R^{CRP}}{r} + \frac{g}{r^2} e^{\alpha[R(z,a(z))-R(z^*,a(z^*))]} + \frac{r-\alpha g}{\alpha r^2} e^{\alpha[R(z,a(z))-R(z^*,a(z^*))]}, \; z > z^* \tag{7}$$

$$p^d(t,z) = \frac{R^{CRP}}{r} + C + \frac{g}{r^2} + \frac{r-\alpha g}{\alpha r^2} + \frac{R(z,a(z)) - R(z^*,a(z^*))}{r}, \; z \le z^* \tag{8}$$

where z^* is the boundary of the developed area. Equation (7) shows that the price of farmland consists of three components: expected net returns from agriculture (including farming return and government payments), growth premium, and option value. Equation (8) states that the price of developed land consists of five components: expected net return from agriculture, conversion cost, growth premium, irreversibility premium, and amenities and accessibility premium. Irreversibility premium represents the cost of not being able to convert the land back to agricultural use once developed. Amenities and accessibility premium represents the value of amenities and the value of proximity to the city center.

The CRP can increase or decrease values of farmland and developed land, depending on the relative magnitude of the effects on various components of the land prices. The CRP increases the agricultural return component (because $R^{CRP} > A$), but reduces growth premium, option value for each parcel of farmland because the distance from the parcel to city boundary is increased as a result of reduction in total developed area. In addition, it also reduces the accessibility premium because the relative distance to the CBD is increased.

Prices for both farmland and developed land are increasing functions of $R(z,a(z))$. This implies that locations with better amenities and lower transportation costs have higher value regardless whether they are farmland or developed land. This result implies that location and amenities affect farmland prices as well as developed land prices.

III. Empirical Specifications

Equations (1), (2), (7) and (8) provide the theoretical basis for the empirical analysis. A *Logit* specification is used to model the probability of bid acceptance:

$$p = F(S - \omega / b^*) = \frac{e^{\delta X}}{1 + e^{\delta X}}, \tag{9}$$

where X is a vector of variables affecting bid acceptance, including environmental score (S), bid price (b^*), and all variables affecting the expected distribution function $F(\bullet)$. The variables affecting farmers'

expectations about $\underline{EBI}$ may include average rental rates in previous sign-ups (b_{-1}) and the percentage of land already enrolled in the CRP (CRP_{-1}). Thus, equation (9) can be rewritten as

$$\ln\left(\frac{p}{1-p}\right) = \delta_0 + \delta_1 S + \delta_2 b^* + \delta_3 b_{-1} + \delta_4 CRP_{-1} + \varepsilon_1, \tag{10}$$

where ε_1 is error term.

Based on equation (2), the optimal bid is a function of net farming return, A, environmental score, *S*, and variables affecting individuals' expectations about $\underline{EBI}$. Thus, the optimal bid is specified as

$$b^* = \xi_0 + \xi_1 A + \xi_2 S + \xi_3 b_{-1} + \xi_4 CRP_{-1} + \varepsilon_2, \tag{11}$$

where ε_2 is error term.

To derive the farmland and developed land price equations that can be estimated econometrically, we rewrite equation (7) and (8) as follows:

$$p^a = \psi_0 + \psi_1 R^{CRP} + \varepsilon_3, \tag{12}$$

$$p^d = \phi_0 + \phi_1 p^a + \phi_2 R^{CRP} + \varepsilon_4, \tag{13}$$

where

$$\psi_0 = e^{\alpha[R(z,a(z))-R(z^*,a(z^*))]} / \alpha r \ ,$$

$$\psi_1 = 1/r \ ,$$

$$\phi_0 = C + [R(z,a(z)) - R(z^*,a(z^*))]/r \ ,$$

$$\phi_1 = e^{-\alpha[R(z,a(z))-R(z^*,a(z^*))]},$$

$$\phi_2 = (1 - e^{-\alpha[R(z,a(z))-R(z^*,a(z^*))]})/r \ ,$$

ε_3, and ε_4 are error terms.

In general, the weights on R^{CRP} and p^a, $\psi_i s$ and $\phi_i s$, vary across counties. However, it is not feasible to estimate a separate set of coefficients for each county using the cross-sectional data. One solution is to

restrict $\psi_i s$ and $\phi_i s$ to be equal across counties. However, we use a less restrictive specification in this study by specifying $\psi_i s$ and $\phi_i s$ as follows:

$$\psi_0 = \gamma_1 g * R^{CRP} + \gamma_2 g * a + \gamma_3 g * z + \gamma_4 g * R(t) + \gamma_5 g^2 + \gamma_6 g * \sigma \tag{14}$$

$$+\gamma_7 \sigma * R^{CRP} + \gamma_8 \sigma * a + \gamma_9 \sigma * z + \gamma_{10} \sigma * R(t) + \gamma_{11} \sigma^2,$$

$$\phi_0 = \zeta_0 + \zeta_1 R^{CRP} + \zeta_2 a + \zeta_3 z + \zeta_4 R(t), \tag{15}$$

$$\phi_{1,2} = \varsigma_1 R^{CRP} + \varsigma_2 a + \varsigma_3 z + \varsigma_4 R(t) + \varsigma_5 g + \varsigma_6 \sigma. \tag{16}$$

Substituting equations (14)-(16) into equations (12) and (13) produces the feasible estimation function:[189]

$$p^a = \theta_1 R^{CRP} + \theta_2 g * R^{CRP} + \theta_3 g * a + \theta_4 g * z + \theta_5 g * R(t) + \theta_6 g * g + \theta_7 g * \sigma$$

$$+ \theta_8 \sigma * R^{CRP} + \theta_9 \sigma * a + \theta_{10} \sigma * z + \theta_{11} \sigma * R(t) + \theta_{12} \sigma * \sigma + \varepsilon_3, \tag{17}$$

and

$$p^d = \eta_0 + \eta_1 p^a * R^{CRP} + \eta_2 p^a * a + \eta_3 p^a * z + \eta_4 p^a * R(t) + \eta_5 p^a * g + \eta_6 p^a * \sigma$$

$$+\eta_7 R^{CRP} * R^{CRP} + \eta_8 R^{CRP} * a + \eta_9 R^{CRP} * z + \eta_{10} R^{CRP} * R(t) + \eta_{11} R^{CRP} * g \tag{18}$$

$$+\eta_{12} R^{CRP} * \sigma + \eta_{13} z + \eta_{14} R(t) + \eta_{15} a + \varepsilon_4.$$

Regional dummies or interactive terms between regional dummy and relevant variables are included in the estimation to explore regional differences in the prices of farmland and developed land. This specification allows us to evaluate the effects of the CRP on the individual component of the farmland prices.

In order to test whether our results are sensitive to the functional form, we also estimate a more general specification, in which all weights are specified as quadratic functions of variables. Specifically, we can rewrite equations (7) and (8) as

$$p^a = \kappa_0 + \kappa_1 R^{CRP} + \varepsilon_3', \tag{19}$$

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[189] Polynomial function forms have been used in several previous studies (e.g., Plantinga and Miller, 2001).

$$p^d = \vartheta_0 + \vartheta_1 + \vartheta_2 R^{CRP} + \varepsilon_4', \tag{20}$$

where

$$\kappa_0 = \beta_0 + \beta_1 R^{CRP} + \beta_2 g + \beta_3 \sigma + \beta_4 a + \beta_5 z + \beta_6 R^{CRP^2} + \beta_7 g^2 + \beta_8 \sigma^2 + \beta_9 a^2$$

$$+\beta_{10} z^2 + \beta_{11} R^{CRP} * g + \beta_{12} R^{CRP} * \sigma + \beta_{13} R^{CRP} * a + \beta_{14} R^{CRP} * z$$

$$+\beta_{15} g * \sigma + \beta_{16} g * a + \beta_{17} g * z + \beta_{18} \sigma * a + \beta_{19} \sigma * z + \beta_{20} a * z + \varepsilon_5,$$

$$\vartheta_0 = \omega_0 + \omega_1 g + \omega_2 \sigma + \omega_3 g^2 + \omega_4 \sigma^2 + \omega_5 g * \sigma,$$

$$\vartheta_1 = \varpi_0 + \varpi_1 R^{CRP} + \varpi_2 a + \varpi_3 z + \varpi_4 R^{CRP^2} + \varpi_5 a^2 + \varpi_6 z^2$$

$$+\varpi_7 R^{CRP} * a + \varpi_8 R^{CRP} * z + \varpi_9 a * z.$$

For convenience, we name the equations (12) and (13) as model I, and equations (19) and (20) as model II. In these two models, we use total road mileage to approximate the distance to the city *z*, and create three amenity indices (climate, recreation, and water) to approximate the amenities *a*.

To test whether road mileage and the created three amenity indices are good measures, three alternative models (model III-V) with the same functional form as model II are estimated. In these models, we use the urban influence codes (UIC) and the natural amenity index created by Economic Research Service (ERS) to approximate the distance to the city or the amenities. In models III-V, UIC and created amenities indices, road mileage and ERS amenity index, and UIC and ERS amenity index approximate the distance to the city and the amenities, respectively. In contrast to model I, models II-V cannot evaluate the effects of the CRP on the individual component of farmland prices.

Estimating the Effect of the CRP

Based on the estimated models, the effects of the CRP on the prices of farmland developed land are evaluated. For example, based on equation (17) and (18), the effect of the CRP on farmland prices equals

$$p_{CRP}^a - p_0^a = \hat{\theta}_1 (R^{CRP} - A) + [\hat{\theta}_2 g * (R^{CRP} - A) + \hat{\theta}_8 \sigma (R^{CRP} - A)], \tag{21}$$

where p_{CRP}^a and p_0^a are the farmland price with and without the CRP, respectively. The first term on the right hand side of (21) measures the direct effect of the CRP on agricultural returns, and the second term (in the brackets) measures the effect of the CRP on growth premium and option value. $(R^{CRP} - A)$ is the

difference in the expected annual return to farming with and without the CRP. The effect of the CRP on developed land prices can be evaluated by the formula

$$p_{CRP}^{d} - p_{0}^{d} = [(\hat{\eta}_2 a + \hat{\eta}_3 z + \hat{\eta}_4 R(t) + \hat{\eta}_5 g + \hat{\eta}_6 \sigma)(\hat{\theta}_1 + \theta_2 g + \hat{\theta}_9 \sigma) + \hat{\eta}_8 a + \hat{\eta}_9 z + \hat{\eta}_{10} R(t) + \hat{\eta}_{11} g + \hat{\eta}_{12} \sigma] * (R^{CRP} - A) + \hat{\eta}_1 (R^{CRP} p_{CRP}^{a} - A p_{0}^{a}) + \hat{\eta}_7 (R^{CRP^2} - A^2), \quad (22)$$

where p_{CRP}^{d} and p_{0}^{d} are the developed land price with and without the CRP, respectively. Similarly, we can evaluate the effects of the CRP on prices of farmland and developed land through models II to V by applying the same method.

IV. Econometric Issues and Estimation Methods

Equations (10), (11), (12) and (13) (or (10), (11), (19), and (20)) comprise the empirical model for this analysis. Three econometric issues arise in the estimation of the model: endogeneity, spatial autocorrelation, and contemporaneous correlations. These issues are addressed using the generalized spatial three stage least square (GS3SLS) developed by Kelejian and Prucha (2004).

The GS3SLS estimator contains three steps. In the first step, the model parameters are estimated using two stage least squares (2SLS) and instrumental variable techniques. All exogenous variables are chosen as instrumental variables.[190] The residuals from the 2SLS estimates are used to test for spatial autocorrelation using Moran's I statistic $I = N(\hat{e}'W\hat{e}) / M(\hat{e}'\hat{e})$,[191] where N is the number of observations, $\hat{e}$ is the vector of estimated residuals, W is the spatial weight matrix indicating spatial structure of the data, and M is the standardization factor equal to the sum of the elements of W. We assume the error structure takes the form $\varepsilon = \rho W \varepsilon + \upsilon$, where ρ is a scalar and υ is a vector of spherical disturbance with zero mean. W is constructed in ArcView 3.2 using rook contiguity criteria, which uses common boundaries to define neighbors; 1 if two counties are adjacent and 0 otherwise.[192]

If the spatial autocorrelation is identified, then in the second step the residuals from the 2SLS are used to estimate the spatial autoregressive parameter ρ for each equation utilizing the generalized moment

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190 The instrumental variable results are not reported, but are available from authors upon request.

191 Moran's I is a spatial analogue to Pearson's correlation coefficient. For its statistic property, see Anselin (1989).

192 Two criteria are usually used to create spatial weight. One is contiguity-based spatial weight and the other is distance-based spatial weight. The contiguity-based spatial weight usually uses two criteria: rook contiguity, which uses common boundaries to define neighbors, and the queen contiguity which uses common points (boundaries and vertices) in the definition. Distance-based spatial weight defines the neighbors according to the specified distance, or the specified k-nearest neighbors. The spatial weight matrix can be created in a variety of softwares such as Arcview 3.2, ArcGIS 9.0, SpaceStat, and Geoda.

estimator (Kelejian and Prucha, 1999). After the spatial autoregressive parameter ρ is estimated, data are transformed using the matrix $\hat{P} = I - \hat{\rho}W$, where I is N by N identity matrix.

Finally, in the third step, after the endogeneity and spatial autocorrelation are corrected in the first two steps, two simultaneous equation systems, probability of acceptance and optional bid equation system, and the prices of farmland and developed land equation system, are estimated separately using seemingly unrelated regression (SUR) estimators. They are estimated separately,

because they have different number of observations.[193]

V. Data

The empirical specification suggests that to estimate the equation systems, data are needed on the prices of farmland and developed land, on agricultural returns, income, amenities, and on CRP participations. The study areas include 2851 counties in the contiguous 48 states.[194] All data used in this study come from 1997. Variables and descriptive statistics are listed in table 1.

The CRP data are provided by the Economic Research Service (ERS). The data contain individual contract information for sign-up 15, which was held in March 1997 based on new program rules that expanded the base of eligible land to more than 240 million acres, including about 65 percent of U.S. cultivated cropland.[195] With the farm-level contract information, we are able to estimate the probability of acceptance by calculating the ratio of the total accepted bids to total bids submitted in sign-up 15. The average county bidding rent per acre is computed by $(\sum_{i=1}^{n} b_i * acre_i) / \sum_{i=1}^{n} acre_i$, where b_i is the bid rent per acre and $acre_i$ is acres offered, and n is the total bids submitted. Using the farm-level CRP data, the average county environmental score is computed. The average past CRP rental rates and percentage of land already enrolled in the CRP in a county may provide important information for individuals to form their expectation on the $\underline{EBI}$. These two variables are constructed using historical county-level CRP data from ERS. The average past CRP rental rates are calculated using rental rates from all previous signups (i.e., signups1-14). The percentage of land enrolled in the CRP is computed as the ratio of total land enrolled to total cropland in a county in December 1996. Eligible land data are obtained from the 1997 National Resource Inventory (NRI 1997). The percentage of eligible land in a county is the ratio of total eligible land to total cropland.

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193 Participation data, and farmland and developed land data are obtained from different sources. The former contains about 2000 observations, while the latter contains about 3000 observations. To make full use of the information in the data, each system is estimated separately.

194 One hundred and ninety counties are omitted due to missing data or absence of agricultural land.

195 We thank Shawn Bucholtz of the Economic Research Service for providing the data.

Net returns to farmland, farmland prices, and developed land prices are obtained from Plantinga, Lobowski and Stavins, who use Census of Agriculture data to calculate the average farming returns and farmland prices.[196] The average return to farmland, A, is calculated by (TR+GP-TC)/TA, where TR is the total revenues from the agricultural products sold, GP is the total government payments except CRP payments, TC is the total farm production expenses, and TA is the total farmland acres. The farmland price (p^a) measures the value of land and buildings per acre, and is the county-level average of self-reported estimates by landowners. Developed land price (p^d) is the county-level average price of recently developed land.[197]

The amenity data used in this study are generated by the National Outdoor Recreation Supply Information System (NORSIS),[198] developed and maintained by USDA Forest Service's Wilderness Assessment Unit, Southern Research Station, and Athens, Georgia. The amenity data are a comprehensive county level data set with more than 250 variables, including climate, natural amenity, man-made amenity and geographic information.

A common practice within the literature is to confine amenities to a single dimensional attribute such as climate or to introduce an *ad hoc* list of selected attributes (Gottlieb, 1994). Another approach is to condense a set of related variables into a single scalar which retains the information in original data (Miller, 1976). The primary advantage of this approach is that variables are not removed from the empirical analysis due to multicollinearity problems or limited degree of freedom (Wagner and Deller, 1998).

Following Deller et al. (2001), this study uses the principal component analysis to calculate amenity scores for each county. The principal component analysis is an approach to compress higher dimension variables into a single scalar. The single scalar is called score which is, in essence, the linear combination of the original variables where the weights are the eigenvectors of the correlation matrix for the factor variables. Because the principal component is very sensitive to scale, all variables used in the principal component analysis are standardized to zero mean and unit variance and the score is calculated by $score = \sum_{l=1}^{L} \lambda_l \tilde{x}_l$, where λ_l is the eigenvector computed from the variance-covariance matrix of the original data, $\tilde{x}_l$ is the standardized amenity variables and L is the number of variables in a category. We separate the amenity variables into three categories: climate (e.g., January sunny day, July temperature), man-made recreation facilities (e.g., the number of golf courses, the number of swimming pools and the number of campgrounds) and natural recreational resources (e.g., total outstanding river miles, white

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196 We thank Plantinga, Lobowski and Stavins for providing data.

197 See Plantiga, Lobowski and Stavins (2002) for the estimate of developed land price.

198 We thank Steve Deller of University of Wisconsin for providing the NORSIS data.

water miles). We include four variables to represent a region's climatic conditions, fourteen variables to describe the man-made recreation facilities, and four to portray water resources.[199]

Unlike our amenity indices, ERS creates an index of natural amenities based on six factors: warm winter (average January temperature), winter sun (average January days of sun), temperate summer (low winter-summer temperature gap), summer humidity (low average July humidity), topographic variation (topography scale), and water area (water area proportion of total county area) (Economic Research Service, 2005). In this study, both amenity data are used in different models to examine their effects on the prices of farmland and developed land.

Total road mileage is used to capture the effect of development pressure and transportation costs on land prices, and is the mileage of interstate and other principal arterial roads (for example, state highways). The data on road mileage are obtained from the Bureau of Transportation Statistics. One alternative measurement is the 1993 UIC, which divides U.S. counties into 9 categories based on population and commuting data from the 1990 census of population. The 1993 UIC is obtained from ERS.

Based on Capozza and Helsley (1990), we use the annual income growth and variance of income growth to approximate g and σ because of lack of time series data on land prices. g and σ are calculated using the average county median household income data from 1993 to 1997. Income data are compiled by the Small Area Income and Poverty Estimates (SAIPE) program of the U.S. Census Bureau.

Regional dummy variables are included to capture regional differences. The ERS divides the contiguous U.S. into 10 farm production regions from west coast to east coast: the Pacific, Mountain, Northern Plains, Southern Plains, Lake States, Corn Belt, Delta States, Northeast, Appalachian, and the Southeast. The Southeast is used as the referenced region. CRP acres were historically concentrated in the Great Plains (Northern Pains and Southern Plains) and Western Corn Belt, with some increases in the Mountain region since the 15th signup.

VI. Empirical Results

Estimated parameters for the two simultaneous equation systems are presented in Tables A1-A4 in the appendix. Overall, the models fit the data well as indicated by the System Weighted R-Square 0.57 for the bid and acceptance equation system and about 0.87 for the land prices equation system for all five models. Most coefficients of interest are statistically significant at the 5% level or better. Spatial autocorrelations are detected in all models and specifications and are adjusted for each of the equations. Moran's I-statistics, with the standard deviation listed in parentheses, is 0.13 (0.0135), 0.45 (0.0135), 0.31 (0.0115), and 0.27(0.0115) for the acceptance, bid, farmland price, and developed land price equations (model I), respectively. Assuming an approximate standard normal distribution for ***I***, the null hypothesis

[199] Variables in each category and its corresponding eigenvector are available upon request.

of no spatial autocorrelation is rejected at 1% level in each case. The estimated values of the spatial autocorrelation parameter ρ are 0.30, 0.68, 0.56, and 0.52, respectively.

Table A1 reports the estimated parameter for the acceptance and bid equations. All coefficients except regional dummies in the acceptance equation are statistically significant at 1% level. The environmental score positively affects the probability of acceptance. Higher environmental score is usually associated with environmentally fragile land, which is the primary target of the CRP and therefore more likely to get accepted into the program. The level of bid affects the probability of acceptance negatively as expected. A 1% increase in the bid rent causes a 9% decrease in the probability of acceptance. The amount of the existing CRP land has a negative effect on the probability of acceptance, because the U.S. Department of Agriculture is more likely to target land for the CRP in areas where CRP participation has been low. Past rental rates have a positive effect on the probability of acceptance, because high past rental rates may indicate a high bid cap which will lead to a high acceptance rate. The probability of acceptance does not vary across regions, since most regional dummies are statistically insignificant.

The parameter estimates for the bid rent equation are also reported in Table A1. All variables (except the regional dummies) are statistically significant at the 1% level. Environmental score affects current bids negatively, because a higher environmental score may be associated with a lower land quality and lower opportunity costs for participation. Past rental rates and net farming returns have a positive effect on bid rents. A $1 increase in the past rental rate results in $0.75 increase in the current bid, and a $1 increase in net farming returns, increases the current bid by three cents. This suggests that farmers put a large weight on past rental rates to decide their optimal bids. The amount of land already enrolled in the CRP has a negative effect on the bid rents.

Table A2 reports the estimated parameters for the farmland and developed land prices for model I, and Tables A3 and A4 report the estimated parameter for the prices of farmland and developed land for models II-V, respectively. Because of interaction terms and nonlinear relationships, the sign and magnitude of individual coefficient do not have clear interpretations. To facilitate interpretation of results, we calculate the marginal effect of amenity variables and UIC and report the results in Table 2. F-statistics for the null hypotheses that the marginal effects are zero were calculated to indicate the statistical significance (Judge et al., pp. 456-59).

Over all, the amenities have a positive and significant effect on prices of both farmland and developed land. The results derived from both the ERS amenity and from our created amenity indices are generally consistent. Climate appears to have a positive effect on land prices, although it is insignificant in the developed land prices in models I and II. The positive sign suggests households prefer location with better climate.

Man-made recreation facilities have positive and significant effects on both farmland and developed land prices. The recreation facility index is driven by the availability of parks, tennis courts, and golf courses, among other things. Therefore counties with more man-made recreation facilities are more attractive to households. The coefficient on the water index is sensitive to specification in both of the equations for

land prices, but it seems that it has little effect on farmland prices given that the index measures the length of white-water, streams, and rivers.

Table 2 also reports the marginal effects of UIC on prices of farmland and developed land. The effects of UIC on land prices are negative and statistically significant, suggesting locations far away from the city have lower prices.

The Effect of the CRP

The effects of the CRP on the prices of farmland and developed land are evaluated using each of the model specifications, and the results are reported in Tables 3 and 4. The CRP has positive and significant effects on prices of farmland in all regions based on each of the models. This result is robust in terms of the sign and relative magnitude of the effects. On average, the CRP increases farmland prices by $18-$25 per acre (or 1.3%-1.8%) nation wide. The CRP has relatively large impacts on farmland prices in the Mountain area, the Southern Plains, and the Northern Plains in all five models; it increases farmland prices in these regions by 5.2-14.0%, 3.7-6.4%, and 2.7-5.3%, respectively. This is not surprising, given that more than 60 percent of CRP lands are located in these three regions and that the CRP rental rates are considerably higher than net farming returns in the three regions. Net farming returns are lower than $30 per acre in the Mountain area and in the Southern Plains, and lower than $50 per acre in the Northern Plains. Compared with farming, participation in the CRP turns out to be a more profitable alternative, and the value of this profitable use is capitalized into farmland prices. Furthermore, the percent increases in farmland prices are enhanced by the lower farmland prices in these three regions, where they are lower than $630 per acre, compared to the national average of $1362 per acre.

Compared to the above three regions, the CRP has mild absolute effects but small relative effects on farmland prices in the Corn Belt, in Appalachia and in the Pacific. The mild absolute effects result from the moderate CRP enrollment and the moderate difference between CRP rental rates and net farming returns in these regions. The mild absolute effects account for only a small percentage of farmland prices, because farmland is rather productive and valuable in these regions, with an average price higher than $1600 per acre. The effect of the CRP on farmland prices is smallest in the Lake States, followed by the Northeast. In the Lake States, there is little difference between CRP rental rates and net returns to farming. The Northeast had the smallest CRP enrollment among the 10 regions. Only about 0.5% of the total CRP enrollment is located in the Northeast.

Generally, the CRP had a positive and statistically significant effect on developed land prices. However, the effect is small. On national average, the CRP increases developed land prices by $6-$274 per acre, which accounts for less than 0.6 % of developed land prices. The CRP has relatively large impacts in the Mountain, Southern Plains, Appalachian, and the Corn Belt regions. It is not surprising that effects of the CRP on developed land prices are relatively large in the Mountain areas and Southern Plains, where the positive and larger effects of the CRP on farmland prices directly contribute to the large increases in developed land prices. However, it is unexpected to find that the effects of the CRP on developed land prices are relatively large in Appalachia and the Corn Belt, given the effects of the CRP on farmland prices are moderate there. One possible explanation is that Appalachia is highly developed, while the

Corn Belt has highly productive farmland. A small reduction in developable land caused by the CRP translated into a relatively large increase in prices for developed land in these regions. The effect of the CRP on developed land prices is smallest in the Northeast and the Pacific region. In the Northeast, the small effects of the CRP on farmland price and the small CRP acreage explain the small effects on developed land prices. In the Pacific Region, the absolute effect of the CRP on developed land prices is relatively large, but it accounts for only a small percentage because developed land prices are the highest of all the 10 regions, with an average price $174,157 per acre.

The spatial distribution of the CRP effects on farmland prices are shown in Figure 1. Overall, the spatial distribution of the CRP effects on farmland prices is consistent with the spatial distribution of the CRP acreages. The CRP has relatively large impacts on the prices of both farmland and developed land in Mountain areas, Plains states, west Corn Belt, and some counties in west Appalachia and the Southwest, where CRP participation is more profitable than farming.

Table 5 reports the magnitude of the major components of farmland price and the effect of the CRP on those components based on model I. On average, agricultural returns account for 40% of farmland prices. Of the 10 regions, the weight of agricultural returns in farmland prices is relatively high in the Mountain and Northern Plains regions, where the farmland prices are relatively low due to low net returns to farming and low development pressure. On national average, growth premium and option value together account for 60% of farmland prices. The Northeast has the highest growth premium and option value, which accounts for about 68% of farmland values. Consistent with the theory, the CRP had a positive impact on agricultural returns, but a negative impact on growth premiums and option values. Specifically, the CRP increases agricultural returns by about $37 per acre, but reduces growth premiums and option values by $12 per acre on national average.

VII. Implications for Permanent Easements Policies

By retiring highly erodible and other environmentally sensitive cropland for 10-15 years, the CRP provides significant benefits to the environment. However, a permanent easement program has an obvious advantage. In recent years, several states, including Minnesota and Maryland have used the Conservation Reserve Enhancement Program (CREP) and other USDA programs to convert short term easements to permanent conservation easements. It has been suggested that since the present discount value of rental payments during a 15-year contract equals about 75% of the value of a perpetual program (assuming a 10% discount rate), states only need to pay 25% more to secure permanent easements. If true it would be particularly appealing to secure a permanent easement, however, our results suggest that 25% additional funding is generally not sufficient to convert a 15-year contract to a permanent easement.

The CRP payment is calculated based on the relative productivity of soils within the county and the local dry land cash rent. That is to say, the easement payments only reflect the stream of agricultural returns, but not growth premium and option value. Our empirical results show that agricultural and conservational returns account for only 40% of the total farmland value, and growth premium and option value account for the other 60%. Growth premium and option value are generated by potential development beyond the CRP period (otherwise, the land would not be enrolled into the CRP). CRP payments during the contract

period account for only about 30% (0.75*0.40) of land value, where 0.75 represents the percentage of the value of agricultural returns covered by CRP payments during a 15-year contract (assuming a 10% discount rate). In order to convert a 15-year CRP contract to a permanent easement, the remaining 70% of land value must be compensated. That would be about $70\% / 30\% = 2.6$ times of the total CRP payment. Thus, in areas where growth premium and option value are higher, states would need to pay much more than 25% to convert a 15-year contract to a permanent easement. However, in rural areas where growth premium and option value are minimal, 25% additional funding may be sufficient.

VIII. Conclusions

As the largest conservation program in the U.S. history, the CRP has been evaluated in a number of studies for its environmental benefits. However, the effects of the CRP on farmland prices have received relatively little attention. The limited existing research generates contradictory results. This paper develops theoretical and empirical models to evaluate the effects of the CRP on prices of farmland and developed land. The theoretical results suggest that the CRP can increase or decrease land prices, depending on the relative magnitude of the effects of the CRP on agriculture returns, growth premium, option value and accessibility premium. Based on the theoretical analysis, five empirical models are specified to quantify the effect of the CRP on prices of farmland and developed land. Results show that the CRP increases farmland prices by 1.3-1.8% on national average. The effects are largest in the Mountain, Southern Plains, and Northern Plains areas, where the CRP increases farmland prices by 5.2-14.0%, 3.7-6.4% and 2.7-5.3%, respectively. The CRP has a positive effect on developed land prices, but the effect is small (less than 0.6%). Results also show that agricultural returns account for about 40% of farmland price, and growth premium and option value together account for the remaining 60%. Climate and recreation amenities have positive effects on farmland prices because they increase both growth premium and option value. These results provide useful information for the design of permanent easement programs.

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Table 1
Variables and Descriptive Statistics

Variables	Description	Mean	Std Deviation
b_{-1}	Past CRP rental rates from signups 1-14 ($)	54	16.16
A	Net farming returns ($)	77	78.45
R^{CRP}	Max(A, A(1-m)+m(pb+(1-p)A))	81	74.10
p^a	Farmland Prices ($)	1362	961.93
p^d	Developed land prices ($)	48837	45052.50
b	Bid price at signup 15 ($)	50	22.46
P	Probability of acceptance at signup 15	0.65	0.31
S	Sum of (N1-N6)	140	34.90
y	Median household income in 1997 ($)	32377	7514.83
g	Mean of annual income growth 1993-1997 ($)	640	2161.27
σ^2	variance of income change 1993-1997	3420	2402.17
Amenity	Amenity index created by ERS	-0.60	1.83
Climate	First principal component of climate	0	1.00
Recreation	First principal component of recreation facility	0	1.00
Water	First Principal component of water	0	1.00
CRP_{-1}	Percentage of land enrolled in the CRP in signups 1-14	4.20	4.70
m	Percentage of land eligible for the CRP participation	45.30	29.40
Road	Interstate and principal arterial road (1,000 miles)	58	86.43
UIC	1993 Urban influence codes	5.60	2.64
r1	1 if counties in the Pacific, 0 otherwise	0.04	0.20
r2	1 if counties in the Mountain, 0 otherwise	0.08	0.27
r3	1 if counties in the Northern Plains, 0 otherwise	0.11	0.31
r4	1 if counties in the Southern Plains, 0 otherwise	0.11	0.31
r5	1 if counties in the Lake States, 0 otherwise	0.08	0.27
r6	1 if counties in the Corn Belt, 0 otherwise	0.17	0.38
r7	1 if counties in the Delta States, 0 otherwise	0.07	0.26
r8	1 if counties in the Northeast , 0 otherwise	0.07	0.26
r9	1 if counties in the Appalachian, 0 otherwise	0.16	0.36
r10	1 if counties in the Southeast, 0 otherwise	0.10	0.31

Table 2
The Marginal Effect of Independent Variables on Farmland and Developed Land Prices

Variables	Marginal Effect on Farmland Prices ($/per acre)					Marginal Effect on Developed Land Prices ($/per acre)				
	Model I	Model II	Model III	Model IV	Model V	Model I	Model II	Model III	Model IV	Model V
ERS Amenity				42***	60***				20	1249**
climate	45*	129***	93***			293	2191	2312*		
recreation	199***	406***	206***			16229***	24707***	4671***		
water	8	-44	7			-2090***	-121***	1460*		
UIC			-60***		-67***			-5543***		-5425***

***significant at 1% level, **significant at 5%level, *significant at 10% level.

Table 3
The Effect of the Conservation Reserve Program on Farmland Price by Regions

Regions	Farmland Prices ($/per acre				
	Model I	Model II	Model III	Model IV	Model V
Pacific	36*** (2.25)	44*** (2.74)	35*** (2.18)	35*** (2.18)	18*** (1.12)
Mountain	60*** (9.79)	85*** (13.87)	52*** (8.48)	55*** (8.97)	32*** (5.22)
Northern Plains	28*** (4.52)	33*** (5.32)	24*** (3.87)	17*** (2.74)	11*** (1.87)
Southern Plains	40*** (6.41)	29*** (4.65)	23*** (3.69)	35*** (5.60)	30*** (4.81)
Lake States	3*** (0.22)	6*** (0.43)	6*** (0.43)	2*** (0.15)	2*** (0.15)
Corn Belt	24*** (1.35)	26*** (1.46)	23*** (1.29)	17*** (0.96)	18*** (1.91)
Delta States	18*** (1.62)	12*** (1.08)	9*** (0.81)	12*** (1.08)	10*** (0.90)
Northeast	8*** (0.33)	9*** (0.37)	8*** (0.33)	7*** (0.29)	7*** (0.29)
Appalachia	28*** (1.51)	24*** (1.30)	21*** (1.13)	21*** (1.13)	21*** (1.13)
Southeast	18*** (1.19)	11*** (0.73)	9*** (0.59)	11** (0.73)	11*** (0.73)
U.S.	25*** (1.84)	25*** (1.84)	22*** (1.61)	18*** (1.32)	18*** (1.32)

Percentages are in parenthesis. *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

Table 4
The Effect of the Conservation Reserve Program on Developed Land Prices, By Regions

Regions	Developed Land Price ($/ per acre)				
	Model I	Model II	Model III	Model IV	Model V
Pacific	540***	549***	203***	715***	158***
	(0.31)	(0.12)	(0.12)	(0.41)	(0.09)
Mountain	843***	809***	341**	901***	233**
	(0.78)	(0.74)	(0.31)	(0.83)	(0.21)
Northern Plains	275***	277***	-20	-139**	-191***
	(0.60)	(0.60)	(-0.04)	(-0.30)	(-0.41)
Southern Plains	244**	202**	19	368***	249***
	(0.61)	(0.50)	(0.05)	(0.92)	(0.59)
Lake States	63	75***	31***	-57***	-33
	(0.15)	(0.18)	(0.07)	(-0.14)	(-0.08)
Corn Belt	277***	271***	155***	10**	78
	(0.67)	(0.65)	(0.37)	(0.02)	(0.30)
Delta States	118***	119***	15	45	33
	(0.45)	(0.45)	(0.06)	(0.17)	(0.05)
Northeast	186***	184***	137***	42	53***
	(0.26)	(0.26)	(0.19)	(0.06)	(0.07)
Appalachia	347***	297***	205***	64	125***
	(0.98)	(0.84)	(0.58)	(0.18)	(0.35)
Southeast	150	114***	57*	79**	94***
	(0.44)	(0.33)	(0.17)	(0.23)	(0.27)
U.S.	274***	273***	155***	6	73
	(0.56)	(0.56)	(0.32)	(0.01)	(0.15)

Percentages are in parenthesis. ***significant at 1% level, **significant at 5%level, *significant at 10% level.

Table 5
The Effects of the Conservation Reserve Program on the Major Components of Farmland Prices, By Region

	Value of Agricultural Returns		Value of Growth Premium and Option value		Effect on Value of Agricultural Returns		Effect on Value of Growth Premium and Option Value	
Regions	$/ acre	% of pa	$/ acre	% of pd	$/ acre	%	$/acre	%
Pacific	813	50.7	792	49.3	51	6.3	-15	-1.9
Mountain	261	42.5	353	57.5	83	32.2	-23	-6.5
Northern Plains	364	58.6	256	41.4	42	11.7	-14	-5.4
Southern Plains	229	36.8	397	63.2	59	26.2	-19	-4.8
Lake States	588	43.0	782	57.0	7	1.2	-4	-0.5
Corn Belt	655	36.8	1125	63.2	39	6.0	-13	-1.1
Delta States	535	48.2	575	51.8	25	4.7	-7	-1.2
Northeast	762	31.6	1648	68.4	15	2.0	-7	-0.4
Appalachian	688	37.2	1165	62.8	38	5.6	-10	-0.9
Southeast	608	40.1	903	59.9	24	4.0	-6	-0.7
U.S.	542	39.8	820	60.2	37	6.9	-12	-1.5

Figure 1
The Percent Increase in Farmland Price Under the Conservation Reserve Program

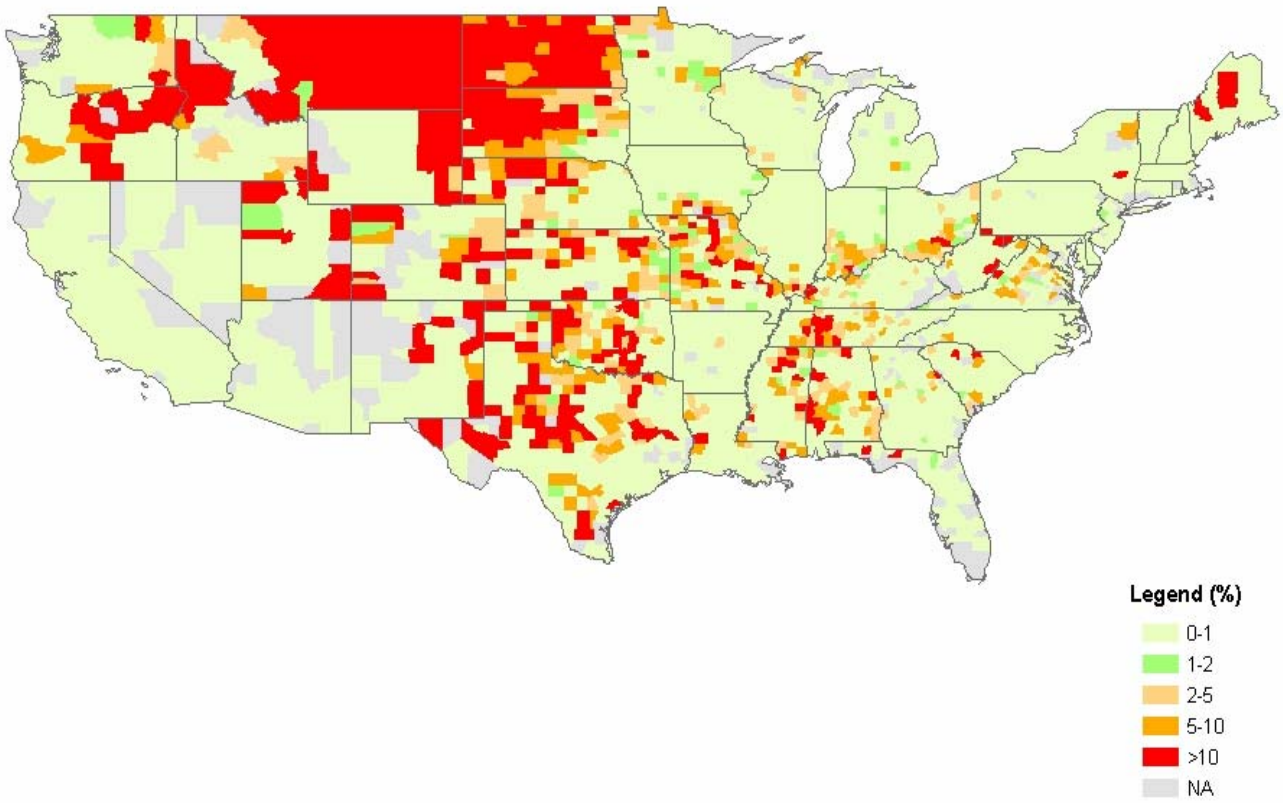


Table A.1
Parameter Estimates of the Probability of Acceptance and Optimal Bid Equations

Variables	Acceptance Equation		Optimal Bid Equation	
	Estimate	Standard Error	Estimate	Standard Error
Intercept	-5.19***	0.349	2.85***	0.443
b_{-1}	0.06**	0.024	0.75***	0.023
A	—	—	0.03***	0.002
S	0.08***	0.002	-0.02***	0.005
CRP_{-1}	-4.00***	1.406	-12.79***	4.604
b	-0.10***	0.019	—	—
r1	0.12	0.486	-5.56***	1.867
r2	-0.27	0.336	-1.88	1.274
r3	0.15	0.294	-0.31	1.364
r4	-0.31	0.307	-0.17	1.192
r5	0.06	0.322	1.39	1.384
r6	-1.15***	0.331	11.93***	1.363
r7	0.16	0.338	-3.16**	1.406
r8	0.29	0.380	0.93	1.566
r9	-0.13	0.290	2.51**	1.154
Number of observations	2206			
System Weighted R^2	0.57			

***significant at 1% level, ** significant at 5% level.

Table A.2
Parameter Estimates of the Farmland and Developed Land Price Equations for Model I

Variables	Farmland Price Equation		Variables	Developed Land Price Equation	
	Estimates	Standard Error		Estimate	Standard Error
R^{CRP}	6.6769***	0.2667	Intercept	-2757.18	2547.0000
g* Road mile	-7.16e-6***	0.0001	p^a * Road	0.0317***	0.0107
g *y	2.4e-6***	7.76e-7	p^a *y	0.0004***	0.0001
g*g	5.0e-6*	2.65e-6	p^a *g	-0.0005***	0.0002
g* R^{CRP}	-0.0007***	4.6e-5	$p^a * \sigma$	-0.0235	0.0216
g *climate	0.0386***	0.0100	$p^a * R^{CRP}$	-0.0114	0.0061
g *Recreation	0.0263***	0.0110	p^a *climate	-2.9862**	1.0399
g* Water	-0.0047	0.0066	p^a *recreation	-6.3869***	0.9050
g*r1	0.2081***	0.0367	p^a *water	1.9253**	0.9361
g*r2	0.0513*	0.0283	R^{CRP} *Road	-0.3720***	0.1258
g*r3	0.0377	0.0287	R^{CRP} *y	0.0007	0.0007
g*r4	-0.0275	0.0234	R^{CRP} *g	0.0063**	0.0033
g*r5	0.0584	0.0343	$R^{CRP} * \sigma$	0.0377	0.2894
g*r6	0.0158	0.0248	R^{CRP} *max	0.0430	0.0243
g*r7	0.0047	0.0273	R^{CRP} *climate	5.1441	9.4251
g*r8	0.0209	0.0313	R^{CRP} *recreation	61.6576***	10.5946
g*r9	-0.0249	0.0214	R^{CRP} *water	3.7066	8.2816
σ *Road	-0.0064	0.0051	Road	-12.6217	19.6437
σ *y	0.0010***	0.0001	y	0.9562***	0.1755
$\sigma * \sigma$	-0.2271***	0.0167	Climate	3324.58*	1745.2000
$\sigma * R^{CRP}$	-0.0304***	0.0041	Recreation	21679.98***	2096.2000
σ *climate	0.2820	0.5023	Water	-4966.70***	1434.4000
σ *recreation	3.3102***	0.4262	r1	139878.5***	5926.1000
σ *water	0.1636	0.2687	r2	71433.5***	4598.5000

Variables	Farmland Price Equation		Variables	Developed Land Price Equation	
	Estimates	Standard Error		Estimate	Standard Error
σ *r1	-2.4834	2.0121	r3	14793.9***	4398.3000
σ *r2	-6.4826***	1.5631	r4	9657.0**	4060.6000
σ *r3	-7.9109***	1.4745	r5	-12048.5**	5280.2000
σ *r4	-3.4203**	1.3269	r6	-4365.1	4110.7000
σ *r5	-5.8818***	1.8168	r7	6096.9	4341.9000
σ *r6	-1.8051	1.3335	r8	-4884.6	5106.7000
σ *r7	0.2520	1.5160	r9	-3621.5	3688.1000
σ *r8	8.2746***	1.1676			
σ *r9	3.6615***	1.1730			
σ *g	0.0004*	0.0003			
Number of observations			2851		
System Weighted R^2			0.87		

*** significant at 1% level, ** significant at 5%,* significant at 10%.

Table A.3. —Parameter Estimates For Farmland Prices Equation For Models II-V

Variables	Estimates			
	Model II	Model III	Model IV	Model V
Intercept	11886.58***	32700.81***	6849.01***	39437.21***
R^{CRP}	61.58***	111.10***	12.34	108.13***
g	-2.18***	- 0.96**	-2.74***	- 1.34***
σ	2.72***	1.57***	2.87***	1.44***
g^2	2.31e-4***	3.39e-4***	1.50e-4	0.42e-4***
σ^2	- 8.00e-5***	-8.00e-5***	7.00e-5**	-1.00e-4***
g* σ	- 1.60e-4***	-1.60e-4***	-1.20e-4**	-1.30e-4***
Amenity			- -1258.77**	4031.25***
climate	4963.67***	-1952.48		
recreation	17786.51***	20396.41***		
water	-1749.59	-1872.00		
road	82.40***		194.99***	
UIC		-21086.50***		-25281.40***
R^{CRP2}	-2.70e-3***	-3.40e-3***	-6.80e-4*	-3.31e-3***
$Amenity^2$			732.89***	818.07***
$climate^2$	-1125.00	1864.22**		
$recreation^2$	-4769.40***	-359.80***		
$water^2$	-277.41	-372.33*		
$road^2$	-0.42***		-0.09***	
UIC^2		1495.91***		1862.91***
R^{CRP} *Amenity			25.30***	12.06***
R^{CRP} *climate	-14.10*	- 11.52*		
R^{CRP} *recreation	26.44***	2.49		
R^{CRP} *water	10.80	14.49**		
R^{CRP} *road	-0.21**		0.07	
R^{CRP} *UIC		- 14.81***		
road*Amenity			1.84	-15.59***
road*climate	-28.10**			
road*recreation	82.83***			
road*water	13.03			-496.14***
UIC*Amenity				
UIC*climate		927.94***		
UIC*recreation		- 2844.45***		

Variables	Estimates			
	Model II	Model III	Model IV	Model V
UIC*water		385.45		
r1	160295.60***	161634.40***	123496.40***	133580.80***
r2	85559.43***	100585.80***	64044.16***	87345.16***
r3	21190.61***	30427.77***	13566.22***	27505.60***
r4	8077.42*	15395.77***	8102.67*	19246.03***
r5	6969.76	14190.87***	2699.35	14891.74***
r6	9380.34**	15595.50***	10059.34**	16544.13***
r7	1553.03	11147.64**	4159.05	13820.66***
r8	17926.73***	23784.98***	33193.82***	37402.49***
r9	2707.72	12918.97***	5117.96	12326.99***
Number of observations	2851			

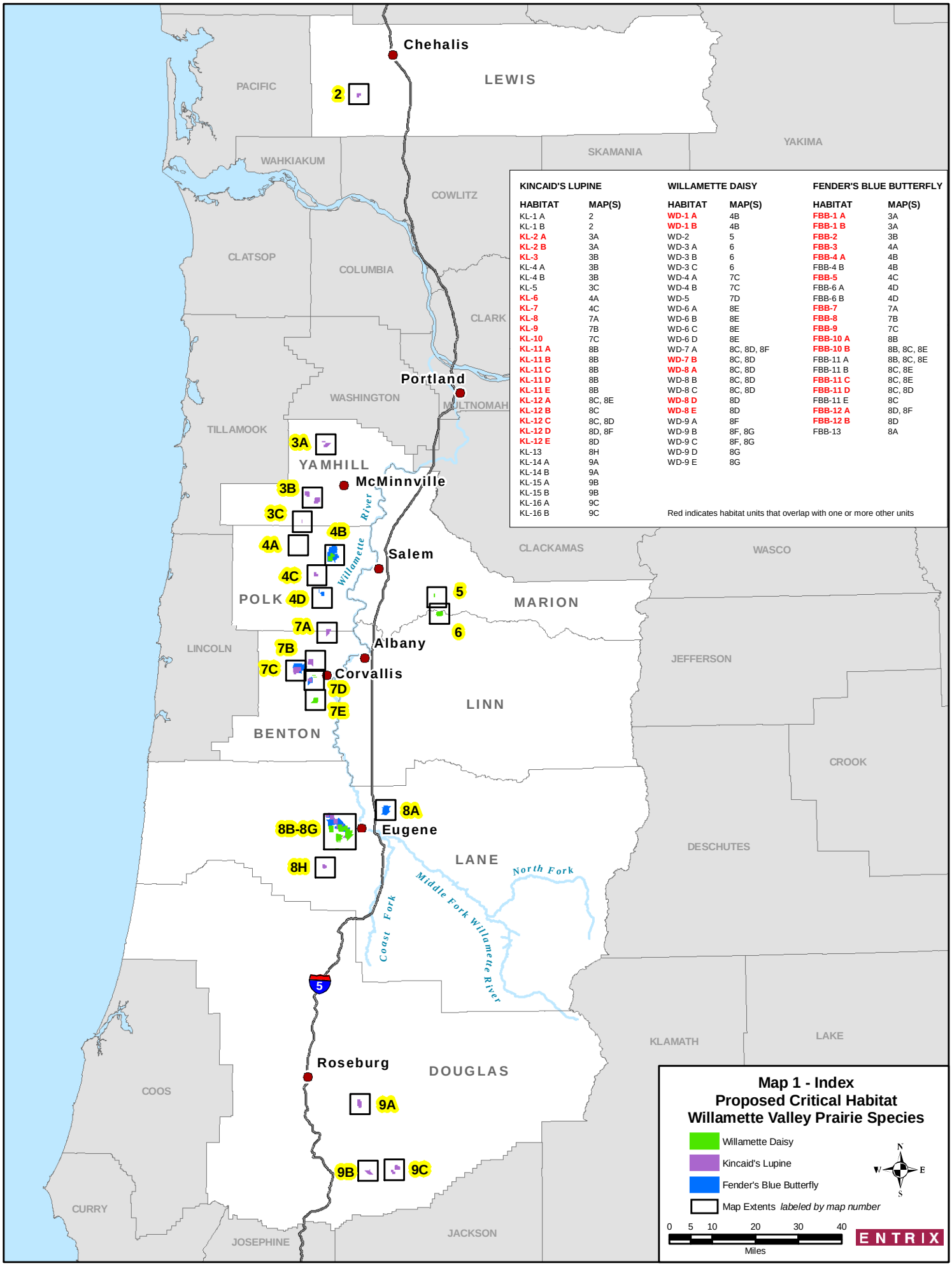
*** Significant at 1% level, ** significant at 5%,* significant at 10%.

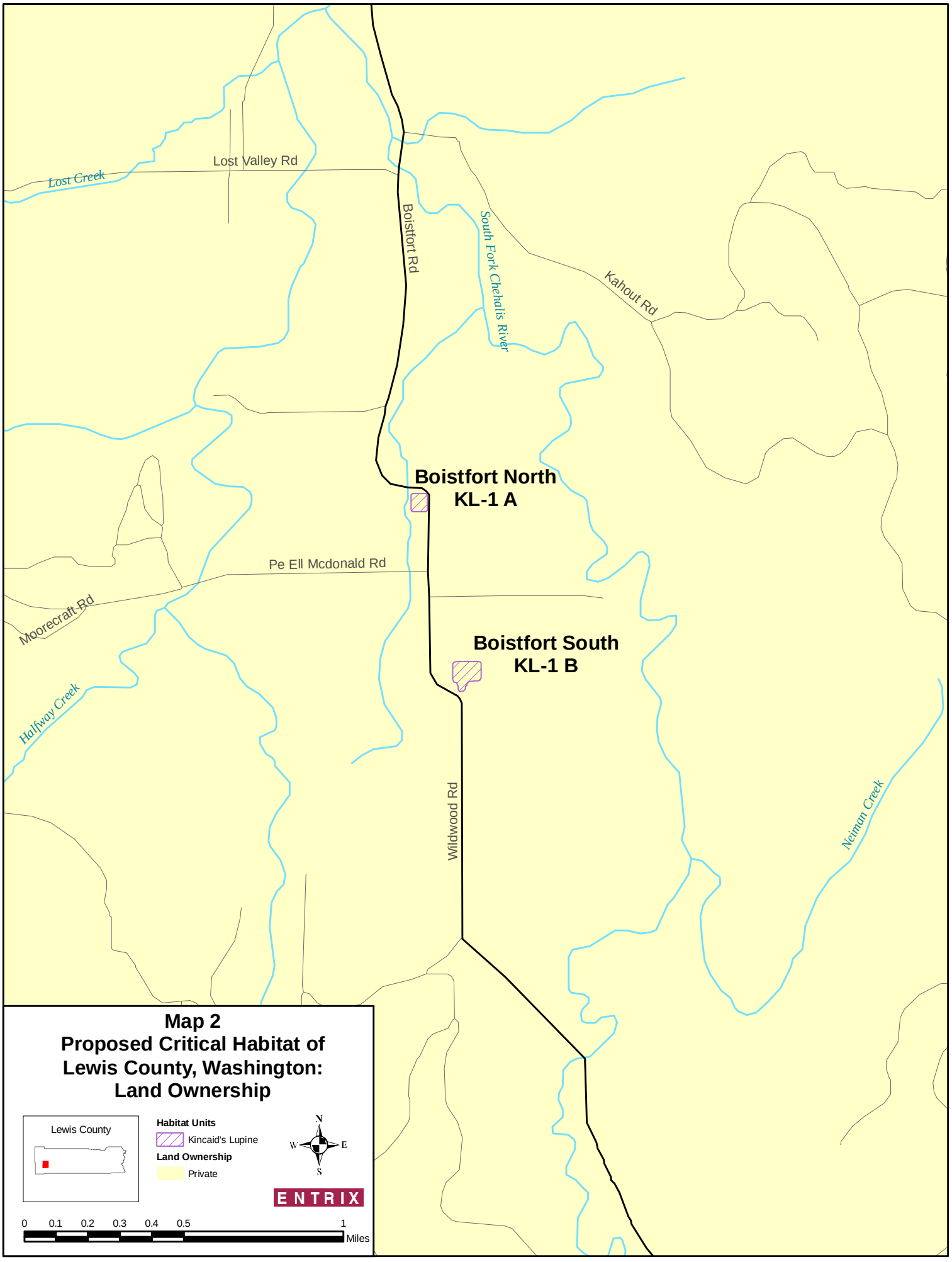
Table A.4. —Parameter Estimates For Developed Land Prices For Model II-V

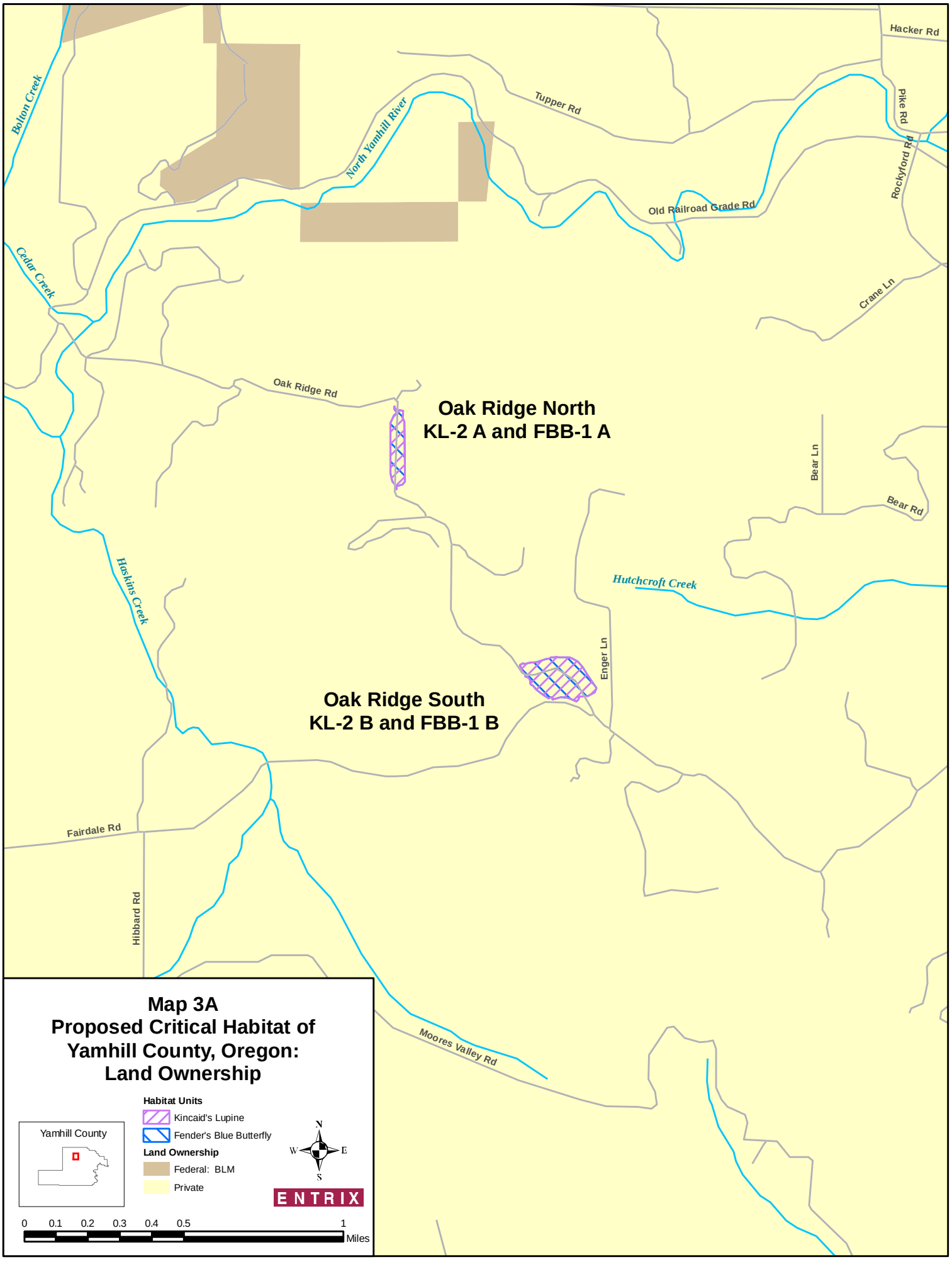
Variables	Estimates			
	Model II	Model III	Model IV	Model V
Intercept	11886.58***	32700.81***	6849.01***	39437.21***
R^{CRP}	61.58***	111.10***	12.34	108.13***
g	-2.18***	- 0.96**	-2.74***	- 1.34***
σ	2.72***	1.57***	2.87***	1.44***
g^2	2.31e-4***	3.39e-4***	1.50e-4	0.42e-4***
σ^2	- 8.00e-5***	-8.00e-5***	7.00e-5**	-1.00e-4***
g* σ	- 1.60e-4***	-1.60e-4***	-1.20e-4**	-1.30e-4***
Amenity			- -1258.77**	4031.25***
climate	4963.67***	-1952.48		
recreation	17786.51***	20396.41***		
water	-1749.59	-1872.00		
road	82.40***		194.99***	
UIC		-21086.50***		-25281.40***
R^{CRP^2}	-2.70e-3***	-3.40e-3***	-6.80e-4*	-3.31e-3***
$Amenity^2$			732.89***	818.07***
$climate^2$	-1125.00	1864.22**		
$recreation^2$	-4769.40***	-359.80***		
$water^2$	-277.41	-372.33*		
$road^2$	-0.42***		-0.09***	

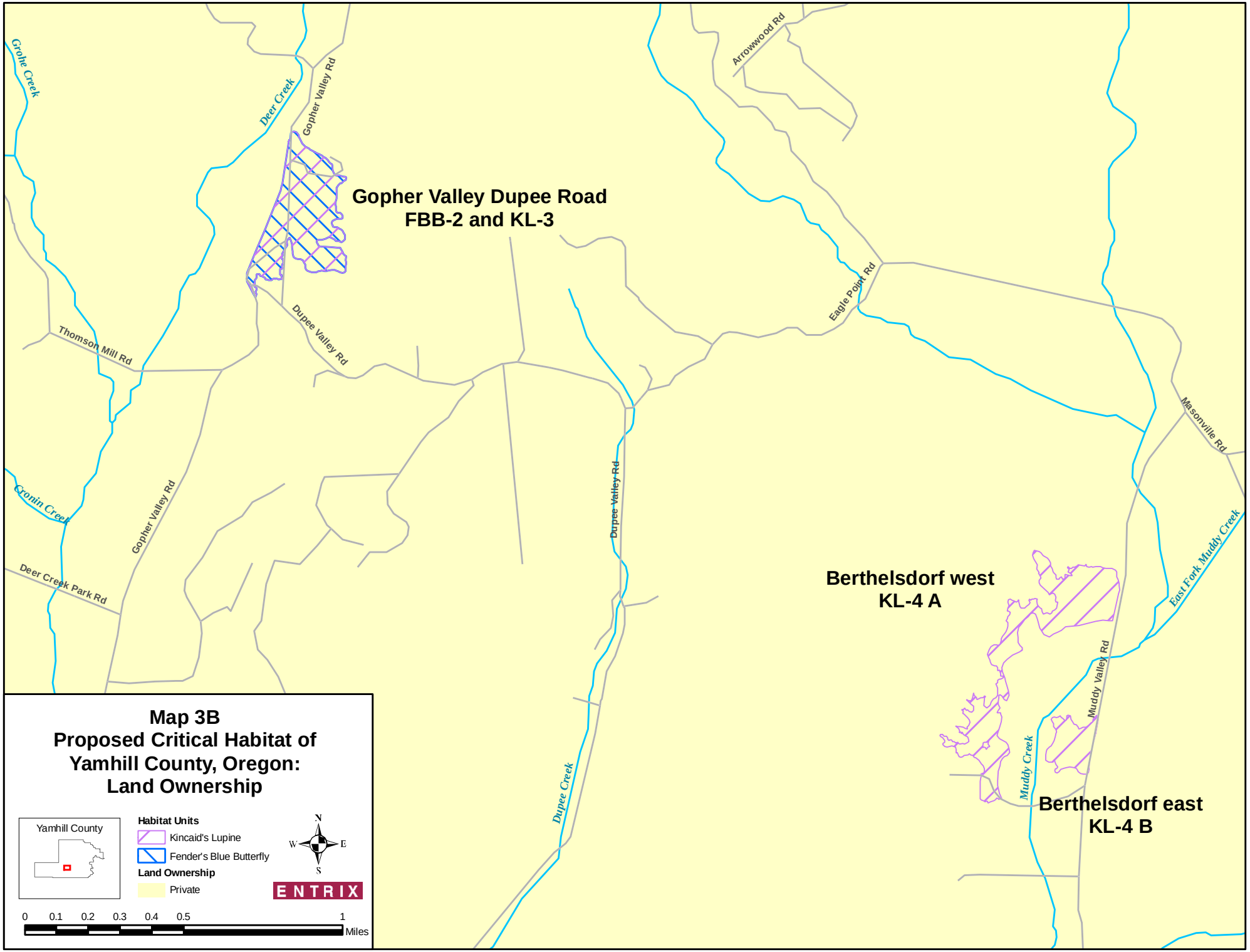
Variables	Estimates			
	Model II	Model III	Model IV	Model V
UIC^2		1495.91***		1862.91***
R^{CRP} *Amenity			25.30***	12.06***
R^{CRP} *climate	-14.10*	- 11.52*		
R^{CRP} *recreation	26.44***	2.49		
R^{CRP} *water	10.80	14.49**		
R^{CRP} *road	-0.21**		0.07	
R^{CRP} *UIC		- 14.81***		
road*Amenity			1.84	-15.59***
road*climate	-28.10**			
road*recreation	82.83***			
road*water	13.03			-496.14***
UIC*Amenity				
UIC*climate		927.94***		
UIC*recreation		- 2844.45***		
UIC*water		385.45		
r1	160295.60***	161634.40***	123496.40***	133580.80***
r2	85559.43***	100585.80***	64044.16***	87345.16***
r3	21190.61***	30427.77***	13566.22***	27505.60***
r4	8077.42*	15395.77***	8102.67*	19246.03***
r5	6969.76	14190.87***	2699.35	14891.74***
r6	9380.34**	15595.50***	10059.34**	16544.13***
r7	1553.03	11147.64**	4159.05	13820.66***
r8	17926.73***	23784.98***	33193.82***	37402.49***
r9	2707.72	12918.97***	5117.96	12326.99***
Number of observations	2,851			

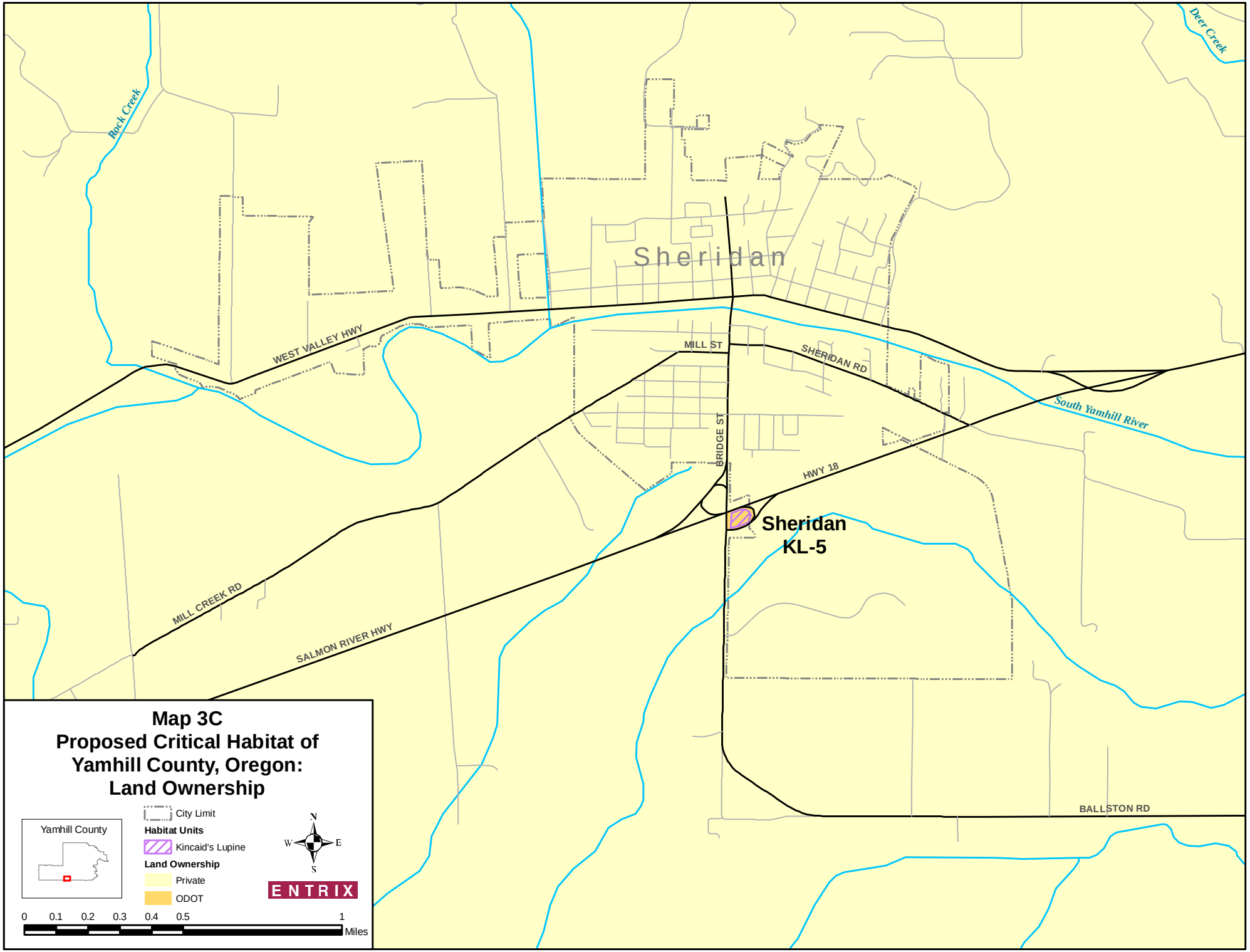
*** significant at 1% level, ** significant at 5%,* significant at 10%.

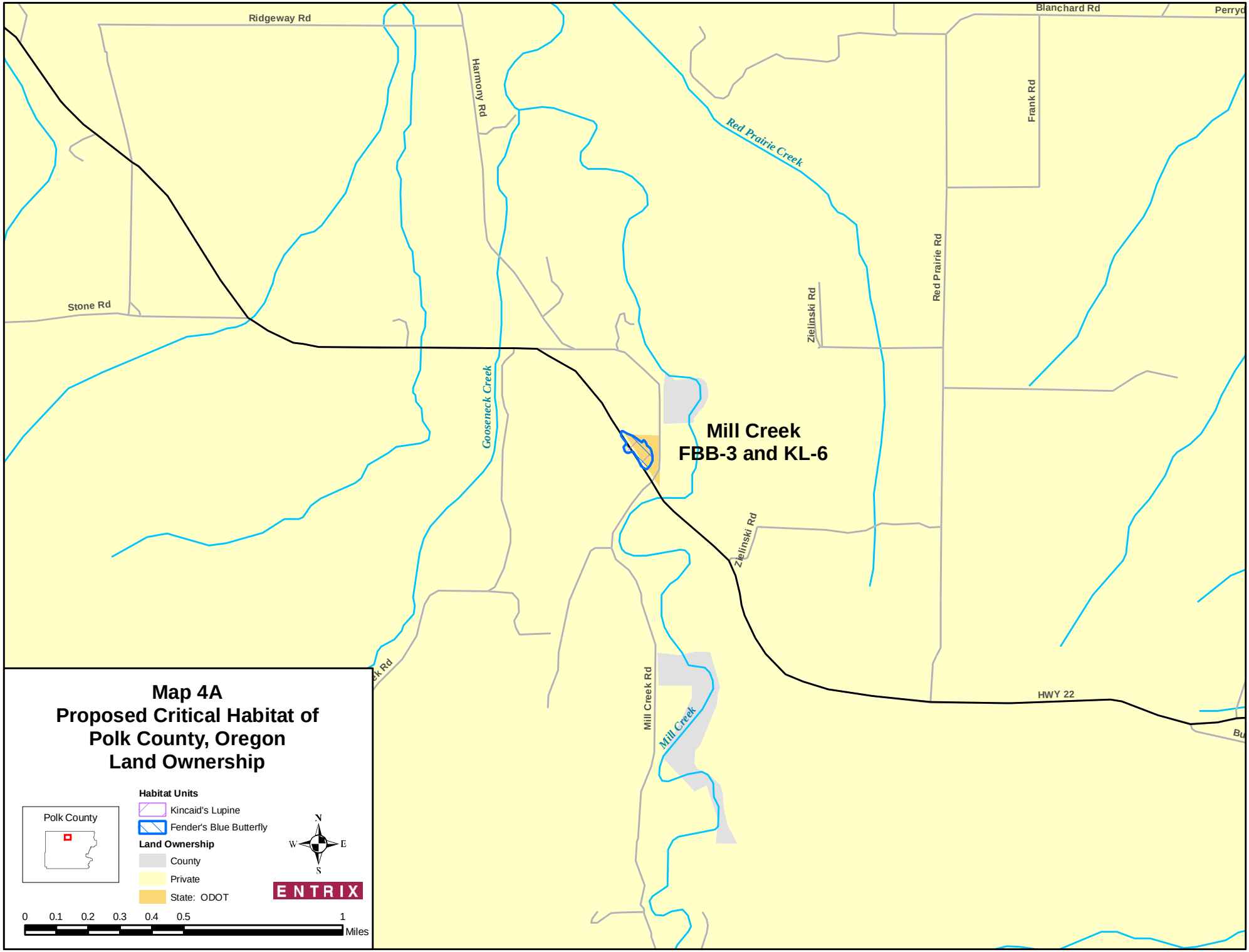

Chehalis
LEWIS
PACIFIC
WAHKIAKUM
COWLITZ
SKAMANIA
YAKIMA
CLATSOP
COLUMBIA
CLARK
Portland
WASHINGTON
MULTNOMAH
TILLAMOOK
YAMHILL
McMinnville
Willamette River
Salem
CLACKAMAS
WASCO
POLK
MARION
LINCOLN
Albany
Corvallis
JEFFERSON
LINN
BENTON
CROOK
Eugene
LANE
North Fork
Middle Fork Willamette River
Coast Fork
DESCHUTES
KLAMATH
LAKE
Roseburg
DOUGLAS
COOS
CURRY
JOSEPHINE
JACKSON
2
3A
3B
3C
4A
4B
4C
4D
5
6
7A
7B
7C
7D
7E
8A
8B-8G
8H
9A
9B
9C
5
KINCAID'S LUPINE
HABITAT MAP(S)
KL-1 A 2
KL-1 B 2
KL-2 A 3A
KL-2 B 3A
KL-3 3B
KL-4 A 3B
KL-4 B 3B
KL-5 3C
KL-6 4A
KL-7 4C
KL-8 7A
KL-9 7B
KL-10 7C
KL-11 A 8B
KL-11 B 8B
KL-11 C 8B
KL-11 D 8B
KL-11 E 8B
KL-12 A 8C, 8E
KL-12 B 8C
KL-12 C 8C, 8D
KL-12 D 8D, 8F
KL-12 E 8D
KL-13 8H
KL-14 A 9A
KL-14 B 9A
KL-15 A 9B
KL-15 B 9B
KL-16 A 9C
KL-16 B 9C
WILLAMETTE DAISY
HABITAT MAP(S)
WD-1 A 4B
WD-1 B 4B
WD-2 5
WD-3 A 6
WD-3 B 6
WD-3 C 6
WD-4 A 7C
WD-4 B 7C
WD-5 7D
WD-6 A 8E
WD-6 B 8E
WD-6 C 8E
WD-6 D 8E
WD-7 A 8C, 8D, 8F
WD-7 B 8C, 8D
WD-8 A 8C, 8D
WD-8 B 8C, 8D
WD-8 C 8C, 8D
WD-8 D 8D
WD-8 E 8D
WD-9 A 8F
WD-9 B 8F, 8G
WD-9 C 8F, 8G
WD-9 D 8G
WD-9 E 8G
FENDER'S BLUE BUTTERFLY
HABITAT MAP(S)
FBB-1 A 3A
FBB-1 B 3A
FBB-2 3B
FBB-3 4A
FBB-4 A 4B
FBB-4 B 4B
FBB-5 4C
FBB-6 A 4D
FBB-6 B 4D
FBB-7 7A
FBB-8 7B
FBB-9 7C
FBB-10 A 8B
FBB-10 B 8B, 8C, 8E
FBB-11 A 8B, 8C, 8E
FBB-11 B 8C, 8E
FBB-11 C 8C, 8E
FBB-11 D 8C, 8D
FBB-11 E 8C
FBB-12 A 8D, 8F
FBB-12 B 8D
FBB-13 8A
Red indicates habitat units that overlap with one or more other units
Map 1 - Index
Proposed Critical Habitat
Willamette Valley Prairie Species
Willamette Daisy
Kincaid's Lupine
Fender's Blue Butterfly
Map Extents labeled by map number
N
W
E
S
0 5 10 20 30 40
Miles
ENTRIX

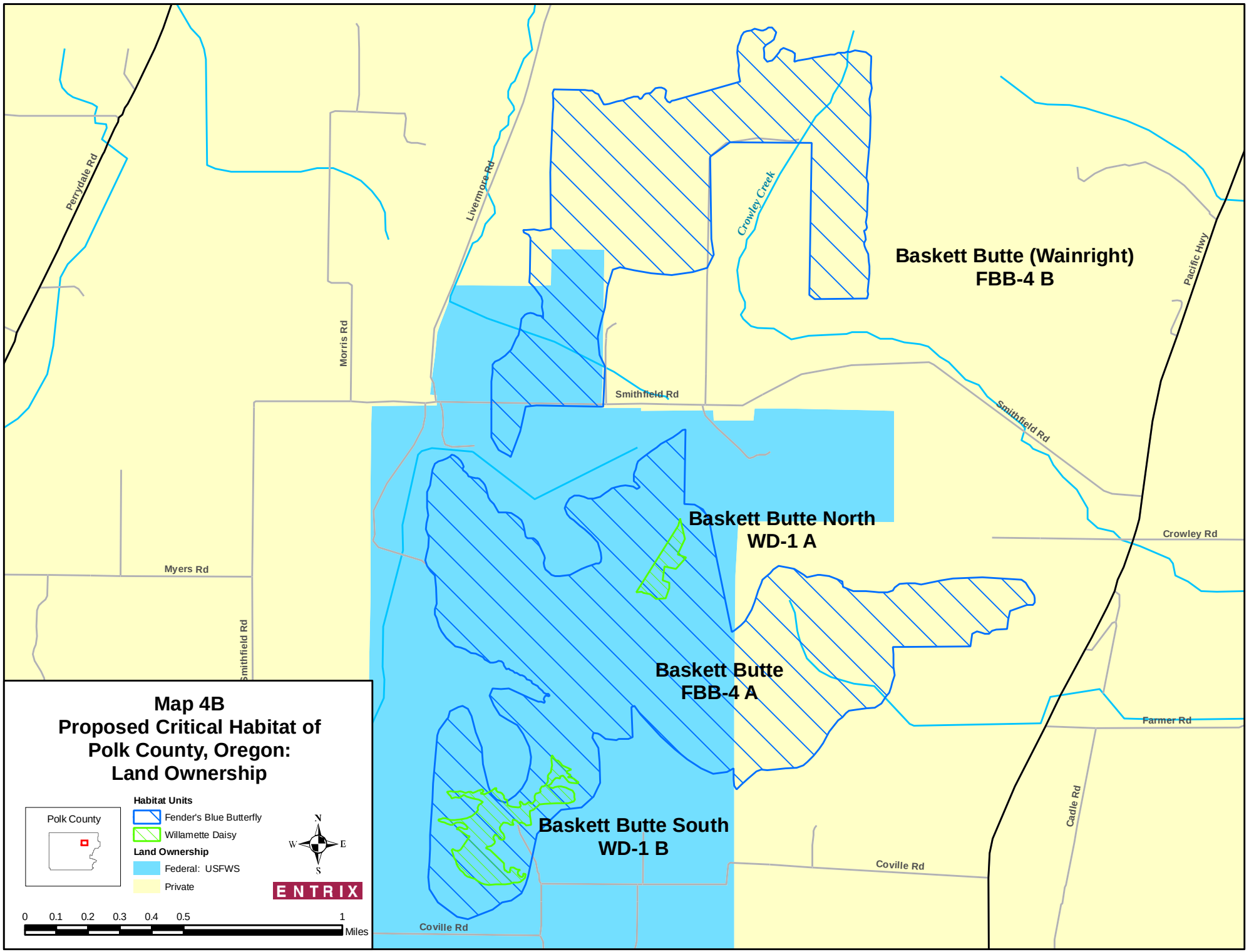

Lost Creek
Lost Valley Rd
Boistfort Rd
South Fork Chehalis River
Kahout Rd
Boistfort North
KL-1 A
Pe Ell Mcdonald Rd
Moorecraft Rd
Boistfort South
KL-1 B
Halfway Creek
Wildwood Rd
Neiman Creek
Map 2
Proposed Critical Habitat of
Lewis County, Washington:
Land Ownership
Lewis County
Habitat Units
Kincaid's Lupine
Land Ownership
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

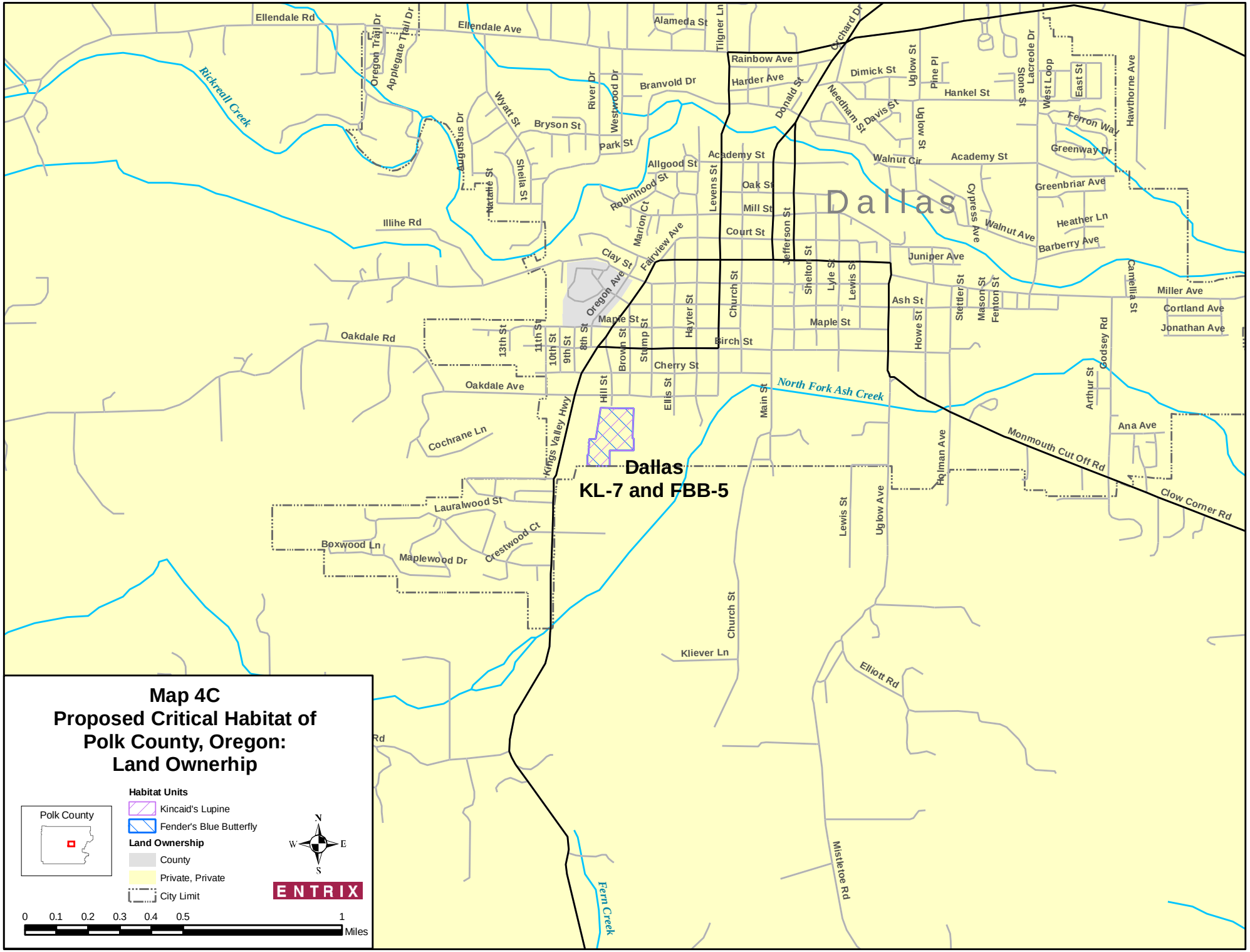

Hacker Rd
Bolton Creek
Tupper Rd
North Yamhill River
Pike Rd
Rockyford Rd
Old Railroad Grade Rd
Cedar Creek
Crane Ln
Oak Ridge Rd
Oak Ridge North
KL-2 A and FBB-1 A
Bear Ln
Bear Rd
Hutchcroft Creek
Hoskins Creek
Enger Ln
Oak Ridge South
KL-2 B and FBB-1 B
Fairdale Rd
Hibbard Rd
Moores Valley Rd
Map 3A
Proposed Critical Habitat of
Yamhill County, Oregon:
Land Ownership
Habitat Units
Kincaid's Lupine
Fender's Blue Butterfly
Land Ownership
Federal: BLM
Private
Yamhill County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles


Gopher Valley Dupee Road
FBB-2 and KL-3
Berthelsdorf west
KL-4 A
Berthelsdorf east
KL-4 B
Grohe Creek
Deer Creek
Gopher Valley Rd
Arrowwood Rd
Eagle Point Rd
Dupee Valley Rd
Thomson Mill Rd
Masonville Rd
Cronin Creek
Gopher Valley Rd
Deer Creek Park Rd
Dupee Valley Rd
East Fork Muddy Creek
Muddy Valley Rd
Muddy Creek
Dupee Creek
Map 3B
Proposed Critical Habitat of
Yamhill County, Oregon:
Land Ownership
Yamhill County
Habitat Units
Kincaid's Lupine
Fender's Blue Butterfly
Land Ownership
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

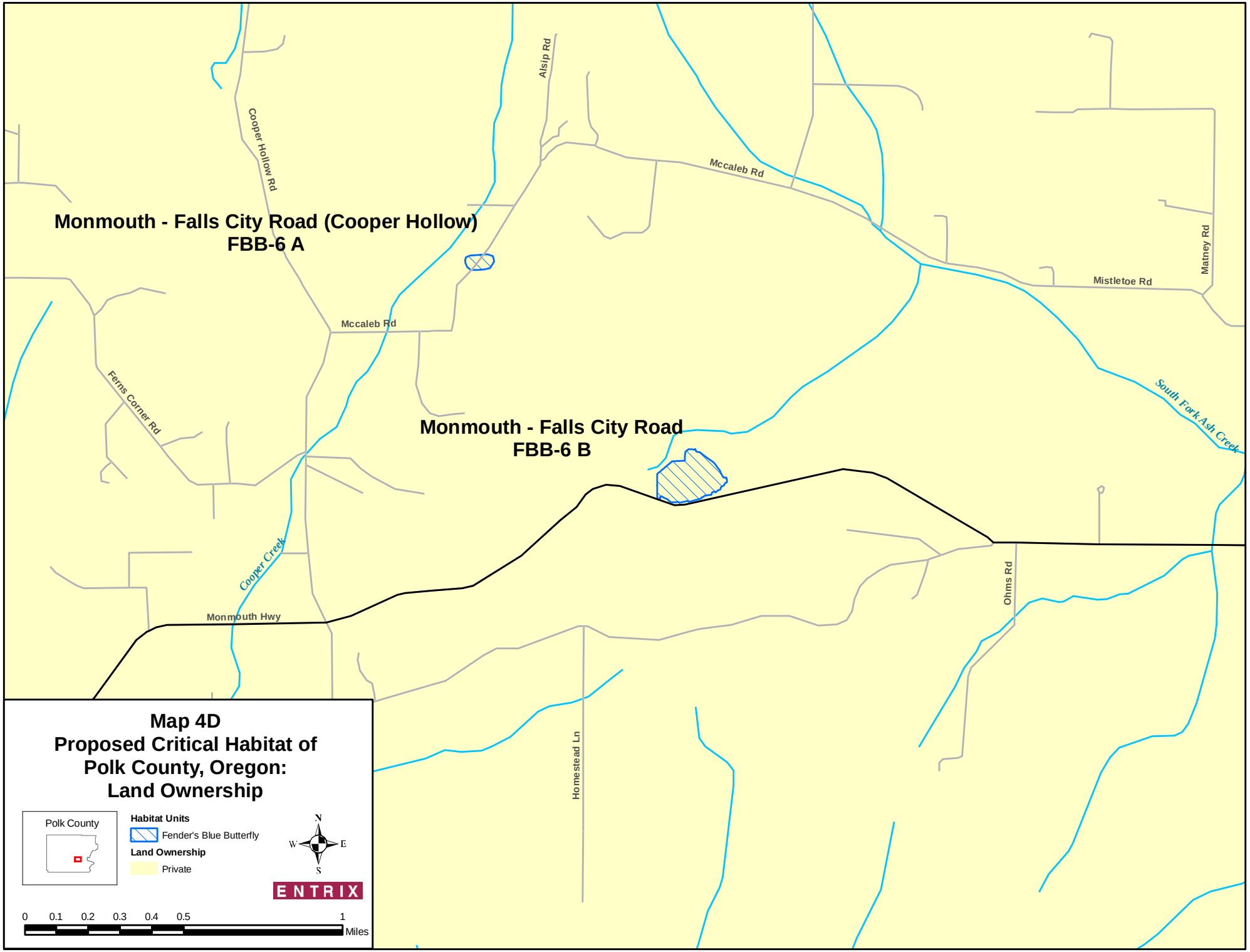

Rock Creek
Deer Creek
Sheridan
WEST VALLEY HWY
MILL ST
SHERIDAN RD
South Yamhill River
BRIDGE ST
HWY 18
Sheridan
KL-5
MILL CREEK RD
SALMON RIVER HWY
BALLSTON RD
Map 3C
Proposed Critical Habitat of
Yamhill County, Oregon:
Land Ownership
Yamhill County
City Limit
Habitat Units
Kincaid's Lupine
Land Ownership
Private
ODOT
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

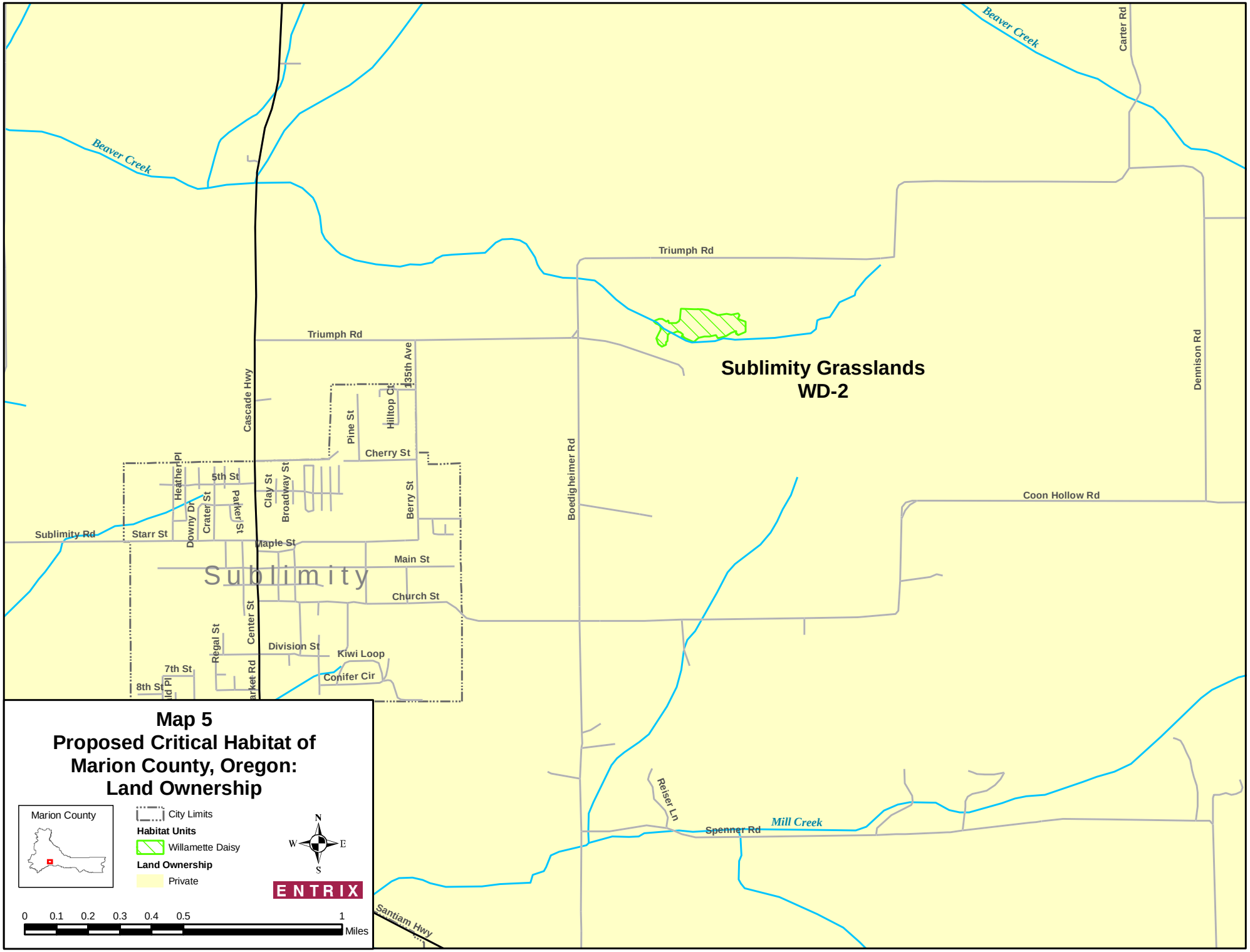

Ridgeway Rd
Harmony Rd
Blanchard Rd
Frank Rd
Red Prairie Creek
Red Prairie Rd
Zielinski Rd
Stone Rd
Gooseneck Creek
Mill Creek
FBB-3 and KL-6
Zielinski Rd
Mill Creek Rd
Mill Creek
HWY 22
Map 4A
Proposed Critical Habitat of
Polk County, Oregon
Land Ownership
Polk County
Habitat Units
Kincaid's Lupine
Fender's Blue Butterfly
Land Ownership
County
Private
State: ODOT
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

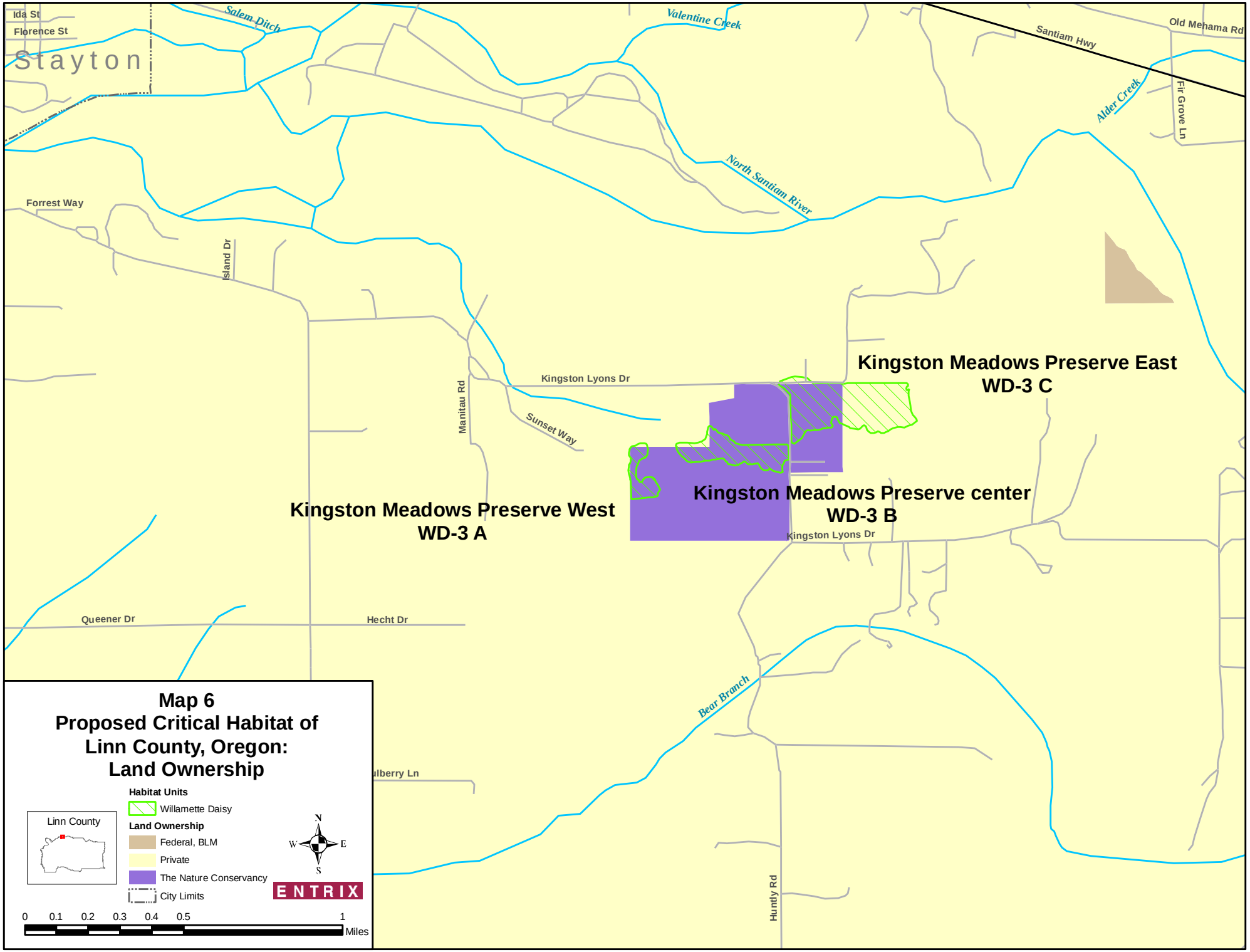

Baskett Butte (Wainright)
FBB-4 B
Baskett Butte North
WD-1 A
Baskett Butte
FBB-4 A
Baskett Butte South
WD-1 B
Perrydale Rd
Livermore Rd
Crowley Creek
Pacific Hwy
Morris Rd
Smithfield Rd
Smithfield Rd
Smithfield Rd
Crowley Rd
Myers Rd
Farmer Rd
Cadle Rd
Coville Rd
Coville Rd
Map 4B
Proposed Critical Habitat of
Polk County, Oregon:
Land Ownership
Polk County
Habitat Units
Fender's Blue Butterfly
Willamette Daisy
Land Ownership
Federal: USFWS
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

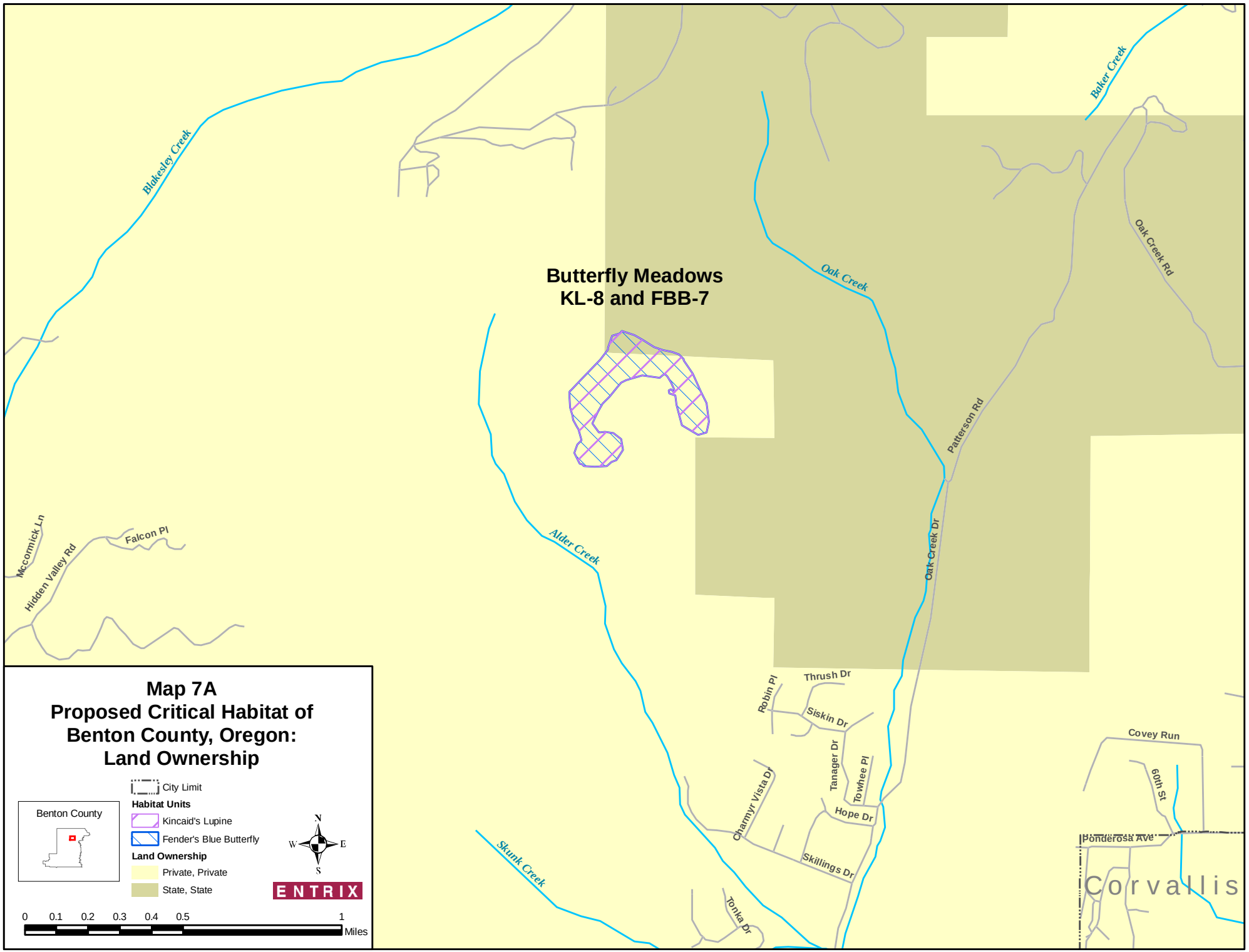


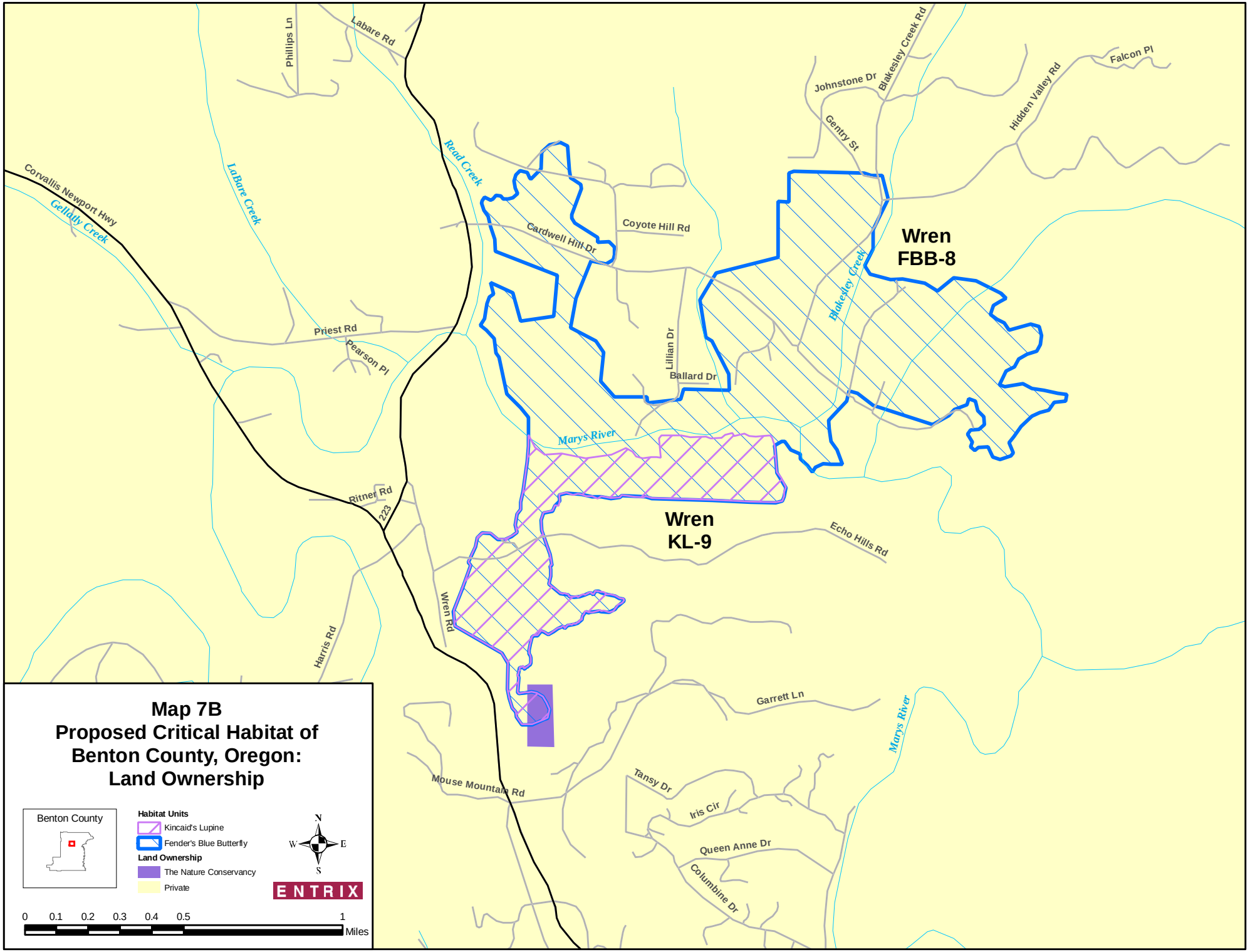
Map 4C
Proposed Critical Habitat of Polk County, Oregon: Land Ownerhip

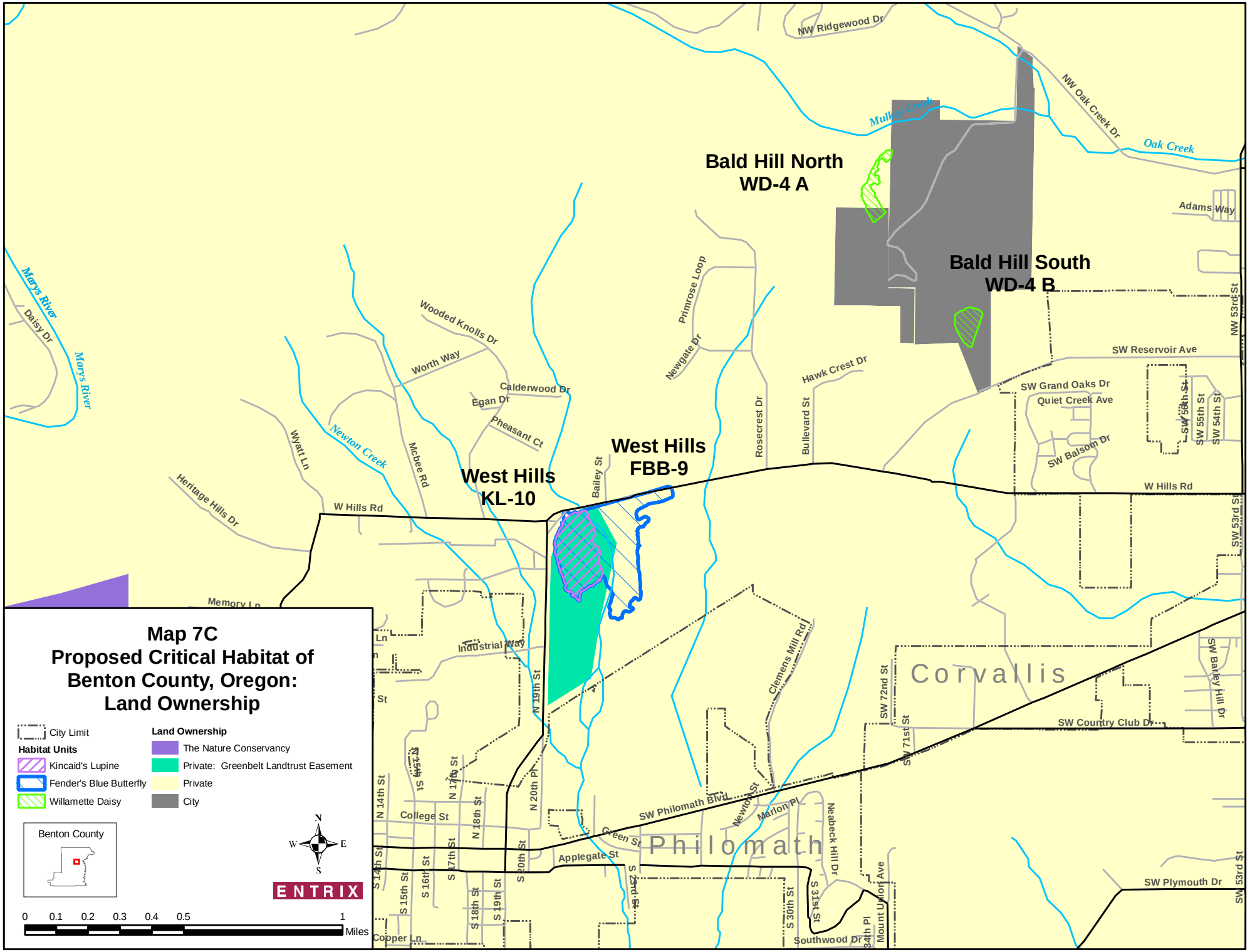

Monmouth - Falls City Road (Cooper Hollow)
FBB-6 A
Monmouth - Falls City Road
FBB-6 B
Cooper Hollow Rd
Alsip Rd
Mccaleb Rd
Mistletoe Rd
Matney Rd
Ferns Corner Rd
South Fork Ash Creek
Cooper Creek
Monmouth Hwy
Ohms Rd
Homestead Ln
Map 4D
Proposed Critical Habitat of
Polk County, Oregon:
Land Ownership
Polk County
Habitat Units
Fender's Blue Butterfly
Land Ownership
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

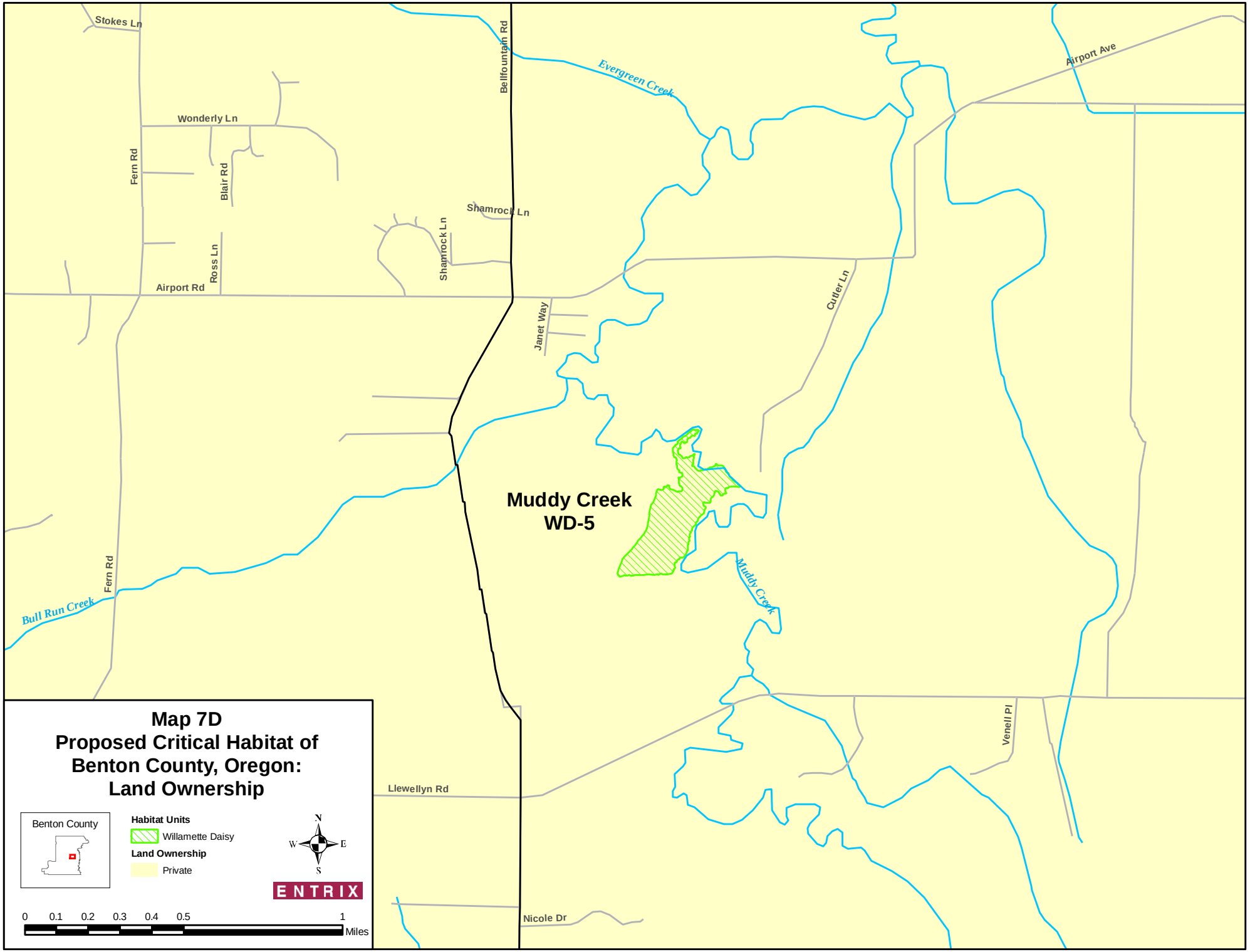

Sublimity Grasslands
WD-2
Sublimity
Beaver Creek
Beaver Creek
Triumph Rd
Triumph Rd
Carter Rd
Dennison Rd
Coon Hollow Rd
Boedigheimer Rd
Cascade Hwy
135th Ave
Hilltop Ct
Pine St
Cherry St
Berry St
Clay St
Broadway St
Parker St
Crater St
Downy Dr
Heather Pl
5th St
Starr St
Sublimity Rd
Maple St
Main St
Church St
Center St
Regal St
Division St
Kiwi Loop
Conifer Cir
7th St
8th St
Market Rd
Reiser Ln
Spenner Rd
Mill Creek
Santiam Hwy
Map 5
Proposed Critical Habitat of
Marion County, Oregon:
Land Ownership
Marion County
City Limits
Habitat Units
Willamette Daisy
Land Ownership
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

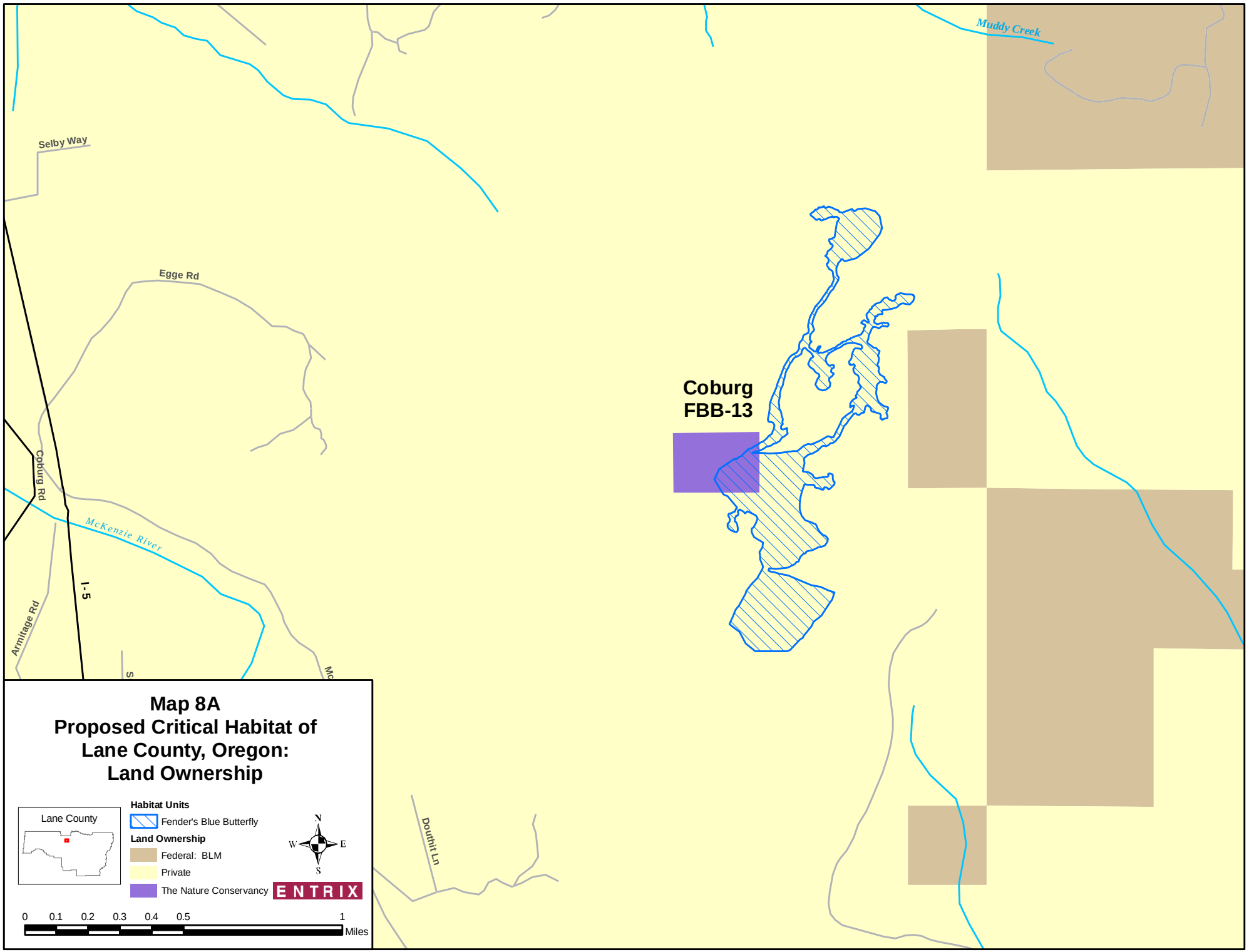

Ida St
Florence St
Stayton
Salem Ditch
Valentine Creek
Santiam Hwy
Old Mehama Rd
Alder Creek
Fir Grove Ln
North Santiam River
Forrest Way
Island Dr
Manitau Rd
Kingston Lyons Dr
Sunset Way
Kingston Meadows Preserve East
WD-3 C
Kingston Meadows Preserve center
WD-3 B
Kingston Meadows Preserve West
WD-3 A
Kingston Lyons Dr
Queener Dr
Hecht Dr
Bear Branch
Huntly Rd
Map 6
Proposed Critical Habitat of
Linn County, Oregon:
Land Ownership
Habitat Units
Willamette Daisy
Land Ownership
Federal, BLM
Private
The Nature Conservancy
City Limits
Linn County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

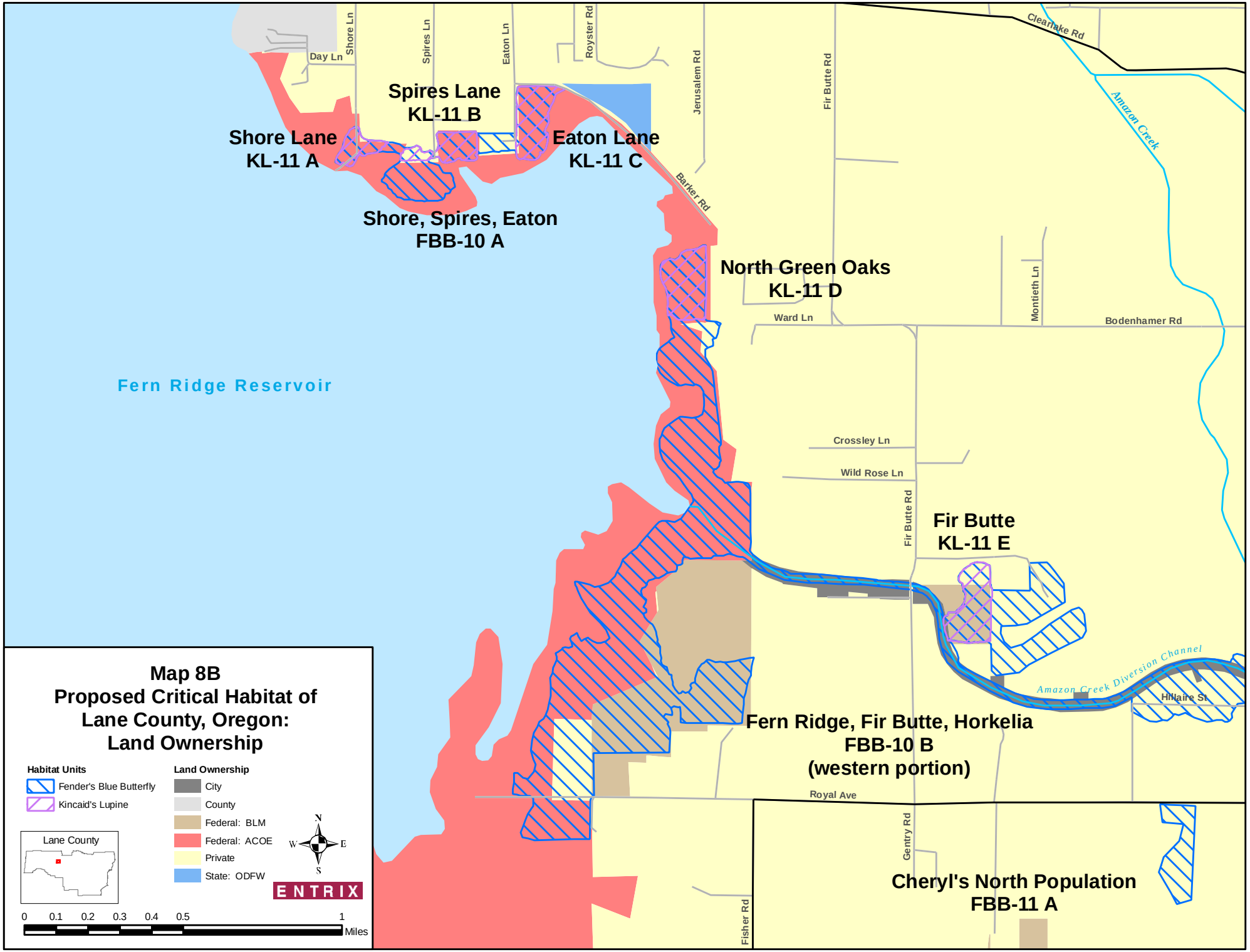

Butterfly Meadows
KL-8 and FBB-7
Blakesley Creek
Baker Creek
Oak Creek
Oak Creek Rd
Patterson Rd
Oak Creek Dr
Alder Creek
Skunk Creek
Mccormick Ln
Hidden Valley Rd
Falcon Pl
Robin Pl
Thrush Dr
Siskin Dr
Tanager Dr
Towhee Pl
Charmyr Vista Dr
Hope Dr
Skillings Dr
Tonka Dr
Covey Run
60th St
Ponderosa Ave
Corvallis
Map 7A
Proposed Critical Habitat of
Benton County, Oregon:
Land Ownership
Benton County
City Limit
Habitat Units
Kincaid's Lupine
Fender's Blue Butterfly
Land Ownership
Private, Private
State, State
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

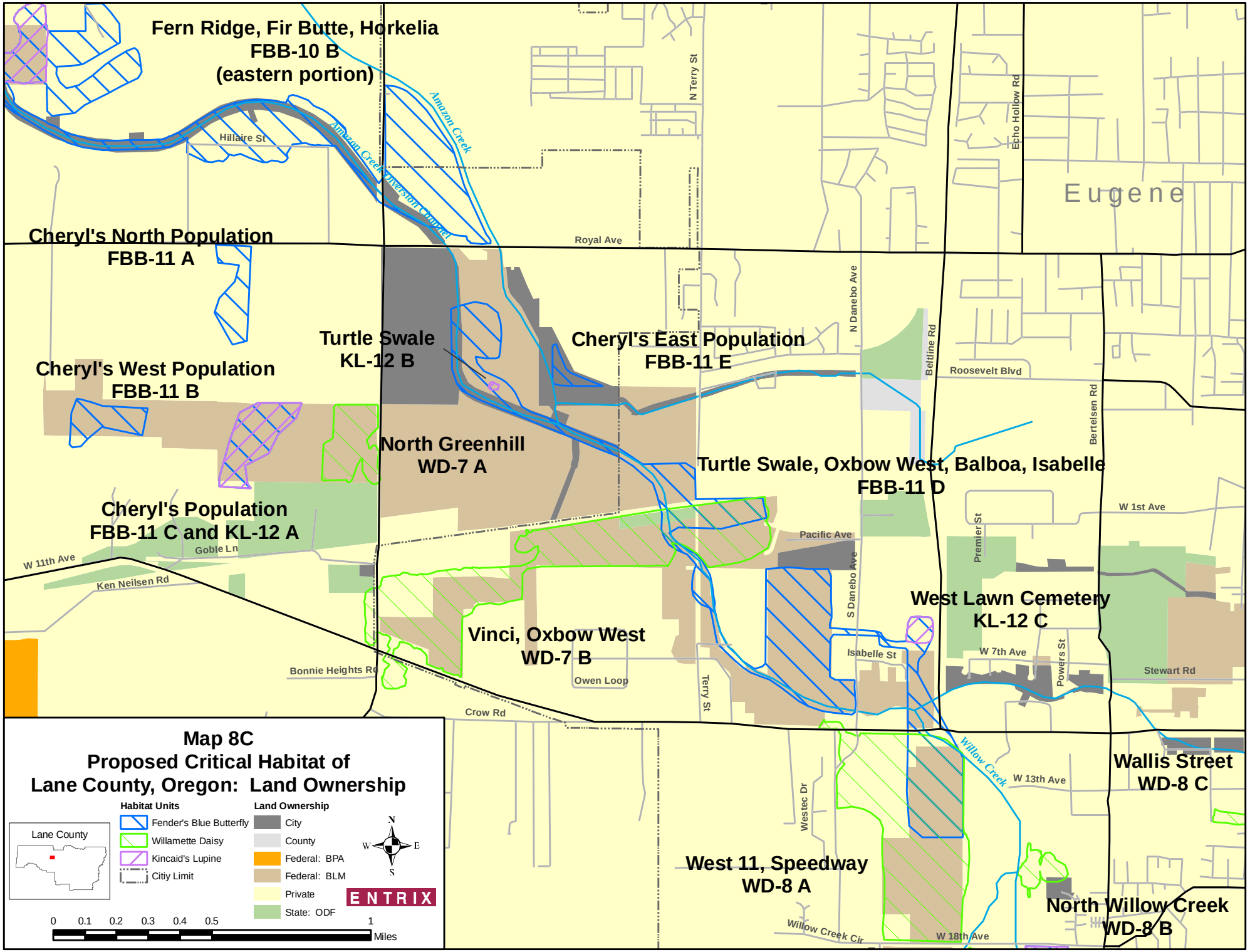

Phillips Ln
Labare Rd
Blakesley Creek Rd
Johnstone Dr
Falcon Pl
Hidden Valley Rd
Gentry St
Read Creek
LaBare Creek
Corvallis Newport Hwy
Gellatly Creek
Coyote Hill Rd
Cardwell Hill Dr
Wren
FBB-8
Blakesley Creek
Lillian Dr
Ballard Dr
Priest Rd
Pearson Pl
Mary's River
Ritner Rd
223
Wren
KL-9
Echo Hills Rd
Wren Rd
Harris Rd
Garrett Ln
Mary's River
Mouse Mountain Rd
Tansy Dr
Iris Cir
Queen Anne Dr
Columbine Dr
Map 7B
Proposed Critical Habitat of
Benton County, Oregon:
Land Ownership
Benton County
Habitat Units
Kincaid's Lupine
Fender's Blue Butterfly
Land Ownership
The Nature Conservancy
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

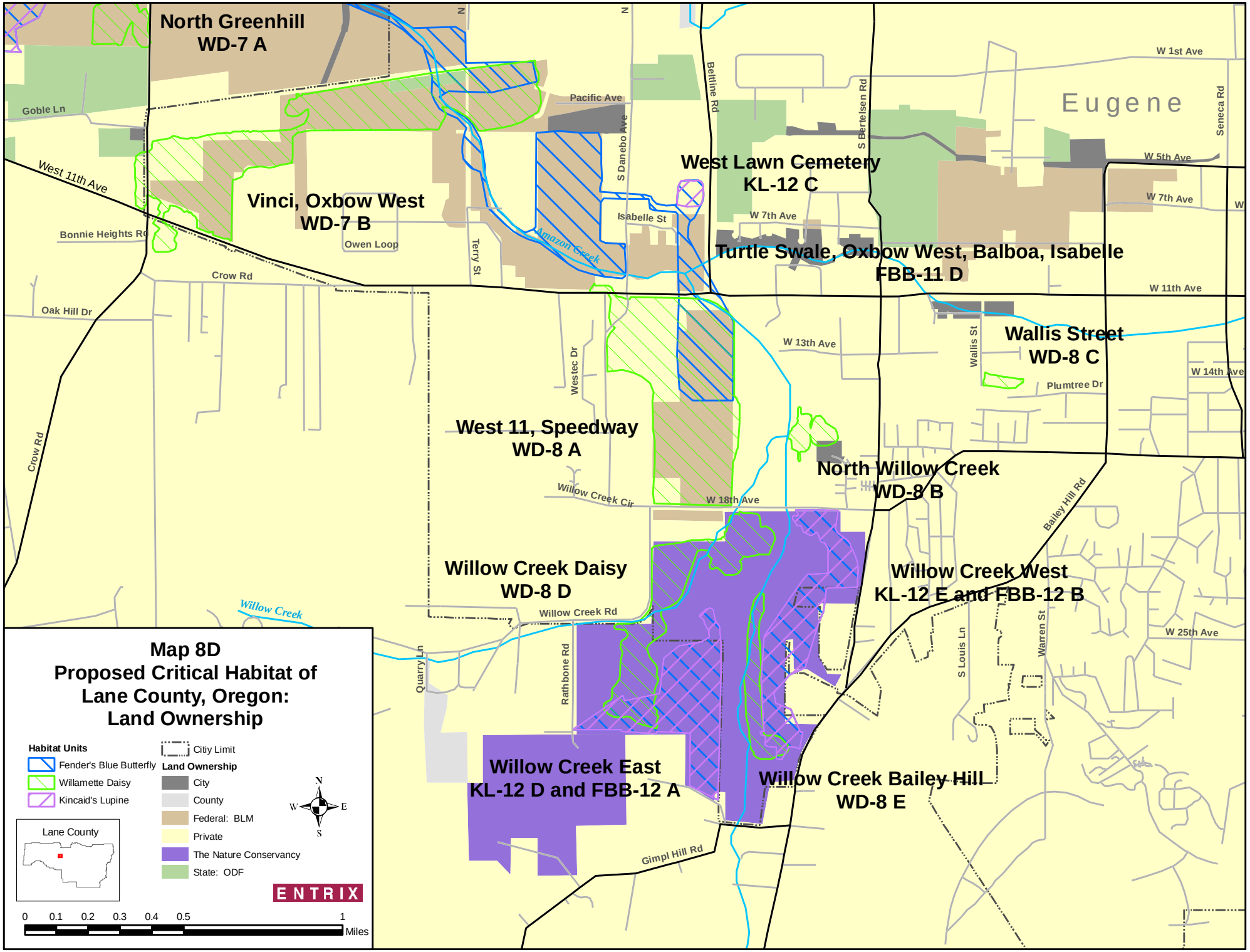

Bald Hill North
WD-4 A
Bald Hill South
WD-4 B
West Hills
FBB-9
West Hills
KL-10
Mary's River
Daisy Dr
Wooded Knolls Dr
Worth Way
Calderwood Dr
Egan Dr
Pheasant Ct
Newton Creek
Wyatt Ln
Mcbee Rd
Heritage Hills Dr
W Hills Rd
Bailey St
Primrose Loop
Newgate Dr
Rosecrest Dr
Hawk Crest Dr
Bullevard St
NW Ridgewood Dr
Mulkey Creek
NW Oak Creek Dr
Oak Creek
Adams Way
NW 53rd St
SW Reservoir Ave
SW Grand Oaks Dr
Quiet Creek Ave
SW Balsom Dr
SW 58th St
SW 55th St
SW 54th St
SW 53rd St
Memory Ln
Industrial Way
N 19th St
Clemens Mill Rd
Corvallis
SW 72nd St
SW 71st St
SW Barley Hill Dr
SW Country Club Dr
College St
N 14th St
N 15th St
N 17th St
N 18th St
N 20th Pl
SW Philomath Blvd
Newton St
Marion Pl
Neabeck Hill Dr
Green St
Philomath
Applegate St
S 14th St
S 15th St
S 16th St
S 17th St
S 18th St
S 19th St
S 20th St
S 23rd St
S 30th St
S 31st St
Mount Union Ave
Southwood Dr
SW Plymouth Dr
Copper Ln
Map 7C
Proposed Critical Habitat of
Benton County, Oregon:
Land Ownership
City Limit
Habitat Units
Kincaid's Lupine
Fender's Blue Butterfly
Willamette Daisy
Land Ownership
The Nature Conservancy
Private: Greenbelt Landtrust Easement
Private
City
Benton County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

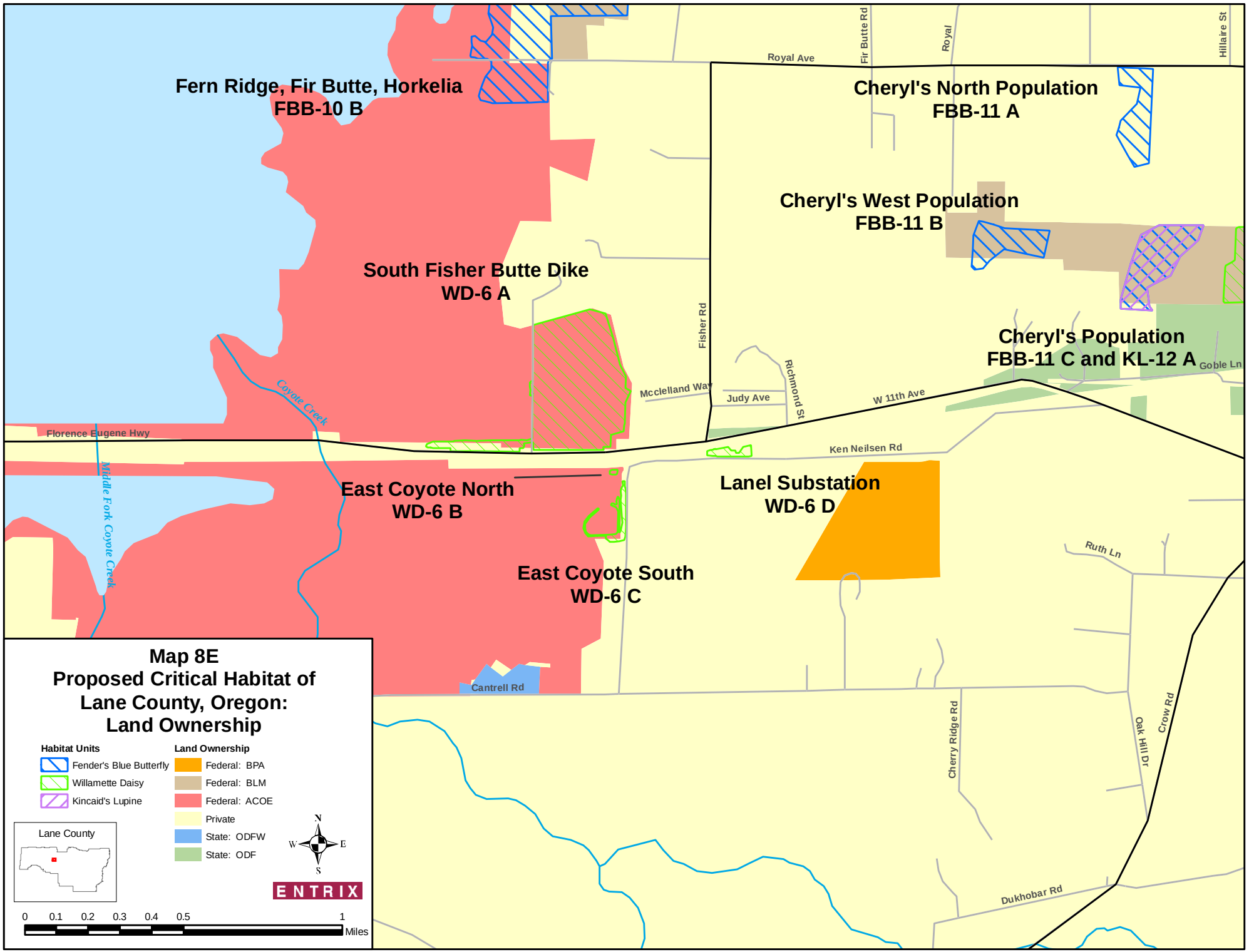

Stokes Ln
Bellfountain Rd
Evergreen Creek
Airport Ave
Wonderly Ln
Fern Rd
Blair Rd
Shamrock Ln
Shamrock Ln
Ross Ln
Airport Rd
Janet Way
Cutter Ln
Muddy Creek
WD-5
Muddy Creek
Fern Rd
Bull Run Creek
Venell Pl
Llewellyn Rd
Nicole Dr
Map 7D
Proposed Critical Habitat of
Benton County, Oregon:
Land Ownership
Benton County
Habitat Units
Willamette Daisy
Land Ownership
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

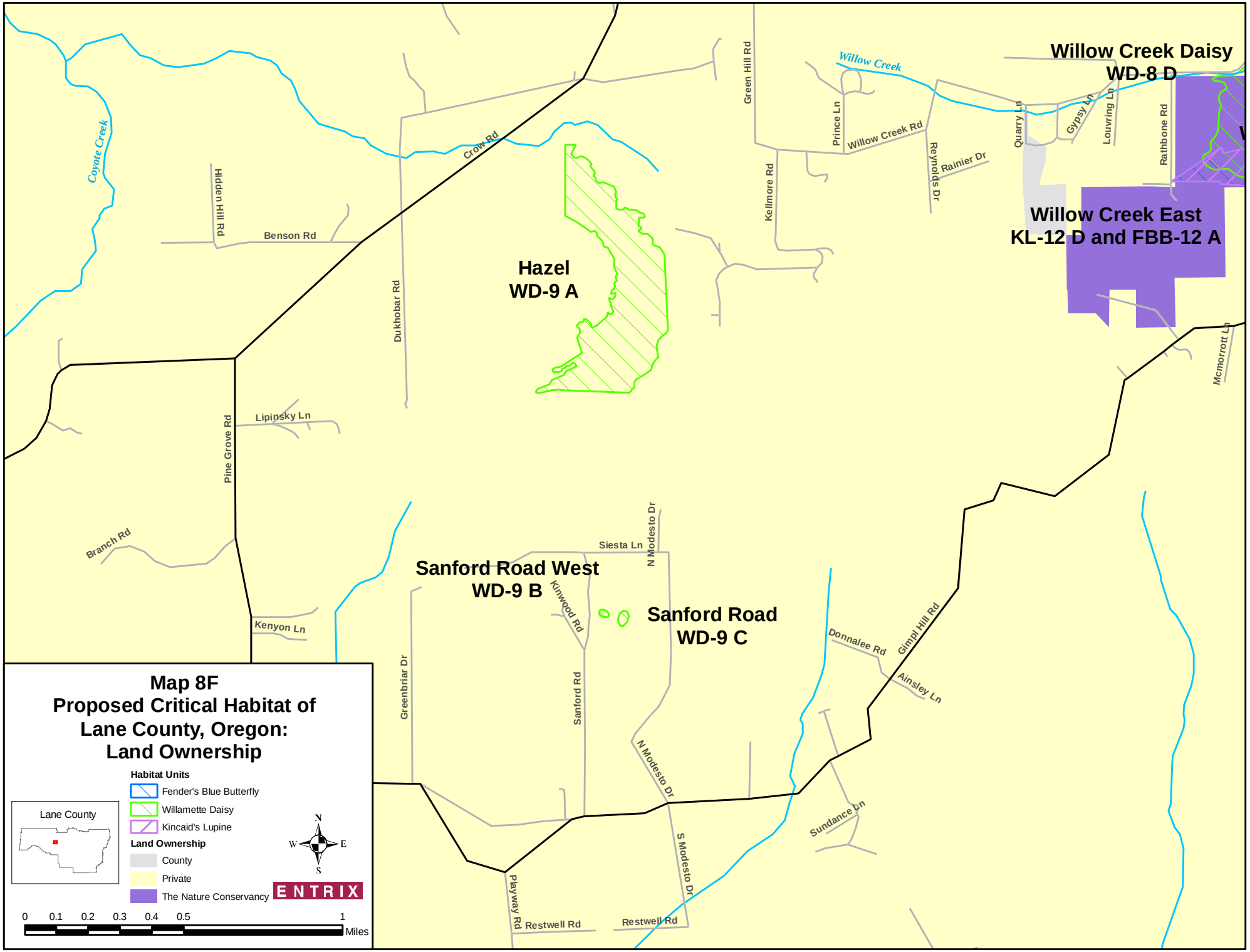

Muddy Creek
Selby Way
Egge Rd
Coburg
FBB-13
Coburg Rd
McKenzie River
I-5
Armitage Rd
Douthit Ln
Map 8A
Proposed Critical Habitat of
Lane County, Oregon:
Land Ownership
Lane County
Habitat Units
Fender's Blue Butterfly
Land Ownership
Federal: BLM
Private
The Nature Conservancy
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

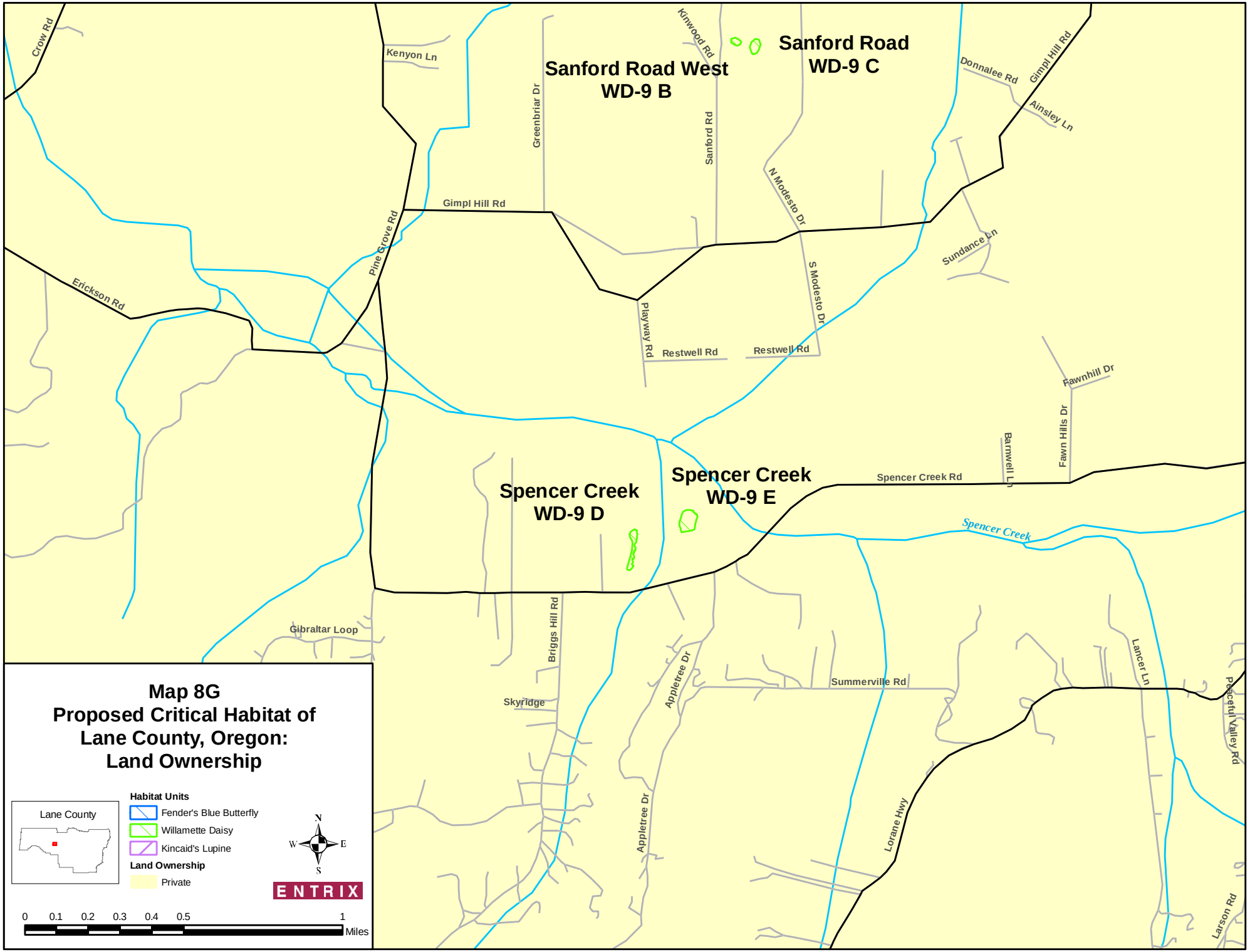

Spires Lane
KL-11 B
Shore Lane
KL-11 A
Eaton Lane
KL-11 C
Shore, Spires, Eaton
FBB-10 A
North Green Oaks
KL-11 D
Fir Butte
KL-11 E
Fern Ridge, Fir Butte, Horkelia
FBB-10 B
(western portion)
Cheryl's North Population
FBB-11 A
Fern Ridge Reservoir
Day Ln
Shore Ln
Spires Ln
Eaton Ln
Royster Rd
Jerusalem Rd
Fir Butte Rd
Clearlake Rd
Amazon Creek
Barker Rd
Ward Ln
Montieth Ln
Bodenhamer Rd
Crossley Ln
Wild Rose Ln
Amazon Creek Diversion Channel
Hillaire St
Royal Ave
Gentry Rd
Fisher Rd
Map 8B
Proposed Critical Habitat of
Lane County, Oregon:
Land Ownership
Habitat Units
Fender's Blue Butterfly
Kincaid's Lupine
Land Ownership
City
County
Federal: BLM
Federal: ACOE
Private
State: ODFW
Lane County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

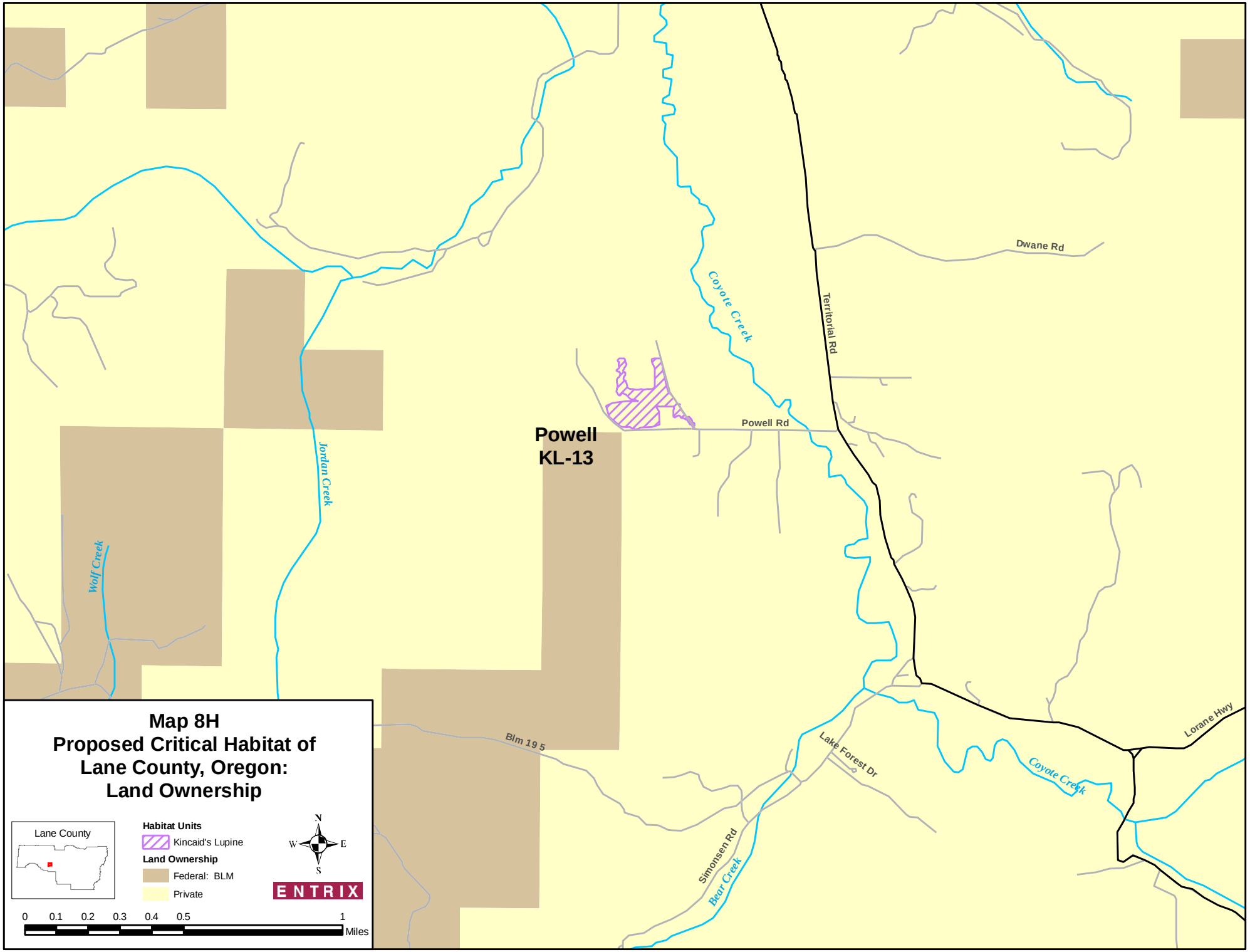

Fern Ridge, Fir Butte, Horkelia
FBB-10 B
(eastern portion)
Cheryl's North Population
FBB-11 A
Cheryl's West Population
FBB-11 B
Turtle Swale
KL-12 B
Cheryl's East Population
FBB-11 E
North Greenhill
WD-7 A
Turtle Swale, Oxbow West, Balboa, Isabelle
FBB-11 D
Cheryl's Population
FBB-11 C and KL-12 A
Vinci, Oxbow West
WD-7 B
West Lawn Cemetery
KL-12 C
West 11, Speedway
WD-8 A
Wallis Street
WD-8 C
North Willow Creek
WD-8 B
Eugene
Hillaire St
Amazon Creek
Amazon Creek Amazon Channel
Royal Ave
N Terry St
Echo Hollow Rd
N Danebo Ave
Beltline Rd
Roosevelt Blvd
Bertelsen Rd
W 1st Ave
Pacific Ave
Premier St
S Danebo Ave
W 11th Ave
Goble Ln
Ken Neilsen Rd
Bonnie Heights Rd
Crow Rd
Owen Loop
Terry St
Isabelle St
W 7th Ave
Powers St
Stewart Rd
Willow Creek
W 13th Ave
Westec Dr
Willow Creek Cir
W 18th Ave
Map 8C
Proposed Critical Habitat of
Lane County, Oregon: Land Ownership
Habitat Units
Fender's Blue Butterfly
Willamette Daisy
Kincaid's Lupine
Citiy Limit
Land Ownership
City
County
Federal: BPA
Federal: BLM
Private
State: ODF
Lane County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

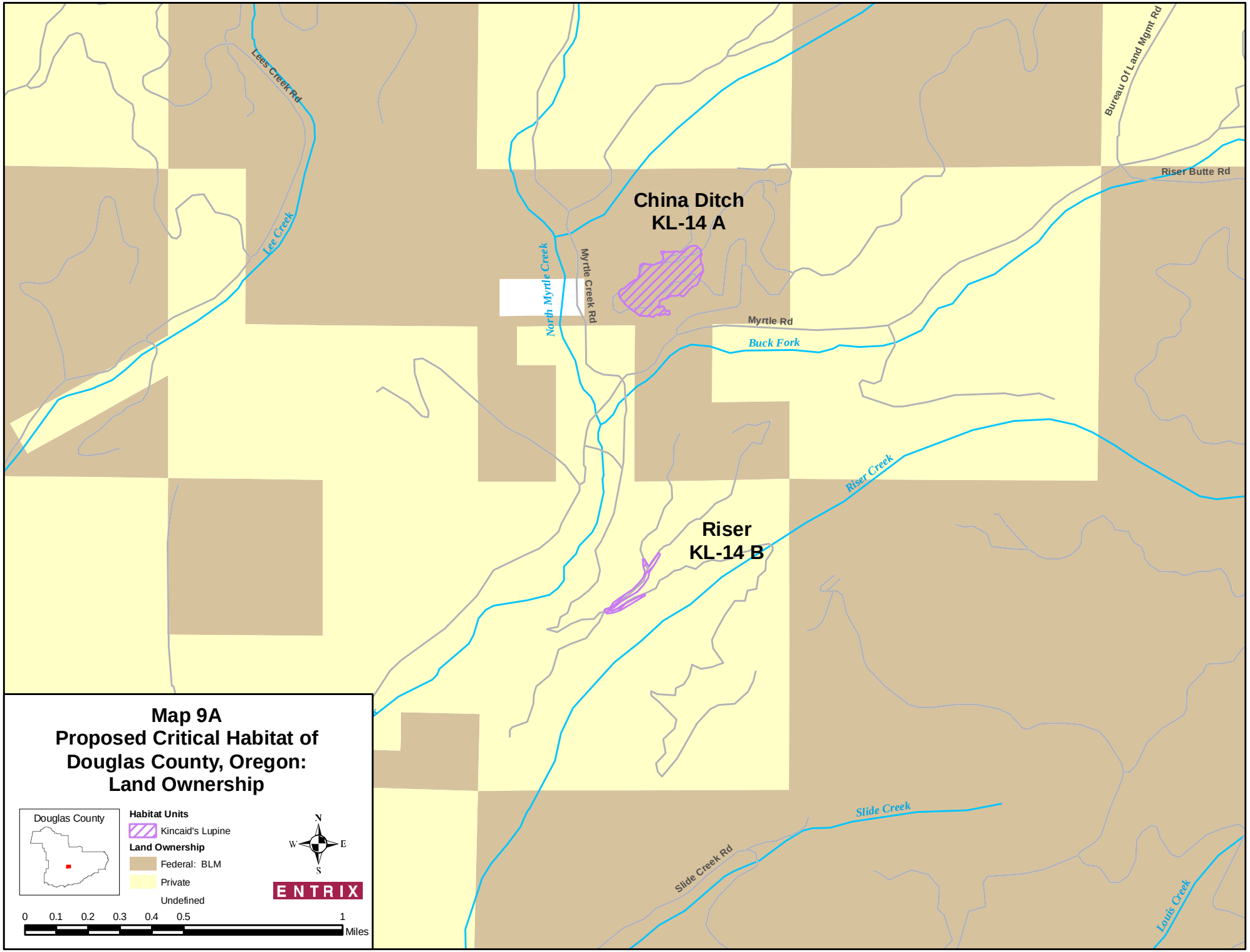

North Greenhill
WD-7 A
Vinci, Oxbow West
WD-7 B
West Lawn Cemetery
KL-12 C
Turtle Swale, Oxbow West, Balboa, Isabelle
FBB-11 D
Wallis Street
WD-8 C
West 11, Speedway
WD-8 A
North Willow Creek
WD-8 B
Willow Creek Daisy
WD-8 D
Willow Creek West
KL-12 E and FBB-12 B
Willow Creek East
KL-12 D and FBB-12 A
Willow Creek Bailey Hill
WD-8 E
Eugene
West 11th Ave
Crow Rd
Oak Hill Dr
Bonnie Heights Rd
Goble Ln
Owen Loop
Terry St
Pacific Ave
S Danebo Ave
Isabelle St
Amazon Creek
Bettline Rd
S Bertelsen Rd
W 1st Ave
W 5th Ave
W 7th Ave
Seneca Rd
W 11th Ave
W 13th Ave
W 14th Ave
Wallis St
Plumtree Dr
Westec Dr
Willow Creek Cir
W 18th Ave
Bailey Hill Rd
Willow Creek
Willow Creek Rd
Quarry Ln
Rathbone Rd
S Louis Ln
Warren St
W 25th Ave
Gimpl Hill Rd
Map 8D
Proposed Critical Habitat of
Lane County, Oregon:
Land Ownership
Habitat Units
Fender's Blue Butterfly
Willamette Daisy
Kincaid's Lupine
Citiy Limit
Land Ownership
City
County
Federal: BLM
Private
The Nature Conservancy
State: ODF
Lane County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

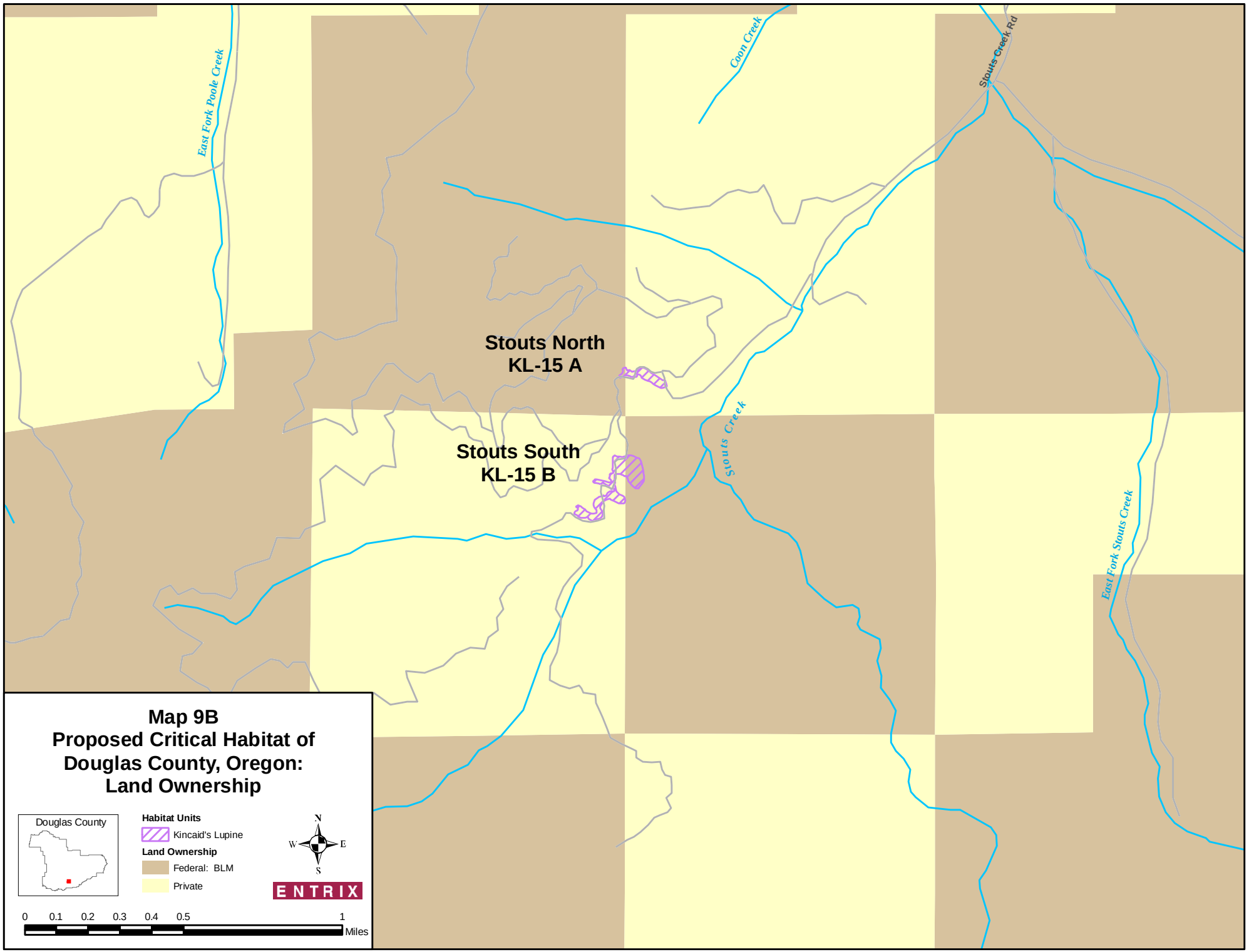

Fern Ridge, Fir Butte, Horkelia
FBB-10 B
Cheryl's North Population
FBB-11 A
Cheryl's West Population
FBB-11 B
South Fisher Butte Dike
WD-6 A
Cheryl's Population
FBB-11 C and KL-12 A
East Coyote North
WD-6 B
Lanel Substation
WD-6 D
East Coyote South
WD-6 C
Royal Ave
Fir Butte Rd
Royal
Hillaire St
Fisher Rd
Mcclelland Way
Judy Ave
Richmond St
W 11th Ave
Goble Ln
Florence Eugene Hwy
Coyote Creek
Middle Fork Coyote Creek
Ken Neilsen Rd
Ruth Ln
Cantrell Rd
Cherry Ridge Rd
Oak Hill Dr
Crow Rd
Dukhobar Rd
Map 8E
Proposed Critical Habitat of
Lane County, Oregon:
Land Ownership
Habitat Units
Fender's Blue Butterfly
Willamette Daisy
Kincaid's Lupine
Land Ownership
Federal: BPA
Federal: BLM
Federal: ACOE
Private
State: ODFW
State: ODF
Lane County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles


Willow Creek Daisy
WD-8 D
Willow Creek East
KL-12 D and FBB-12 A
Hazel
WD-9 A
Sanford Road West
WD-9 B
Sanford Road
WD-9 C
Willow Creek
Coyote Creek
Crow Rd
Hidden Hill Rd
Benson Rd
Dukhobar Rd
Green Hill Rd
Prince Ln
Willow Creek Rd
Kellmore Rd
Reynolds Dr
Rainier Dr
Quarry Ln
Gypsy Ln
Louvring Ln
Rathbone Rd
Mcmorrott Ln
Pine Grove Rd
Lipinsky Ln
Branch Rd
Kenyon Ln
Siesta Ln
N Modesto Dr
Kinwood Rd
Sanford Rd
Greenbriar Dr
Donnalee Rd
Gimpl Hill Rd
Ainsley Ln
Sundance Ln
S Modesto Dr
Playway Rd
Restwell Rd
Restwell Rd
Map 8F
Proposed Critical Habitat of
Lane County, Oregon:
Land Ownership
Habitat Units
Fender's Blue Butterfly
Willamette Daisy
Kincaid's Lupine
Land Ownership
County
Private
The Nature Conservancy
Lane County
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles


Sanford Road West
WD-9 B
Sanford Road
WD-9 C
Spencer Creek
WD-9 D
Spencer Creek
WD-9 E
Crow Rd
Kenyon Ln
Kinwood Rd
Greenbriar Dr
Sanford Rd
Donnalee Rd
Gimpl Hill Rd
Ainsley Ln
N Modesto Dr
Gimpl Hill Rd
Pine Grove Rd
Sundance Ln
Erickson Rd
S Modesto Dr
Playway Rd
Restwell Rd
Restwell Rd
Fawnhill Dr
Barnwell Ln
Fawn Hills Dr
Spencer Creek Rd
Spencer Creek
Briggs Hill Rd
Gibraltar Loop
Skyridge
Appletree Dr
Summerville Rd
Lancer Ln
Peaceful Valley Rd
Appletree Dr
Lorane Hwy
Larson Rd
Map 8G
Proposed Critical Habitat of
Lane County, Oregon:
Land Ownership
Lane County
Habitat Units
Fender's Blue Butterfly
Willamette Daisy
Kincaid's Lupine
Land Ownership
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles


Powell
KL-13
Powell Rd
Dwane Rd
Territorial Rd
Coyote Creek
Jordan Creek
Wolf Creek
Blm 19 5
Lake Forest Dr
Simonsen Rd
Bear Creek
Coyote Creek
Lorane Hwy
Map 8H
Proposed Critical Habitat of
Lane County, Oregon:
Land Ownership
Lane County
Habitat Units
Kincaid's Lupine
Land Ownership
Federal: BLM
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles


China Ditch
KL-14 A
Riser
KL-14 B
Lees Creek Rd
Lee Creek
North Myrtle Creek
Myrtle Creek Rd
Myrtle Rd
Buck Fork
Bureau Of Land Mgmt Rd
Riser Butte Rd
Riser Creek
Slide Creek
Slide Creek Rd
Louis Creek
Map 9A
Proposed Critical Habitat of
Douglas County, Oregon:
Land Ownership
Douglas County
Habitat Units
Kincaid's Lupine
Land Ownership
Federal: BLM
Private
Undefined
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles


East Fork Poole Creek
Coon Creek
Stouts Creek Rd
Stouts North
KL-15 A
Stouts South
KL-15 B
Stouts Creek
East Fork Stouts Creek
Map 9B
Proposed Critical Habitat of
Douglas County, Oregon:
Land Ownership
Douglas County
Habitat Units
Kincaid's Lupine
Land Ownership
Federal: BLM
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

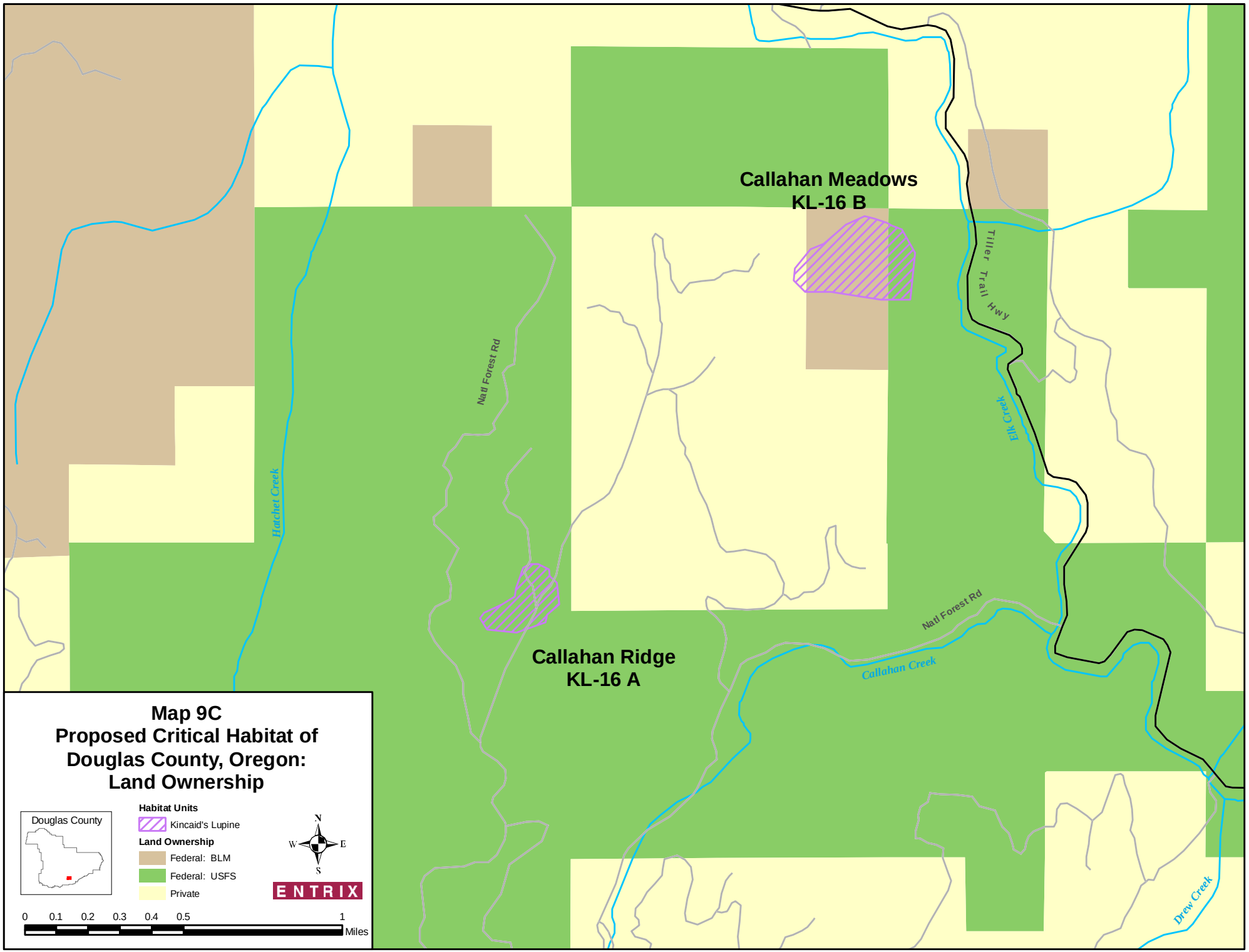

Callahan Meadows
KL-16 B
Callahan Ridge
KL-16 A
Tiller Trail Hwy
Natl Forest Rd
Natl Forest Rd
Elk Creek
Hatchet Creek
Callahan Creek
Drew Creek
Map 9C
Proposed Critical Habitat of
Douglas County, Oregon:
Land Ownership
Douglas County
Habitat Units
Kincaid's Lupine
Land Ownership
Federal: BLM
Federal: USFS
Private
N
W
E
S
ENTRIX
0 0.1 0.2 0.3 0.4 0.5 1
Miles

Table E-1
Summary of Total Economic Impacts, by Habitat Unit, in $1,000s (2006$)

	Pre-Designation (Total) (2000-2006)		Post-Designation (Total) (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-1A/KL-2A	$817	$1,911	$7,910	$12,048	$5,820	$8,887	$4,094	$6,281	$392	$597	$386	$593
FBB-1B/KL-2B	$271	$320	$2,678	$5,962	$2,186	$4,841	$2,240	$4,764	$148	$324	$212	$449
FBB-2/KL-3	$468	$1,102	$5,165	$7,732	$3,801	$5,705	$2,687	$4,056	$256	$383	$254	$384
FBB-3/KL-6	$595	$1,400	$1,650	$4,326	$1,266	$3,269	$1,066	$2,606	$84	$220	$100	$245
FBB-4A/WD-1A & B	$129	$208	$460	$2,905	$368	$2,493	$513	$2,556	$25	$167	$48	$241
FBB-4B	$698	$1,069	$1,931	$3,893	$1,456	$3,021	$1,122	$2,411	$98	$204	$106	$228
FBB-5/KL-7	$13	$48	$738	$4,523	$499	$3,029	$320	$1,879	$34	$203	$29	$178
FBB-6A	$93	$96	$381	$1,154	$300	$1,019	$275	$985	$20	$69	$26	$93
FBB-6B	$161	$454	$471	$1,410	$363	$1,065	$307	$844	$24	$71	$29	$79
FBB-7/KL-8	$86	$89	$342	$963	$268	$844	$240	$809	$18	$56	$22	$76
FBB-8/KL-9	$70	$250	$72	$821	$60	$708	$146	$788	$4	$48	$14	$75
FBB-9/KL-10	$7	$12	$105	$420	$101	$345	$168	$409	$7	$23	$16	$39
FBB-10A/KL-11A, B, & C	$529	$549	$382	$613	$296	$474	$242	$394	$20	$33	$23	$37
FBB-10B/KL-11D & E	$116	$273	$274	$672	$204	$500	$146	$357	$14	$33	$14	$33
FBB-11A	$99	$241	$265	$650	$197	$484	$142	$348	$13	$32	$13	$33
FBB-11B	$13	$16	$144	$340	$118	$276	$126	$277	$8	$18	$11	$26
FBB-11C/KL-12A	$23	$25	$96	$292	$76	$257	$69	$249	$5	$18	$7	$24
FBB-11D/KL-12B & C/WD-7B & 8A	$205	$211	$433	$456	$323	$340	$230	$242	$22	$23	$22	$23
FBB-11E	$21	$22	$87	$263	$69	$232	$62	$224	$5	$16	$6	$21
FBB-12A/KL-12D/WD-8D	$60	$147	$162	$401	$122	$299	$88	$215	$8	$20	$8	$20
FBB-12B/KL-12E/WD-8E	$125	$155	$195	$327	$154	$261	$121	$205	$11	$19	$13	$20

	Pre-Designation (Total) (2000-2006)		Post-Designation (Total) (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-13	$54	$57	$156	$228	$119	$174	$105	$158	$8	$11	$10	$14
KL-1A	$55	$57	$267	$280	$198	$208	$141	$148	$13	$14	$13	$14
KL-1B	$0	$1	$8	$130	$7	$114	$19	$124	$0	$8	$2	$12
KL-4A	$1	$2	$8	$114	$8	$104	$18	$114	$1	$7	$2	$11
KL-4B	$10	$11	$42	$129	$33	$114	$31	$110	$2	$8	$3	$10
KL-5	$36	$51	$106	$154	$80	$115	$62	$91	$5	$8	$6	$9
KL-13	$46	$56	$116	$140	$88	$106	$66	$81	$5	$8	$6	$8
KL-14A	$54	$66	$134	$148	$99	$111	$71	$79	$7	$8	$7	$8
KL-14B	$10	$46	$35	$140	$26	$104	$19	$77	$2	$8	$2	$7
KL-15A	$23	$34	$66	$113	$51	$88	$45	$77	$3	$6	$3	$8
KL-15B	$1	$2	$20	$78	$19	$64	$31	$76	$1	$4	$3	$7
KL-16A	$1	$2	$18	$72	$17	$59	$28	$70	$1	$4	$3	$6
KL-16B	$10	$46	$29	$123	$21	$91	$15	$65	$1	$6	$1	$6
WD-1B	$38	$46	$98	$114	$74	$86	$54	$64	$4	$6	$4	$7
WD-2	$27	$28	$73	$80	$54	$59	$41	$45	$4	$4	$4	$4
WD-3A	$8	$8	$38	$59	$29	$45	$22	$40	$2	$3	$2	$4
WD-3B	$80	$86	$54	$73	$40	$56	$30	$40	$3	$4	$3	$4
WD-3C	$2	$5	$12	$46	$11	$37	$17	$40	$1	$3	$1	$4
WD-4A	$23	$24	$26	$51	$21	$40	$20	$36	$2	$3	$2	$4
WD-4B	$0	$0	$1	$20	$1	$17	$3	$19	$0	$1	$0	$2
WD-5	$0	$1	$15	$47	$10	$30	$5	$17	$1	$2	$0	$2
WD-6A	$12	$14	$29	$32	$22	$24	$15	$17	$1	$1	$1	$1
WD-6B	$9	$10	$27	$29	$20	$22	$16	$16	$1	$1	$1	$1
WD-6C	$0	$0	$3	$12	$3	$9	$6	$12	$0	$1	$1	$1

Unit/Subunit	Pre-Designation (Total) (2000-2006)		Post-Designation (Total) (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
WD-6D	$0	$0	$2	$12	$2	$9	$4	$11	$0	$1	$0	$1
WD-7A	$0	$0	$2	$10	$2	$8	$4	$9	$0	$1	$0	$1
WD-7B	$1	$1	$5	$11	$3	$10	$4	$9	$0	$0	$0	$1
WD-8A	$0	$0	$2	$9	$2	$7	$3	$9	$0	$0	$0	$1
WD-8B	$1	$1	$3	$11	$2	$8	$2	$9	$0	$0	$0	$1
WD-8C	$0	$0	$1	$5	$1	$4	$3	$5	$0	$0	$0	$1
WD-8D	$0	$0	$1	$5	$1	$4	$2	$5	$0	$0	$0	$0
WD-8E	$0	$0	$1	$3	$1	$3	$1	$3	$0	$0	$0	$0
WD-9A	$21	$41	$6	$6	$5	$5	$3	$3	$0	$0	$0	$0
WD-9B	$0	$0	$1	$3	$1	$3	$1	$3	$0	$0	$0	$0
WD-9C	$0	$0	$0	$2	$0	$1	$1	$2	$0	$0	$0	$0
WD-9D	$0	$0	$0	$1	$0	$0	$0	$0	$0	$0	$0	$0
WD-9E	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$5,122	$9,294	$25,347	$52,659	$19,119	$40,287	$15,311	$32,581	$1,285	$2,710	$1,442	$3,077

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-2
Summary of Administrative Costs, by Habitat Unit, in $1,000s (2006$)

Unit/Subunit	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-1A/KL-2A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-1B/KL-2B	$0	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-2/KL-3	$2	$3	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-3/KL-6	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-4A/WD-1A & B	$39	$70	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-4B	$18	$33	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-5/KL-7	$1	$2	$14	$22	$9	$14	$5	$8	$1	$1	$0	$1
FBB-6A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-6B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-7/KL-8	$5	$10	$1	$1	$1	$1	$1	$1	$0	$0	$0	$0
FBB-8/KL-9	$13	$23	$24	$36	$22	$34	$21	$33	$2	$2	$2	$3
FBB-9/KL-10	$1	$2	$1	$1	$1	$1	$1	$1	$0	$0	$0	$0
FBB-10A/KL-11A, B, & C	$5	$9	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-10B/KL-11D & E	$58	$95	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-11A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-11B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-11C/KL-12A	$1	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-11D/KL-12B & C/WD-7B & 8A	$49	$74	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-11E	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-12A/KL-12D/WD-8D	$4	$11	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-12B/KL-12E/WD-8E	$4	$10	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Unit/Subunit	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-13	$2	$4	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-1A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-1B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-4A	$1	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-4B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-13	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-14A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-14B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-15A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-15B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-16A	$19	$39	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-16B	$0	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-1B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-2	$1	$2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-3A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-3B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-3C	$0	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-4A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-4B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-5	$0	$1	$1	$1	$1	$1	$1	$1	$0	$0	$0	$0
WD-6A	$4	$7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-6B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-6C	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Unit/Subunit	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
WD-6D	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-7A	$14	$23	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-7B	$29	$44	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-8A	$2	$4	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-8B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-8C	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-8D	$2	$6	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-8E	$1	$2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9A	$1	$3	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9C	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9D	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9E	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$276	$482	$41	$61	$34	$51	$29	$44	$3	$3	$2	$4

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-3
Summary of Economic Impacts Related to Development, by Habitat Unit, in $1,000s (2006$)

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-1A/KL-2A	$0	$0	$7	$89	$7	$84	$12	$89	$0	$6	$1	$8
FBB-1B/KL-2B	$0	$0	$16	$201	$16	$190	$27	$201	$1	$13	$3	$19
FBB-2/KL-3	$0	$0	$53	$635	$53	$600	$87	$635	$4	$40	$8	$60
FBB-3/KL-6	$0	$0	$0	$8	$0	$7	$1	$8	$0	$1	$0	$1
FBB-4A/WD-1A & B	$0	$0	$75	$742	$75	$677	$139	$742	$5	$46	$13	$70
FBB-4B	$0	$0	$101	$2,163	$101	$1,941	$322	$2,163	$7	$130	$30	$204
FBB-5/KL-7	$0	$0	$4	$91	$4	$82	$13	$91	$0	$5	$1	$9
FBB-6A	$0	$0	$1	$18	$1	$16	$3	$18	$0	$1	$0	$2
FBB-6B	$0	$0	$5	$118	$5	$105	$17	$118	$0	$7	$2	$11
FBB-7/KL-8	$0	$0	$17	$43	$17	$43	$17	$43	$1	$3	$2	$4
FBB-8/KL-9	$0	$0	$456	$3,032	$456	$2,561	$926	$3,032	$31	$172	$87	$286
FBB-9/KL-10	$0	$0	$16	$116	$16	$97	$35	$116	$1	$7	$3	$11
FBB-10A/KL-11A, B, & C	$0	$0	$8	$37	$8	$31	$15	$37	$1	$2	$1	$4
FBB-10B/KL-11D & E	$0	$0	$155	$683	$155	$563	$275	$683	$10	$38	$26	$64
FBB-11A	$0	$0	$15	$68	$15	$56	$27	$68	$1	$4	$3	$6
FBB-11B	$0	$0	$1	$5	$1	$4	$2	$5	$0	$0	$0	$0
FBB-11C/KL-12A	$0	$0	$1	$6	$1	$5	$2	$6	$0	$0	$0	$1
FBB-11D/KL-12B & C/WD-7B & 8A	$0	$0	$24	$105	$24	$87	$42	$105	$2	$6	$4	$10
FBB-11E	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-12A/KL-12D/WD-8D	$0	$0	$0	$1	$0	$1	$0	$1	$0	$0	$0	$0

Unit/Subunit	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-12B/KL-12E/WD-8E	$0	$0	$3	$15	$3	$13	$6	$15	$0	$1	$1	$1
FBB-13	$0	$0	$27	$752	$27	$657	$122	$752	$2	$44	$12	$71
KL-1A	$0	$0	$1	$5	$1	$4	$3	$5	$0	$0	$0	$1
KL-1B	$0	$0	$3	$12	$3	$9	$6	$12	$0	$1	$1	$1
KL-4A	$0	$0	$64	$795	$64	$752	$107	$795	$4	$51	$10	$75
KL-4B	$0	$0	$15	$181	$15	$171	$24	$181	$1	$12	$2	$17
KL-5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-13	$0	$0	$17	$74	$17	$61	$30	$74	$1	$4	$3	$7
KL-14A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-14B	$0	$0	$1	$3	$1	$3	$1	$3	$0	$0	$0	$0
KL-15A	$0	$0	$0	$8	$0	$6	$1	$8	$0	$0	$0	$1
KL-15B	$0	$0	$0	$19	$0	$15	$2	$19	$0	$1	$0	$2
KL-16A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-16B	$0	$0	$1	$2	$1	$2	$1	$2	$0	$0	$0	$0
WD-1B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-2	$0	$0	$8	$114	$8	$104	$18	$114	$1	$7	$2	$11
WD-3A	$0	$0	$0	$1	$0	$1	$1	$1	$0	$0	$0	$0
WD-3B	$0	$0	$1	$4	$1	$3	$2	$4	$0	$0	$0	$0
WD-3C	$0	$0	$11	$79	$11	$63	$28	$79	$1	$4	$3	$7
WD-4A	$0	$0	$2	$17	$2	$14	$5	$17	$0	$1	$0	$2
WD-4B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-5	$0	$0	$26	$185	$26	$156	$56	$185	$2	$10	$5	$18
WD-6A	$0	$0	$4	$20	$4	$16	$8	$20	$0	$1	$1	$2

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
WD-6B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-6C	$0	$0	$2	$8	$2	$7	$3	$8	$0	$0	$0	$1
WD-6D	$0	$0	$2	$9	$2	$8	$4	$9	$0	$1	$0	$1
WD-7A	$0	$0	$0	$2	$0	$2	$1	$2	$0	$0	$0	$0
WD-7B	$0	$0	$30	$133	$30	$109	$53	$133	$2	$7	$5	$13
WD-8A	$0	$0	$46	$204	$46	$168	$82	$204	$3	$11	$8	$19
WD-8B	$0	$0	$8	$34	$8	$28	$14	$34	$1	$2	$1	$3
WD-8C	$0	$0	$2	$11	$2	$9	$4	$11	$0	$1	$0	$1
WD-8D	$0	$0	$2	$7	$2	$6	$3	$7	$0	$0	$0	$1
WD-8E	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9A	$0	$0	$90	$397	$90	$328	$160	$397	$6	$22	$15	$38
WD-9B	$0	$0	$0	$2	$0	$1	$1	$2	$0	$0	$0	$0
WD-9C	$0	$0	$1	$3	$1	$3	$1	$3	$0	$0	$0	$0
WD-9D	$0	$0	$1	$5	$1	$4	$2	$5	$0	$0	$0	$0
WD-9E	$0	$0	$2	$9	$2	$7	$3	$9	$0	$0	$0	$1
Total	$0	$0	$1,326	$11,269	$1,326	$9,879	$2,713	$11,269	$89	$664	$256	$1,064

Considering the impact occurs in year 1 (2006) at the time the proposed designation is finalized, the range of undiscounted 2006 dollars is comprised of the low estimate of impacts for PV 3% (low) and the high estimate of impacts for PV 7% (high). Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-4
Summary of Economic Impacts Related to the Benton County HCP, by Habitat Unit, in $1,000s (2006$)

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-7/KL-8	$16	$16	$135	$142	$105	$112	$80	$86	$7	$8	$8	$8
FBB-8/KL-9	$233	$233	$1,996	$2,105	$1,557	$1,658	$1,185	$1,278	$105	$111	$112	$121
FBB-9/KL-10	$16	$16	$135	$143	$106	$112	$80	$87	$7	$8	$8	$8
WD-4A	$2	$2	$13	$14	$10	$11	$8	$8	$1	$1	$1	$1
WD-4B	$1	$1	$13	$13	$10	$11	$8	$8	$1	$1	$1	$1
WD-5	$13	$13	$107	$113	$84	$89	$64	$69	$6	$6	$6	$6
Total	$281	$281	$2,399	$2,530	$1,872	$1,993	$1,425	$1,536	$127	$135	$136	$145

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-5
Summary of Economic Impacts Related to the Transportation Activities, by Habitat Unit, in $1,000s (2006$)

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-1A/KL-2A	$10	$11	$35	$40	$26	$30	$19	$21	$2	$2	$2	$2
FBB-1B/KL-2B	$23	$24	$80	$91	$60	$67	$42	$48	$4	$5	$4	$5
FBB-2/KL-3	$84	$86	$289	$328	$215	$244	$153	$174	$14	$16	$14	$16
FBB-3/KL-6	$10	$46	$35	$132	$26	$97	$18	$69	$2	$7	$2	$6
FBB-4A/WD-1A & B	$7	$29	$138	$574	$103	$427	$73	$304	$7	$29	$7	$29
FBB-4B	$4	$16	$77	$319	$57	$237	$41	$169	$4	$16	$4	$16
FBB-5/KL-7	$12	$46	$720	$4,410	$486	$2,933	$302	$1,780	$33	$197	$28	$168
FBB-6A	$0	$0	$0	$2	$0	$1	$0	$1	$0	$0	$0	$0
FBB-6B	$0	$1	$3	$12	$2	$9	$2	$6	$0	$1	$0	$1
FBB-7/KL-8	$1	$3	$12	$51	$9	$38	$7	$27	$1	$3	$1	$3
FBB-8/KL-9	$20	$54	$188	$762	$141	$568	$101	$406	$9	$38	$10	$38
FBB-9/KL-10	$1	$3	$12	$51	$9	$38	$7	$27	$1	$3	$1	$3
FBB-10A/KL-11A, B, & C	$3	$5	$8	$13	$6	$10	$4	$7	$0	$1	$0	$1
FBB-10B/KL-11D & E	$29	$45	$87	$219	$64	$158	$45	$108	$4	$11	$4	$10
FBB-11A	$1	$2	$3	$4	$2	$3	$1	$2	$0	$0	$0	$0
FBB-11B	$1	$1	$2	$4	$2	$3	$1	$2	$0	$0	$0	$0
FBB-11C/KL-12A	$1	$2	$4	$6	$3	$4	$2	$3	$0	$0	$0	$0
FBB-11D/KL-12B & C/WD-7B & 8A	$60	$66	$5,987	$7,196	$4,383	$5,267	$3,045	$3,659	$295	$354	$287	$345
FBB-11E	$0	$1	$1	$1	$1	$1	$0	$1	$0	$0	$0	$0
FBB-12A/KL-12D/WD-8D	$4	$6	$10	$15	$7	$12	$5	$8	$1	$1	$1	$1
FBB-12B/KL-12E/WD-8E	$3	$5	$9	$14	$7	$10	$5	$7	$0	$1	$0	$1

Unit/Subunit	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-13	$8	$13	$22	$34	$16	$25	$12	$18	$1	$2	$1	$2
KL-1A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-1B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-4A	$92	$95	$317	$359	$236	$267	$168	$190	$16	$18	$16	$18
KL-4B	$21	$22	$72	$82	$54	$61	$38	$43	$4	$4	$4	$4
KL-5	$10	$46	$29	$123	$21	$91	$15	$65	$1	$6	$1	$6
KL-13	$1	$2	$3	$4	$2	$3	$1	$2	$0	$0	$0	$0
KL-14A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-14B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-15A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-15B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-16A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-16B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-1B	$0	$0	$0	$1	$0	$0	$0	$0	$0	$0	$0	$0
WD-2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-3A	$7	$7	$20	$20	$15	$15	$11	$11	$1	$1	$1	$1
WD-3B	$20	$20	$54	$54	$40	$40	$29	$29	$3	$3	$3	$3
WD-3C	$47	$47	$126	$126	$94	$94	$67	$67	$6	$6	$6	$6
WD-4A	$0	$0	$1	$5	$1	$4	$1	$3	$0	$0	$0	$0
WD-4B	$0	$0	$1	$5	$1	$4	$1	$3	$0	$0	$0	$0
WD-5	$0	$2	$10	$41	$7	$30	$5	$22	$0	$2	$0	$2
WD-6A	$5	$8	$13	$20	$10	$15	$7	$11	$1	$1	$1	$1
WD-6B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-6C	$0	$0	$1	$1	$0	$1	$0	$0	$0	$0	$0	$0

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
WD-6D	$0	$0	$0	$1	$0	$0	$0	$0	$0	$0	$0	$0
WD-7A	$1	$2	$4	$6	$3	$4	$2	$3	$0	$0	$0	$0
WD-7B	$40	$45	$4,065	$4,885	$2,975	$3,576	$2,067	$2,484	$200	$240	$195	$235
WD-8A	$6	$9	$16	$24	$12	$18	$8	$13	$1	$1	$1	$1
WD-8B	$1	$1	$1	$2	$1	$2	$1	$1	$0	$0	$0	$0
WD-8C	$0	$0	$0	$1	$0	$0	$0	$0	$0	$0	$0	$0
WD-8D	$3	$5	$8	$13	$6	$10	$4	$7	$0	$1	$0	$1
WD-8E	$1	$2	$2	$4	$2	$3	$1	$2	$0	$0	$0	$0
WD-9A	$6	$9	$15	$23	$11	$17	$8	$12	$1	$1	$1	$1
WD-9B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9C	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9D	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9E	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$543	$787	$12,480	$20,078	$9,116	$14,437	$6,319	$9,815	$612	$971	$595	$926

Results are shown in $1,000s. Numbers may not sum due to rounding

Table E-6
Summary of Conservation Costs on Public and Conservancy Lands, by Habitat Unit, in $1,000s (2006$)

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-1A/KL-2A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-1B/KL-2B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-2/KL-3	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-3/KL-6	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-4A/WD-1A & B	$652	$970	$1,718	$2,577	$1,278	$1,917	$910	$1,365	$86	$129	$86	$129
FBB-4B	$107	$159	$282	$423	$210	$315	$150	$224	$14	$21	$14	$21
FBB-5/KL-7	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-6A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-6B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-7/KL-8	$103	$126	$30	$90	$22	$67	$16	$48	$2	$5	$2	$5
FBB-8/KL-9	$5	$10	$14	$27	$10	$20	$7	$15	$1	$1	$1	$1
FBB-9/KL-10	$511	$528	$218	$302	$164	$226	$119	$163	$11	$15	$11	$15
FBB-10A/KL-11A, B, & C	$15	$20	$50	$63	$37	$47	$26	$33	$2	$3	$2	$3
FBB-10B/KL-11D & E	$508	$1,260	$1,408	$3,424	$1,047	$2,548	$746	$1,815	$70	$171	$70	$171
FBB-11A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
FBB-11B	$59	$146	$159	$392	$119	$292	$85	$208	$8	$20	$8	$20
FBB-11C/KL-12A	$97	$238	$260	$638	$193	$475	$138	$339	$13	$32	$13	$32
FBB-11D/KL-12B & C/WD-7B & 8A	$708	$1,771	$1,899	$4,747	$1,413	$3,533	$1,007	$2,517	$95	$237	$95	$238
FBB-11E	$0	$0	$14	$46	$9	$29	$5	$16	$1	$2	$0	$2
FBB-12A/KL-12D/WD-8D	$46	$49	$124	$132	$92	$98	$66	$70	$6	$7	$6	$7
FBB-12B/KL-12E/WD-8E	$39	$41	$104	$111	$78	$83	$55	$59	$5	$6	$5	$6

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
FBB-13	$60	$233	$23	$35	$17	$26	$12	$18	$1	$2	$1	$2
KL-1A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-1B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-4A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-4B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-13	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-14A	$55	$57	$267	$280	$198	$208	$141	$148	$13	$14	$13	$14
KL-14B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
KL-15A	$1	$1	$3	$3	$2	$2	$1	$1	$0	$0	$0	$0
KL-15B	$8	$8	$38	$40	$29	$30	$20	$21	$2	$2	$2	$2
KL-16A	$2	$2	$6	$6	$5	$5	$3	$3	$0	$0	$0	$0
KL-16B	$205	$210	$432	$454	$322	$338	$229	$240	$22	$23	$22	$23
WD-1B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-2	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-3A	$2	$3	$7	$8	$5	$6	$4	$4	$0	$0	$0	$0
WD-3B	$7	$8	$18	$22	$13	$16	$10	$12	$1	$1	$1	$1
WD-3C	$7	$9	$19	$23	$14	$17	$10	$12	$1	$1	$1	$1
WD-4A	$21	$22	$10	$15	$8	$11	$6	$8	$1	$1	$1	$1
WD-4B	$79	$85	$40	$55	$29	$41	$21	$29	$2	$3	$2	$3
WD-5	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-6A	$27	$36	$89	$114	$66	$84	$47	$60	$4	$6	$4	$6
WD-6B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-6C	$1	$1	$2	$2	$1	$2	$1	$1	$0	$0	$0	$0

	Pre-Designation (2000-2006)		Post-Designation (2007-2026)									
			Undiscounted		PV 3%		PV 7%		Annualized 3%		Annualized 7%	
Unit/Subunit	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
WD-6D	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-7A	$101	$248	$270	$664	$201	$494	$143	$352	$14	$33	$14	$33
WD-7B	$399	$1,013	$1,070	$2,714	$796	$2,020	$567	$1,439	$54	$136	$54	$136
WD-8A	$153	$441	$409	$1,182	$305	$879	$217	$627	$20	$59	$20	$59
WD-8B	$1	$4	$3	$10	$2	$7	$2	$5	$0	$1	$0	$1
WD-8C	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-8D	$33	$35	$88	$94	$66	$70	$47	$50	$4	$5	$4	$5
WD-8E	$10	$10	$27	$28	$20	$21	$14	$15	$1	$1	$1	$1
WD-9A	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9B	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9C	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9D	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
WD-9E	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total	$4,022	$7,744	$9,101	$18,721	$6,771	$13,927	$4,825	$9,917	$454	$937	$453	$938

Results are shown in $1,000s. Numbers may not sum due to rounding