Environmental Assessment

for issuance of an Endangered Species Act Section 10(a)(1)(B) Permit for incidental take of Fender's blue butterfly, Taylor's checkerspot butterfly, Willamette daisy, Kincaid's lupine, Bradshaw's lomatium, Nelson's checkermallow, and peacock larkspur in Benton County.

Benton County
Corvallis, Oregon

U.S. Fish and Wildlife Service
Portland, Oregon
December 2010

Title for Proposed Action: Environmental Assessment for issuance of an Endangered Species Act Section 10(a)(1)(B) Permit for incidental take of Fender's blue butterfly, Taylor's checkerspot butterfly, Willamette daisy, Kincaid's lupine, Bradshaw's lomatium, Nelson's checkermallow, and peacock larkspur in Benton County.

Unit of Fish and Wildlife Service Proposing Action: US Fish and Wildlife Service, Portland, Oregon.

Legal Mandate for Proposed Action: Endangered Species Act of 1973, as amended, Section 10(a)(1)(B), as implemented by 50 CFR 17.22 for endangered species; National Environmental Policy Act of 1969, as implemented by 40 CFR 1500, *et. seq.*

Applicant: Benton County, Oregon.

Date: December 2010.

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1 Purpose and Need for Action

1.1 Introduction

This Environmental Assessment (EA) has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) to address impacts on the environment resulting from the proposed issuance of an Incidental Take Permit (Permit) under section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (Act), to Benton County, a political subdivision of the State of Oregon. The Act prohibits "take" of federally listed species, defining take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect such species or to attempt to engage in any such conduct." Section 10(a)(1)(B) defines incidental take as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity; and provides for the issuance of Permits to authorize such take. Under section 10(a)(2)(A), any application for a Permit must include a "conservation plan" detailing, among other things, the impacts of the incidental take allowed by the Permit on affected covered species and how the impacts will be minimized and mitigated. Accordingly, Benton County has received from the U.S. Fish and Wildlife Service (USFWS) a Permit in connection with planned and ongoing activities in Benton County, and has prepared a Benton County Prairie Species Habitat Conservation Plan (HCP), dated December 2010, in support of that Permit. Benton County has also prepared a Implementation Agreement (IA), specifying responsibilities under the HCP and various legal understandings among the parties to the Permit.

1.2 Purpose

The purpose of the Proposed Action is to authorize incidental take coverage to Benton County for impacts to seven species, the HCP "Covered Species": Fender's blue butterfly (endangered); Taylor's checkerspot butterfly (candidate), Kincaid's lupine (threatened), Willamette daisy (endangered), Bradshaw's lomatium (endangered), Nelson's checkermallow (threatened); and peacock larkspur (species of concern), resulting from (1) home, farm, and forest construction and utility construction/maintenance on private lands; (2) public service facility construction; (3) transportation and work within road rights-of-way; (4) water and wastewater management; (5) habitat restoration, enhancement, and management (including monitoring and plant material collection) activities (both as a HCP mitigation measure and as a conservation activity at parks, natural areas, and open spaces); (6) agricultural activities; and (7) emergency response activities on non-federal public lands and lands owned or held under conservation easement by a specific conservation organization (See Chapter 2 of EA for more details). Under the permit, Benton County would have authorization to issue certificates of inclusion (take authorization) to private landowners needing a County permit or agricultural building authorization, and "Cooperators": a conservation organization, two utility companies, and several city and state public landowners. In return, Benton County and Cooperators would implement conservation measures set forth in a habitat conservation plan (HCP) to mitigate these impacts to the maximum extent practicable. The issuance of the Permit and implementation of the HCP is referred to throughout the EA document as the "Proposed Action".

1.3 Need

Benton County, Cooperators, and private landowners needing County permits or agricultural building authorizations in the Fender's Blue Zone (area of potential Fender's blue butterfly habitat; Figure 1.1) need the regulatory certainty over the next 50-years that the Permit provides. The Permit allows for a streamlined approach to the issuance of take for the Covered Species on lands covered in the Permit to accommodate future growth (homes, farm and forest buildings, road improvements, water and wastewater facilities, and utility construction/maintenance), address public safety (road maintenance, emergency services), and improve prairie habitat in Benton County. The Permit will ensure the timely development of these projects, while enhancing prairie habitat for the Covered Species through targeted conservation and mitigation measures designed to increase the populations of Covered Species over the 50-year Permit term.

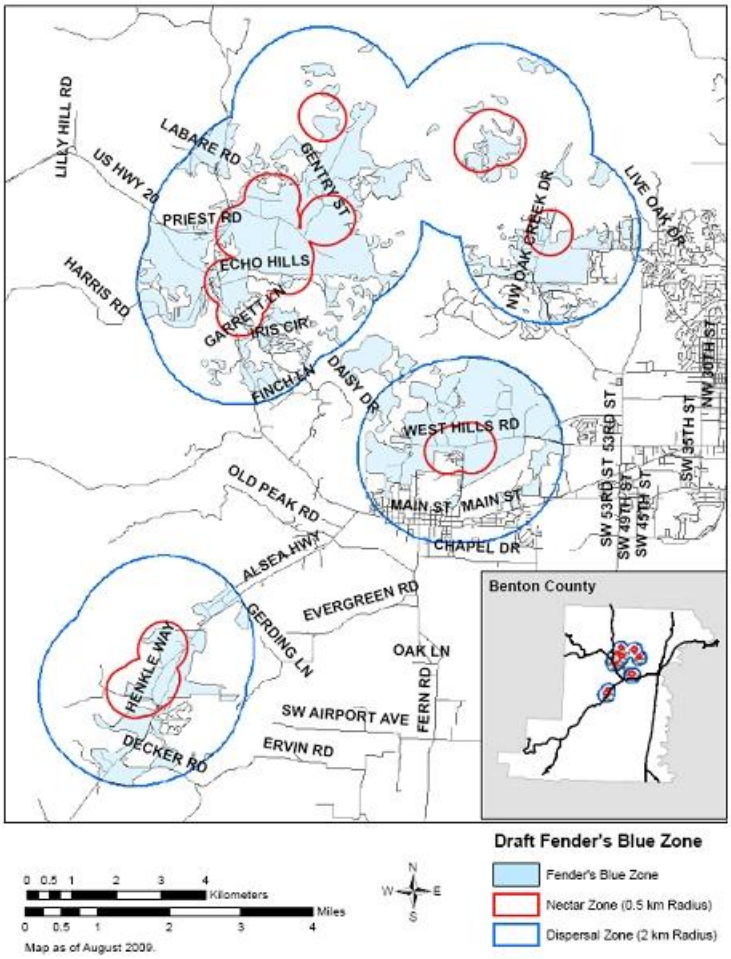

Figure 1.1 Fender's Blue Zone

In the absence of the Permit and HCP, the County, Cooperators, and those private landowners requiring a County permit or agricultural building authorization for home, farm, and forest construction within the Fender's Blue Zone, would need to obtain incidental take authorization for Fender's blue butterfly and its habitat on an individual, project-by-project basis for each of

the covered activities in order to comply with the Act. Issuing take on a project-by-project basis would result in time delays and a patchwork of small, fragmented mitigation projects with little or no coordinated planning or County-wide consideration of Fender's blue butterfly and its habitat. The other six species would not have federal ESA protection from take.

1.4 Location and Scope

The planning area ("Plan Area") under consideration in the EA consists of (1) private (excluding Greenbelt Land Trust) lands within the Fender's Blue Zone (Planning Unit #2), (2) select conservation organization (Greenbelt Land Trust) lands (Planning Unit #1), and (3) select non-federal public lands in Benton County (Planning Unit #1), totaling approximately 7,651 ha (18,906 ac) (Figure 1.2). All seven species would have federal ESA take protection on Planning Unit #1 lands that are non-federal public lands. Fender's blue butterfly and its habitat will have federal ESA take protection on all private lands within Planning Unit #1 and all Planning Unit #2 lands where the species occurs (Figure 1.1).

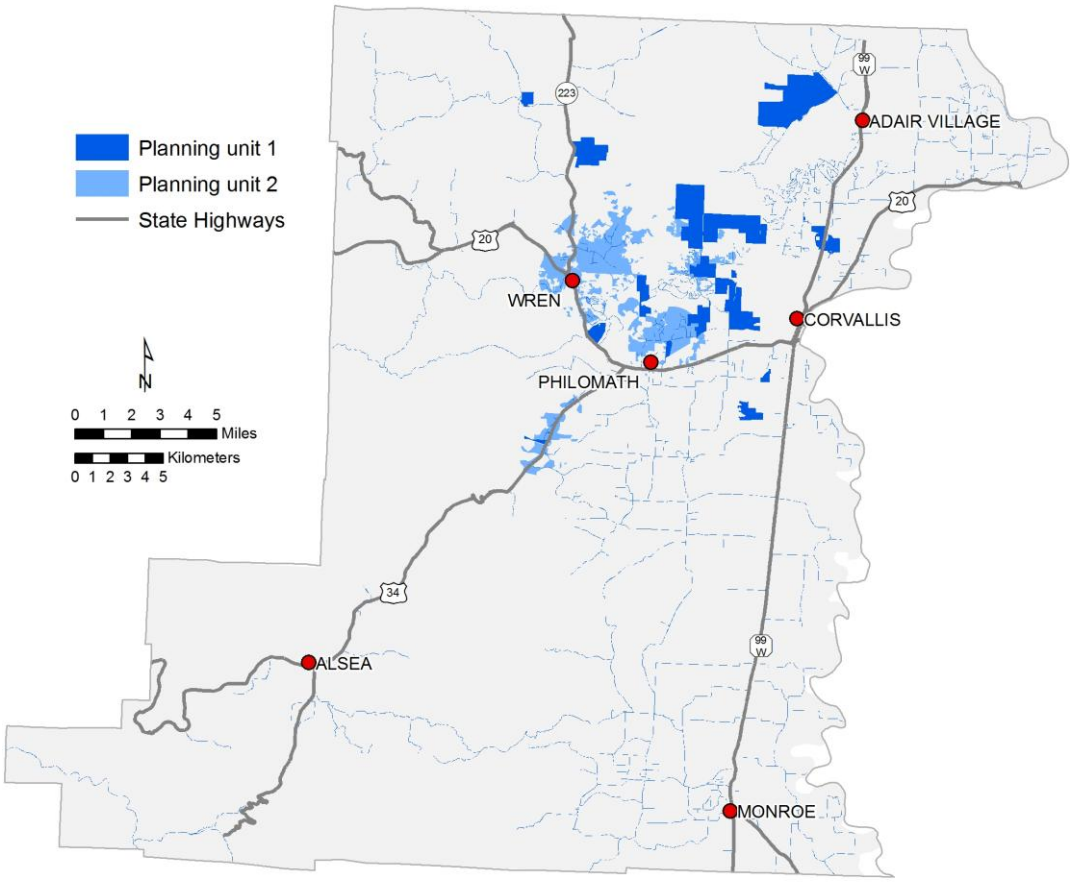

Figure 1.2 Plan Area for Benton County Prairie Species Habitat Conservation Plan

1.5 Decisions to be made by USFWS

Federal regulations require the USFWS to determine whether to issue Benton County a Permit, based on whether Benton County has demonstrated the following:

- The action resulting in incidental take is an otherwise lawful activity.
- The impacts of the proposed taking are minimized and mitigated to the maximum extent practicable.
- The applicant ensures proper funding will be provided to implement the conservation measures proposed in the HCP.
- The proposed take will not appreciably reduce the likelihood of survival and recovery of species in the wild.
- The HCP contains procedures to deal with unforeseen circumstances.

(50 CFR 17.22(b)(2), 50 CFR 17.32(b)(2)). If all of these criteria are satisfied then a Permit can be issued by USFWS to Benton County.

USFWS must evaluate the Proposed Action and No Action alternative and determine whether this EA is adequate to support a Finding of No Significant Impact, or whether an Environmental Impact Statement (EIS) is necessary. The aspects of the human environment that may be affected by the Proposed Action and the No Action alternative are analyzed in Chapter 4 of the EA.

2 Alternatives

This section describes two alternatives: the Proposed Action alternative and the No Action alternative. In the No Action alternative no Permit would be issued and take would be avoided, projects would not be constructed or implemented, or incidental take would be obtained on an individual, project-by-project basis. Five additional alternatives that were explored, but rejected, are also described in the EA document.

2.1 Alternative 1: Proposed Action Alternative

The Proposed Action alternative consists of USFWS issuing Benton County a 50-year Permit under Section 10(a)(1)(B) of federal Endangered Species Act authorizing incidental take and requiring implementation of a HCP to minimize and mitigate, to the maximum extent practical, impacts to the seven HCP "Covered Species": Fender's blue butterfly, Taylor's checkerspot butterfly, Kincaid's lupine, Willamette daisy, Bradshaw's lomatium, Nelson's checkermallow, and peacock larkspur. The activities likely to result in take for which the Permit is being requested include:

- Home, Farm, and Forest Construction
- Benton County Permits and Authorizations
- Public Service Facilities Construction
- Transportation and Work in Rights-of-Way
- Telephone and Natural Gas Utility Construction and Maintenance on Private Lands
- Water and Wastewater Management
- Parks/Natural Areas/Open Space Management Activities
- Agriculture Activities
- Habitat Conservation Plan Implementation Activities
- Emergency Response Activities

The HCP addresses (1) covered activities for Benton County and Cooperators (cities, state agencies, two utility companies and a conservation organization) for impacts to the Covered Species, and (2) covered activities of private individuals needing County permits or agricultural building authorizations for home, farm, and forest construction, and whose activities have the potential to affect Fender's blue butterfly and its habitat within the Fender's Blue Zone (Figure 1.1). The HCP includes a range of conservation measures designed to minimize and mitigate, to the maximum extent practicable, the effects of take of the Covered Species resulting from the covered activities on covered lands (See Chapter 6 of the HCP).

2.1.0 Activities and Impacts of the HCP

This section describes the covered activities and their estimated impacts.

2.1.0.0 Home, Farm, and Forest Construction

This activity involves construction of homes, accessory buildings (e.g., garages, shops), additions to structures, agricultural buildings, medical hardship dwellings, septic systems, driveways, and underground/above-ground utilities on lots zoned urban or rural residential,

essential farm use, and forest conservation within the Fender's Blue Zone. The estimated frequency of and total ground disturbance resulting from these construction activities are described in Table 2.1.

Table 2.1 Estimated Ground Disturbance – Home, Farm, and Forest Construction.

Impacts	Homes	Accessory Buildings	Agricultural Buildings	Medical Hardship Dwellings[1]	Medical Hardship Dwellings[2]	Additions to Structures	Grand Total
# Units	*195*	*513*	*118*	*37*	*4*	*413*	
Total Impacts (ha)	53.8	42.7	19.9	3.5	0.6	3.2	123.7
Total Impacts (ac)	133.0	105.5	49.1	8.7	1.6	7.9	305.7

[1] Manufactured home only.
[2] Manufactured home with full utilities, separate driveway and separate septic.

2.1.0.1 Benton County Permits and Agricultural Building Authorizations

Benton County issues agricultural building authorizations and various permits, including but not limited to building permits, permits for work within the County's road right-of-way, and utility permits. The activity for which a permit or agricultural building authorization is issued could impact a federally listed animal species, making both the County and the permittee liable for take of the species. Therefore, the County seeks take authorization for the underlying impact, so that when it issues the permit or agricultural building authorization, the County will be protected.

2.1.0.2 Public Service Facilities Construction

This activity involves the construction of two rural schools and two rural fire stations on lands within the Fender's Blue Zone to be acquired by Benton County in the future. These ground disturbance activities are estimated to disturb approximately 3.6 ha (9.0 ac) for new school construction and 0.80 ha (1.8 ac) for fire station construction.

2.1.0.3 Transportation and Work in Rights-of-Way

The County and Oregon Department of Transportation (ODOT) complete activities associated with transportation or work in rights-of-way. Up to 37.1 ha (91.7 ac) of ground disturbance would occur as a result of these activities within the Plan Area that are Covered under the Permit.

County activities have the potential to impact up to 32.1 ha (79.2 ac), and impacts will result from a combination of:

(1) Road construction projects (e.g., shoulder/bike path paving/development, bridge improvement/replacement, intersection improvement, road widening, culvert replacement and road surfacing projects) that may intersect Type 2 Special Management Areas[1], including, but not limited to those identified within the County's 20-year Transportation System Plan (Benton County 2001). Up to 17 construction projects could occur over the permit term.

[1] Special Management Areas have been established to include threatened and endangered species locations within County and ODOT rights-of-way. County SMAs have been classified as Type 1 or 2 (see Chapter 5 of the HCP).

(2) Road maintenance activities (e.g., grading, resurfacing, sweeping, ditch/culvert maintenance, sign/mailbox replacement, and vegetation management). County vegetation management activities include herbicide spraying and mowing. Herbicide spraying occurs on all roads (L. Starha, pers. comm. 2009). Spraying begins in April and ends in October. Mowing occurs year round. Beginning in April and through September 1st, 1-2 passes (3'-6') of right-of-way is mowed. Spot mowing occurs in the Spring/Summer to address safety related sight distance issues, with intersections, curves, and areas with significant brush receiving the attention (L. Starha, pers. comm. 2009).

(3) Work authorized within the County's right-of-way (e.g., utility construction and maintenance, driveway construction).

ODOT's covered activities will impact up to 5 ha (12.5 ac), and only involve vegetation management (mowing and spraying) within its right-of-way.

2.1.0.4 Utility Construction and Maintenance on Private Lands

Telephone Utilities

Activities include replacement of existing below-ground facilities with new facilities, and replacing above-ground telephone lines with below-ground lines on private lands. Underground installation methods include the (1) plow method (disturbs approximately 15.24 cm (6 in) of soil in a 3 m (10 ft) wide swath for the distance of cable to be replaced, and the (2) bore (directional drill) method (with an average bore length of 91.4 m (300 ft) and an impact area of 5.5 m^2 [59 ft^2] per bore). Maintenance (e.g., digging up of underground lines) occurs every 30-40 years, or more frequently depending upon damage to the underground cables. Take coverage would be required for replacement of approximately 29,051 m (95,313 ft) of cable in the Fender's Blue Zone, with approximately 50% of all cables being bored, 25% plowed within an existing road/driveway, 12.5% plowed immediately adjacent to an existing road/driveway, and 12.5% plowed cross-country (see Chapter 5 of HCP for more detail).

Natural Gas Utilities

NW Natural's existing pipeline infrastructure within the HCP Plan Area is almost exclusively under existing pavement. Typical modifications, maintenance and repair will be limited to the infrastructure already in existence in these areas, and there will be no anticipated impacts to habitat or species of concern in these instances.

Expansion of the pipeline system within the HCP Plan Area is anticipated to be very minimal. In the event that expansion occurs, it will typically track housing development or industrial development and will therefore likely be developed in associated roadways. In the event of a required repair of a damaged pipeline or the addition of a gas service of a pipeline outside of the roadway, or in a sensitive habitat zone, construction procedures will typically involve excavation. Excavation is typically done using a backhoe or trackhoe. Equipment is usually staged on the pavement and excavation spoils are directly loaded into trucks for disposal. Excavations are minimized to the extent practical, both to control cost and minimize restoration requirements. Typical linear trench dimensions for service main installation is the overall length

required x 36 in width x 36 in depth. The width may vary, according the dimensions of the excavation attachment used. Service installations and repairs are limited to minimal requirements necessary for work completion (e.g. 6 ft x 8 ft x depth required) and vary according to discrete conditions (J. Payson, Pers. comm. 2009).

2.1.0.5 Water and Wastewater Management

Activities conducted by the City of Corvallis include (1) construction of surface water intake facilities, pumping plants, water treatment facilities, and water supply pipelines; (2) inspection, cleaning, rehabilitation, repair, and/or replacement of pipelines, intake facilities, treatment facilities, and pumping stations; and (3) construction, installation, replacement, and maintenance of wastewater facilities.

2.1.0.6 Parks/Natural Areas/Open Space Management Activities

Activities include habitat restoration, enhancement, and management activities, such as mowing, herbicide application, prescribed burning, tree/shrub removal, planting native species, rare species introductions, livestock grazing, and road and trail decommissioning/restoration.

These activities will be completed at one or more of the following conservation areas:

- Lupine Meadows, Owens Farm, Lone Star Ranch (Greenbelt Land Trust)
- Butterfly Meadows, Soap Creek Ranch (Oregon State University)
- Beazell Memorial Forest, Fitton Green Natural Area, Jackson-Frazier Wetland, Fort Hoskins Historic Park (Benton County)
- Herbert Farm and Natural Area, Bald Hill Park, Lancaster Property, Marys River Natural area, Caldwell Open Space, Noyes Property, Corvallis Watershed (City of Corvallis)

2.1.0.7 Habitat Conservation Plan Implementation Activities

Activities include but are not limited to: habitat enhancement, restoration, and management for mitigation purposes (e.g., mowing, herbicide application, prescribed burning, tree and shrub removal, planting native species, grazing, and road and trail decommissioning and restoration); species and habitat monitoring for conservation or mitigation purposes; and plant material collection. See Chapter 6 of the HCP for more information. Lands on which these activities will occur include those listed above, as well as the sites below, which have been designated as potential mitigation sites:

- Benton County Fender's Blue Butterfly Conservation Areas (Benton County)
- Beazell Memorial Forest, Fitton Green Natural Area, Jackson-Frazier Wetland (Benton County)
- Type 1[2] Special Management Areas (Benton County)
- Bald Hill Park, Lancaster Property, Herbert Farm and Natural Area, Corvallis Watershed (City of Corvallis)
- Lone Star Ranch (Greenbelt Land Trust)
- Wren Mitigation Site, Henkle Quarry (ODOT)

[2] Type 1 SMAs are sites meeting certain habitat criteria (See Chapter 5 of HCP).

2.1.0.8 Agriculture

Activities include production of agricultural crops (e.g., grass seed or hay) at the City of Corvallis' Owens Farm. Of the approximate 53.2 ha (131.5 ac) of farm owned by the City, an estimated 28.3 ha (70.0 ac) is in agricultural production. Agricultural operations have the potential to impact Nelson's checkermallow, a Covered Species.

2.1.0.9 Emergency Activities

Activities in this category are related to emergency situations involving public health, safety, and welfare (e.g., fire fighting, utility repair, hazardous material cleanup, traffic accident response and cleanup, and disaster relief and evacuations). These activities are covered on all Benton County and Cooperator lands included in the Plan Area.

2.1.1 Rationale of the Proposed Alternative

This alternative was selected as the Proposed Action because it will allow otherwise lawful activities by Benton County, Cooperators, and private landowners, while offsetting potential adverse impacts to the Covered Species through minimization and mitigation measures. Additionally, this alternative provides legal protection to covered plants and covered candidate species, not currently provided under the federal ESA. The proposed term of the HCP and the Permit is fifty (50) years. The amount of allowable take for permanent impacts under the HCP is set forth in Table 2.2. Permanent impacts are impacts from all the covered activities except for Parks/Natural Areas/Open Space Management and HCP Implementation activities. Impacts for these activities are considered short term impacts (Table 2.2).

Table 2.2 Total Proposed Permanent and Short Term Take of HCP Covered Species Over the 50 year HCP.

Species	Permanent Take	Short term Take*
Bradshaw's lomatium (#)	2	1,087
Willamette daisy (#)	1	1,460,630
Peacock larkspur (#)	56	401,787
Nelson's checkermallow	222	8,884,914
Kincaid's lupine (m^2) (outside Fender's Blue Zone)	8	3,313
Kincaid's lupine (m^2) (inside Fender's Blue Zone)	402	23,720
Native Nectar Species for Fender's blue (m^2)	8,570	11,405
Non-Native Nectar Species for Fender's blue (m^2)	12,218	n/a**
Fender's blue butterfly (estimated #)[3]	4,253	***
Taylor's checkerspot butterfly (m^2 habitat)	57	2,948
Taylor's checkerspot butterfly (estimated #)[4]	5	***

*These impacts are mortality to seeds (of plants, host plants or nectar plants) resulting from prescribed fire.
**Short term impacts typically result from habitat restoration activities; these activities seek to replace non-native plant species with natives, therefore short term impacts to non native nectar will not be tracked.
***Potential impacts discussed in Section 4.1.4.2.

[3] Butterfly number estimated based on the area of habitat (nectar/host plants) to be impacted. Estimate of 0.474 butterflies/m^2 of host or nectar plants) was calculated using best available data from a single site in Cardwell Hill (Area 5: Hammond 2005), the only known site that had both butterfly population estimates (2005 & 2007) and host/nectar plant census data (Benton County 2009, unpublished data).
[4] Butterfly number estimated based on the area of occupied habitat to be impacted. Estimate of 0.084 butterflies/m^2 of habitat was calculated using butterfly data from Beazell Memorial Forest (Ross 2005-2009).

The HCP identifies appropriate conservation measures to be taken by the County, Cooperators, and private landowners to mitigate for impacts to the Covered Species resulting from the activities covered in the HCP. Mitigation efforts include conservation easement acquisition and enhancement of up to 20-24 ha (50-60 ac) of high quality prairie habitat supporting Fender's blue butterfly within the Fender's Blue Zone; and conducting habitat restoration, enhancement, and management activities at designated mitigation areas. These management activities would include augmenting populations of covered plant species and enhancing host plant and native nectar habitat for populations of Fender's blue butterfly and Taylor's checkerspot butterfly (See Chapter 6 of HCP for more details on proposed conservation measures). Mitigation shall not be required for impacts to non-native nectar species for Fender's blue butterfly, as these species, many of which are considered weeds, are common across the landscape. Fender's blue have demonstrated a preference for utilizing native nectar species over non-native ones (Schultz and Dlugosch 1999, Wilson et al. 1997). All of the nectar zones of the Fender's Blue Zone contain private properties with native nectar species present and confirmed by survey. A mix of native and non-native nectar species are found along roadside rights-of way. Non-native nectar species tend to be self-mitigating (ground disturbance from projects tends to increase their cover, often at the expense of native species). Mitigation for non-native nectar species, if it involved augmentation of non-native nectar species at mitigation sites, would be counterproductive to long term goals of enhancing native habitat components. At sites with conservation easements, augmentation of non-native species may be prohibited in easement terms.

Covered lands managed for the Covered Species will also provide suitable habitat for other prairie species. HCP Implementation and Parks/Natural Areas/Open Spaces activities have the potential to negatively affect the Covered Species over the short term, but impacts are not anticipated to be permanent (Table 2.2).

2.2 No Action Alternative

Under the No Action alternative, the proposed Permit would not be issued, the HCP would not be implemented, and the status quo would be maintained. The amount of home, farm, and forest construction on private lands within the Fender's Blue Zone would not be expected to differ from that occurring under the Proposed Action. The process for obtaining the necessary incidental take coverage in order to lawfully conduct activities impacting the Fender's blue butterfly and/or its habitat, however, would be different.

The USFWS would process requests for take authorization rather than Benton County. Before the County would issue a County permit or agricultural building authorization, the private landowner would need to survey their property during the butterfly's flight season (May to mid June), demonstrate their construction will not impact Fender's blue butterfly or its habitat, or if impacts are unavoidable, demonstrate they have obtained the necessary take authorization from the USFWS and conducted any required mitigation. The USFWS may require each landowner who may impact Fender's blue butterfly and its habitat to complete their own habitat conservation plan, obtain their own permit and conduct and pay for their own mitigation, which could add anywhere from one to three years onto the amount of time needed to obtain the necessary authorization to proceed with the construction project.

No HCP and no acquisition of conservation easements on, and enhancement of, high quality Fender's blue butterfly habitat, could result in a patchwork of uncoordinated mitigation projects with little or no County-wide consideration for impacts to the species.

Without the Permit the County and Cooperators would need to seek out, on an individual project-by-project basis, their own USFWS incidental take permit before conducting any of the covered activities likely to result in the take of Fender's blue butterfly and its habitat. Currently, a federal permit is not required for impacts to federally listed plant species or candidate animal species. The same would be true for any potential Cooperators (e.g., the City of Corvallis, Greenbelt Land Trust) – each of them would need to obtain an incidental take permit on a project-by-project basis for any impacts to Fender's blue butterfly or its habitat, but not for the other six Covered Species. Benton County and the Cooperators would also be required to get take coverage for any habitat restoration, enhancement, and management activities they wanted to conduct on their lands that would impact Fender's blue butterfly and its habitat.

2.3 Alternatives Considered and Rejected

2.3.0 Benton County Coverage Only/Animal Species Only

Under this alternative, only Benton County's activities on lands it owns or manages would receive incidental take coverage for listed and candidate animal prairie dependent species: Fender's blue butterfly, Streaked Horned Lark[5], and Taylor's checkerspot butterfly. This alternative was rejected because it did not meet the intent of the Benton County Board of Commissioners to provide a comprehensive conservation plan for the prairie species and does not streamline the federal permitting process for private landowners whose activities the County permits or authorizes and which have the potential to affect Fender's blue butterfly and/or its habitat.

2.3.1 All Lands in Benton County/ Eight Species

Under this alternative, private and non-federal public landowners would need to minimize and mitigate for impacts to eight species from activities occurring on their lands. The eight species include five federally listed species: Fender's blue butterfly, Kincaid's lupine, Willamette daisy, Nelson's checkermallow, and Bradshaw's lomatium; two candidate species: Taylor's checkerspot butterfly and Streaked Horned Lark; and one species of concern: peacock larkspur. This alternative would extend the liability of private landowners for take beyond what exists today under the Act. Under existing federal law, absent a federal nexus, non-federal landowners are only liable for impacts to the Fender's blue butterfly and/or its habitat.

This alternative was rejected because it added a legal responsibility to prevent take of plant and candidate animal species private landowners currently do not have under federal law. Benton County Commissioners would prefer to offer private landowners non-regulatory incentives for the protection and conservation of these non-listed species. Invoking take for these species and the legal responsibility to mitigate for such take is a regulatory responsibility the County does not intend to undertake, and which would not encourage stewardship of the species.

[5] At the time the County considered this alternative the Streaked Horned Lark was under consideration. It wasn't until later that the County learned the lark's habitat was not present on County lands.

One benefit of including the candidate and plant species in the Permit and HCP would be if the Taylor's checkerspot butterfly or Streaked Horned Lark were ever listed or Congress changed the law and imposed take liability for impacts to listed plant species on private lands, then private landowners would be covered for take of these species. In this event, a new HCP would not be required to cover these species, nor would the existing HCP need to be amended. However, due to the uncertainty of the listing of these candidate species or changes in the Act related to plants, the County determined at this time not to include coverage of candidate and plant species on private lands.

2.3.2 All Lands in Benton County/Fender's Blue Butterfly Only

Under this alternative, take authorization could be obtained from Benton County by private and non-federal public landowners whose activities would impact Fender's blue butterfly.

This alternative provides regulatory streamlining for all landowners in Benton County who need take authorization for unavoidable impacts to Fender's blue butterfly and its habitat resulting from activities they conduct on their property. Anyone needing take coverage could seek such coverage from Benton County so long as there was sufficient take available, impacts were unavoidable, their proposed activity was a covered activity, and they minimized and mitigated for their impacts. The landowners would not be required to go to USFWS for take coverage which could result in time delays and possibly require the applicant to prepare their own habitat conservation plan.

This alternative was rejected because the number of landowners who may seek take authorization from the County could place an onerous burden on the County's already stretched resources. In addition to processing the paperwork for take, the County also would need to track the mitigation conducted by each applicant, enforce permit terms requiring mitigation, and conduct additional reporting and data collection, all of which would require additional County resources.

2.3.3 Coverage of Private Development Activities on Lots Generated through Partitions in Fender's Blue Zone

In the HCP, the County proposes covering those lots established as of July 31, 2009. If a private landowner after that date petitions to have the property divided, only one of the newly created lots, the "original" lot, would be covered under the County's incidental take permit and HCP. The landowners would need to obtain take coverage directly from the USFWS before the County would issue them a County permit or agricultural building authorization for home, farm or forest construction activities.

Under this alterative, the owner(s) of newly created lots (after July 31, 2009) would be allowed to seek take coverage under the County's incidental take permit for the Covered Activities on each lot located within the Fender's Blue Zone. This option would add approximately 300 vacant residential lots to the home, farm, and forest construction impacts analysis. Predicted development on the added lots would increase the impact to Kincaid's lupine by about 40%, and increase by about 15% the impacts to native nectar species. Required mitigation would increase proportionally.

The County is currently proposing to acquire and manage conservation easements on 20-24 ha (50-60 ac) of high quality prairie habitat supporting Fender's blue butterfly habitat. This alternative was rejected because the County would need to acquire and manage conservation easements on additional acreage of Fender's blue butterfly habitat to satisfy the additional mitigation required, which would place additional demands on County resources.

2.3.4 Private Landowners Share Mitigation Costs for Impacts on their Lands

Under the HCP, the County proposes acquiring conservation easements on approximately 20-24 hectares (50-60 acres) of high quality Fender's blue butterfly habitat in Benton County. Securing these sites under easement will benefit populations of the butterfly and contribute to the recovery of the species. Benton County will also manage and enhance the habitat at these sites. Any increases in habitat for the butterfly (above baseline) would be used to offset and mitigate for impacts to Fender's blue butterfly from home farm, and forest construction on private lands within the Fender's Blue Zone. The estimated cost for annual enhancement and management work at the Benton County Fender's Blue Butterfly Conservation Areas (including monitoring and outreach) is approximately $20,000 per year (in 2009 dollars). Annual administrative costs for implementing the private land program are estimated to be approximately $4,500 (2008 dollars), which would cover working with the permit applicant to help them understand the program and obtain the necessary information to avoid and/or minimize habitat impacts, record-keeping and compliance reporting by the County, and ensuring the County Permittee does not exceed the permitted impact.

Under this alternative, Benton County would incur 50% of the annual cost to mitigate for impacts (including administrative costs) on private lands resulting from home, farm, and forest construction development in the Fender's Blue Zones allowed under a County permit or agricultural building authorization. The other 50% of the mitigation costs would be paid for by the County permit applicant. The private landowner would pay a HCP Permit and Mitigation Fee averaging $1,500-$3,500, varying with the scale of impacts.

This alternative was rejected because it does not distribute the burden of endangered species conservation across all citizens in the County, but rather places a burden on individuals who own property within the Fender's Blue Zone. The County felt this alternative could have a negative impact on the Covered Species, because it could create a disincentive for private landowners to manage their lands for conservation, for fear of reduced property values and increased development costs.

3 Description of the Affected Environment

This section describes the affected environment of the covered lands in the Benton County Prairie Species Habitat Conservation Plan (HCP).

3.1 Physiographic Setting

3.1.0 Overview

Benton County is located within two ecoregions: Willamette Valley and Coast Range. None of the HCP covered species have been or are anticipated to be found within the Coast Range ecoregion of Benton County (Figure 3.1).

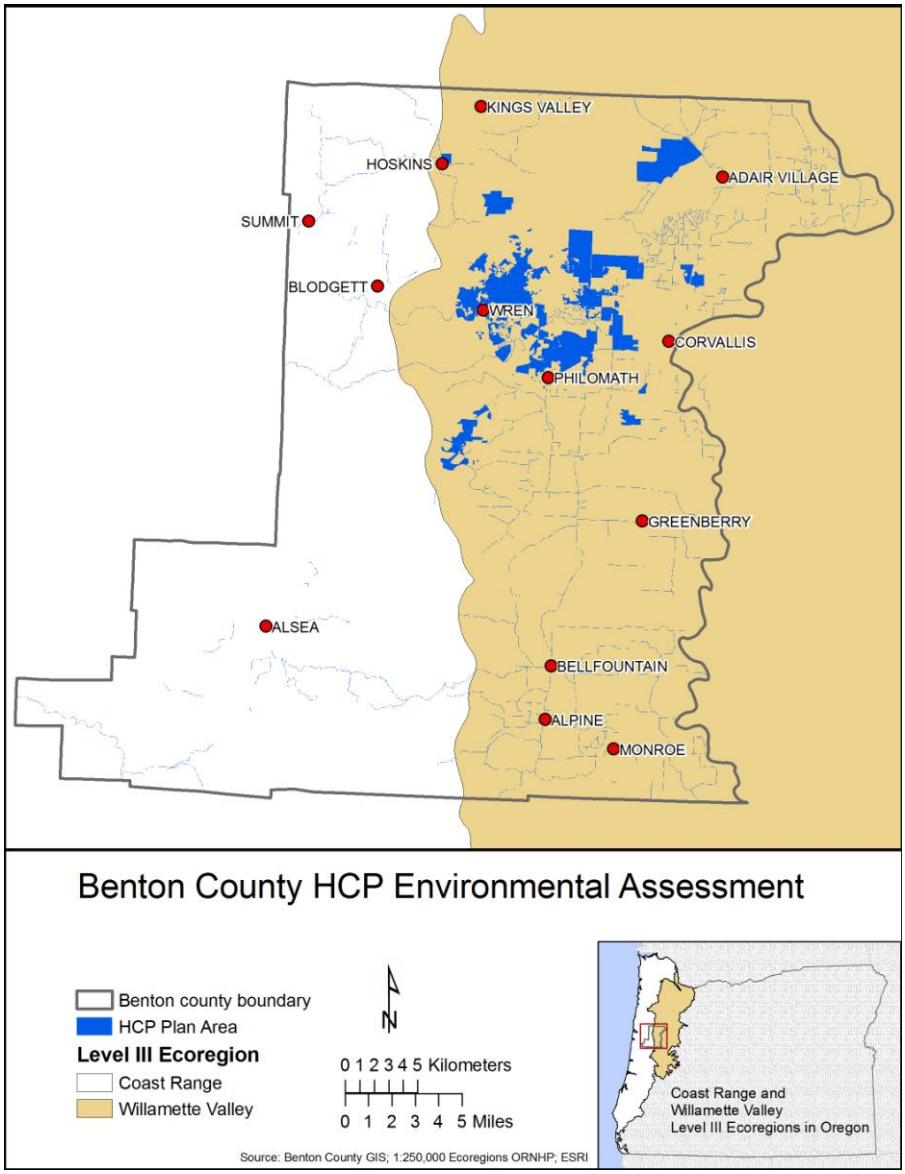

Figure 3.1 Ecoregions – Benton County.

3.1.1 Willamette Valley Ecoregion

The Willamette Valley ecoregion is a low elevation, broad alluvial plain oriented north to south, approximately 193 km (120 miles) long and ranging from 32 to 64 km (20-40 miles) wide (ODFW 2006). The valley, located approximately 64 km (40 miles) inland from the Oregon Coast, is essentially flat and defined by the Coast Range along the west and the Cascade Range along the east. The Willamette River, the main drainage system of the valley, bisects the valley and is 298 km (185 miles) long (ODFW 2006).

Much of the Willamette Valley ecoregion, especially south of Salem, Oregon was historically an open expanse of native upland and wet prairies, riparian areas, and oak savanna (Wilson 1998a). While the exact composition of natural communities within the Willamette Valley is not known, estimations of prairie habitat prior to European settlement included 300,000 ha (741,316 ac) of wet prairie habitat, 700,000 ha (1,729,738 ac) of upland prairie habitat, and 500,000 ha (1,235,527 ac) of oak savanna, comprising approximately 45% of the Willamette Valley ecoregion (Macdonald 2000). These native prairies were home to many species endemic to the Willamette Valley including the Willamette daisy and Fender's blue butterfly. The Kalapuya used fires to maintain prairie habitat to increase food production (Alverson 2005).

European settlement of the Willamette Valley began in the 1800s. By the mid 1800s, Kalapuya burning ceased and those prairies not converted to crop lands or urban development began to be overtaken through forest succession and invasive species (ODFW 2006). Today, less than one percent (>1%) of this native prairie habitat within the Willamette Valley remains intact (Alverson 2005), making prairie habitat one of the rarest ecosystems in North America (Noss and Peters 1995).

3.2 Climate

Benton County, the center of which is located within 53 km (33 miles) the Pacific Ocean, is influenced by a maritime climate. Benton County has wet mild winters and moderate dry summers. The average winter temperature (December-February) is 4.9 °C (40.9 °F), with 17 °C (62.6 °F) as the average summer temperature (June-August). The annual average (January – December) low temperature is 5.5 °C (41.8°F), while the average annual high temperature is 17.2 °C (62.9°F) for the years 1890-2005 (Western Regional Climate Center 2006a). Precipitation is mainly rainfall, with some snow accumulation in the foothills and mountains. The annual average precipitation level is 1.04 meters (40.95 inches), with an annual high precipitation of 1.86 meters (73.21 inches) in 1996, and an annual low precipitation of 0.58 meters (22.9 inches) in 1944 (Western Regional Climate Center 2006b).

3.3 Topography/Soils

The Willamette River, for the most part, serves as the eastern boundary of the County, with a few portions of the County located east of the river. Lands adjacent to the river are relatively flat, with a few interspersed low basalt hills. Further west, the elevation increases with the county line ending in the Coast Range. Elevations in the County range from 40.4 m (133 ft) above sea level to over 1,249 m (4,097 ft) above sea level at the high point of the Coast Range.

Prairie terrace soils include Alfisols, Mollisols, and Inceptisols, with major soil types including Aloha, Amity, Bashaw, Concord, Colburg, Dayton, Malabon Salem, Waldo, Willamette, and Woodburn (Thorson et al. 2003). Soil textures range from deep silty clay loam to silt loam, and are well drained to poorly drained (Thorson et al. 2003) (See Appendix A: List of Soils in the Benton County HCP Plan Area).

3.4 Prairie Habitat Vegetation

The lands covered in the Benton County Prairie Species Conservation Plan include upland and wet prairies.

3.4.0 Wet Prairies

Wet prairies are seasonally flooded habitats dominated by herbaceous plants, occurring at low elevations primarily on poorly or well drained soils with shallow bedrock impeding drainage (Wilson 1998b). Soils generally have hydric characteristics; with standing water present from November through April (Wilson 1998b). Wet prairies are dominated by tufted hairgrass (*Deschampsia cespitosa*), sedges (*Carex* spp.), rushes (*Juncus* spp.), and a variety of forbs, including Willamette daisy, Bradshaw's lomatium, Nelson's checkermallow, and peacock larkspur (Macdonald 2000) (Appendix B: Native Vegetation of Wet and Upland Prairies).

Wet prairies can differ greatly in composition and in turn may respond differently to disturbance. These prairies can support dense shrubs and trees, which the Kalapuya curtailed through the annual burning of grasslands (Alverson 2005). Succession threatens wet prairie habitats (ODFW 2006).

3.4.1 Upland Prairies

Upland prairies occur on well drained soils, often on dry slopes (ODFW 2006). These habitats are occupied by plant communities dominated by small stature bunchgrasses interspersed with forb species (Appendix B: Native Vegetation of Wet and Upland Prairies) (Wilson 1998a).

Threats to upland prairie habitat include habitat loss, fragmentation, and conversion to agriculture, urban development, rural residential development; changes in hydrology (draining); successional processes (due to lack of natural or human disturbances, e.g., fire); and the spread of invasive species which compete for resources (e.g., water) and shade out native species (ODFW 2006, Wilson 1998a).

3.5 Wildlife and Fish

Benton County has a wide diversity of wildlife (mammals, amphibians, reptiles, birds) and fish, with many species found in prairie habitats. Many of these species may on occasion occupy the HCP covered lands.

3.5.0 Mammals

Benton County is home to an estimated 65 mammal species, of which 33 require prairie habitat for breeding and foraging purposes (Appendix C: Wildlife in Benton County Prairies).

3.5.1 Amphibians

Benton County provides feeding and breeding habitat to 15 amphibians, of which 10 require prairie habitat: Northwestern salamander (*Ambystoma gracile*), Long-toed salamander (*A. macrodactylum*), Pacific giant salamander (*Dicamptodon tenebrosus*), Ensatina (*Ensatina eschscholtzii*), rough-skinned newt (*Taricha granulose*), Western toad (*Bufo boreas*), Pacific chorus frog (*Pseudacris regilla*), red-legged frog (*Rana aurora*), Foothill yellow-legged frog (*R. Boylii*), and Bull frog (*Rana catesbeiana*) (Csuti et al. 1999, Johnson & O'Neil 2001). All of these amphibians require a pond, lake, stream, or depressional wet area for breeding purposes.

3.5.2 Reptiles

Benton County provides feeding and breeding habitat to 15 reptiles, with prairie habitat providing refugia for 13 of these reptiles: Western pond turtle (*Clemmys marmorata*), Northern alligator lizard (*Elgaria coerulea*) Southern alligator lizard (*Elgaria multicarinata*), Western fence lizard (*Sceloparus ocidentalis*), Western skink (*Eumeces skiltonianus*), Rubber boa (*Charina bottae*), Sharp-tailed snake (*Contia tenuis*), Racer (*Coluber constrictor*), Ring-necked snake (*Diadophis punctatus*), gopher snake (*Pituophis melanoleucus*), Western terrestrial garter snake (*Thamnophis elegans*), Common garter snake (*Thamnophis sirtalis*), and Western rattlesnake (*Crotalus viridis*) (Csuti et al. 1999, Johnson & O'Neil 2001).

3.5.3 Birds

The Willamette Valley is the located within the Pacific Flyway, making it an important area for wintering waterfowl and migratory birds (shorebirds, landbirds) (Roth et al. 2004). The flooded agricultural fields benefit geese and shorebirds. The southern and central Willamette Valley (including Benton County) has been recommended for inclusion in the Western Hemisphere Shorebird Reserve Network (Roth et al. 2004).

In Benton County, approximately 184 species of birds can be found in all habitat types (Csuti et al. 1997, Audubon Society of Corvallis 2008), with approximately 73 birds utilizing prairie habitat for breeding, foraging, and/or roosting activities (Johnson & O'Neil 2001) (Appendix C: Wildlife in Benton County Prairies). Of these species, the Oregon Vesper Sparrow, Streaked Horned Lark, Grasshopper Sparrow, Western Meadowlark, Common Nighthawk, Western Bluebird, Lazuli Bunting, Northern Harrier, Western Kingbird, Killdeer, Short-eared Owl, and Savannah Sparrow are the most highly associated with prairies (Altman 1997).

A number of prairie habitat dependent bird species are declining significantly, including the following species found in Benton County prairies: Killdeer, California Quail, Mourning Doves, Barn Swallows, Acorn Woodpeckers, Lazuli Bunting, Western Kingbirds, Cliff Swallows, Black-capped Chickadees, Western Meadowlarks, Brown-headed Cowbirds, and Brewer's Blackbirds (Altman 2000). The decline of these species is due, in part, to habitat loss and fragmentation.

3.5.4 Invertebrates

Benton County provides habitat for over 54 invertebrate butterfly species (Appendix C: Wildlife in Benton County Prairies). Upland and wet prairies provide habitat for many of these species.

3.5.5 Fish

Fish native to Benton County include Chinook salmon(*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), cutthroat trout (*O. clarki*), bulltrout (*Salvelinus confluentus*), Oregon Chub *Oregonichthys crameri*), white sturgeon (*Acipenser transmontanus*), Pacific lamprey (*Lampetra tridentate*), brook lamprey (*Lampetra richardsoni*), three-spine stickleback (*Gasterosteus aculeatus*), mountain whitefish (*Prosopium williamsoni*), large scale sucker (*Catostomus macrocheilus*), Mountain sucker (*Catostomus platyrhynchus),* chiselmouth (*Acrocheilus alutaceus*), northern pikeminnow (*Ptychocheilus oregonensis),* peamouth (*Mylocheilus caurinus*), redside shine (*Richardsonius balteatus*), speckled dace (*Rhinichthys osculus*), long nose dace (*Rhinichthys falcatus*), leopard dace (*Rhinichthys falcatus),* Paiute sculpin (*Cottus beldingi),* shorthead sculpin (*Cottus confuses),* reticulate sculpin (*Cottus perplexus),* torrent sculpin (*Cottus rhotheus),* sandroller (*Percopsis transmontana),* smelt (*Thaleichthys pacificus)* (K. Hans, pers. comm. 2009). Four of these species are listed as threatened (Table 3.1). Habitat for these species has been degraded due in part to the placement of culverts and other fish passage barriers, straightening of river channels.

Benton County is also home to many non-native fish species, including largemouth bass *(Micropterus salmoides),* smallmouth bass *(M. dolomieui),* bluegill *Lepomis macrochirus),* crappie *Pomoxis sp.),* channel catfish *(Ictalurus punctatus),* brown bullhead catfish *(Ameiurus nebulosus),* yellow bullhead catfish*(A. natalis)* , and mosquito fish *(Gambusia affinis)* (K. Hans, pers. comm. 2009).

3.6 Listed, Proposed and Candidate Species

3.6.0 Listed Species

Federally listed threatened and endangered species located in Benton County include 13 species: two birds, one butterfly, four fish, and six plants (Table 3.1).

Table 3.1. Threatened and endangered species that occur in Benton County (USFWS 2008g).

Scientific Name	Common Name	Status
Erigeron decumbens var. *decumbens*	Willamette daisy	Endangered
Icaricia icarioides fenderi	Fender's blue Butterfly	Endangered
Lomatium bradshawii	Bradshaw's lomatium	Endangered
Oregonichthys crameri	Oregon chub	Endangered
Brachyramphus marmoratus	Marbled Murrelet	Threatened
Castellia levisecta	Golden paintbrush	Threatened
Howellia aquatilis	Water howellia	Threatened
Lupinus sulphureus ssp. *kincaidii*	Kincaid's lupine	Threatened
Oncorhynchus mykiss	Upper Willamette River Steelhead	Threatened
Oncorhynchus tshawytscha	Upper Willamette River Chinook	Threatened
Salvelinus confluentus	Bull trout	Threatened
Sidalcea nelsoniana	Nelson's checkermallow	Threatened
Strix occidentalis caurina	Northern Spotted Owl	Threatened

3.6.0.0 Prairie Species

Of the 13 listed species, only Fender's blue butterfly and four of the plants are currently found in Benton County prairies[6]. Many of the populations of these species are located on private lands (See Table 3.2 in the HCP).

Fender's blue butterfly

Fender's blue butterfly (*Icaricia icarioides fenderi*) was listed as endangered under the federal Endangered Species Act in 2000 (USFWS 2000a). A Recovery plan for the Fender's blue butterfly and other prairie species was released by the USFWS in 2010 (USFWS 2010). On October 31, 2006, the USFWS designated critical habitat for the Fender's blue butterfly. There are 314.3 ha (776.7 ac) of designated critical habitat within Benton County, approximately 25.8 % of the total designated critical habitat for Fender's blue butterfly rangewide. The plan area contains 313.3 ha (774.3 ac) of designated critical habitat for this species.

Fender's blue butterfly is dependent upon upland prairie habitat supporting Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) and native nectar plant species. Native nectar species provide greater nectar than non-native nectar species, and appear to be the preferred food source of Fender's blue butterfly (Schultz and Dlugosch 1999, Wilson et al. 1997). Kincaid's lupine is the Fender's blue butterfly primary larval host species, and a federally listed threatened species.

Adult butterflies lay their eggs on the lupine leaves in May and June. Larvae hatch a few weeks later, feed for a few weeks and then go into dispause in the soil near the base of the lupine until the following February or March. The larvae then emerge to feed on the young lupine leaves and flowers. The larvae grow, pupate, and emerge as butterflies in early May (Wilson et al. 1997).

Fender's blue butterflies are endemic to the Willamette Valley and found only in Linn, Lane, Benton, Polk, and Yamhill counties (USFWS 2008a). In 2007 there were 26 populations in the Willamette Valley, with four known populations composed of several subpopulations in Benton County (USFWS 2008h). The majority of the subpopulations (66%) are located on private property (Benton County, unpublished data).

Primary threats to Fender's blue butterfly include habitat loss and fragmentation (primarily loss of host and nectar species), and the encroachment of tree, shrubs, and invasive species (ODFW 2006).

Kincaid's lupine

Kincaid's lupine was listed as threatened under the federal ESA in 2000 (USFWS 2000a). This species is also listed as threatened by the Oregon Department of Agriculture (ODA 2007). In 2010, the USFWS released a recovery plan for this and other prairie habitat species (USFWS 2010). Critical habitat was designated by USFWS for this species on October 31, 2006 (USFWS). There are 81.3 ha (201 ac) of designated critical habitat within Benton County, approximately 34.4 % of the total designated critical habitat for Kincaid's lupine rangewide. The plan area contains 80.4 ha (198.7 ac) of designated critical habitat for this species.

[6] Historically *Castilleja levisecta* (Golden paintbrush) was found on native prairie habitat and was subsequently extirpated from Benton County. Efforts are underway to reintroduce this species in Benton County.

Kincaid's lupine is found in southwestern Washington, the Willamette Valley (Benton, Lane, Polk, Yamhill, and Linn counties), and Douglas County, typically in upland prairie habitat (USFWS 2008b). As of the time of listing (2000), there were 54 known populations of Kincaid's lupine covering 158 ha (370 ac). Field surveys conducted in preparation of the HCP resulted in the identification of an additional four populations comprising 34 subpopulations of Kincaid's lupine in Benton County. As of 2009, in Benton County there were 17 known populations of Kincaid's lupine, with 59 subpopulations (Benton County, unpublished data), of which 34 subpopulations are located partial or wholly on private property. Kincaid's lupine is the primary host plant for the endangered Fender's blue butterfly.

Primary threats to Kincaid's lupine include habitat loss and fragmentation, tree and shrub encroachment, and the proliferation of invasive species (ODFW 2006).

Willamette daisy

The Willamette daisy (*Erigeron decumbens* var. *decumbens*) was listed as endangered under the federal ESA in 2000 (USFWS 2000a). The daisy is also a state listed endangered species (ODA 2007). The USFWS released a recovery plan for the Willamette daisy and other listed prairie species (USFWS 2010). On October 31, 2006, the USFWS (2006) designated critical habitat for Willamette daisy. There are 19.34 ha (47.8 ac) of designated critical habitat within Benton County, approximately 6.67% of the total designated critical habitat for Willamette daisy rangewide. The plan area only contains 2.5 ha (6.2 ac) of designated critical habitat for this species, and 0.73 % of the total designated critical habitat for this species.

Willamette daisy can be found in both wet and upland prairie. This species is endemic to the Willamette Valley, occurring in Benton, Lane, Linn, Marion, and Polk counties (USFWS 2008c). As of 2009, there were approximately 33 known sites of Willamette daisy rangewide (K. Norman, pers. comm. 2009), of which three sites (natural and planted) are located in Benton County. Of these, one site is located on non-federal public lands and two sites are located on private lands (Benton County, unpublished data).

Threats to Willamette daisy include habitat loss and fragmentation, tree and shrub encroachment, and the proliferation of invasive species (ODFW 2006).

Bradshaw's lomatium

Bradshaw's lomatium (*Lomatium bradshawii*) was listed as endangered under the federal ESA in 1988 (USFWS). The species is also state listed as endangered under the Oregon ESA (ODA 2007). A recovery plan for the species was released in 1993 (USFWS 1993a); a revised recovery plan for Bradshaw's lomatium and other prairie species was released in 2010 (USFWS 2010). Critical habitat has not been designated for this species.

Bradshaw's lomatium can be found in wet prairie habitat dominated by tufted hairgrass and sedges. The species can be found in Benton, Marion, Linn, Lane, and Polk counties, Oregon, and in Clark County Washington (USFWS 2008d). As of 2009 there were approximately 61 known sites of Bradshaw's lomatium rangewide, of which seven confirmed populations (natural and planted) are located in Benton County (K. Norman, pers. comm. 2009). Of these seven

populations, two are on federal lands, one is located on non-federal public lands and four populations are located on private lands.

Habitat loss and fragmentation from agricultural conversion and urban development are the primary threats to the lomatium (ODFW 2006). In addition, water diversion and flood control structures have changed the hydrology of wet prairie habitat thereby affecting seedling establishment and allowing for the tree and shrub encroachment of trees, and the proliferation of invasive species (USFWS 2008d).

Nelson's checkermallow

Nelson's checkermallow (*Sidalcea nelsoniana*) was listed as threatened under the federal ESA in 1993 (USFWS 1993b). The species is also state listed as endangered under Oregon's ESA (ODA 2007). A recovery plan was released in 1998 (USFWS 1998a); with a recovery plan for this and several other prairie species released in September 2010 (USFWS 2010). Critical habitat has not been designated for the species.

Nelson's checkermallow typically occurs in wet prairies in the Willamette Valley from southern Benton County northward (Benton, Clackamas, Lane, Linn, Marion, Polk, Yamhill, and Washington counties) and in the Coast Range (Clatsop, Columbia, and Tillamook counties) of Oregon (USFWS 2008e).

As of 2009, there were approximately 56 known sites of Nelson's checkermallow rangewide, 34 of which occur in Benton County (K. Norman, pers. comm. 2009). In 2009, there were 46 confirmed occurrences in Benton County, both planted and natural, with 11 occurrences located on private lands, 32 located on non-federal public lands, and 4 located on federal lands (Benton County, unpublished data). The largest known population is located at the William L. Finley National Wildlife Refuge (Wilson 2004).

The primary threats to Nelson's checkermallow include habitat loss and fragmentation resulting from urban development and agricultural conversion activities, and from tree and shrub encroachment, and the proliferation of invasive species (ODFW 2006).

Golden paintbrush

Golden paintbrush *(Castilleja levisecta*) was listed as threatened under the federal ESA in 1997 (USFWS 2008f) and is extirpated from Oregon. In 2000, the USFWS (2000b) prepared a draft recovery plan for golden paintbrush, calling for efforts to reintroduce this species to the Willamette Valley. Critical habitat has not been designated for this species. Potential habitat occurs in Benton, Linn, Marion, and Polk Counties (USFWS 2008f). Efforts are underway to reintroduce this species in Oregon (T. Kaye, pers. comm. 2009).

3.6.0.1 Non-Prairie Species

The following non- prairie species and designated critical habitat are not anticipated to be affected by the proposed actions, because the majority of the covered lands lack suitable habitat for these species (see Appendix D: Listed Non-Prairie Species for more information).

- Water howellia (*Howellia aquatilis*) (threatened)
- Northern Spotted Owl (*Strix occidentalis caurina*) (threatened) (critical habitat)

- Marbled Murrelet (*Brachyramphus marmoratus*) (threatened) (critical habitat)
- Oregon chub (*Oregonichthys crameri*) (endangered) (critical habitat proposed)

The Northern Spotted Owl and Marbled Murrelets nest and/or forage in forested habitats. Water howellia has been extirpated from Oregon. No Oregon chub are located on the lands covered by the Permit.

Two fish species or their habitat that intersect lands covered by the Proposed Action alternative include Upper Willamette River Chinook and Upper Willamette River Steelhead (described below), however no covered activities will impact these species.

Upper Willamette River Chinook

The Upper Willamette River Chinook (*Oncorhynchus tshawytscha*) was listed as threatened on March 24, 1999 under the federal ESA (NMFS 1999a). This species is not listed under Oregon's ESA. A recovery plan is in progress. Critical habitat was designated by NMFS (2005) on September 2, 2005. The Upper Willamette River Chinook evolutionary significant unit includes all naturally spawned spring-run Chinook salmon populations in the Willamette River and its tributaries above the Willamette Falls (NMFS 1999a). Portions of Marys River, Oak Creek and Muddy Creek are designated as critical habitat (NMFS 2009). None of the streams in Benton County are designated as used by salmon for spawning use (ODEQ et al. 2005), while many streams in the County are designated as used by salmon for rearing and migration or core cold water habitat (ODEQ et al. 2003).

Upper Willamette River Steelhead

The Upper Willamette River Steelhead (*Oncorhynchus mykiss*) was listed as threatened on March 25, 1999 under the federal ESA (NMFS 1999b). This species is not listed under Oregon's ESA. A recovery plan is being prepared. Critical habitat was designated by the NMFS (2005) on September 2, 2005.

This Upper Willamette River Steelhead distinct population segment includes all naturally spawned steelhead populations below natural and manmade impassable barriers in the Willamette River and its tributaries upstream from Willamette Falls to the Calapooia River (inclusive) (NMFS 1999b). The Luckiamute River and a number of its tributaries are designated as critical habitat (NMFS 2009). No streams in Benton County are designated as used by steelhead for spawning (ODEQ et al. 2005), while many streams in the County are designated as used by steelhead for rearing/migration, and core cold water habitat (ODEQ et al. 2003).

3.6.1 Proposed and Candidate Species

There are no USFWS or NMFS proposed species within Benton County. Candidate species are limited to the Streaked Horned Lark and Taylor's checkerspot butterfly. Taylor's checkerspot butterfly would be covered under the Permit on Benton County owned lands.

3.6.1.0 Streaked Horned Lark

In 2001, the U.S. Fish and Wildlife Service added the Streaked Horned Lark to the list of federal candidate species[7] (USFWS); with an annual review conducted in 2007 (USFWS 2008j). The Oregon Department of Fish and Wildlife has classified the Streaked Horned Lark as critical sensitive[8] (ORNHIC 2007). The Lark is protected under the Migratory Bird Treaty Act. If the species becomes listed, a recovery plan may be prepared and critical habitat designated.

In Oregon, the Lark is found primarily within the central Willamette Valley. The largest known population range-wide is at the Corvallis Airport in Benton County (R. Moore, pers. comm. 2009). Streaked Horned Larks can be found at many airports, where suitable habitat exists,. Population estimates indicate less than 800 larks rangewide, with approximately 330 birds in Washington and 444 in Oregon (Pearson & Altman 2005). The numbers of larks in Oregon may be much larger, but are difficult to estimate on private lands (R. Moore, pers. comm. 2009)

Gravelly, well drained prairie is the primary native habitat for the Lark; preferably short (< 30 cm tall), sparsely vegetated (annual) or bare ground (Altman 1999). Many of these habitat types are ephemeral, and subject to human disturbance, changes in ground cover type (farmers changing from one crop to another, e.g., from annual grasses to Christmas Trees), and fluctuating inundation caused by rainfall or flooding.

Loss or degradation of suitable native prairie habitat is the most significant long-term threat to Streaked Horned Lark populations (R. Moore, pers. comm. 2007). Nest predation is the primary source of nest failure and is magnified by habitat loss affecting distribution and abundance of the species. Additionally threats include mortality from moving vehicles (adults and chicks may forage and feed along roadsides); nest loss through trampling (humans, animals), mowing, destruction by vehicles, and flooding; pesticides; stochastic events; and small populations (Altman 1999, Pearson & Altman 2005).

3.6.1.1 Taylor's checkerspot butterfly

In 2001, Taylor's checkerspot butterfly was designated as a candidate species by the USFWS (USFWS), with an annual review conducted in 2007 (USFWS 2008i) If the USFWS subsequently lists the species as threatened or endangered under the ESA, a recovery plan and/or critical habitat may be established for the species.

Taylor's checkerspot butterfly goes through four distinct life stages: egg (May), larva (June through early March), pupa (late March), adult (early April through May). Taylor's checkerspot butterfly produces one brood per year (Stinson 2005), with only one to two of the eggs generally surviving to adulthood (Stinson 2005).

In 2002, there were only four confirmed populations of Taylor's checkerspot butterfly (Xerces et al. 2002) – three in Washington, one in Oregon; with an estimated population size of 1,000 butterflies in Oregon (Ross 2005). In 2004, a population of 500 Taylor's checkerspot butterfly was discovered at Beazell Memorial Forest (Ross 2005). As of 2004, Oregon's two populations

[7] Candidate species are species for which the USFWS has sufficient information to support listing.
[8] Critical sensitive species are species for which listing as threatened or endangered is appropriate if immediate conservation action are not taken or a species at risk throughout its range, or a disjunct population (geographically isolated).

of Taylor's checkerspot butterfly comprised greater than 75% of the known populations in Oregon and Washington (Hill 2004).

The Taylor's checkerspot butterfly require upland prairie habitat, dominated by short-stature grasses, such as fescue (Stinson 2005). These prairie habitats must include a diversity of both host and nectar food sources. In Oregon, the primary larval host species is *Plantago lanceolata* (narrowleaf plantain), a non-native species (Ross 2006). The primary nectar species in Oregon is strawberry (*Fragaria virginiana*), followed by Tolmie's mariposa lily (*Calochortus tolmiei*), sea blush (*Plectritis congesta*), and bi-colored flaxflower (*Linanthus bicolor)* (Ross 2006).

The Taylor's checkerspot butterfly is primarily threatened by habitat loss, fragmentation, and degradation from tree and shrub encroachment, land conversion, and invasive species competition (ODFW 2006). Natural threats include weather, parasitism, disease, and predation. Human and natural threats lead to small and isolated populations resulting in demographic and genetic risks. Population sizes fluctuate greatly from year to year, and thus are susceptible to local extinction.

3.7 Water Resources (Quantity and Quality)

Much of Benton County is located within the Upper Willamette River sub-basin of the Willamette River Basin (ODEQ 2006), with the mainstem of the Willamette River serving as a majority of the County's eastern border. The remaining portion of the County is located within the Northern Coastal basin.

Benton County is located within two hydrological units: the Upper Willamette River Basin (HUC 17090003) – comprised of 1,830 square miles and the Alsea Basin (HUC 17100205) – comprised of 697 square miles (USGS 1996). Watersheds within Benton County include Marys River, Luckiamute River, Upper Alsea River, Lower Alsea River, Oak Creek, Muddy Creek, Long Tom, Five Rivers-Lobster Creek, and Upper Yaqunia River (Figure 3.2). Most of the county is within the Marys River Watershed.

Beneficial uses of water include fisheries, aquatic life, drinking water, recreation, and irrigation (ODEQ 2006). The Willamette River serves as one source of drinking water for the City of Corvallis (2009). The City of Corvallis (2009) also gets its water from the three streams in the Marys River Watershed: north and south forks of Rock Creek and Griffith Creek. The City of Philomath (2003) gets its drinking water from the Marys River. In rural areas, ground water is used for drinking.

Water quality in Oregon is measured by criteria established the Oregon Department of Environmental Quality (ODEQ). Two sources of water pollution affecting water quality are point source pollution (also known as end of pipe discharge) and non-point source pollution (generally storm water runoff). Too much runoff can cause erosion, flooding, and pollution of streams and other water bodies, thereby affecting beneficial uses of those streams. Beneficial uses for tributaries of the Willamette River include: Public Domestic Water Supply, Private Domestic Water Supply, Livestock Watering, Fish and Aquatic Life, Fishing, Boating, Hydro

Power, Aesthetic Quality, Industrial Water Supply, Irrigation, Water Contact Recreation, and Wildlife and Hunting (ODEQ 2005).

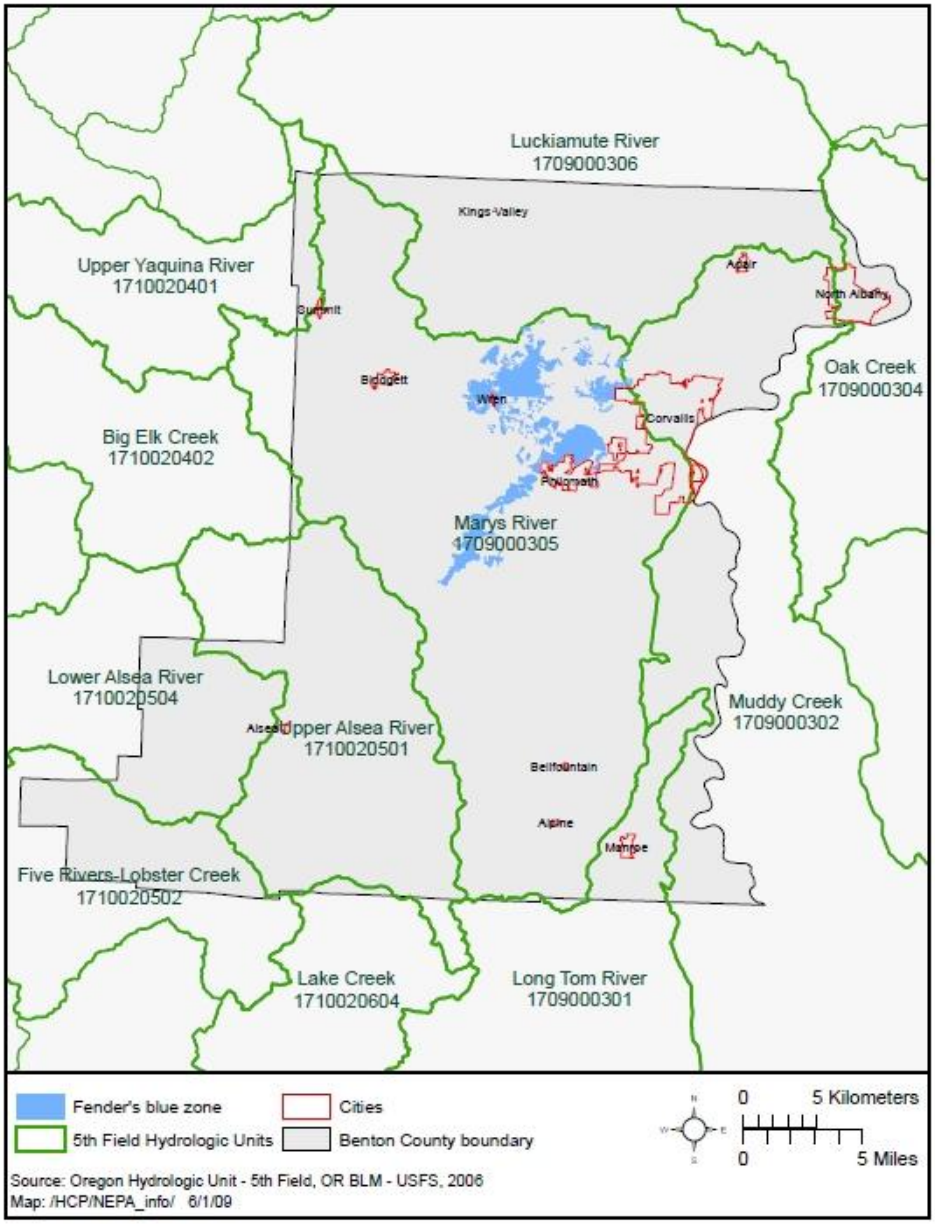

Figure 3.2 Benton County Watersheds.

3.7.0 Water Quality Limited Streams

The water quality of the Upper Willamette River sub-basin is primarily influenced by agriculture, although municipal and industrial point sources and urban non-point sources also affects water quality (Primozich and Bastasch 2004). Several water bodies within Benton County are on the ODEQ's list of water quality limited streams (303d): Willamette River, Marys River, Luckiamute River, Muddy Creek, Soap Creek Long Tom, Alsea River, South Fork Alsea

River, Lobster Creek, Camp Creek, Little Lobster Creek, Phillips Creek, and Preacher Creek (Figure 3.2). Water quality limited streams are water bodies failing to meet water quality standards.

3.7.1 Groundwater

Groundwater is stored in aquifers at various depths below the earth's surface, yet linked to surface water supplying the base flow of most Oregon's wetlands, streams, rivers, and lakes (ODEQ 2003). Groundwater provides drinking water for many rural residents in the state, including Benton County. Ground water can be contaminated from a number of sources including, but not limited to: (1) improperly installed or old domestic wells, (2) poorly maintained septic systems, (3) improperly applied pesticides or pesticide spills, (4) household chemicals and cleaning products, and (5) excess nitrogen fertilizers, including manure and lawn fertilizers (ODEQ 2008a).

Benton County is comprised of the following hydrogeologic units: Low Yield Unit, Willamette Silt Unit, and the Basin Fill Unit (ODWR and DLCD 2002). The ground water within the Low Yield Unit is at risk for high salinity. The Low Yield Unit has low storage capacity, and while users generally have sufficient water for domestic uses, with wells typically yield less than 10 gallons per minute, with 5 gallons per minute more common. Many wells are unable to provide sufficient water beyond household uses. Most of the private property within the Fender's Blue Zone is located within the Low Yield Unit.

No aquifers within Benton County contain restriction classifications (Primozich and Bastasch 2004), nor is any portion of Benton County, as of 2007, considered a groundwater critical area (ODWR 2007).

3.8 Wetlands

The Willamette Valley, including Benton County, historically contained extensive and diverse wetland complexes, including wet prairies, forest wetlands, backwater sloughs, permanent marshes, and scrub-shrub wetlands (Roth et al. 2004). Most (over 85%) of the wetlands within the Willamette Valley ecoregion have been lost to agricultural conversion, flood control, and urbanization (Roth et al. 2004, ODFW 2006). Remaining wetlands are highly degraded from altered water regimes, invasive plant and animal disturbance, and pollution (ODFW 2006).

No wetland delineations or determinations were conducted as part of the HCP. Wet prairies are included as covered lands and wet prairies may satisfy requirements for jurisdictional wetlands, requiring a permit to impact wetlands. In Oregon, both the U.S. Army Corps of Engineers and the Oregon Department of State Lands have jurisdiction over wetland fill and/or removal projects.

3.9 Air Quality

The Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards for six "criteria" pollutants: Ozone (O_3), carbon monoxide (CO), nitrogen oxide (NOx), sodium dioxide (SO_2), Particulate Matter (PM_{10}, and Lead (Pb) (ODEQ 2008b). Ozone

is generally considered a regional pollutant as it affects air quality on a regional scale. Pollutants such as CO, NO_2, SO_2, and Pb are considered to be local pollutants accumulating in the air locally. PM_{10} is considered to be both a localized and a regional pollutant.

Air pollutants come from natural sources (e.g., forest fires and volcanoes) and from human sources, both stationary and mobile. Stationary sources include, but are not limited to, wood products, metal processing plants, wood stoves, and auto body shops. Mobile sources (e.g., cars, trucks, construction equipment, and lawnmowers) are major contributors to air pollutant emissions.

The Oregon Department of Environmental Quality monitors the air quality in Oregon, and identifies those areas not meeting the National Ambient Air Quality Standards (NAAQS) set by the EPA. Those areas are determined to be in "nonattainment". If an area has a history of being in nonattainment, but is now meeting the NAAQS, that area is considered to be a "maintenance area" (ODEQ 2008b). No portion of Benton County is in a non-attainment or maintenance area.

3.10 Cultural and Historical Resources

The Kalapuya Tribe, which collectively consisted of many related bands, occupied the Willamette Valley (Benton County 2002). The Luckiamute Band of Kalapuya Tribe occupied much of the area which later became Benton County. The Kalapuya intensively managed the valley, using fire to encourage growth of food plants (e.g., camas, white oak, and tarweed) and plants used for baskets, mats, and tools. Burning also allowed for easier access to game animals (Benton County 2002).

Settlers began moving into Oregon in the 1800s. In 1850 Congress passed the Oregon Donation Land Act giving land to settlers. In 1855, the Indians and the U.S. signed a treaty, which was ratified by the Senate and signed into law by President Pierce. The Kalapuya Indians, under the treaty, ceded 20.0 million acres of land to the U.S. in exchange for two permanent reservations: the Coast Reservation (Siletz) and the Grand Ronde Reservation (Benton County 2002).

The U.S. Army established Fort Hoskins in 1856, which was located along two major trails and became a regional center of economic and political activity (Benton County 2002). Between 200-300 troops served at Fort Hoskins until 1865 when the fort was decommissioned and purchased by Samual and Mary Frantz. The Franz built a Gothic Revival Home on the property which in 1974 was listed on the National Register of Historic Places (C. Bentley, pers. comm. 2009). Benton County acquired the property in 1992 from members of the Franz family, and created the Fort Hoskins Historic Park.

3.11 Land Use/Socio-Economic

3.11.0.0 Land Use Patterns and Trends

Benton County is located within the northwestern portion of the state, and consists of approximately 175,717 ha (434,201 acres), of which approximately 82.6% is in private ownership (Figure 3.3) (Benton County Taxlot GIS Layer, 2009).

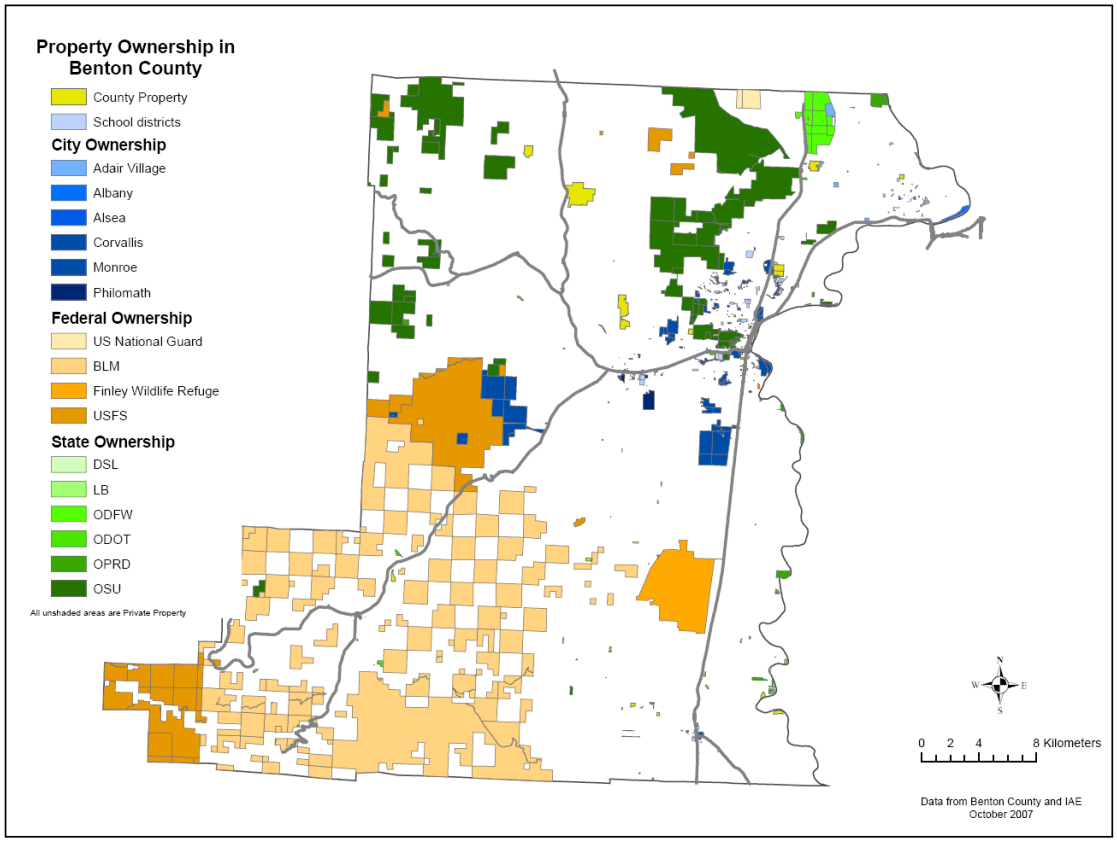

Figure 3.3 Land Ownership Patterns in Benton County

3.11.0.1 Socio-Economic

Benton County was established in 1847, when it was separated from Polk County by an act of the Provisional Government of Oregon. The county seat is located in Corvallis. The economy is primarily agriculture, forest products, research and development (i.e., Oregon State University), electronics, and wineries (Oregon Secretary of State 2009). Benton County is governed by a three-member board of commissioners each serving a three-year staggered term (G. Verret, pers. comm. 2009).

Benton County's population, in 2000, was 78,153, with 49.8% of the population males (38,095) and 50.2% females (39,248) (U.S. Census Bureau 2000). By 2008, Benton County's population was estimated at 81,859 persons (U.S. Census Bureau 2009), a 4.8% increase. The majority (approximately 67%) of these residents live in the City of Corvallis. The median household income in 2007 was $49,061, with 17.6% of the County's population living below the poverty level (U.S. Census Bureau 2009). In 2000 (U.S. Census Bureau) 38,356 persons were in the civilian labor force, of which 67.5% (25,872) were employed by private companies. The largest industry employer was in education, health, and social services (11,944 persons or 31.1% of the civilian labor force), followed by manufacturing (6,372 persons or 16.6% of the civilian labor force).

Incorporated communities within Benton County include Adair Village (incorporated 1976), Albany (1864), Corvallis (1857), Monroe (1914), and Philomath (1882) (Oregon Secretary of

State 2009). Only a portion of Albany is located within Benton County, with the remaining portion located within Linn County. There are five officially designated unincorporated communities within Benton County: Wren, Alpine, Bellfountain, Alsea, and Greenberry.

In 2000, Benton County had a median age of residents of 31.1 years, with 78.2% of the population 18 years of age and older; 31,980 housing units, with 57.3% owner occupied; and an average household size of 2.43 persons (U.S. Census 2000).

According to the U.S. Census Bureau (2000) in 2000, the majority of Benton County residents were Caucasian (69,678 or 89.2%), followed by Hispanics (3,645 or 4.7%), Asians (3,506 or 4.5%), with blacks (658), American Indians (619), and Native Hawaiians and other Pacific Islanders (188) each comprising less than one percent of the population. Persons of races not listed (1,503) accounted for 1.9% of the population, and persons reporting two or more races (2,001) accounted for 2.6% of the population.

3.12 Transportation

Roads within Benton County are owned and/or maintained by the Oregon Department of Transportation (ODOT), Benton County, Oregon State University (OSU), Oregon Parks and Recreation Department (OPRD), the cities of Corvallis, Philomath, Monroe, Adair Village, and Albany, and several public road districts. All of Benton County's and a portion of ODOT's owned and maintained roads and adjacent rights-of-way are covered in the HCP.

3.12.0.0 Oregon Department of Transportation

ODOT maintains and has jurisdiction over the following main roadways within Benton County (Benton County 2001): (1) Corvallis-Newport Highway (U.S. 20), (2) Corvallis-Lebanon Highway (Highway 34), (3) Pacific Highway West (Highway 99W), (4) Albany-Corvallis Highway (U.S. 20), (5) Alsea Highway (Hwy 34), (6) Kings Valley Highway (Hwy 223), (7) Eddyville-Blodgett Highway, (8) Territorial Highway, and (9) Alsea-Deadwood Highway (ODOT 2007). All these roads are paved. All ODOT right-of-way and any off-highway lands within the nectar zone of the Fender's Blue Zone or an ODOT Special Management Area rights-of-way for the Covered Species, a total of 6.7 ha (16.6 ac), would be covered in the Permit.

3.12.0.1 Benton County

The County has jurisdiction over approximately 756 km (470 miles) of roads within the County, of which 394 km (245 miles) are asphalt/concrete and oil mat, 304 km (189 miles) are gravel road, 27 km (17 miles) are dirt roads, and 31 km (19 miles) are unclassified surfaces (Benton County 2001). Typical right-of-way width is 18.28 m (60 ft). The County does road maintenance activities for other local communities, state government (ODOT, OSU), and fire departments, depending upon the availability of funding from other jurisdictions (L. Starha, pers. comm. 2007). Within the County's ROW, there are 31 established Special Management Areas (SMAs). These areas are managed specially for protection of rare and sensitive species, including the covered HCP plant species (L. Starha, pers. comm. 2008). Each SMA is classified as either Type 1 or Type 2 (See Chapter 5 of the HCP for more information on these categories and how established).

4 Environmental Consequences

This section addresses the effects the Proposed Action alternative and the No Action alternative would have on the affected environment described in Chapter 3 of the EA.

Several of the activities covered by the HCP are similar in nature and have been combined for purposes of analyzing the impacts. These include:

(1) "Building Construction Activities": Home, Farm, and Forest Construction and Public Service Facilities Construction
(2) "Linear Projects": Includes Road Construction, Maintenance, and Work within Rights-of-way Activities; Utility Maintenance Activities on Private Lands, and Water and Wastewater Management Activities, and
(3) "Habitat Restoration, Enhancement, and Management Activities": Includes Parks/Natural Areas/Open Space Management Activities and Habitat Conservation Plan Implementation Activities.

This section also analyzes the impacts of the remaining covered activities:

(4) Agricultural activities
(5) Emergency response activities ("Emergency Activities")

Benton County issues private landowners permits and agricultural building authorizations for construction of new homes, accessory buildings, agricultural buildings, additions to buildings, medical hardship dwellings, and utilities on private lands. The County also issues permits for work conducted within its right-of-way (e.g., utility construction and maintenance, and road approaches). Activities for which County permits and agricultural building authorizations are issued are found under Building Construction Activities and Linear Projects.

Wetland impacts were not analyzed in the EA. Most of the habitat covered by the HCP is upland prairie habitat, although some wet prairie habitat lands are also covered. Prior to any impacts to wetlands, the County, Cooperators, or private landowners would need to obtain any necessary state (Department of State Lands) or federal (Army Corp of Engineers) permits and conduct the necessary wetland mitigation.

There are no expected or planned changes in land use associated with the covered activities.

4.1 Proposed Action Alternative

Under the Proposed Action alternative, Benton County would obtain a Permit from USFWS for take of the Covered Species. In turn, Benton County would be allowed to issue incidental take coverage through a certificate of inclusion to Cooperators (Oregon Department of Transportation, Oregon State University, City of Corvallis, Greenbelt Land Trust, Pioneer Telephone Cooperative and NW Natural), as well as private landowners needing a County permit or agricultural building authorization in the Fender's Blue Zones.

The Benton County Prairie Species HCP would cover residential construction of 195 new homes, 41 medical hardship dwellings (of which 4 will require utilities not associated with the main residence), 513 accessory structures, 413 structure additions, and 118 agricultural buildings. For private landowners, incidental take would only be issued for impacts to Fender's blue butterfly habitat (Kincaid's lupine and native nectar species) on private property within the Fender's Blue Zone.

For Benton County and Cooperators that are non-federal public entities (City of Corvallis, Oregon State University, Oregon Department of Transportation) incidental take would be issued for all seven species occurring on their lands or for species their activities would impact: Fender's blue butterfly, Taylor's checkerspot butterfly, Kincaid's lupine, Willamette daisy, Bradshaw's lomatium, Nelson's checkermallow, and peacock larkspur. For private land Cooperators (Greenbelt Land Trust) or Cooperators working on County or private lands (Pioneer Telephone Cooperative and NW Natural), incidental take would be issued only for Fender's blue butterfly. Mitigation for impacts by Benton County or Cooperators would occur at designated Prairie Conservation Areas or Type I ROW Special Management Areas. Benton County also will acquire conservation easements in the Fender's Blue Zones on up to 20-24 ha (50-60 ac) of high quality Fender's blue butterfly habitat, and enhance this habitat to mitigate for impacts to Fender's blue butterfly habitat from home, farm, and forest development activities in the Fender's Blue Zones requiring a County permit or agricultural building authorization; public service facilities construction; utility construction and maintenance activities on private lands; and some road maintenance and work authorized within the County's road rights-of-way. Type I Road SMAs will also be used as mitigation sites for impacts at Type I Road SMAs.

4.1.0 Climate

Greenhouses gases produced both naturally and by humans are the leading cause of climate change (Karl and Trenberth 2003). The main greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (US EPA 2009a). Carbon dioxide enters the atmosphere through the burning of fossils fuels and burning of solid waste, trees, and wood products for transportation and residential uses. Methane is emitted from livestock (e.g., cattle) and agricultural practices. Nitrous oxide is emitted from agricultural activities, and from the combustion of fossil fuels.

4.1.0.0 Building Construction Activities

Up to 1,280 projects for new homes, medical hardship dwellings, accessory buildings, additions to structures, and agricultural buildings, along with two rural schools and two rural fire stations could be undertaken during the Permit term within the Fender's Blue Zone. Sources of fossil fuel emissions (CO_2, CH_4, and N_2O) would come from the use of heavy equipment to construct the buildings and install the utilities, and from construction workers traveling to and from the work site. Heavy equipment used for construction of these buildings, roads, driveways, septic systems, utilities, playgrounds, ball fields, and buffers would introduce greenhouses gases into the atmosphere through vehicle emissions. Impacts from construction activities will be on-going during the Permit, with an average of 26 buildings constructed in a given year, with construction taking anywhere from 6 months to two years, depending upon the size of the structure. Greenhouse gas emissions from individual projects, and cumulatively, are expected to be short-term and minor.

Building Construction Activities will result in 195 new homes, two rural schools, and two rural fire stations over a 50-year period, thereby increasing the number of vehicles on the road in Benton County. If each new home has, on average, two vehicles, and only 8 new homes will be constructed in a given year, then production of greenhouse gases from vehicles emissions would be minor in the first years of the Permit and increasing in severity over the life of the permit until 380 more vehicles would be added by the end of the Permit term. These additional impacts may be alleviated by the use of more fuel efficient vehicles, including electric and hybrid cars. Overall, during the Permit term, increases in greenhouse gas emissions from household transportation are anticipated to be minor.

Fossil fuels would be burned for heating and/or lighting of 1,280 new homes, accessory buildings, agricultural buildings, medical hardship dwellings, and structure additions within the Fender's Blue Zone. Greenhouse gases produced from the lighting and heating of these structures will increase each year as 26 new buildings are constructed. While the amount of greenhouse gases will increase each year, the amount of greenhouse gases emitted, even at the end of the Permit term, is not anticipated to be significant.

Benton County proposes construction of two rural schools and two rural fire stations. Operation of such buildings will generate greenhouse gases through the burning of fossil fuels for heating and lighting, in addition to fuel burned during the transportation of employees and children to and from school each day. Each fire station will also produce greenhouse gases with employees and volunteers traveling to and from the fire stations, and the operation of fire trucks and emergency response vehicles. These emissions are not anticipated to result in a substantial increase in greenhouse gases emitted.

The rate of development within the Fender's Blue Zone is not expected to be different in the absence of a HCP, and therefore, any regional climate impacts would not differ from those that would occur otherwise.

4.1.0.1 Linear Projects

Heavy equipment used for road construction activities would introduce greenhouse gases into the atmosphere. Over Permit term up to 17 road construction projects are anticipated to occur (in Type 2 roadside Special Management Areas of the right-of-way with the HCP covered species), with each project being short-term (less than two years). Total impacted area will not exceed 24.8 ha (61.2 ac), approximately 1.6% of the area of the County's overall rights-of-way. These emissions are not anticipated to be significant.

County road maintenance activities require the use of heavy equipment which emits greenhouse gases into the atmosphere. The extent of non-vegetation maintenance activities undertaken by the County varies from year to year depending upon need and available funding to perform such maintenance activities (L. Starha, pers. comm. 2009). None of the activities covered by the Permit are new – all are reoccurring activities. These activities are not anticipated to create greenhouse gas emissions above and beyond those greenhouse gases already being emitted.

All County rights-of-way outside Special Management Areas are mowed at least once per year, with problem areas being mowed at least twice per year (for safety purposes). Any mowing or herbicide use that does occur within Special Management Areas will follow the guidelines in Appendix L of the HCP: Roadside and Streamside Vegetation Management Guidelines for Covered Plants. Mowing outside Special Management Areas occurs year round. Certain areas receive spot mowing for sight distance. Generally two mowers are operated at the same time (L. Starha, pers. comm. 2009). All paved and some gravel rights-of-way are sprayed with an herbicide each year, unless the landowner specifically requests the ROW not be sprayed. Herbicide spraying occurs during a four week period beginning in April. The County also does "spot" spraying of herbicide during spring, summer and fall. The total duration of herbicide application takes only 4-5 weeks but covers from April 1 – October 31. The area sprayed each year depends upon the problem vegetation (e.g., Himalayan blackberry, Scotch broom, thistle, knapweed, knotweed, and poison oak). Only one sprayer is operated at a given time (L. Starha, pers. comm. 2009).

ODOT maintains their right-of-ways (outside Specical Management Areas) at least once annually, through mowing and spraying activities (Nick Testa, pers. comm. 2009). Under the Permit, ODOT would be mowing and spraying only on certain highway segments (those within the Nectar Zone of the Fender's Blue Zone) totaling 5 ha (12.5 ac). Mowing and spraying, while it occurs annually, does not occur year-round.

Mower and sprayer use will emit greenhouse gases. However, these emissions are anticipated to be of short duration (several months per year) and minor, although on-going (each year for the 50-year Permit term). Increased use of motorized equipment for vegetation management purposes is not expected to occur as no new roads are anticipated to be added during the Permit term. While use of motorized equipment adds greenhouse gases to the atmosphere, the activity is not expected to create greater greenhouse gas emissions than those gases already being emitted for these activities. As old equipment is replaced, new equipment will be more fuel efficient thereby emitting few quantities of greenhouse gases, and thus reducing climate impacts.

Activities authorized within the County rights-of-way are sporadic and dependent upon need. In 2008, 44 road approach permits, 39 right-of-way permits, and 74 utility permits were issued. Heavy equipment is used to construct driveways, and install and maintain utility lines. This equipment would introduce greenhouses gases into the atmosphere. However, impacts are anticipated to be minor and of short duration (road approach – less than one year, utility construction – less than two years, and utility maintenance – less than one year). Individual projects will not be on-going, however, activities could occur each year of the Permit term. With vehicles becoming more fuel efficient and emitting less greenhouse gases, impacts from heavy equipment are expected to decline over the Permit term as old equipment is replaced.

Water and wastewater management activities would involve the construction, operation, and maintenance of pipelines, water treatment plants, sewage treatment plants, and related facilities. Heavy equipment used for construction and maintenance activities will introduce greenhouse gases into the environment. Operations of the facilities will also introduce greenhouse gases into the environment. Construction impacts will be short-term (less than two years) and minor. Operation impacts will be on-going.

Telephone utility maintenance on private lands would require the use of heavy equipment to replace underground cable. This equipment would emit greenhouse gases into the environment. An estimated 29,051 m (95,313 ft) of cable in the Fender's Blue Zone will be replaced during the 50 year HCP. This averages out to 581 m (1,906 ft) of cable to be replaced per year, with the time estimated to complete this work estimated at two weeks per year, and most work occurring during the dry season. Impacts to the environment from heavy vehicles introducing greenhouse gases into the atmosphere are anticipated to be minor, although on-going.

Natural gas utility construction and maintenance on private lands would require the use of heavy equipment to install and replace underground pipelines. This equipment would emit greenhouse gases into the environment. An estimated 3,237 m (10,620 ft) of new pipeline in the Fender's Blue Zone will be installed and 4,601 m (15,094 ft) will be replaced, for a total of 7,838 m (25,714 ft) of pipeline to be affected during the 50 year HCP. This averages out to a total of 157 m (514 ft) of pipeline to be installed/replaced each year, with the time estimated to complete this work estimated at half a day per year, and most work occurring during the dry season. Impacts to the environment from heavy vehicles introducing greenhouse gases into the atmosphere are anticipated to be minor, although on-going.

4.1.0.2 Habitat Restoration, Enhancement, and Management Activities

Several habitat restoration, enhancement, and management techniques (e.g., prescribed burning, mowing, mechanical brush removal, and grazing) would release greenhouse gases into the atmosphere. However, utilization of these techniques would have no measurable impact on regional climate.

Prescribed burning would introduce additional greenhouse gases into the atmosphere. While prescribed burning will add CO_2 emissions, the carbon is estimated to be recaptured the next growing season (US EPA 2009b); however, prescribed burning will result in the production of CH_4, CO, NO_X, and N_2O. This production, however, is anticipated to be minor compared to other sources of CH_4 and N_2O, such as enteric fermentation[9], soil management, and manure management.

Prescribed burning activities would only occur as specified under Oregon law. A total of approximately 211 ha (522 ac) of prairie habitat on County or Cooperator lands is covered for up to 10 prescribed burns over the course of the 50 year incidental take permit. On average, 42 ha (104 ac) could be burned in any given year. In areas with Fender's blue butterfly, the annual burn area is constrained (see Section 4.1.4.2 for more information).

While prescribed burning will add CO_2 emissions, the carbon is estimated to be recaptured the next growing season (EPA 2009b); prescribed burning will result in the production of CH_4, CO, NO_X, and N_2O. This production, however, is anticipated to be minor compared to other sources of CH_4 and N_2O, such as enteric fermentation, soil management, and manure management, and other larger prescribed burns that would occur during the Permit term, including potential

[9] Enteric fermentation is fermentation taking place in the digestive systems of ruminant animals, such as cattle.

prescribed burns at the William L. Finley National Wildlife Refuge, located within Benton County.

Oregon State University (OSU) will continue to use livestock grazing (cattle) as a vegetation management technique on its agricultural properties. Livestock grazing will result in production of methane (CH_4) and nitrous oxide (N_2O), with the highest rate of production occurring from enteric fermentation (EPA 2009b). However, this activity is already occurring on OSU property and the number of cattle on the property is not expected to increase significantly over the Permit term. Allowing grazing for habitat restoration, enhancement, and management purposes is not expected to result in significant increases in greenhouse gases than those already produced on site by existing livestock.

Use of two-stroke engines in lawnmowers, trimmers, leaf blowers and chainsaws are a significant source of greenhouse gas emissions. Four-stroke engines also introduce greenhouse gases into the atmosphere, but to a much lesser extent than two-stroke engines. Fewer than 15 pieces of motorized equipment would be used at the same time and would only be operated for 5-10 days per year in any given covered Prairie Conservation Area. Therefore, emissions from these types of motorized equipment are estimated to be negligible compared to emissions from other local sources.

Motorized vehicles used in managing conservation and mitigation sites would introduce greenhouse gases into the atmosphere. However, these vehicles (up to five per site) would be used approximately one-three weeks per year at any given site covered by the Permit (A. Kitzman, pers. comm. 2009).

4.1.0.3 Agricultural Activities

Agricultural activities would have no measurable impact on regional climate. Approximately 28.3 ha (70 ac) of land is under agricultural production. Crops grown may vary from year to year depending upon demand. Agricultural activities involve use of vehicles for soil tillage and harvesting of crops and soil management activities (e.g., fertilization, application of livestock manure, production of nitrogen fixing crops, retention of crop residues, irrigation, drainage, tillage practices, and fallowing of land). These activities would result in the production of carbon dioxide and nitrous oxide (EPA 2009b). However, the amount of greenhouse gases generate from agricultural production activities at Owens Farm are estimated to be negligible compared to emissions from other local agricultural sources.

4.1.0.4 Emergency Activities

The number of emergency activities is not known. These activities are sporadic and would occur on an as-needed basis. Vehicles used for fire fighting, hazardous materials cleanup, traffic accident cleanup, disaster relief, and medical assistance and/or evacuation would emit greenhouse gases. However, such emissions are expected to be minor and short-term.

4.1.1 Topography/Soils

4.1.1.0 Building Construction Activities

Home, farm, and forest construction and public service facility construction activities will alter the natural topography and soils through (1) disruption of soil profile due to grading and excavation; (2) soil compaction due to infrastructure and traffic; (3) alteration of soil chemistry due to hardened surface, runoff, and landscaping; (4) modification of organic matter levels and nutrient availability; and (5) increased erosion due to increased soil exposure and alteration of flow patterns.

Modifications to soil and topography are anticipated to be minor as these construction activities are only expected affect up to 123.7 ha (305.7 ac) of the 127,978 ha (316,242 ac) of private lands in Benton County, located outside of the city limits, and an estimated 0.74 ha (1.84 ac) for construction of two fire stations and 3.6 ha (9.0 ac) for construction of two schools. Additionally, sites selected for construction would most likely be level ground or near level ground to reduce the potential construction costs associated with having to move large volumes of material. Building construction projects are not expected to require extensive excavation.

4.1.1.1 Linear Projects

Road construction and maintenance projects and work authorized within the County's right-of-way will alter the natural topography and soils through (1) disruption of soil profile due to grading and excavation; (2) soil compaction due to infrastructure and traffic; (3) alteration of soil chemistry due to hardened surface, runoff, and landscaping; (4) modification of organic matter levels and nutrient availability; and/or (5) increased erosion due to increased soil exposure and alteration of flow patterns.

Soil and/or topography impacts[10] are estimated to be less than 24.8 ha (61.2 ac) (L. Starha, pers. comm. 2009) for a maximum of 17 road construction projects during the Permit term and covered under the Permit, which would affect approximately 1.6% of the County's total rights-of-way.. Road construction projects impacts on topography and soil are anticipated to be minor

Road maintenance activities, including vegetation management, are not expected to alter the natural topography as the topography for most road rights-of-way have already been altered. Some additional soil compaction could occur during maintenance activities, with the use of heavy equipment. However, heavy equipment is generally driven on the road or road shoulders, which are already heavily compacted. These activities have been on-going for many years and do not constitute a new activity. Soil compaction during vegetation management activities within Special Management Areas will be minimized by following the Roadside and Streambank Management Guidelines for Covered Plants (See Appendix L of the HCP).

Authorized activities within County rights-of-way are not expected to change the natural topography as the topography, for the most part, has already been altered. Soil excavation would disrupt the soil profile in localized areas. For utility activities within County rights-of-way,

[10] Assumes each project will be at least 0.8 km (0.5 miles) in length, with 18.2 m (60 ft) of ROW impacts (9.1 m (30 ft) per side of road).

excavated areas would be backfilled using the displaced soils. Soil compaction activities would occur during construction activities (use of heavy equipment) and from the actual constructed infrastructure (e.g., a driveway).

Construction of water and wastewater facilities may result in changes to the natural topography if soil is excavated or sites leveled for structures. Construction activities will result in some soil compaction depending upon the type of equipment used. The extent of impacts is not known as the projects have not been planned or designed.

Telephone utility maintenance activities on private lands could result in changes to the natural topography and soil compaction during construction. The extent of impacts on any given property would be very minor. Use of a bore machine would impact the area where the boring machine is placed (4.5 m^2 [48 ft^2]), where the bore head is inserted into the ground (0.20 m^2 [2 ft^2]), and where the bore head exits (0.84 m^2 [9ft^2]) – which averages out to approximately 5.5 m^2 (59 ft^2). The plow method disturbs approximately 15.24 cm (6 in) of soil (depth), and 3 m (10 ft) wide swath of vegetation, for the length of line to be plowed. When plowing takes place in an existing road, the plow method disturbs approximately 15.24 cm (6 in) of soil (depth) and 15.24 cm (6 in) wide area. The total non-road area to be disturbed is 2.30 ha (5.68 ac). Approximately 25% of the cables would be placed within existing roadways on private property.

Natural gas utility maintenance activities on private lands could result in changes to the natural topography and soil compaction during construction. The extent of impacts on any given property would be very minor. Excavation/trenching is expected to be the primary construction method, which disturbs approximately 0.96 m (3 ft) of soil (depth), 0.96 m (3 ft) wide, for the length of line to be trenched. The total non-road area to be disturbed for replacements and installation is 0.72 ha (1.77 ac). Roughly 90% of the pipeline would be placed within existing roadways on private property.

Modifications to topography and soils from Linear Projects are expected to be minor, although some impacts will be permanent, including soil compaction due to construction of structures, driveways, and roads; and from soil chemistry alterations due to hardened surfaces, runoff.

4.1.1.2 Habitat Restoration, Enhancement, and Management Activities

Habitat restoration, enhancement, and management activities should not alter the natural topography. However, these activities would have minor, temporary, and localized impacts on soil features.

Prescribed burning would alter soil nutrients, reduce soil nitrogen and organic matter (affecting chemical composition and future decomposition rates), and raise pH (slightly and temporarily) (Neary et al. 2005). However, these changes occurred historically as part of the natural and human caused (Kalapuya Indians) disturbance regimes. The Kalapuya Indians burned much larger areas of habitat than would be burned under the Permit. Nitrogen is the most limiting nutrient found in soil; and the amount of nitrogen lost during a prescribed burn is directly proportional to the amount of organic matter lost (Neary et al. 2005). If the amount of available nitrogen in the soils is low, prescribed burning could have long term impacts on the prairie habitat ecosystem. However, the overall long-term effects of prescribed burning are expected to

be positive for maintaining prairie habitat by preventing, reducing, or eliminating invasive species and tree/shrub encroachment versus any short term negative effects (e.g., seed mortality). The frequency of burning will depend upon need and weather conditions. Generally prescribed burning activities would occur once every one-five years, except at Beazell Memorial Forest where prescribed burn activities for Taylor's checkerspot butterfly would occur twice during the Permit term.

Soil compaction due to motorized vehicle traffic would be minor as only a small number (less than 10) of vehicles (trucks, ATVs) would be used in managing conservation and mitigation areas, and these vehicles would only be used less than one-three weeks per year at any given conservation and mitigation areas covered by the Permit. Also, specific vehicles will be used to perform the work and the work will be performed at specific times of the year to limit soil compaction (See Appendix I: Prairie Habitat Vegetation Management Guidelines of the HCP). Oregon State University intends to continue using livestock (e.g., cattle) grazing as a habitat restoration, enhancement, and management tool. Cattle grazing will cause soil compaction in the areas grazed by the cattle, which could affect on-site vegetation and hydrology.

Impacts to topography/soil are anticipated to be short term and minor. Overall, these activities will have a net benefit on prairie habitat.

4.1.1.3 Agricultural Activities

Agricultural activities have been occurring on-site at the Owens Farm property for over 70 years (Satre & Associates 2004). Soils on the site have been impacted by farm equipment and crop planting. Existing slopes were graded thereby affecting the topographic relief, and fill material was used to fill wet prairie habitat (Satre & Associates 2004). An additional 7.0 m^2 (75 ft^2) of soil on Owens Farm could be compacted during the Permit term due to mowing and spraying operations. These impacts are expected to be very minor and would not involve changes to the site's topography.

4.1.1.4 Emergency Activities

Natural topography may be affected (through soil excavation activities) by fire fighting crews responding to wildfires on County or Cooperator covered lands and during a hazardous materials cleanup in order to remove any contaminated soil. Soil compaction would occur from heavy equipment used during emergency activities, such as fire fighting, hazardous materials removal, tow trucks moving motor vehicles involved in a crash, or emergency response vehicles.

These activities are anticipated to be infrequent, and with the possible exception of a wildfire, minor. The extent of impact to soil and topography from fighting a wildfire is dependent, in part, upon the size of the fire.

4.1.2 Prairie Habitat Vegetation

4.1.2.0 Building Construction Activities

Within the Fender's Blue Zone, construction of 1,280 structures, including new homes (including driveways, septic system, and utilities), accessory buildings, agricultural buildings, additions to structures, and medical hardship dwellings will result in the removal of native and

non-native vegetation - up to 123.7 ha (305.7 ac). Some vegetation removal will be permanent (buildings, driveways), while other temporary (septic systems, utilities, fire buffers, and medical hardship dwellings[11]). Where vegetation removal is temporary, the area may re-vegetate voluntarily or the landowner may decide to re-vegetate the disturbed areas with native plants.

There is a potential for private landowners to introduce non-native, invasive species onto their properties from the limited development activities, which could result in such species out-competing native vegetation or by changing the fire regime to the detriment of native vegetation. Currently, on average, vegetation in the Fender's Blue Zone consists of native (20%) and non-native species (80%) (Benton County, unpublished data).

The construction of two rural fire stations and two rural schools has the potential to remove up to 4.43 ha (10.84 ac) of prairie habitat. Invasive species also have the potential to invade remaining undisturbed vegetative areas.

Benton County is acquiring, through conservation easements, 20-24 ha (50-60 ac) of high quality prairie habitat to mitigate for impacts to Fender's blue butterfly from home, farm, and forest construction; public service facilities construction; utility construction and maintenance on private lands; and Benton County road construction and maintenance activities and activities authorized within County rights-of-way. The lands will be protected, enhanced, and managed as high quality prairie habitat. While the total prairie habitat acreage for these conservation easements is a little over half of the amount of land to be lost through land conversion activities, this prairie habitat is far superior, in most cases, to the prairie habitat being lost.

Impacts to vegetation are expected to be minor since a large portion of the prairie habitat in the Fender's Blue Zone is estimated to be non-native.

4.1.2.1 Linear Projects

Road construction projects could result in the removal of roadside vegetation, making these areas more susceptible to erosion. The exact amount of vegetation to be removed is unknown because the construction projects have yet to be designed, however, up to an estimated 24.8 ha (61.2 ac) of vegetation would be affected by the projected projects (L. Starha, pers. comm. 2009). Much of this vegetation is non-native vegetation. Proposed conservation measures related to transportation include best management practices (BMPs) for planting native species, which would offset some of the impacts to vegetation during transportation construction activities (See Chapter 6 of the HCP).

Road maintenance activities have the potential to impact vegetation within the right-of-way. The extent of the impacts will depend upon the type of maintenance activity undertaken. Impacts are expected to be minor as most maintenance activities occur on road shoulders, which are devoid of vegetation.

Roadside vegetation management activities would affect vegetation through mowing and spraying activities. These activities are undertaken to improve sight distance and for safety

[11] Medical hardship dwellings are temporary and once the hardship is gone, the dwelling must be removed.

purposes. Much of the vegetation within the rights-of-way is non-native, except for County and ODOT Special Management Areas (SMAs) where rare and sensitive species, including Covered Species, are found. In the SMAs, County Public Works and ODOT personnel will follow the Roadside and Streambank Management Guidelines for Covered Plants (Appendix L of the HCP). These guidelines include specific guidance on mowing, cutting, thinning, tree stump removal, and chemical treatment. Impacts to vegetation from road vegetation management activities are anticipated to be on-going (through the Permit term), but of short duration during the year (several months), and minor. Mowing is not anticipated to remove vegetation from the rights-of-way, and spraying is intended to kill select non-native vegetation.

Authorized activities within the right-of-way would affect roadside vegetation. Construction of a paved or gravel driveway/road approach would result in the permanent removal of vegetation. Utility construction would affect variable amounts of vegetation, depending on the type of methods (plow or bore) used.

Water and wastewater management activities would affect vegetation. Vegetation would be permanent removed from areas where structures such as water storage facility or wastewater treatment systems are built. The exact footprints for these facilities are not known at this time as the need for these facilities currently does not exist and no planning or design work has occurred. With respect to water and wastewater maintenance activities, impacts to vegetation would occur during maintenance repair of any pipelines. These impacts, however, would be short-term impacts as the area would be restored and vegetation would be allowed to re-establish in areas disturbed during maintenance activities. Maintenance of pipelines installed during the Permit term is expected to only occur once or twice during the Permit term, depending upon when the pipeline is installed and the life of the pipeline.

Telephone utility installation activities on private lands would disturb vegetation in the areas plowed or the entry and exit points for boring. Up to 2.41 ha (5.96 ac) would be impacted. However, as approximately 25% of the pipeline would be placed within existing roadways on private property, only 2.3 ha (5.68 ac) of prairie habitat will would be affected. These impacts, however, would be short-term impacts as the vegetation would be allowed to re-establish.

The total area to be disturbed for natural gas utility replacements and installation is 7.2 ha (17.7 ac). However, as roughly 90% of the pipeline would be placed within existing roadways on private property, only 0.72 ha (1.77 ac) of prairie habitat will would be affected. These impacts, however, would be short-term impacts as the vegetation would be allowed to re-establish.

4.1.2.2 Habitat Restoration, Enhancement, and Management Activities

Habitat restoration, enhancement, and management activities (e.g., mowing, spraying, manual and mechanical removal, prescribed burning) will have short term negative impacts (e.g., seed mortality) to vegetation. However, the long term impacts from these activities will be positive as such efforts are undertaken to decrease invasive species and tree/shrub encroachment, and increase covered species abundance and native species diversity. The goal of the habitat restoration, enhancement, and management activities is to restore and enhance prairie habitat, and to prevent further decline through actions to (1) reduce canopy cover and density of woody stemmed vegetation; (2) increase available light, nutrients, and water for native graminoids and

forb species, which cannot compete with invasive species and woody vegetation; and (3) decrease litter layers, and (4) reduce and prevent the further establishment and spread of invasive species.

Prescribed burning would mimic effects of fire that occurred prior to European settlement, with the intent of promoting grasses and forbs. Short term effects of prescribed burning include (1) erosion resulting from the loss of organic matter, and (2) impacts to vegetation, including impacts from construction of fire lines around burn area and activities necessary to contain fires (emergency activities). Fire lines would be dug by hand or using heavy equipment. Impacts could be permanent if mineral soils are scraped, and the fire lines are broad and regularly used. Re-vegetation would stabilize eroding sites to prevent further erosion.

Mechanical brush control (including mowing) is used to control and remove woody species, thereby promoting re-vegetation of the area by graminoids and forbs. Use of heavy equipment could affect non-targeted vegetation through crushing and uprooting. However, overall long term impacts are beneficial in maintaining prairie habitat, which supports prairie plant species.

Herbicide spraying would be used to control, reduce, and/or eliminate invasive plant species. While the spraying would kill all targeted vegetation (and possibly some non-targeted vegetation), overall the benefits to prairie habitat and the Covered Species is positive.

Benton County and Cooperators will follow the Prairie Habitat Vegetation Management Guidelines set forth in Appendix I of the HCP to minimize impacts to vegetation from habitat restoration, enhancement, and management activities.

4.1.2.3 Agricultural Activities

In addition to agricultural lands, the City of Corvallis' portion of Owens Farms contains oak woodlands, degraded wetlands, degraded drainageway corridor, unused agricultural lands, hedgerow/fence lines, and a small portion of the ash/willow wetland/riparian woodland (Satre & Associates 2004). An estimated 7.0 m^2 (75 ft^2) of habitat may be affected by mowing and spraying during the Permit term by agricultural operations.

Pesticides, which are applied yearly for use on agricultural crops for weed control, could affect native vegetation located in areas adjacent to agricultural fields. Pesticide use is for targeted weed species, has been ongoing, and is not anticipated to significantly affect any additional native vegetation. Mowing of adjacent areas is not anticipated to permanently remove vegetation, but could affect seed production.

4.1.2.4 Emergency Activities

Emergency activities on County and Cooperator covered lands have the potential to impact vegetation in these areas. Fire fighting activities could remove vegetation through the construction of fire lines. Hazardous materials cleanup would affect vegetation (killing it) in the area spilled and possibly in adjacent staging areas (trampling, crushing). Vegetation could also be trampled or crushed by such activities as emergency vehicles responding to accidents, medical evacuations, and disaster relief. Depending upon the extent of damage and the plant damaged, impacts could be long-term (permanent) or short-term.

While the extent of the impacts is not known, impacts to vegetation are anticipated to be minor due to the infrequency of emergency activities.

4.1.3 Wildlife and Fish

4.1.3.0 Building Construction Projects

The construction of 1,280 new structures, including homes, accessory buildings, medical hardship dwellings, additions to structures, and agricultural buildings, will result in the displacement of wildlife species (e.g., birds, amphibians, reptiles, mammals) on up to 123.7 ha (305.7 ac) of prairie habitat within the Fender's Blue Zone. There also will be a decrease in available wildlife habitat as a result of the construction of two fire stations and two schools, causing the displacement of wildlife species on up to 4.43 ha (10.84 ac) of prairie habitat.

Ground disturbance impacts could include, but are not limited to: (1) disturbance of small mammals and birds startled from their burrows, nests, roost sites; (2) direct kill or injury as a result of digging or excavation (crushed burrows, nests); (3) eggs and chicks left unattended and exposed to hot or cold temperatures and predators; and (4) direct kill or injury of aquatic species resulting from sedimentation and pollutants into adjacent streams.

Species dependent upon existing prairie habitat would likely decrease in the local impact area. Wildlife would be displaced to adjacent, undeveloped properties, some only during construction, while others permanently. With a loss of prairie habitat, species populations would decline and there would be a decrease in the productivity of some species, particularly Killdeer, California Quail, Mourning Doves, Barn Swallows, Acorn Woodpeckers, Lazuli Bunting, Western Kingbirds, Cliff Swallows, Black-capped Chickadees, Western Meadowlark, Brown-headed Cowbirds, and Brewer's Blackbirds (Altman 2000).

Adverse indirect effects may include: Habitat and population fragmentation; uncontrolled foot-traffic and pets (especially cats); lighting from residences; which may alter nocturnal behavior or interfere with breeding, foraging or nesting behavior of wildlife; and loss of cover, exposure to the weather, starvation, and increased risk of predation. An increase in vehicle traffic may contribute to an increase in road mortality of wildlife.

Overall, impacts are anticipated to be minor. While each construction project would have localized impacts, the type and scale of impacts would not differ regionally from those that otherwise would have occurred absent the HCP.

4.1.3.1 Linear Projects

Road construction activities have the potential to eliminate wildlife habitat. Only a small portion of habitat has the potential to be affected, an estimated 24.8 ha [61.2 ac] for construction projects, approximately 1.6% of all County rights-of-way. Direct impacts (death) to wildlife could occur through crushing and trampling of occupied nests and burrows, depending upon when construction activities are initiated (e.g., the breeding season). Indirect impacts would include loss of cover, exposure to the weather, starvation, and increased risk of predation.

Construction projects near streams could result in impacts to aquatic species through the introduction of sediments and pollutants into the stream. Only one anticipated project – the bridge repair/replacement project at Bellfountain road has the potential to directly affect aquatic species and their habitat, including native fish present in the stream. If listed fish or fish habitat are present and impacts are anticipated, prior to the construction of this project, the County will need to obtain the necessary federal and state permits to impact listed fish or fish habitat.

Heavy equipment used for road maintenance activities, including vegetation management, could directly affect ground nesting birds and small mammal. Impacts include the direct killing or injury of wildlife through collapse of den/burrow; and eggs, young, or slow moving adults being crushed. Indirect effects include disturbance from noise; and the disturbance and displacement of vegetation resulting in exposure, starvation, and increase risk of predation. The removal of trees and shrubs near streams, which provide shade for aquatic species, could indirectly impact aquatic species by increasing water temperatures, and eliminating cover for native fish.

Ditch cleaning, which occurs in the spring when rainfall is low, could result in impacts to aquatic species and its habitat through sedimentation into streams, although impacts are expected to be minimal. Techniques used to reduce soil erosion and sedimentation of nearby streams include rotor-ditching (e.g., disturbing a small, 30.5 cm (12 in) swatch in the bottom of the ditch); skip ditching (clean a section of ditch, leave a section of vegetation, clean a ditch, leave a section of vegetation, etc.); and reseeding and placement of mulch material on large areas of exposed soils.

Authorized activities within the County's rights-of-way have the potential to affect wildlife and fish. Construction of driveways would eliminate habitat (habitat loss) and create barriers to migration (habitat fragmentation) for some animals. Utility construction activities within the rights-of-way could affect ground nesting birds, invertebrates, and small animals directly (death) and indirectly (loss of habitat, loss of food supplies, and an increased risk of predation). Disturbance to wildlife from maintenance activities would most likely on occur once or twice during the Permit term. Any of these activities occurring near a stream have the potential to release sediments and pollutants into the stream.

Water and wastewater management activities would result in some impacts to wildlife through ground disturbance and/or vegetation management activities. These impacts would be similar to those addressed for road construction and maintenance activities. The extent of the impacts is not known at this time as the City of Corvallis has not identified the extent of acreage needed to perform these activities. Maintenance activities associated with new underground pipelines is expected to be minimal, in terms of frequency of ground disturbance activities over the course of the Permit term, as maintenance is generally only required once every 30-40 years. The extent of the impacts will depend, in part, on whether the underground pipeline needs to be dug up or not.

Telephone utility maintenance activities on private lands would result in some impacts to wildlife through ground disturbance activities. These impacts would be similar to those addressed for road construction and maintenance activities. An estimated 2.3 ha (5.68 ac) of ground disturbance activity outside existing road surfaces will occur over the Permit term (an estimated 460 m^2 (4,954 ft^2) per year).

Natural gas utility installation/replacement activities on private lands would result in some impacts to wildlife through ground disturbance activities. These impacts would be similar to those addressed for telephone utility maintenance activities. An estimated total of 0.72 ha (1.77 ac) of ground disturbance activity outside existing road surfaces will occur over the Permit term (an estimated 143 m^2 (1,542 ft^2) per year).

Linear Projects are anticipated to produce both short-term (underground work within County rights-of-way and on private property), long-term (construction of driveways) and result in direct (death, injury), and indirect (loss of habitat, habitat fragmentation, loss of food supplied, noise disturbances, loss of cover, exposure) impacts. Such impacts are anticipated to be minor, especially since much of the road right-of-way habitat is low quality and serves more as a sink for populations, than as a source.

4.1.3.2 Habitat Restoration and Enhancement Activities

Wildlife use prairie habitat for homes (burrows), nesting (ground nesters), foraging (food sources), and cover from predators. Habitat restoration, enhancement, and management activities, including mowing, spraying, and prescribed burning, have the potential to cause direct (death) and indirect (loss of habitat, including food sources) effects on wildlife (e.g., ground nesting birds, small mammals, reptiles, and amphibians) in the short term. However, in the long term wildlife species would benefit from the conservation of prairie habitat through the restoration, enhancement, and management of prairie habitat needed for breeding, foraging, roosting, and cover activities.

Mowing can result in the direct killing or injury of wildlife through den/burrow collapse and the crushing of eggs and chicks (ground nesting birds). Indirect effects include disturbance from noise; and disturbance and displacement of vegetation resulting in exposure, starvation, and increase risk of predation.

Prescribed burning may result in the direct death or injury to wildlife through suffocation in burrows and actual burn effects (animals unable to flee fires, e.g., small mammals, reptiles, amphibians, avian chicks and eggs). Indirect effects include post fire mortality resulting from the displacement and loss of vegetative cover leading to starvation, exposure, and increased risk of predation. However, grassland fires are typically slow moving and low intensity. Soil erosion could increase sedimentation into streams. However, most prescribed burning will occur well away from streams.

Pesticide use could lead to death or injury to wildlife through contamination and loss of food sources.

Overall despite short term negative impacts to fish and wildlife, over the long-term, habitat restoration, enhancement, and management activities should result in an increase in suitable prairie habitat through the removal of invasive species and trees and shrubs, thereby increasing native species and providing more and higher quality habitat for wildlife species.

The HCP conservation measures call for the acquisition (conservation easements) and conservation (habitat restoration, enhancement, and management) of 20-24 ha (50-60 ac) of high

quality prairie habitat. Wildlife species would benefit from the conservation of this habitat, which would be protected in perpetuity.

4.1.3.3 Agricultural Activities

Impacts to fish and wildlife from ground disturbance (e.g., soil tilling) and harvesting operations would include disturbance to small mammals and birds startled from their burrows, nests, roost sites; direct kill or injury as a result from plowing (crushed burrows, nests); eggs and chicks left unattended and exposed to hot or cold temperatures and predators; and death or injury of aquatic species resulting from sedimentation and pollutants. Pesticide use could result in death or injury to fish and wildlife through contamination and loss of food sources.

Impacts to wildlife and fish from agricultural activities are expected to be minor. Existing farming activities are not expected to increase as a result of this activity being covered by the Permit.

4.1.3.4 Emergency Activities

Emergency activities have the potential to impact fish and wildlife. Vehicles responding to vehicle accidents, hazardous material spills, firefighting, or medical emergencies could result in wildlife being crushed; loss of foraging, water, and cover resources; and young or eggs being left unattended and subject to predation. These impacts are anticipated to be minor, with the underlying activity (wildfire, hazardous material spill, vehicular accident, etc.) resulting in greater impacts to fish and wildlife.

4.1.4 Threatened and Endangered Species

The majority of the Plan Area lacks suitable habitat for Northern Spotted Owl or Marbled Murrelet. Only 0.24% of Marbled Murrelet and 0.12% of Northern Spotted Owl critical habitat is located within the Plan Area. These species nest, breed, and forage in forested habitat. These species and their habitat would not be significantly affected by the Proposed Action alternative. Golden paintbrush and Water howellia have been extirpated from the County. There are no Oregon Chub located within the Plan Area.

4.1.4.0 Building Construction Projects

In preparing the HCP, Benton County surveyed over 4,010 ha (9,910 ac) within the County, including 1,416 ha (3,500 ac) of private lands for Kincaid's lupine and native nectar species within areas potentially occupied by Fender's blue butterfly. The County then established, based upon known butterfly dispersal and nectaring distances, the Fender's Blue Zone (See Figure 1.1). The Zone is comprised of approximately 2,920 ha (7,208 ac) of unprotected private property, of which all is located within the dispersal zone, and 834 ha (2,061 ac) is located within the nectar zone. The total amount of Kincaid's lupine and native nectar species estimated to be present on unprotected[12] private lands within the Fender's Blue Zone is 8,165 m^2 (87,889 ft^2) and 141,815 m^2 (1,526,478 ft^2), respectively.

[12] Unprotected lands lack a deed restriction or conservation easement protecting prairie habitat or the Covered Species.

The County estimated that private landowners would seek County permits or agricultural building authorizations to construct up to 1,280 buildings and structures within the Fender's Blue Zone within a 50-year period, and therefore the County is seeking take authorization for 346 m^2 (3,724 ft^2) of Kincaid's lupine and 5,364 m^2 (57,737 ft^2) of native nectar species (Table 4.1), the estimated impact to Fender's blue butterfly from building construction projects.

Table 4.1 Take Amounts for Building Construction Projects

	Bradshaw's lomatium (#)	Willamette daisy (#)	peacock larkspur (#)	Nelson's checkermallow (#)	Kincaid's lupine (m^2) outside Fender's Blue Zone	Kincaid's lupine (m^2) inside Fender's Blue Zone	Native nectar species for FBB (m^2)[13]	Non-native nectar species for FBB (m^2)[14]	Fender's blue butterfly (estimated #)	Taylor's checkerspot butterfly habitat (m^2)	Taylor's checkerspot butterfly (estimated #)
Home, Farm and Forest Construction	---	---	---	---	---	346	5,364	8,835	2,707	---	---
Public Service Facility Construction	---	---	---	---	---	12.3	222	366	111	---	---
Total	---	---	---	---	---	358.3	5,586	9,201	2,818	---	---

Direct effects to the butterfly and its habitat from the covered activities include: trampling and crushing of butterfly larvae and eggs; and increased road mortality of Fender's blue butterfly from an increase in vehicle traffic as human population increases within FB Zones (from new home construction). Indirect effects include habitat loss (conversion of host and native nectar species habitat), habitat fragmentation, population fragmentation, killing of butterflies through starvation (through habitat conversion of butterfly's nectar habitat), a reduction of dispersal corridors, and mortality from secondary poisoning due to herbicide use on private properties.

Listed plant species on private lands are not protected under the federal Endangered Species Act, unless these species provide habitat for a listed animal species (e.g., Kincaid's lupine providing habitat for the Fender's blue butterfly) or there is a federal nexus. Some or many of the private lands covered in the HCP on which home, farm, and forest construction would occur, may include threatened and endangered plants. Construction projects could result in permanent harm to these species through ground disturbance activities. The extent of that harm is unknown, however, Table 4.2 identifies the number of known populations of the covered plant species located within the Fender's Blue Zone.

Candidate species are not protected under the federal Endangered Species Act from take. The Proposed Action does not include Taylor's checkerspot butterfly habitat located on private lands. The extent of harm to these species is not known.

[13] This is an estimate of native nectar habitat.

The proposed alternative will allow construction of two rural schools and two rural fire stations within Fender's Blue Zone. These ground disturbance activities are estimated to disturb approximately 4.4 ha (10.8 ac) of land (Table 4.1). The County will be acquiring the private property needed for the two rural schools and two rural fire station facilities. The County intends to survey the property for Covered Species prior to construction and will make every effort to avoid impacts. If any of the Covered Species, other than Fender's blue butterfly habitat, are located on the property, the County does not have incidental take authorization and impacts to

Table 4.2 Number of Known and Projected Individual Covered Plant Species on Unprotected Private Lands within the Fender's Blue Zone

	Bradshaw's lomatium (#)	Willamette daisy (#)	peacock larkspur (#)	Nelson's checkermallow (#)	Kincaid's lupine (m^2) outside Fender's Blue Zone	Kincaid's lupine (m^2) inside Fender's Blue Zone	Native Nectar Species for FBB (m^2)[15]	Non-Native Nectar Species for FBB (m^2)[16]	Taylor's checkerspot butterfly habitat (m^2)
Covered Species on Private Lands	---	---	1,358	---	---	2,583*	141,815**	233,577**	---

* Actual amount found during on-the-ground surveys. Not all lands have been surveyed. Projections based on acreage and average Kincaid's lupine cover of 0.028% estimate a total of 8,165 m^2 could be present.
** Projected abundance, based on average native nectar species cover of 1.39% along roadsides and 1.7% in all other areas, and non-native nectar species cover of 1.36% along roadsides and 2.8% in all other areas.

the species must be avoided. If impacts are unavoidable, the County would be required to obtain an incidental take permit from the USFWS.

Benton County will mitigate for impacts to Fender's blue butterfly habitat from building construction activities with the acquisition of 20-24 ha (50-60 ac) of conservation easements on high quality prairie habitat supporting Fender's blue butterfly within the Fender's Blue Zone, to establish the Benton County Fender's Blue Butterfly Conservation Areas. This habitat contains approximately 733 m^2 (7,890 ft^2) of Kincaid's lupine and 285 m^2 (3,068 ft^2) of native nectar species. The property will be enhanced and maintained to protect, in perpetuity, habitat for the Fender's blue butterfly according to the conservation measures set forth in the HCP (See Chapter 6 of the HCP). Without the Permit, mitigation for impacts to Fender's blue butterfly habitat would occur on-site, in a fragmented, piecemeal fashion. Protection of large parcels of habitat has a greater conservation benefit to the species than small scale mitigation sites.

Kincaid's lupine at the proposed Benton County Fender's Blue Butterfly Conservation Areas accounts for 27 % of the known Kincaid's lupine within the Fender's Blue Zone. To mitigate building construction impacts, Benton County will enhance Fender's blue butterfly habitat at the Fender's Blue Butterfly Conservation Areas by increasing Kincaid's lupine by 358 m^2 (3,853 ft^2) and native nectar species by 5,586 m^2 (60,127 ft^2), based on a 1:1 mitigation ratio.

[15] This is an estimate of native nectar habitat, based on acreage and average cover of native nectar species of 1.7%.
[16] This is an estimate of non- native nectar habitat, based on acreage and average cover of native nectar species of 2.8%.

Due to avoidance, no population levels effects for Fender's blue butterfly or its habitat are anticipated from home, farm, and forest construction or from public service facilities construction.

4.1.4.1 Linear Projects

County road construction (grading, excavation, filling, and paving) and road maintenance activities and activities authorized within the County's right of way (e.g., utility construction, driveway construction) have the potential to impact several of the Covered Species: peacock larkspur, Nelson's checkermallow, Kincaid's lupine (both inside and outside the Fender's Blue Zone), and Fender's blue butterfly nectar habitat (See Table 4.3). These species are located within areas designated by the County as "Special Management Areas" or SMAs. The County has further categories each SMA as either a Type 1 or Type 2 SMA based upon size, connectivity potential, and quality of associated vegetation (see Section 5.2.3.0 of the HCP). Within Type 1 rights-of-way no take of the covered species would be allowed, whereas within Type 2 rights-of-way, take would be allowed in the amounts identified in Table 4.3. On ODOT's rights-of-way, impacts to 701 m^2 (7,546 ft^2) of Fender's blue butterfly habitat (native nectar species only) are anticipated during the Permit term at the following areas:

- Hwy 34 (near Rock Creek/Henkle Way)
- Hwy 20 (near Wren)
- Hwy 223 (From split with 20 north to Cardwell Hill Drive)

Benton County also requests impacts to population of the covered plants that are currently not known, and may exist in rights-of way that have not been surveyed for Covered Species, estimating this impact to be 3% of the populations known to occur in the rights-of-way currently. Requested impacts from road maintenance activities are identified in Table 4.3.

Under the HCP, measures will be taken to minimize impacts, and unavoidable impacts (take) will be mitigated. In Type 1 SMAs, no materials will be stockpiled, no vehicles parked, or foot traffic permitted. County personnel will be trained on the proper procedures for maintaining Type 1 SMAs. The County and Cooperators working within Special Management Areas would be required to comply with the Roadside and Streambank Management Guidelines for Covered Plants (Appendix L of the HCP).

Water and wastewater management activities have the potential to impact 10 Nelson's checkermallow plants (See Table 4.3). These activities, to be conducted by the City of Corvallis, include ground disturbance activities associated with the construction and installation of pipelines, intake facilities, pump houses, treatment facilities; and pipeline maintenance.

Telephone utility maintenance activities on private land have the potential to impact 6.4 m^2 (68.9 ft^2) of Kincaid's lupine and 101.1 m^2 (1,088 ft^2) of native nectar species. These activities, to be conducted by Pioneer Telephone Cooperative, include ground disturbance activities associated with either boring or plowing trenches for installation of copper or fiber telephone cable. The total area to be disturbed (outside existing road surfaces) within the Fender's Blue Zone is approximately 2.30 ha (5.68 ac) or 0.079% of the private property within the Fender's Blue Zone (See Table 4.3).

Natural gas utility activities on private land have the potential to impact 0.2 m^2 (2.16 ft^2) of Kincaid's lupine and 1.4 m^2 (15 ft^2) of native nectar species (See Table 4.3). These activities, to be conducted by NW Natural, include ground disturbance activities associated trenches for installation of natural gas pipeline. The total area to be disturbed (outside existing road surfaces) within the Fender's Blue Zone is approximately 0.72 ha (1.77 ac) or 0.025% of the private property within the Fender's Blue Zone.

Table 4.3 Take for Linear Projects

	Bradshaw's lomatium (#)	Willamette daisy (#)	peacock larkspur (#)	Nelson's checkermallow (#)	Kincaid's lupine outside Fender's Blue Zone (m^2)	Kincaid's lupine inside Fender's Blue Zone (m^2)	Native Nectar Species for FBB (m^2)	Non- Native Nectar Species for FBB (m^2)	Fender's blue butterflies (estimated #)	Taylor's checkerspot butterfly habitat (m^2)	Taylor's checkerspot butterfly (estimated #)
Transportation Construction, Maintenance and Activities Authorized within ROW– Benton County	--	--	7	169	4.3	35	2031	1987	979	--	--
Transportation Maintenance and Activities Authorized within ROW – unknown populations – Benton County	--	--	19	27	0.1	1.3	61	60	30	--	--
Transportation Maintenance – ODOT	--	--	--	--	--	--	701	686	332	--	--
Telephone Utility Maintenance on Private Lands	--	--	--	--	--	6.4	101.1	137.4	51	--	--
Natural Gas Utility Maintenance on Private Lands	--	--	--	--	--	0.2	1.4	1.4	1	--	--
Water and Wastewater Management	--	--	--	10	--	--	--	--	--	--	--
Total	--	--	26	206	4.4	42.9	2,895	2872	1393	--	--

Impacts to the Covered Species resulting from covered activities would be mitigated for at mitigation ratios determined by the impacted and mitigation site quality, mitigation site protection, and timing of mitigation (See Chapter 6 of the HCP). For example, impacts to the 10 Nelson's checkermallow plants from water and wastewater management would be mitigated with 30 plants at the Lancaster Property, a 3:1 ratio for pre-mitigation or a 5:1 ratio for concurrent mitigation. See Chapter 6 of the HCP for description of where impacts will be mitigated and at what estimated ratio (See Table 4.4 for mitigation figures for linear projects).

No population level effects for Nelson's checkermallow, Kincaid's lupine, Fender's blue butterfly native nectar species, and peacock larkspur are anticipated from implementation of the linear projects covered in the HCP. Of the known populations on all lands within Benton County

(including federal lands), only 5.8 % of Nelson's checkermallow, 0.5 % of the projected Kincaid's lupine in the Fender's Blue Zone, 1.9 % of native nectar and 1.2% of non-native nectar species within the Fender's Blue Zone Nectar Zone, 1.1 % of Kincaid's lupine outside the Fender's Blue Zone, and 0.6% of peacock larkspur will be impacted as a result of these linear projects.

Only one anticipated project – the bridge repair/replacement project at Bellfountain road has the potential to directly affect fish habitat. If listed fish or fish habitat is present and impacts are anticipated, prior to the construction of this project, the County will need to obtain the necessary federal and state permits to impact fish or fish habitat. As for other listed species, if the County or Cooperator has the potential to impact a listed animal species not covered by the HCP, they will need to obtain the necessary state and federal permits, and where necessary, conduct the requirement minimization and mitigation before implementing the project.

No effects are anticipated for Bradshaw's lomatium, Willamette daisy, and Taylor's checkerspot butterfly habitat as a result of linear projects.

Table 4.4 Mitigation for Linear Projects. No mitigation to be undertaken for non-native nectar species for Fender's blue butterfly.

	Bradshaw's lomatium (#)	Willamette daisy (#)	peacock larkspur (#)	Nelson's checkermallow (#)	Kincaid's lupine (m^2) outside the Fender's Blue Zone	Kincaid's lupine (m^2) inside the Fender's blue Zone	Nectar habitat for FBB (m^2)	Taylor's checkerspot butterfly habitat (m^2)
Transportation Construction, Maintenance and Activities Authorized within ROW– Benton County	--	--	21	507	12.9	35	2,031	--
Transportation Maintenance and Activities Authorized within ROW – unknown populations – Benton County	--	--	57	80	0.4	1.3	60	--
Transportation Maintenance – ODOT	--	--	--	--	--	--	2403	--
Telephone Utility Maintenance on Private Lands	--	--	--	--	--	6.4	101.1	--
Natural Gas Utility Maintenance on Private Lands	--	--	--	--	--	0.2	1.4	--
Water and Wastewater Management	--	--	--	30	--	--	--	--
TOTAL	--	--	78	617	13.3	42.9	4,597	--

4.1.4.2 Habitat Restoration, Enhancement, and Management Activities

Habitat restoration, enhancement, and management activities would occur on covered County and Cooperator lands. The goal of these activities is to enhance the growing conditions for Covered Species by (1) reducing or eliminating invasive species and tree/shrub species, (2)

reducing thatch, (3) preparing sites for seeding and planting, (4) increasing available light, nutrients, and water for native species, (5) raising soil pH, (6) enhancing native plant diversity and abundance, (7 increasing the number of covered plant species through augmentation of existing populations, and (8) increasing the amount of prairie habitat necessary for the support of Fender's blue and Taylor's checkerspot butterfly. However, a number of habitat restoration, enhancement, and management activities have the potential to adversely affect the Covered Species.

Mowing

In Fender's blue butterfly or Taylor's checkerspot butterfly habitat with eggs or larvae present, mowing may crush or suction up a small number (< 5%) of eggs (spring mowing) and/or larvae (spring, summer, fall/winter mowing), killing them (USFWS 2008h)- cumulative effects are expected to be negligible. During the spring, adults may be harassed if mowing overlaps flight season. However, these short term effects are off-set by the greater long-term effects from mowing. Mowing is an effective tool for controlling non-native species which tend to out compete butterfly host (e.g., Kincaid's lupine) and native nectar species (Kaye and Thorpe 2006). The abundance of Fender's blue butterfly eggs is correlated with the abundance of Kincaid's lupine leaves, with eggs increasing substantially at sites treated to control non-native species (Schultz et al. 2003). Mowing also helps in preparing a site to plant/seed.

Spring and summer mowing within patches of covered plant species may remove much of the above ground growing parts of the plants, reducing the growth and reproductive success of the plant (USFWS 2008h). If spring or summer mowing must occur in order to treat invasive species, then only ½ the population of the covered plant species should be mowed at any one time (USFWS 2008h). Fall mowing after the covered plants have senesced, is not likely to adversely affect the covered plant species. Mowing is one of the most effective techniques for increasing native prairie species cover while reducing competing invasive species (Kaye and Benfield 2005). The County and Cooperators do not anticipate mowing in the spring or summer months, and will generally wait until the Covered Plants have senesced.

Soil compaction from mowing equipment may adversely affect the Covered Species. The level of injury or mortality to butterfly larvae from soil disturbing and compacting activities is expected to be very low (USFWS 2008h). Mowing equipment with rubber tracks on the tractors should prevent soil compaction.

Spring mowing would result in a negative effect on Fender's blue butterfly, Kincaid's lupine, and Willamette daisy designated critical habitat (USFWS 2008h).

Manual Invasive Plant Removal, Tree and Shrub Removal, and Tree Girdling

These activities are not likely to adversely affect Covered Species or designated critical habitat; rather the effects over the long-term will be beneficial (USFWS 2008h).

Raking

Raking to remove built up thatch should occur after the covered plant species have senesced for the season, resulting in minimal adverse effects to the covered plant species through the removal of above ground growing parts of the covered plant species (USFWS 2008h). Raking may cause

soil compaction which would have a small adverse effect on Fender's blue butterfly or Taylor's checkerspot butterfly eggs and larvae, through crushing and killing. Raking may also adversely affect butterfly eggs and larvae present in the thatch by removing the protective thatch layer. At sites with greater than 100 Fender's blue or Taylor's checkerspot butterfly present, raking should be limited to 1/3 of the site. Sites with less than 100 Fender's blue or Taylor's checkerspot butterfly present, raking should be limited to 1/4 of the site. These limits ensure that if 100% of the eggs or larvae within the area raked are killed, then the population would not be substantially reduced due to this activity (USFWS 2008h).

Death or injury to butterfly larvae from raking is expected to be a very small portion of the population, of which an exact number cannot be determined (USFWS 2008h). These effects can be prevented by the use of rubber tracks on the tractors.

Nelson's checkermallow could suffer adverse effects if raking occurs prior to the plant senescing, and therefore no thatch raking should occur in Nelson's checkermallow sites (USFWS 2008h).

The overall long-term effects of raking on the Covered Species and designated critical habitat are anticipated to be beneficial (USFWS 2008h).

Shade Cloth

Use of shade cloth in areas with Covered Species would result in adverse effects to the Covered Species (death) covered by the cloth. Therefore, use of shade cloth should be limited to areas without Covered Species present. This technique, used for site preparation, has long-term beneficial effects to the Covered Species and designated critical habitat by enhancing prairie habitat (USFWS 2008h).

Sod Rolling, Solarization, and Tilling/Disking

Use of these techniques in areas with Covered Species would result in adverse effects to the Covered Species (death). Therefore, these activities should only be used to control invasive species in areas without Covered Species present (at least greater than 10 m (30 ft) away). This technique has long-term beneficial effects to the Covered Species and designated critical habitat by enhancing prairie habitat (USFWS 2008h).

Livestock Grazing

Livestock grazing should not be used in areas with Fender's blue butterfly, Taylor's checkerspot butterfly, or Nelson's checkermallow present when it will have detrimental impacts to the species. Livestock grazing will result in trampling (crushing, killing) of butterfly egg and larvae. For the other Covered Species, livestock grazing should only be used as a habitat restoration, enhancement, and management technique in areas with Covered Species during the fall season. Even then, fall grazing may have some adverse effects on the Covered Species and designated critical habitat through the introduction of invasive species seeds (USFWS 2008h).

Prescribed Burning

Fall burning results in adverse effects to Taylor's checkerspot and Fender's blue butterfly larvae in the area burned, killing most or all larvae present. Prescribed burning however, improves

habitat for the butterfly by increasing the amount of native species cover, including the butterfly's host and nectar species. To limit the effects of prescribed burning on the Taylor's checkerspot butterfly and Fender's blue butterfly, at sites supporting a population greater than 100 butterflies, only 1/3 of the site should be burned at any one time, and for sites supporting less than 100 butterflies, only ¼ of the site should be burned at any one time (USFWS 2008h). These limits ensure that if 100% of the larvae within the area burned are killed during the prescribed burn, then the population would not be substantially reduced due to this activity (USFWS 2008h). In any given year, no more than 1/3 of the critical habitat for Fender's blue butterfly may be burned (USFWS 2008h). In Benton County there are 314.3 ha (776.7 ac) of designated critical habitat for the butterfly (USFWS 2006). This comprises 25.9% of all Fender's blue butterfly designated critical habitat.

Prescribed burning would mimic effects of fire that occurred prior to European settlement, with the intent to promote grasses and forbs. Impacts from prescribed burning will occur to covered plant species and Fender's blue and Taylor's checkerspot butterfly and its habitat (host and nectar species).

For Fender's blue butterfly populations at conservation sites, the sites would be treated with prescribed fire ten times during the Permit term. The affected Fender's blue butterfly habitat to be burned is 112.5 m^2 (1,211 ft^2), of which 100% mortality of the butterfly eggs and/or larvae would be expected during each prescribed fire, in the portion of the habitat burned. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 1,125 m^2 (12,110 ft^2).

For Fender's blue butterfly at mitigation sites, prescribed burning would occur ten times during the Permit term. The affected area to be burned is 404 m^2 (4,348.6 ft^2), of which 100% mortality of the butterfly eggs and/or larvae would be expected. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 4,038 m^2 (43,464.7 ft^2).

For Taylor's checkerspot butterfly management at Benton County Natural Areas and Parks sites, prescribed burning would occur ten times during the Permit term. The affected area to be burned is 5,743 m^2 (61,817.1 ft^2), of which 100% mortality of the butterfly eggs and/or larvae would be expected. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 57,430 m^2 (618,171.4 ft^2).

As mitigation management for Taylor's checkerspot butterfly impacts, prescribed burning would occur two times during the Permit term. The affected area to be burned is 172 m^2 (1,851.4 ft^2), of which 100% mortality of the butterfly eggs and/or larvae would be expected. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 345 m^2 (3,713.6 ft^2).

Heavy equipment used in prescribed burning may cause soil compaction which could adversely affect the Covered Species. Adverse effects to the covered plant species (except Nelson's checkermallow) can be alleviated by conducting burns after August 15 after the plants have senesced, and using routes away from the Covered Species, and using rubber tracks on tractors (USFWS 2008h).

Prescribed burning is likely to kill seeds of the covered plants located at or near the soil surface. Seeds above the soil surface will be destroyed, and some rhizomes (Willamette daisy, Kincaid's lupine) may be injured or destroyed (USFWS 2008h). However, fall burning is effective in reducing invasive species cover, with Kincaid's lupine (Wilson et al. 2003) and Bradshaw's lomatium (Pendergrass et al. 1999) responding positively to fire. Benton County estimates only 5% of the seeds produced annually would be affected each time an area with the covered plants is burned, with an estimated ten prescribed burns during the Permit term. The take estimate includes the seeds of plants introduced for conservation and recovery purposes.

If the prescribed burn occurs prior to Nelson's checkermallow having senesced, effects to the species may be adverse. To avoid adversely affecting Nelson's checkermallow, only ½ of the site occupied by the species should be burned at any given time. This allows the Nelson's checkermallow within the unburned portion of the site to serve as a recolonization source for the burned area (USFWS 2008h).

Prescribed burning within designated critical habitat for Kincaid's lupine, Fender's blue butterfly, and Willamette daisy may result in short-term adverse effects to primary constituent elements for those species by reducing early seral structure; however, the long term benefits of prescribing burning outweigh the short-term negative effects (USFWS 2008h).

Overall, the net long-term benefits of prescribed burning on the Covered Species and designated critical habitat are beneficial (USFWS 2008h).

Herbicide Application

Herbicides applied to areas with Covered Species could result in adverse effects to the species. For areas with Fender's blue butterfly or Taylor's checkerspot butterfly present, only 1/3 of the habitat should be sprayed when the butterfly's population exceeds 100 individuals, and only ¼ of the site should be sprayed when there is less than 100 individual butterflies present (USFWS 2008h). To lessen the impacts of herbicides on butterflies, the best time to spray is when the butterfly is in diapause and the covered plant species have senesced. Herbicide application is likely to affect less than 5% of butterfly larvae in a given year through incidental exposure of some butterfly larvae (USFWS 2008h).

For Fender's blue butterfly at conservation sites, herbicide application would occur over 10% of the area annually or 100% of the area would be sprayed five times over the Permit term. The affected area to be sprayed is 156.5 m^2 (1,685 ft^2), of which 5% mortality of the butterfly eggs and/or larvae would be expected. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 39.1 m^2 (421 ft^2).

For Fender's blue butterfly at mitigation sites, herbicide application would occur over 10% of the area annually or 100% of the area would be sprayed five times over the Permit term. The affected area to be sprayed is 404 m^2 (4,348.6 ft^2), of which 5% mortality of the butterfly eggs and/or larvae would be expected. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 101 m^2 (1,087.2 ft^2).

For Taylor's checkerspot butterfly at conservation sites, herbicide application would occur over 10% of the area annually or 100% of the area would be sprayed five times over the Permit term. The affected area to be sprayed is estimated to be 5,743 m^2 (61,817.1 ft^2), of which 5% mortality of the butterfly eggs and/or larvae would be expected. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 1,436 m^2 (15,457 ft^2).

For Taylor's checkerspot butterfly at mitigation sites, herbicide application would occur over 60% of the entire area. The affected area to be sprayed is 172 m^2 (1,851.4 ft^2), of which 5% mortality of the butterfly eggs and/or larvae would be expected. Cumulative impacts over the Permit term would result in the mortality of all eggs/larvae residing within 5 m^2 (53.8 ft^2).

Soil compaction from equipment used to spray the herbicide or from foot traffic may adversely affect the Covered Species, although the effects are expected to be small (USFWS 2008h). These effects can be alleviated by minimizing foot and vehicle traffic in areas occupied by the Covered Species.

Herbicide application of Triclopyr, Glyphosate, Oryzalin, and 2, 4-D amine would have a negative short term effect on Fender's blue butterfly, Kincaid's lupine, and Willamette daisy designated critical habitat, by affecting the early seral structure of prairie habitats (USFWS 2008h). Since Nelson's checkermallow senesce later than the other covered plant species, Nelson's checkermallow plants should be covered during fall herbicide application. Herbicide application of Glyphosate, Triclopyr, Oryzalin, and 2, 4D amine during the spring growing season may have small incidental adverse affects on the covered plant species (USFWS 2008h).

Impacts (take requested) to the Covered Species from habitat restoration, enhancement, and management activities are outlined in Table 4.5.

Monitoring

Covered activities include pre- and post-activity and effectiveness monitoring[17]. Monitoring activities may adversely affect a small number of Covered Species, including butterfly eggs and larvae. Fender's blue butterfly use Kincaid's lupine for food, shelter, and reproduction (e.g., ovipositioning). Plant (host and nectar species) and butterfly surveys could result in the death or injury to a small percentage of Fender's blue butterfly larvae and eggs by brushing them from Kincaid's lupine during monitoring activities. The larvae and eggs also could be crushed (injured or killed) by foot traffic. Covered plant species could be stepped upon during monitoring, crushing the plants. The County estimated monitoring activities will result in take of 1% of the known Covered Species in Benton County, and butterfly host and nectar plant populations, including those added through mitigation and conservation actions. The estimated take of the Covered Species from monitoring activities conducted at conservation and mitigation areas are set forth in Table 4.5. Impacts to Covered Species from monitoring activities are anticipated to be negligible.

[17] Capturing adult Fender's blue butterfly or Taylor's checkerspot butterfly during monitoring activities is not covered by the Permit.

Plant Material Collection

Benton County and Cooperators seek to increase the size and number of Covered Species populations at conservation and mitigation areas. However, plant collection activities (e.g., propagule collection, transport, storage, and cultivation) have the potential to affect the covered plant species, depending upon the amount of material collected. Limited seed and rhizome collections of individual covered plant species may adversely affect some individuals by removing propagules from the wild since a small percentage of propagules may have survived (USFWS 2008h). Collection adhering to the Plant Material Collection and Plant Introduction Protocols (Appendix K of the HCP) is not expected to adversely affect covered plant species overall (USFWS 2008h).

Table 4.4Take Requested for Estimated Short-term Impacts to the Covered Species from Habitat Restoration and Enhancement Activities, Monitoring, and Plant Material Collection. No take is requested for short-term impacts to non-native nectar species for Fender's blue butterfly.

	Bradshaw's lomatium	Willamette daisy	peacock larkspur	Nelson's checkermallow	Kincaid's lupine Outside the Fender's Blue Zone	Kincaid's lupine Inside the Fender's Blue Zone	Native Nectar Species for FBB	Taylor's checkerspot butterfly habitat (
Habitat restoration and enhancement activities for Conservation	249 seeds	1,426,739 seeds	274,635 seeds	5,552,250 seeds	418 seeds	2,649 seeds	Seeds produced in 4,406 m^2	Seeds produced in 2,872m^2
Habitat restoration and enhancement activities for Mitigation	86 seeds	10,798 seeds	7,280 seeds	1,097,575 seeds	220 seeds	17,819 seeds	Seeds produced in 6,756m^2	Seeds produced in 17 m^2
Monitoring	4 plants	11 plants	34 plants	29 plants	207 m^2	9 m^2	244 m^2	59 m^2
Plant Material Collection	748 seeds	23,082 seeds	119,838 seeds	2,235,060 seeds	2,468 seeds	3,242 seeds	0	0
TOTAL SEEDS	1,083	1,460,619	401,753	8,884,885	3,120	19,788	Seeds produced in 8,313 m^2	Seeds produced in 2,889m^2
TOTAL PLANTS OR m^2 PLANTS	4 plants	11 plants	34 plants	29 plants	207 m^2	9 m^2	244 m^2	59 m^2

Take estimates for plant material collection are based on current plant abundance of the covered plant species on Benton County and Cooperator owned or managed lands, and are set forth in Table 4.5. Plant material collection should have no adverse effects on Fender's blue or Taylor's checkerspot butterfly.

Summary of Habitat Restoration, Enhancement and Management Effects

The habitat restoration, enhancement, and management activities; monitoring; and plant material collection have the potential to adversely affect the Covered Species in the short term. The USFWS does not require mitigation for short term effects.

To prevent long-term negative impacts to the Covered Species, the County and Cooperators will follow the guidelines and protocols set forth in Appendix I (Prairie Habitat Vegetation Management Guidelines) and Appendix K (Plant Material Collection and Plant Introduction Protocols) of the HCP. If these guidelines are followed, none of the habitat restoration, enhancement, and management activities; monitoring; or plant material collection activities covered in the Permit are likely to permanently decrease reproduction or distribution of the Covered Species. Rather, these activities are likely to increase the reproduction and distribution of the species.

The Permit would provide increased protection of the four federally listed covered plants species (Kincaid's lupine, Willamette daisy, Nelson's checkermallow, and Bradshaw's lomatium) on Benton County and Cooperator lands, which are not federally protected from take on non-federal public lands absent a federal nexus. The Permit and implementation of the habitat restoration and enhancement activities at Beazell Memorial Forest would provide increased protection of Taylor's checkerspot butterfly, which is not federally protected from take, and help to avoid listing this species in the future. The conservation of peacock larkspur on County and Cooperator lands could help ensure the species is not listed as threatened or endangered in the future. All of the covered plant species are state listed and protected on state or city owned or managed lands.

The Proposed Action does not cover habitat restoration, enhancement, and management activities conducted by private landowners (except for Greenbelt Land Trust) on private lands. Private landowners wishing to conduct such activities would need to obtain their own incidental take permit or enter into a Safe Harbor Agreement with the USFWS.

No population level effects are anticipated for Bradshaw's lomatium, Willamette daisy, peacock larkspur, Nelson's checkermallow, Kincaid's lupine, and Taylor's checkerspot butterfly and Fender's blue butterfly habitat as a result of habitat restoration, enhancement, and management activities.

4.1.4.3 Agricultural Activities

The Proposed Action includes agricultural activities on City of Corvallis lands at Owens Farm. These agricultural activities are likely to permanently affect five Nelson's checkermallow plants, located between the road edge and the agricultural field, through mowing and herbicide spraying. The City of Corvallis will mitigate for impacts to these five Nelson's checkermallow with the augmentation of 15 Nelson's checkermallow plants at the Lancaster Property.

No population levels affects are anticipated from the taking of five Nelson's checkermallow plants at Owens Farm.

4.1.4.4 Emergency Activities

Proposed emergency activities, such as responding to a fire or a vehicular accident, may result in impacts to the Covered Species. Benton County anticipates impacts from emergency activities on County and Cooperator's covered lands at one percent (1%) of the known populations after the already described amounts of incidental take for other covered activities (Table 4.6). These

impacts would be mitigated at one of the designated mitigation sites by the County or Cooperator as set forth in the HCP (See Chapter 6 of HCP), based on the appropriate ratio (Table 4.4) with any mitigated impact smaller than 20 individuals, requiring that at least 20 of the individual Covered Species be planted (e.g., Bradshaw's lomatium and Willamette daisy) (Table 4.7).

No population level effects are anticipated for the Covered Species or their habitat as a result of emergency activities.

Table 4.5 Take and mitigation for Emergency Activities. No mitigation to be completed for non-native nectar species for Fender's blue butterfly.

	Bradshaw's lomatium (#)	Willamette daisy (#)	peacock larkspur (#)	Nelson's checkermallow (#)	Kincaid's lupine (m^2) outside the Fender's Blue Zone	Kincaid's lupine (m^2) inside the Fender's Blue Zone	Native Nectar Species for FBB (m^2)	Non -Native Nectar Species for FBB (m^2)	Fender's blue butterfly (estimated #)	Taylor's checkerspot butterfly habitat (m^2)	Taylor's checkerspot butterfly (estimated) #)
Impacts from Emergency Activities	2	1	30	11	3.4	1.1	88	146	42	57	5
Mitigation for Impacts from Emergency Activities	20	20	91	33	10.1	3.3	265	n/a	n/a	172	n/a

4.1.5 Critical Habitat

The HCP plan area intersects critical habitat units for Fender's blue butterfly, Kincaid's lupine and Willamette daisy, as described by the USFWS (2006). Effects to each unit and effects to the primary constituent elements (PCEs; physical or biological features essential to the conservation of a species for which its designated or proposed critical habitat is based on) of these species habitats are described below and summarized in Table 4.6.

4.1.5.0 FBB 7

This critical habitat (CH) unit is described as Butterfly Meadows in the HCP. The site is occupied by Fender's blue butterfly and Kincaid's lupine. A small part of the site is owned by Oregon State University, while the majority is privately owned.

HCP covered activities in the OSU owned portion of the unit include habitat restoration, enhancement and management ("habitat restoration activities") and emergency response activities. Habitat restoration activities, including prescribed burning, mowing and herbicide treatment, will benefit the early seral upland prairie and oak savanna habitat at the site, by enhancing low-growing grasses and forbs, removing thatch and creating spaces to establish seedlings or new vegetative growth; and reducing dense canopy vegetation (FBB PCE 1), in

addition to controlling invasive species at the site such as false brome (*Brachypodium sylvaticum*). Some short term impacts to Kincaid's lupine (FBB PCE 2) and native nectar species (FBB PCE 3) may occur, as some seeds on the soil surface may be destroyed during prescribed fire. However, both these PCEs will experience a net benefit over time, through reduced competition and increased open space for seedling establishment. Restoration activities will follow guidelines in the Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion (USFWS 2008h), and are described in HCP Appendix F: Prairie Habitat Vegetation Management Guidelines. As this CH unit is a core population that is greater than 1.2 km from the nearest known population, stepping stone habitat (FBB PCE 4) will not be affected. Emergency response activities (e.g., off road travel by emergency vehicles) could result in temporary damage (e.g., crushing, flattening, or other damage to vegetation) to early seral upland prairie habitat and oak savanna, (FBB PCE 1), larval host plants (FBB PCE 2), and adult nectar sources (FBB PCE 3). As this CH unit represents a core population that is currently >1.2 km from the nearest known population, stepping stone habitat (FBB PCE 4) will not be affected.

HCP covered activities in the privately owned area of the unit include home, farm and forest construction. This activity could result in removal of early seral upland prairie habitat and oak savanna, (FBB PCE 1), larval host plants (FBB PCE 2), and adult nectar sources (FBB PCE 3) within the disturbance area of construction activities. The amount of habitat removed from this activity is limited as this CH unit intersects only two lots on private property, both of which are land use zoned for forest conservation, not rural residential use. The buildability of the site is also limited as it possesses extremely steep topography. As this CH unit is a core population greater than 1.2 km from the nearest known population, stepping stone habitat (FBB PCE 4) will not be affected.

4.1.5.1 FBB-8

This CH unit includes the Cardwell Hill area. It is occupied by Fender's blue butterfly and Kincaid's lupine. It is primarily privately owned, although Benton County is negotiating conservation easement or fee simple acquisition of parcels for mitigation purposes. The CH area includes roadside right-of-way managed by Benton County, and has been identified as a potential area to construct two public service facilities (a rural school and fire station) during the permit term of the HCP.

Covered activities in this CH unit include building construction (home, farm and forest structures and public service facilities), linear projects, and emergency response activities. Limited building construction in this area, which is land use zoned for exclusive farm use or forest conservation use, will result in removal of some early seral upland prairie habitat and oak savanna (FBB PCE 1); a portion of the CH unit has already been converted from prairie to vineyard or exists as degraded pasture. Some larval host plants (FBB PCE 2) are also likely to be removed, though under the HCP, Benton County land use planners will encourage building permit applicants to site structures to avoid known Kincaid's lupine patches. Loss of adult nectar sources (FBB PCE 3) and stepping stone habitat (FBB PCE 4) will also likely occur within the footprint of building areas. Linear projects such as road construction and maintenance, utility construction and maintenance, and driveway approach construction would result in the removal of roadside vegetation. Much of this work occurs in the gravel or highly degraded vegetation on

or adjacent to a road shoulder. Such projects could result in temporary damage (e.g., crushing, flattening, or other damage to vegetation) to early seral upland prairie habitat and oak savanna, (FBB PCE 1), larval host plants (FBB PCE 2), adult nectar sources (FBB PCE 3) or stepping stone habitat (FBB PCE 4). Emergency response activities (e.g., off road driving by emergency vehicles) could result in temporary damage (e.g., crushing, flattening, or other damage to vegetation) to early seral upland prairie habitat and oak savanna, (FBB PCE 1), larval host plants (FBB PCE 2), adult nectar sources (FBB PCE 3) or stepping stone habitat (FBB PCE 4).

In the event that property in the Cardwell Hill CH unit is acquired by Benton County, habitat restoration activities will be covered for Benton County. Such activities, including prescribed burning, mowing and herbicide treatment, will benefit the early seral upland prairie and oak savanna habitat at the site, by enhancing low-growing grasses and forbs, removing thatch and creating spaces to establish seedlings or new vegetative growth; and reducing dense canopy vegetation (FBB PCE 1), in addition to controlling invasive species at the site (e.g., false brome). Some short term impacts to Kincaid's lupine (FBB PCE 2) and native nectar species (FBB PCE 3) may occur, as some seeds on the soil surface may be destroyed during prescribed fire; however, both these PCEs will experience a net benefit over time, in terms of reduced competition and increased open space for seedling establishment. Restoration activities will follow guidelines in the Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion (USFWS 2008h), and are described in HCP Appendix G: Prairie Habitat Vegetation Management Guidelines.

4.1.5.2 FBB-9

This unit is discussed in the HCP as Lupine Meadows. The site supports both Kincaid's lupine and Fender's blue butterfly. It is owned by the Greenbelt Land Trust and is managed for conservation purposes.

HCP covered activities in this CH unit include habitat restoration and emergency response activities. Habitat restoration activities, including prescribed burning, mowing and herbicide treatment, will benefit the early seral upland prairie and oak savanna habitat at the site, by enhancing low-growing grasses and forbs, removing thatch and creating spaces to establish seedlings or new vegetative growth; and reducing dense canopy vegetation (FBB PCE 1), in addition to controlling invasive species at the site such as meadow knapweed (*Centaurea debeauxii*). Short term impacts to Kincaid's lupine (FBB PCE 2) and native nectar species (FBB PCE 3) may occur, as some seeds on the soil surface may be destroyed during prescribed fire. However, both these PCEs will experience a net benefit over time, in terms of reduced competition and increased open space for seedling establishment. Restoration activities will follow guidelines in the Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion (USFWS 2008h), and are described in HCP Appendix H: Prairie Habitat Vegetation Management Guidelines. Emergency response activities (e.g., off road travel by emergency vehicles) could result in temporary damage (e.g., crushing, flattening, or other damage to vegetation) to early seral upland prairie habitat and oak savanna, (FBB PCE 1), larval host plants (FBB PCE 2), and adult nectar sources (FBB PCE 3). As this CH unit represents a core population stepping stone habitat (FBB PCE 4) will not be affected.

4.1.5.3 WD-4A & B

These CH units are owned by the City of Corvallis, as part of Bald Hill Park.

Covered activities in this unit include habitat restoration and emergency response activities. Habitat restoration activities, including prescribed burning, mowing and herbicide treatment, will benefit the early seral upland prairie and oak savanna habitat at the site. Such activities will enhance low-growing grasses and forbs, remove thatch and create spaces to establish seedlings or new vegetative growth, and reduce dense canopy vegetation (WD PCE 1). Restoration activities will follow guidelines in the Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion (USFWS 2008h), and are described in HCP Appendix I: Prairie Habitat Vegetation Management Guidelines. Management will also control invasive species at the site (e.g., false brome). Emergency response activities (emergency vehicle off-road driving, etc.) could result in temporary (e.g., flattening or crushing of vegetation) or permanent damage to the early seral upland prairie and oak savanna habitat (WD PCE 1).

4.1.5.4 KL-8

This unit is described as Butterfly Meadows in the HCP. The site is occupied by Fender's blue butterfly and Kincaid's lupine. A small part of the site is owned by Oregon State University, while the majority is privately owned.

HCP covered activities in the OSU owned portion of the unit include habitat restoration and emergency response activities. Habitat restoration activities will be conducted to enhance the PCEs for Kincaid's lupine, and will benefit the early seral upland prairie and oak savanna habitat at the site (KL PCE 1). Burning, mowing, and targeted herbicide use will promote low growing grasses and forbs, control invasive species (e.g., false brome) and reduce thatch to encourage spaces for native prairie species recruitment. These restoration activities will also reduce canopy cover and competition from encroaching tree and shrub species (including Douglas-fir (*Pseudotsuga menziesii*), scotch broom (*Cytisus scoparius*), and hawthorn (*Crataegus monogyna*). Restoration activities will follow guidelines in the Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion (USFWS 2008h), and are described in HCP Appendix J: Prairie Habitat Vegetation Management Guidelines. Reductions in woody species are likely to have no effect or positive effects on movement of insect outcrossing pollinators (such as species of *Bombus*) between existing lupine patches (KL PCE 2). Emergency response activities (emergency vehicle off-road driving, etc.) could result in temporary or permanent damage to the early seral upland prairie and oak savanna habitat (PCE 1), but would likely not impact pollinators (KL PCE 2), unless a ground nest were directly impacted.

HCP covered activities on the privately owned portion of the unit include home, farm and forest construction. This activity could result in removal of early seral upland prairie habitat and oak savanna, (PCE 1) and within the footprint of building areas. The amount of habitat removed from this activity is likely limited as this CH unit intersects only two lots on private property, both of which are land use zoned for forest conservation, not rural residential use. The buildability of the site is also limited as it possesses extremely steep topography.

4.1.5.5 KL-9

This unit includes the Cardwell Hill area, and is occupied by Fender's blue butterfly and Kincaid's lupine. It is primarily privately owned, although Benton County is negotiating conservation easement or fee simple acquisition of parcels for mitigation purposes. The unit includes roadside right-of-way managed by Benton County. The Cardwell Hill area has been identified as a potential area to construct two public service facilities (a rural school and fire station) during the permit term of the HCP.

Covered activities in this CH unit include building construction, linear projects, and emergency response activities. Building construction (for home, farm and forest structures or public service facilities) would result in removal of early seral upland prairie habitat and oak savanna, (KL PCE 1) within the footprint of building areas (footprint areas identified in HCP). Linear projects such as road construction and maintenance, utility construction and maintenance, and driveway approach construction would result in the removal of roadside vegetation. Much of this work occurs in the gravel or highly degraded vegetation on or adjacent to a road shoulder; adverse effects to early seral upland prairie habitat (KL PCE 1) and pollinators (KL PCE 2) are likely minimal to non-existent. Emergency response activities (emergency vehicle off-road driving, etc.) could result in temporary (e.g., flattening or crushing of vegetation) or permanent damage to the early seral upland prairie and oak savanna habitat (KL PCE 1), but would likely not impact pollinators (KL PCE 2), unless a ground nest were directly impacted.

In the event that property is acquired by Benton County, habitat restoration activities shall also be covered for Benton County. Such activities will be conducted to enhance the PCEs for Kincaid's lupine, and will benefit the early seral upland prairie and oak savanna habitat at the site (KL PCE 1). Burning, mowing, and targeted herbicide use will promote low growing grasses and forbs, and reduce thatch to encourage spaces for native prairie species recruitment. These restoration activities will also reduce canopy cover and competition from tree and shrub species, which will enhance movement of insect outcrossing pollinators (such as species of Bombus) between existing lupine patches (KL PCE 2). Restoration activities will follow guidelines in the Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion (USFWS 2008h), and are described in HCP Appendix K: Prairie Habitat Vegetation Management Guidelines.

4.1.5.6 KL-10

This unit is discussed in the HCP as Lupine Meadows. The site supports both Kincaid's lupine and Fender's blue butterfly. It is owned by the Greenbelt Land Trust and is managed for conservation purposes.

HCP covered activities in this unit include habitat restoration and emergency response activities. Habitat restoration activities will be conducted to enhance the PCEs for Kincaid's lupine, and will benefit the early seral upland prairie and oak savanna habitat at the site (KL PCE 1). Burning, mowing, and targeted herbicide use will promote low growing grasses and forbs, and reduce thatch to encourage spaces for native prairie species recruitment. These restoration activities will also reduce canopy cover and competition from tree and shrub species, which will enhance movement of insect outcrossing pollinators (such as species of Bombus) between existing lupine patches (KL PCE 2). Restoration activities will follow guidelines in the

Programmatic Formal Consultation on Western Oregon Prairie Restoration: Biological Opinion (USFWS 2008h), and are described in HCP Appendix L: Prairie Habitat Vegetation Management Guidelines. Emergency response activities (emergency vehicle off-road driving, etc.) could result in temporary (e.g., flattening or crushing of vegetation) or permanent damage to the early seral upland prairie and oak savanna habitat (KL PCE 1), but would likely not impact pollinators (KL PCE 2), unless a ground nest were directly impacted.

Table 4.6 Summary of effects to critical habitat.

Action	FBB-7	FBB-8	FBB-9	WD-4A & B	KL-8	KL-9	KL-10
Home, farm and forest construction	LAA (if occurs)	LAA	NE	NE	LAA (if occurs)	LAA	NE
Public service facility construction	NE	LAA	NE	NE	NE	LAA	NE
Linear projects	NE	LAA	NE	NE	NE	LAA	NE
Habitat restoration, enhancement and management	NLAA (entirely beneficial)	NLAA (entirely beneficial)	NLAA (entirely beneficial)	NLAA (entirely beneficial)	NLAA (entirely beneficial)	NLAA (entirely beneficial)	NLAA (entirely beneficial)
Emergency response activities	LAA (if occurs)	LAA (if occurs)	LAA (if occurs)	LAA (if occurs)	LAA (if occurs)	LAA (if occurs)	LAA (if occurs)

LAA: Likely to adversely affect; NLAA Not likely to adversely affect; NE: Not applicable or no effect.

4.1.6 Water Resources

4.1.6.0 Building Construction Activities

An increase of 195 additional new homes[18] requiring utilities within Fender's Blue Zone, could affect water quantity within the aquifer. These landowners will be required to drill water wells for drinking water. An additional 195 new water wells would result in an increased demand on the aquifer. Most of the property within the Fender's Blue Zone is located within the Low Yield Unit, which has low storage capacity. Users generally have sufficient water for domestic purposes. Americans consume 100 gallons of water per person, per day of which 70 gallons is used indoors (State of North Carolina 2008). In Benton County (U.S. Census Bureau 2000) the average household size is 2.43. For each household around 88,695 gallons of water is required each year. The addition of 195 additional dwellings with would result in the need for

[18] Does not consider water use for medical hardship dwellings because these dwellings are temporary and no information is available as to the number of people who live in such dwellings, on average, or the length of time these dwellings are in place.

approximately 17.3 million gallons of water per household per year once all 195 dwellings have been constructed. In 1990, the population of Benton County was 70,811 (US Census Bureau 1990). In 2000, Benton County's population rose approximately 10% to 78,153 persons. If the population of Benton County continues to grow at a rate of 10% every ten years, by 2060, the County's population should be around 138,463 persons, or approximately 56,980 households. In 2060, the amount of water needed to supply 195 households is less than 4% of the amount of water needed to supply 56,980 households within Benton County. Increases in water use will be incremental. An estimated 4 dwellings would be constructed each year, requiring the use of additional 354,780 gallons of water each year. Impacts to water resources (quantity) are anticipated to be minor.

The addition of two rural new schools and two rural new fire stations could also affect water quantity, as they will need sufficient water resources to support their operations. If the school buildings are constructed within Low Yield Unit, there could be insufficient water resources to accommodate their demands. Likewise, if the rural fire stations need water supplied beyond what is available through household consumption, there could be insufficient water resources to accommodate their operational needs. The amount of water needed for these structures and when is not known. However, impacts to water resources (quantity) are anticipated to be minor.

Impacts to water quality from the construction of 1280 new structures, including homes, medical hardship dwellings, additions to structures, accessory buildings, agricultural buildings, and associated amenities (e.g., driveways), and two new schools and fire stations include: (1) creation of hardened surfaces impervious to precipitation infiltration, (2) alteration of flow patterns, and (3) an increase in the level of pollutants from storm water runoff. These impacts could affect surface runoff, groundwater flow, and ground water recharge. The nature and scope of the impacts will depend on individual projects and proximity to waterbodies. Adherence to local, state, and federal regulations will minimize the potential for increased levels of pollutants in storm water runoff. An additional increase in the amount of impervious surfaces, especially from the schools and fire stations, could affect the water quality within the Marys River, a 303(d) water quality limited stream for temperature, dissolved oxygen, and fecal coliform. An increase in stormwater runoff without measures to reduce water quality impacts could further degrade streams.

Impacts to water quality from building construction activities are anticipated to be minor. Not all buildings would be constructed at one time (on average 26 per year), with most located in upland habitat.

4.1.6.1 Linear Projects

Road construction projects have the potential to affect water quality, both during and following construction activities, through erosion and sedimentation, and from pollutants released into water bodies through storm water runoff. Any pavement projects will increase storm water runoff by increasing the amount of impervious surfaces. However, the amount of impervious surface that could be added to the transportation system or replaced under this Permit is minimal, and would not exceed 24.8 ha (61.2 ac), or approximately 1.6% of the Benton County rights-of-way in the County. Hydrology in these areas could be impacted due to soil compaction. Water would be required during road construction for such purposes as dust control.

Road maintenance activities have the potential to affect water quality through runoff, erosion, and pollutants entering streams. Hydrology could be impacted due to soil compaction through use of heavy equipment to perform maintenance activities. The nature and scope of the impacts would depend on the specific details of the individual projects.

The conservation measures in the HCP include Best Management Practices which Benton County and Cooperators would follow for covered transportation construction and maintenance projects, including sediment and erosion control measures (See Chapter 6 of the HCP).

Activities authorized in rights-of-way could result in impacts to water quality. Construction activities have the potential to add sediment and pollutants to nearby waterways. Pavement projects, e.g., driveway construction, would increase the amount of storm water runoff, which could affect water temperatures in nearby stream, and increase sedimentation and pollutants entering the streams. These impacts, however, are anticipated to be minor. Use of new technology, such as bioswales or pervious asphalt, could help in reducing water quality impacts.

Water and wastewater management activities would provide additional water resources for homes within the City of Corvallis. The City currently obtains water from surface resources, e.g., the Willamette River, Rock and Griffith Creeks. The need for additional water infrastructure would result in a decrease in water quantity, and could impact water quality (indirectly by decreasing stream flows thereby increasing water temperature and affecting cold water aquatic species). Construction activities have the potential to affect water quality by adding sediments and pollutants to nearby waterways. However, if the best management practices are followed (See Chapter 6 of the HCP), including sedimentation and erosion control, any water quality impacts from construction of water and wastewater facilities are anticipated to be minor.

Telephone and natural gas utility construction and maintenance activities on private lands should not require water resources. Ground disturbance activities could result in impacts to water quality, through erosion and sedimentation and potential hazardous spills. Impacts would be greatest near streams. However, these impacts are anticipated to be minor. Pioneer Telephone and NW Natural would follow the best management practices outlined in the HCP during their activities.

4.1.6.2 Habitat Restoration, Enhancement, and Management Activities

Habitat restoration, enhancement, and management activities would be conducted primarily in upland prairie habitats, with the exception of Jackson-Frazier Wetland and Owens Farm. Ground water is not expected to change as a result of these activities. Hydrological impacts due to soil compaction associated with management activities would be negligible as impacts would be of short duration and low intensity, especially on well-drained soils. Erosion is not expected to increase as a result of these activities, unless the ground is scarified (e.g., through prescribed burning activities). Projects occurring in close proximity to streams could result in sedimentation (ground disturbance activities) and ash (prescribed burns) entering waterbodies affecting aquatic habitats. Sedimentation degrades water quality, changes pH levels. Most

habitat restoration, enhancement, and management activities are not anticipated to occur near waterbodies.

There is the potential for spills from motorized equipment. Best management practices would be implemented to limit the potential impacts resulting from a spill. Herbicide application would conform to the Prairie Habitat Vegetation Management Guidelines (Appendix I of the HCP). These guidelines specify the types of herbicides that can be applied and the distance (buffer) from a water body.

OSU will continue to use livestock grazing as a habitat restoration, enhancement, and management tool on its property. Livestock grazing can compact soils and remove vegetation, thereby affecting infiltration of water into the soil and surface water runoff, which could affect water quality. The extent of these impacts will be dependent upon the type of vegetative cover, the amount of bare ground, the season of use, and the number of livestock on the site at a given time. Riparian areas have been or will be fenced off to exclude livestock as part of a CREP (Conservation Reserve Enhancement Program) project undertaken by OSU, so water resources should not be directly impacted.

Short term negative impacts to water quality are expected to be minor. Habitat restoration, enhancement, and management activities are expected to have net long-term benefits through (1) increased graminoid and forb cover, (2) increased vegetative productivity, and (3) decrease in sheet and gully erosion.

4.1.6.3 Agricultural Activities

Drainageways at Owens Farm (City of Corvallis' ownership) have been channelized to increase the amount of farmable land (Satre & Associates 2004). Herbicide application and runoff from soil erosion due to farm activities has the potential to enter the drainageways which flow into the Jackson-Frazier Wetland (Satre & Associates 2004), which is owned and managed by Benton County. Impacts, while ongoing, are anticipated to be minor.

The effects of agricultural activities on water consumption are dependent upon the type of crops grown. The type of crops grown on the property has changed through the past 50 years. However, water consumption in a given year is not expected to increase significantly over the amount of water that has been used in previous years.

4.1.6.4 Emergency Activities

Responding to emergency activities could result in spills from motorized vehicles. However, most emergency activities are not anticipated to occur in the vicinity of a waterbody. Any spill would be addressed immediately after addressing the emergency situation. Such spills are expected to be minor and infrequent. Emergency activities are not anticipated to affect water quantity with the exception of fire fighting. The larger the fire the greater the amount of water needed to fight the fire.

4.1.7 Land Use/Socio-Economic/Environmental Justice

4.1.7.0 Building Construction Projects

New home and building construction would provide construction jobs and increased income for many local businesses. The County would receive increased tax revenues following the construction of new buildings, as property values would increase.

Private landowners would save money by obtaining incidental take coverage from Benton County, rather than having to obtain their own incidental take permit from the USFWS, which could involve species surveys, development of an HCP, and mitigation costs as well as substantial time delays (one-three years). Benton County would receive increased tax revenues in which to support County operations, including mitigation for impacts to Fender's blue butterfly habitat on private lands within the Fender's Blue Zone.

Construction of two new rural fire stations and two rural new schools would have overall positive long term benefits for County residents. The schools would provide long-term employment of teachers and school personnel. The fire stations would provide long term employment for fire personnel and should reduce the cost of fire insurance for area residents within the service area. The construction of two new schools and two new fire stations would, however, result in increased traffic congestion in the area. Both types of facilities would be constructed based on need for these services resulting from increase in population of the area.

4.1.7.1 Linear Projects

Road construction projects will result in short-term employment (construction jobs). Road maintenance activities and activities within County rights-of-way are not anticipated to create new jobs.

Water and wastewater management activities will result in additional jobs both in the construction of the facilities and in their maintenance and operation. Water and wastewater services will increase property values, although residents receiving the benefit of the services may be called upon to pay for the construction, operation, and maintenance costs.

Telephone and natural gas utility construction and maintenance activities on private lands could result in a few additional jobs, however, fewer and fewer people may request telephone landlines or natural gas in the future as telephone and alternative energy technology keeps advancing.

Overall, impacts to the local economy are anticipated to be positive, although minor.

4.1.7.2 Habitat Restoration and Enhancement Activities

Habitat restoration, enhancement, and management activities may result in short-term employment (personnel to mow, assist with prescribed burn activities, spraying).

The HCP calls for the acquisition of conservation easements on and conservation of 20-24 ha (50-60 ac) of high quality prairie habitat supporting Fender's blue butterfly. Acquisition of these properties will only remove one vacant lot from future tax rolls as the other lands already have existing houses on them (although these homes will not be part of the conservation easements).

The absence of additional accessory or agricultural building construction on the lots removes the opportunity for construction jobs and spillover income for local businesses. Tax revenues would not be affected, as the property owners (easement grantors) would continue to pay property taxes (G. Verret, pers.comm. 2009). Effects on the economy are expected to be minor.

4.1.7.3 Agricultural Activities

Agricultural activities at the Owens Farm presently have little direct impact on persons living within Benton County as the current crop is grass seed. However, in the future, the property could be used to grow vegetable crops, which would have a benefit to local residents if such crops are sold locally.

No new jobs are anticipated to be created to provide on-going farming at Owens Farm.

4.1.7.4 Emergency Activities

As the County's population increases there would be an increased need for emergency services. With this increased need, is the need for more personnel to operate emergency vehicles and tow trucks. With respect to fire fighting and hazardous materials cleanup, whether these would generate additional employment is dependent upon the size of the spill or fire, and its frequency and duration.

4.1.7.5 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629), directs Federal agencies to incorporate environmental justice in their decision making processes. Federal agencies are directed to identify and address, as appropriate, any disproportionately high and adverse environmental effects of their programs, policies, and activities on minority or low-income populations.

Neither low-income or minority populations are known to be disproportionately represented in Benton County. No environmental justice issues exist for the Proposed Action alternative. No low-income or minority populations would be displaced or negatively affected by the Proposed Alternative.

4.1.8 Cultural and Archaeological Resources

As part of the Cooperative Agreement between the County and Cooperators for any of the projects below, the Cooperator would be required to comply with all state and federal laws, including laws pertaining to cultural and archaeological resources.

4.1.8.0 Building Construction Projects

Ground disturbance activities within the Fender's Blue Zone have the potential to affect archaeological resources. Landowners should survey their properties for archaeological resources before undertaking any ground disturbance activities. The extent of potential impacts is not known.

4.1.8.1 Linear Projects

Ground disturbance activities within Benton County rights-of-way have the potential to affect (crush and expose) any archaeological resources that may be present, although the extent of

potential impacts is not known. Prior to conducting any ground disturbance activities in previously undisturbed areas, Benton County will notify the Oregon State Historic Preservation Office to determine the probability of the presence of cultural and archaeological resources. If there is a potential for cultural or archaeological resources to be present, the County will conduct any necessary surveys, and will work with the Oregon State Historic Preservation Office (SHPO) and the appropriate tribes to address any concerns they may have regarding potential impacts to these resources.

ODOT does not intend to conduct any ground disturbance activities as part of their road vegetation management activities within state rights-of-way.

Ground disturbance activities within the County's rights-of-way for such activities as driveway construction and utility construction and maintenance, have the potential to impact (crush and expose) archaeological resources present. The extent of potential impacts is not known.

Water and wastewater management by the City of Corvallis has the potential to impact (crush and expose) archaeological resources. The extent of potential impacts is not known.

Telephone and natural gas utility construction and maintenance activities on private lands have the potential to impact (crush and expose) archaeological resources, although the extent of potential impacts is not known. The County does not require a permit to install or maintain telephone utilities on private lands. A permit is required for electrical and natural gas utilities, but only for work or maintenance completed between the meter and a building.

4.1.8.2 Habitat Restoration and Enhancement Activities

Prescribed burning activities should have little or no effect, per se, on cultural resources as fires would be low to medium intensity (i.e., non-destructive) and most exposed archeological resources are composed of clay, ceramic, or stone, which typically occur below the ground surface. The primary threat of prescribed burning to archaeological resources would be activities associated with managing and controlling the fire, such as establishing fire lines and use of motorized vehicles (fire engines and bulldozers), which could crush or expose artifacts.

Mechanical brush control activities (e.g., mowing) could affect archaeological sites and artifacts by crushing and exposing artifacts.

Plant augmentation is a ground disturbance activity. The area of impact is anticipated to be small. The areas where plant augmentations may occur include: Lancaster Property, Jackson-Frazier Wetland, Corvallis Watershed, Fitton Green, Lone Star Ranch, Beazell Memorial Forest, Bald Hill, Benton County Fender's Blue Butterfly Conservation Areas, and ODOT's Wren Mitigation Site and Henkle Quarry.

Prior to undertaking any ground disturbance activities on its properties, Benton County would conduct archaeological investigations, as necessary. If archaeological resources are present, the County would work with Oregon SHPO and the tribes to identify and undertake the measures necessary to mitigate for any impacts to archaeological resources.

4.1.8.3 Agricultural Activities

Since these activities have been on-going at the Owens Farm for over 70-years, impacts to cultural or archaeological resources are not expected.

4.1.8.4 Emergency Activities

The extent of potential impacts is not known. Activities involving the management and control of a fire, such as establishing fire lines and use of motorized vehicles (fire engines and bulldozers) could crush or expose artifacts. Hazardous material spill cleanup activities could involve soil excavation, which could expose or crush artifacts. If any archaeological resources are discovered during emergency activities, the entity performing the activity would contact Benton County and the Oregon SHPO after completion of the emergency activities.

4.1.9 Air Quality

4.1.9.0 Building Construction Activities

The Permit will allow for construction of 1,280 building over a 50-year period, averaging approximately 26 structures per year. Construction vehicles would emit carbon monoxide, an air pollutant. Particulate matter would increase due to soil disturbance and operation of heavy equipment during construction. Impacts to air quality from construction vehicles and soil disturbance will be incremental (26 buildings constructed per year, on average), but on-going throughout the Permit term. However, impacts from individual construction projects are anticipated to be short term (6 months – 2 years) and minor.

There will be an increase in vehicle emissions, over the long term, due to an increase in traffic from farm, residential, and fire response vehicles; and from school buses, school personnel, and parents driving their children to and from school. These increases will be incremental, and are anticipated to only minimally degrade the air quality in Benton County. These impacts are not anticipated to result in, or contribute to, or exceed National Ambient Air Quality Standards. Over the long term, as vehicles become more fuel efficient or alternative energy vehicles become available, air quality impacts from the combustion of fossil fuels should decrease.

These impacts are not anticipated to exceed National Ambient Air Quality Standards.

4.1.9.1 Linear Projects

Carbon monoxide emissions from vehicles and equipment would occur during road construction activities. Particulate matter will increase due to soil disturbance and operation of heavy equipment during construction. Road construction projects will result in minor, short term (less than two years for each project) impacts to air quality with impacts limited to approximately 34-years of the 50-year Permit term, as only 17 road construction projects are covered by the Permit, affecting approximately 1.6% of County rights-of-way. Particulate matter from soil disturbance activities would be minimized by application of best management practices, including dust and erosion control practices to control erosion and the use of water trucks to minimize fugitive dust emissions (See Chapter 6 of HCP).

Use of heavy equipment for transportation maintenance projects would result in the emissions of carbon monoxide and particulate matter. Soil disturbance activities (e.g., ditch cleaning) would

result in particulate matter emissions. While these activities would be performed throughout the Permit term, they would only be performed on an as-needed basis. Use of heavy equipment for vegetation management activities within ODOT and County rights-of-way would occur on an annual basis, but would be short in duration (at most several months per year). Road maintenance activities impacts on air quality are anticipated to be minor. As more fuel efficient equipment becomes available, impacts to air quality should decrease.

Use of heavy equipment (e.g., mowers, graders, backhoes) for activities authorized (e.g., utility construction and maintenance, driveway construction) within the County's road rights-of-way would result in emissions of carbon monoxide and particulate matter. Soil disturbance activities (e.g., trenching, soil excavation for driveways) will result in particulate matter emissions. While these activities would be performed throughout the Permit term, they would only be performed on an as-needed basis. Impacts on air quality from work authorized within the County's road rights-of-way are anticipated to be minor. As more fuel efficient equipment becomes available, impacts to air quality should decrease.

For water and wastewater management activities, use of heavy equipment (e.g., mowers, graders, backhoes) for construction and maintenance activities would result in emissions of carbon monoxide and particulate matter. Soil disturbance activities (e.g., trenching, soil excavation for buildings, pipelines) will result in particulate matter emissions. These impacts to air quality are anticipated to be short term and minor. Construction activities are estimated to take up to 3 years to complete. Underground utilities lines will require vegetation management resulting in use of heavy equipment (mowers) to keep vegetation in check. Vegetation management is expected to take a few weeks per year, at most. Pipeline repair work is anticipated only once or twice during the Permit term; and worst case scenario would require the entire pipeline be exposed (ground disturbance activities). The water and wastewater facilities have not been planned or designed yet, so the full extent of impacts is not known at this time.

Telephone and natural gas utility construction and maintenance activities on private land require the use of heavy equipment to install underground cable or pipeline, which would result in the emissions of air pollutants. Soil disturbance activities (boring and plowing) would result in particulate matter emissions. These impacts to air quality are anticipated to be on-going, but minor over the long-term. Maintenance/replacement of telephone cables is only needed once every 30-40 years, and once cables are replaced, they will be placed within conduit, and future maintenance will be non-invasive and require minimal ground disturbance. An estimated 95,313 ft (29,051 m) of telephone cable in the Fender's Blue Zone will be replaced during the 50 year HCP for an estimated disturbance area, including work in existing roads, of up to 2.41 ha (5.96 ac) (G. Vick, pers. comm. 2009). An estimated 7,838 m (25,714 ft) of natural gas pipeline will be installed/replaced during the Permit term, for an estimated disturbance area, 90% of which will occur in existing roads, of 7.2 ha (17.7 ac). Maintenance work would require the use of heavy equipment and result in ground disturbance activities, which would further add pollutants into the air.

These impacts are not anticipated to exceed National Ambient Air Quality Standards.

4.1.9.2 Habitat Restoration, Enhancement, and Management Activities

Habitat restoration, enhancement, and management activities at Prairie Conservation Areas (including those managed for mitigation purposes) will minimally degrade the air quality in Benton County, primarily through an increase in motorized equipment emissions (carbon monoxide and particulate matter) and prescribed burning activities (particulate matter) .

Particulate matter emissions can be anticipated as a result of soil disturbance and operation of heavy equipment. Use of small two-stroke gas engines found in lawnmowers, trimmers, leaf blowers and chainsaws would impact air quality. Two stroke engines produce hydrocarbons, particulate matter (diesel engines), carbon dioxide, and nitrogen oxide. Use of four stroke gas engines would also result in emissions impacting air quality, but to a lesser degree. The impacts from motorized equipment are anticipated to be minor and short-term in nature (several weeks per year), although on-going (throughout the Permit term).

Prescribed burning activities may release a variety of air pollutants into the air, including aerosols of organic acids and hydrocarbons, and particulate matter (Monroe et al. 2009) and reduce visibility. The type of pollutant released varies with the type of fuel burned, moisture content of the vegetation, temperature of the fire, and the amount of time materials smolder after the fire. Prescribed burning activities will only occur as specified under Oregon law.

Prescribed burning is recommended as a management tool to enhance or maintain Taylor'checkerspot butterfly and Fender's blue butterfly habitat. Over the 50 year HCP, an estimated average of 42.2 ha (104.4 ac) of habitat would be burned in a given year at conservation or mitigation areas. Any particulate matter introduced into the atmosphere from prescribed burning would be negligible compared to particulate matter introduced by other sources, such as vehicles and industrial emissions, and from wild fires occurring in the region.

OSU will use livestock grazing as a habitat restoration, enhancement, and management tool on their property. Livestock trampling bare ground will cause the particulate matter emission. The amount of particulate matter emissions depends upon the number of livestock on site, habitat type, and the type of graving management implemented. Season long or heavy use will increase the amount of bare ground which increases dust (particulate matter) emissions. Drier climate will also result in increased dust emissions. Support vehicles will generate small amounts of particular matter and could transport dirt to paved roads, thereby increasing particular matter emissions. However, no significant off-site impacts are anticipated, and actual on-site particulate matter emission amounts are anticipated to be negligible.

Air quality impacts from habitat restoration, enhancement, and management activities will be minimized through implementation of best management practices, including dust and erosion control practices to control erosion. These activities will be conducted according to the Prairie Habitat Vegetation Management Guidelines (Appendix I in the HCP).

These impacts are not anticipated to exceed National Ambient Air Quality Standards.

4.1.9.3 Agricultural Activities

Air quality impacts from agricultural activities include dust emissions from soil disturbance activities and non-road (farm equipment) emissions, primarily carbon monoxide and particulate matter (diesel engines). Non-road emissions account for 15-20% of air pollution across the United States (US EPA 2009c).

Non-road emissions are anticipated to be minor, although they would continue so long as the property is farmed. No new emissions are anticipated, and emissions could possibly decrease with the use of more energy efficient machinery.

These impacts are not anticipated to exceed National Ambient Air Quality Standards.

4.1.9.4 Emergency Activities

Emergency activities will result in minor impacts to air quality. Motorized vehicles emitting pollutants into the environment are used to conduct these activities. However, these impacts would be short term with vehicles used only on an as-needed basis. Fire fighting activities have the greatest potential to affect air quality in the County. However, the amount of pollutants emitted by fire fighting vehicles and related activities (soil disturbance by building a fire line), would be minor compared to amount of pollutants entering the air from the fire itself.

These impacts are not anticipated to exceed National Ambient Air Quality Standards.

4.1.10 Transportation

4.1.10.0 Building Construction Projects

Under the Permit, up to 195 additional new homes could be constructed. If each home has at least two vehicles, then an additional 380 vehicles would be utilizing County roads for work and pleasure once all 195 homes are constructed[19]. The increase in traffic will be incremental as not all 195 homes will be constructed at one time. The addition of approximately eight new cars on the road system per year (four units multiplied by two cars per household) would not result in a noticeable increase in traffic patterns. An increase number of cars on the roads could affect road conditions by causing faster road deterioration and requiring additional funding to maintain roads. The existing road systems should accommodate the additional vehicles, in that no new lanes would be required to handle the additional traffic.

Construction of two new rural schools would increase traffic on the roads Monday through Friday from school personnel traveling to and from work, school buses traveling at least twice a day, and from parents transporting kids to and from school. Construction of two new rural fire stations would increase the number of vehicles on the road as employees will need to get to and from work (seven days per week), and emergency vehicles (fire trucks and ambulances) would need to utilize the road systems. This additional traffic would impact current road conditions causing deterioration at a faster rate than if such traffic did not occur. No new lanes would be required to handle the additional traffic.

[19] Note: Construction of these homes is estimated to occur, on average, at a rate of 4 homes per year. No additional vehicles are anticipated for persons requiring a medical hardship dwelling.

4.1.10.1 Linear Projects

The 17 construction projects covered in the Permit should result in improvements to the County's road system, thereby increasing public safety.

Road maintenance activities proposed will maintain or improve existing road conditions. These activities are not expected to be different in the absence of a HCP, and therefore, would not differ from those that would occur otherwise.

Activities authorized within the County's rights-of-way would have minor impacts to road maintenance activities. Construction and maintenance of utility lines within the right-of-way could result in temporary delays to road maintenance activities scheduled to occur in the road right-of-way at the same time. In some cases, the utility construction or maintenance activity could result in the County foregoing the maintenance activity (e.g., vegetation management) altogether for that year where the utility construction or maintenance activity has addressed the maintenance issue. Road approach projects outside Fender's Blue Zone would provide access from private property onto the County's road system. Driveways constructed for new housing could affect the County's transportation system by adding more traffic and imposing safety risks from vehicles entering and existing private property. Overall, however, impacts are expected to be negligible. In 2008, only 44 road approach permits were issued, of which an estimated 25% of landowners were seeking a second access point onto their properties.

Water and wastewater management activities would have minor impacts to transportation system. Such activities will employ additional workers putting more vehicles on the road in the area of these facilities. This could cause the roads in these areas to deteriorate faster than if such traffic did not occur.

Telephone and natural gas utility construction and maintenance activities on private lands will have minor impacts on the transportation system. Heavy equipment used to install the underground telephone cable or gas lines would put more vehicles on the road in the area of installation causing roads to deteriorate at a faster rate, however, the impacts would be spread out over the 50-year Permit term and are expected to be minor.

4.1.10.2 Habitat Restoration, Enhancement, and Management Activities

Any impacts to the transportation system within Benton County would be negligible and limited to heavy equipment being transported on the County road system. Heavy equipment would be moved to the different conservation and mitigation areas in order to conduct habitat restoration, enhancement, and management activities. While such movement of heavy equipment would be on-going throughout the Permit term, it would occur, at most, only several times per year for each site where habitat restoration, enhancement, and management activities are to occur.

4.1.10.3 Agricultural Activities

Any impacts to the transportation system from agricultural activities within Benton County would be negligible. Heavy equipment would be moved to and from the site for grading, planting, tilling, and harvesting purposes. The movement of this equipment is not expected to be different in the absence of a HCP, and therefore, would not differ from what would occur otherwise.

4.1.10.4 Emergency Activities

Any impacts to the transportation system within Benton County would be negligible. Emergency activities may result in some roads being closed to thru traffic in the event of a serious accident, utility repair, hazardous material spill, or fighting a fire. Depending on the extent of an automobile accident, some maintenance activities may be required (e.g., replacement of guardrails, pavement repairs).

4.2 No-Action Alternative

Under the No Action alternative, the HCP as proposed would not be implemented, the proposed Permit would not be issued, and the status quo with respect to the planned and ongoing activities of Benton County, Cooperators, and private landowners in the Fender's Blue Zone would be maintained. The HCP conservation measures (see Chapter 6 of HCP) would not be implemented.

A "no development" scenario is unrealistic and unlikely given the need for more housing, road improvements (construction and maintenance) and road approaches, utility construction and maintenance, driveways, public schools and fire stations, water and wastewater facilities, and emergency services as the County's population grows; and habitat restoration, enhancement, and management activities at parks/natural areas/open spaces to conserve prairie habitat for the Covered Species.

The most likely scenario under the No Action alternative is that the same level of activities and impacts to the Covered Species would occur as under the Benton County Prairie Species HCP, depending on future individual permit decisions by the USFWS. Under the No Action alternative, take from the USFWS would be required for impacts to Fender's blue butterfly and its habitat on all lands, and take from the Oregon Department of Agriculture would be required for impacts to state-listed plant species on public lands. The County, Cooperators, and private landowners would need to obtain incidental take coverage directly from the appropriate agency on a project-by-project basis, which would increase the time and cost required to obtain incidental take coverage, delaying project construction. The following activities are anticipated to require incidental take coverage of some type:

- Home, farm, and forest construction (Fender's blue)
- Public Service Facility Construction (Fender's blue)
- Transportation Activities (Fender's blue and Covered Plants)
- Activities authorized within the County's road rights-of-way (Fender's blue, Nelson's checkermallow, peacock larkspur, and Kincaid's lupine)
- Park/Natural Areas/Open Space Management, (All Covered Species)
- Agricultural Activities and Water/Wastewater Management (Nelson's checkermallow)
- Telephone and Natural Gas Utility Construction and Maintenance Activities (on private lands) (Fender's blue)
- Emergency Activities (after the fact) (All Covered Species)

The majority of Fender's blue butterfly habitat is located on private lands, and the majority of anticipated impacts are from home, farm, and forest construction activities on private lands. On average, an estimated 26 County permits or agricultural building authorizations per year would

be sought to construct homes, medical hardship buildings, additions to structures, agricultural buildings, and accessory buildings. Many, but not all, of these landowners would need an incidental take permit from the USFWS, and impacts to Fender's blue butterfly and its habitat could be greater or less than the take authorization sought under the Proposed Action alternative.

The primary difference in impacts between the two alternatives is that under the No Action alternative, impacts to the resources (air quality, vegetation, etc.) in areas with Covered Species would occur at a slightly (several years) later time, delaying these impacts.

4.2.0 Climate

4.2.0.0 Building Construction Activities

Impacts to the climate from the production of greenhouse gases from these activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.0.1 Linear Projects

Impacts to the climate from the production of greenhouse gases from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.0.2 Habitat Restoration, Enhancement, and Management Activities

Under the No Action alternative, fewer greenhouse gases will be produced from habitat restoration, enhancement, and management activities. Impacts to the climate from the production of greenhouse gases in parks/natural areas/open spaces are expected to primarily the same for the No Action alternative as for the Proposed Action alternative. The conservation measures in the HCP would not be implemented and thus would not result in the production of greenhouse gases.

4.2.0.3 Agricultural Activities

Impacts to the climate from the production of greenhouse gases from these activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.0.4 Emergency Activities

The extent of potential impacts is not known. However, impacts from emergency activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.1 Topography and Soils

4.2.1.0 Building Construction Activities

Impacts to soil and topography from building construction activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.1.1 Linear Projects

Impacts to soil and topography from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.1.2 Habitat Restoration, Enhancement, and Management Activities

Impacts to soil and topography from habitat restoration, enhancement, and management activities are anticipated to be similar to those under the Proposed Action alternative for Parks/Natural Areas/Open Spaces. The conservation measure implementation activities would not occur under the No Action alternative.

4.2.1.3 Agricultural Activities

Impacts to soil and topography from agricultural activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.1.4 Emergency Activities

Impacts to soil and topography from emergency activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.2 Prairie Habitat Vegetation

4.2.2.0 Building Construction Activities

The same amount of vegetation is expected to be affected by building construction activities under the No Action alternative as under the Proposed Action.

4.2.2.1 Linear Projects

The same amount of vegetation is expected to be affected by linear projects under the No Action alternative as under the Proposed Action.

4.2.2.2 Habitat Restoration, Enhancement, and Management Activities

The same amount of vegetation will be affected by habitat restoration, enhancement, and management activities (e.g., mowing, spraying, and prescribed burning) at Parks/Natural Areas/Open Spaces under the No Action alternative as under the Proposed Action. However, impacts to vegetation that might have been affected through implementation the conservation measures would not occur under the No Action alternative, resulting in fewer impacts (both positive and negative) to vegetation from habitat restoration, enhancement, and management activities.

4.2.2.3 Agricultural Activities

The same amount of vegetation is expected to be affected by Agricultural Activities under the No Action alternative as under the Proposed Action.

4.2.3 Wildlife and Fish

4.2.3.0 Building Construction Activities

Impacts to fish and wildlife from building construction activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.3.1 Linear Projects

Impacts to fish and wildlife from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.3.2 Habitat Restoration, Enhancement, and Management Activities

Impacts to fish and wildlife from habitat restoration, enhancement, and management activities at parks/natural areas/open spaces would be the same under the No Action alternative as under the Proposed Action alternative.

Impacts to fish and wildlife from the implementation of conservation measures set forth in the HCP would not occur, and prairie habitat in these areas could decline. While these conservation measures have negative short-term impacts, the long-term impacts to fish and wildlife are beneficial.

4.2.3.3 Agricultural Activities

Impacts to fish and wildlife from agricultural activities would be the same under the No Action alternative as under the Proposed Action alternative.

4.2.3.4 Emergency Activities

Impacts to fish and wildlife from emergency activities would be the same under the No Action alternative as under the Proposed Action alternative.

4.2.4 Threatened and Endangered Species

The Plan Area lacks suitable habitat for Northern Spotted Owl or Marbled Murrelet. Only 0.24% of Marbled Murrelet and 0.12% of Northern Spotted Owl critical habitat is located within the area covered in the Permit. These species and their habitat would not be significantly affected by the No Action alternative. Golden paintbrush and Water howellia have been extirpated from the County. There are no Oregon Chub located within the Plan Area.

4.2.4.0 Building Construction Activities

Under the No Action alternative the same number of homes would, in all likelihood, be constructed, however the amount of impacts to Fender's blue butterfly habitat could differ. Under this alternative, the private landowners would be required to survey the property for Fender's blue butterfly and its habitat. The landowners would be required to first avoid impacting the species and its habitat and if impacts were unavoidable, then they would need to obtain an incidental take permit from the USFWS. Depending upon the extent of the potential impacts, the USFWS may require a low-impact Habitat Conservation Plan.

During HCP development, approximately 872 ha (2,155 ac) of habitat were surveyed within the identified Fender's Blue Zone (over 4,010 ha (9,910 ac) were surveyed County-wide). Based on the amount of Fender's blue butterfly habitat identified in the Fender's Blue Zone, the County estimated that on any given hectare (2.47 ac) of land, there would be 2.8 m^2 (30.1 ft^2) of Kincaid's lupine and 170 m^2 (1,829.8 ft^2) of native nectar species. The total projected amount of Kincaid's lupine and native nectar species estimated to be present on private lands within the Fender's Blue Zone is 8,165 m^2 (87,889 ft^2) and 141,815 m^2 (1,526,478 ft^2), respectively. Under

the No Action alternative, not all lands within the Fender's Blue Zone would have Kincaid's lupine or native nectar species present. These landowners will not need a USFWS permit for incidental take of Fender's blue butterfly. On lands where there is Kincaid's lupine and/or native nectar species present, landowners impacts may be greater or less than the estimated 2.8 m^2 (30.1 ft^2) of Kincaid's lupine and 170 m^2 (1,829.8 ft^2) of native nectar species per hectare (2.47 ac). When all 1,280 buildings have been constructed, the amount of take may exceed or be less than what was projected under the Proposed Action alternative. Thus, under the No Action alternative, impacts could potentially exceed those projected under the Proposed Action alternative.

As for public service facility construction, the properties to be acquired for the two rural schools and two rural fire stations have not been identified. The County does estimate, however, that a total of 4.4 ha (10.8 ac) will be needed for their construction. The potential impacts to Fender's blue butterfly and its habitat are not known. Under the Proposed Action alternative, take is estimated at 12.3 m^2 (116.5 ft^2) of Kincaid's lupine and 222 m^2 (2,393 ft^2) of native nectar species. However, the lands purchased by the County could have no Fender's blue butterfly habitat or they could have more butterfly host and nectar habitat than was estimated in the Proposed Action alternative. Under either scenario, the County would survey the property for Fender's blue butterfly and seek to avoid impacts to the species. If impacts are unavoidable under the No Action alternative, the County would seek incidental take authorization on a project-by-project basis.

Mitigation under the No Action alternative would be conducted on-site and would be small, fragmented, and piecemeal. Enhancement of the high quality 20-24 ha (50-60) acres proposed under the Proposed Action alternative to mitigate for impacts to Fender's blue butterfly habitat from home, farm, and forest development and from public service facility construction would not occur.

4.2.4.1 Linear Projects

Under the No Action alternative, Benton County would need to seek take authorization on a project-by-project basis for impacts to Fender's blue butterfly and its habitat for road construction and maintenance projects. Persons seeking to obtain a County permit to perform work within the County's right of way would need to obtain take authorization from USFWS before the County would issue a County permit. Impacts to Nelson's checkermallow, Kincaid's lupine (not considered occupied Fender's blue butterfly habitat), and peacock larkspur are not protected from take under the Federal ESA absent a federal nexus. If the County obtains federal funding for road construction projects, then these plants would be covered and take authorization would be necessary. Absent the federal nexus however, only State law protects these species on non-federal public lands and the County and persons requiring a permit to work within the County's right-of-way would need to obtain authorization from the Oregon Department of Agriculture to impact the species.

Absent a federal nexus, no incidental take authorization is required for water and wastewater management activities as these activities are not anticipated to affect Fender's blue butterfly or its habitat. The City of Corvallis would need authorization from the Oregon Department of Agriculture to impact Nelson's checkermallow.

Pioneer Telephone Cooperative and NW Natural would need to obtain take authorization to impact Fender's blue butterfly and its habitat on private lands. The landowner would most likely survey for the species, and if impacts were unavoidable, would conduct any necessary mitigation. Under the No Action alternative, the amount of impacts to Fender's blue butterfly and its habitat from the installation of underground telephone cable and natural gas lines could be either less than or greater than that projected under the Proposed Action alternative. The extent of impacts is not known until the property has been surveyed and designed (avoidance efforts undertaken), but may be greater or lesser than impacts under the Proposed Action alternative.

4.2.4.2 Habitat Restoration, Enhancement, and Management Activities

Under the No Action alternative, for habitat restoration, enhancement, and management activities at Parks/Natural Areas/Open Spaces, the County and Cooperators would only need an incidental take permit from the USFWS for impacts to Fender's blue butterfly habitat. The County and Cooperators would not need permits, absent a federal nexus, for impacts to the covered plant species. No permit would be needed for impacts to Taylor's checkerspot butterfly or its habitat as this species is not yet listed. This species could however, become listed within the Permit term, in which case anyone wishing to impact the butterfly or its habitat would need a permit from the USFWS.

Under the No Action alternative, the HCP conservation measures would not be implemented. These include augmenting populations of the covered plant species beyond what is required to mitigate for impacts. The enhancement of 20-24 ha (50-60 ac) conservation easements on high quality prairie habitat supporting Fender's blue butterfly would not occur. These lands are private property and the landowners could simply do nothing on their lands, which would allow for proliferation of invasive species and tree and shrub encroachment. This prairie habitat could be lost over the Permit term due to inaction on the part of the landowners to maintain the property as prairie habitat. This could result in the loss of up to 2,405 m^2 (22,012 ft^2) of Kincaid's lupine, which in 2007 supported a population of approximately 1280 butterflies (USFWS 2008h). Public and private landowners wishing to restore, enhance, or manage their lands for Fender's blue butterfly and its habitat would need to either obtain their own incidental take permit or enter into a Safe Harbor Agreement with the USFWS.

4.2.4.3 Agricultural Activities

No take of Fender's blue butterfly and its habitat will occur from agricultural activities on Owens Farm under the No Action alternative. Agricultural activities could impact five Nelson's checkermallow, however, absent a federal nexus, there is no take protection for this species under the federal ESA. Nelson's checkermallow is protected under state law for activities occurring on state lands (which include city owned lands). The City of Corvallis would need authorization from the Oregon Department of Agricultural to impact these five Nelson's checkermallow.

4.2.4.4 Emergency Activities

The extent of impacts to the Covered Species from emergency actions is unknown. Under the Proposed Action, Benton County estimated take of the Covered Species at 1% of the known

populations of these species in the County on non-federal lands remaining after take has been authorized for all other activities. Under the No Action alternative, take is only an issue for Fender's blue butterfly habitat as the other Covered Species, absent a federal nexus, are not protected from take under the federal ESA on non-federal lands. If the Fender's blue butterfly or its habitat is impacted from emergency activities under the No Action alternative, the County or Cooperator would need to work with USFWS to address any take that may have resulted from the performance of the emergency action. The County and Cooperator, in most instances, would not be able to obtain take authorization before the emergency actions were undertaken. Mitigation for impacts would occur at designated mitigation sites.

4.2.5 Critical Habitat

Effects to units of critical habitat within the HCP plan area under the No Action Alternative are described below.

4.2.5.0 FBB 7

Habitat restoration and emergency response activities, and effects to critical habitat in the OSU owned portion of the unit would likely still occur, with permitting and any needed mitigation (for emergency response) occurring on a case by case basis.

Home, farm and forest construction activities, and the resulting effects to critical habitat would still likely occur under the No Action Alternative; the private land owner could seek needed incidental take permit coverage from the USFWS.

4.2.5.1 FBB-8

Effects to critical habitat from building construction (home, farm and forest structures and public service facilities), linear projects, and emergency response activities are anticipated to be similar to those under the Proposed Action alternative.

Under the No Action Alternative, Benton County will not need to obtain properties in the Cardwell Hill CH unit for mitigation, and habitat restoration activities and any net benefits to the PCEs for Fender's blue butterfly will not occur.

4.2.5.2 FBB-9

Habitat restoration and emergency response activities, and effects to critical habitat in the OSU owned portion of the unit would likely still occur under the No Action Alternative, with permitting and any needed mitigation (for emergency response) occurring on a case by case basis.

4.2.5.3 WD-4A & B

Habitat restoration and emergency response activities, and effects to critical habitat would likely still occur under the No Action Alternative, with permitting and any needed mitigation (for emergency response) occurring on a case by case basis with Oregon Department of Agriculture.

4.2.5.4 KL-8

Habitat restoration and emergency response activities, and effects to critical habitat in the OSU owned portion of the unit would likely still occur under the No Action Alternative.

Home, farm and forest construction activities, and the resulting effects to critical habitat would still likely occur under the No Action Alternative.

4.2.5.5 KL-9

Effects to critical habitat from building construction (home, farm and forest structures and public service facilities), linear projects, and emergency response activities are anticipated to be similar to those under the Proposed Action alternative.

Under the No Action Alternative, Benton County will not need to obtain properties in the Cardwell Hill CH unit for mitigation for Fender's blue butterfly, and habitat restoration activities and any net benefits to to the PCEs for Kincaid's lupine will not occur.

4.2.5.6 KL-10

Habitat restoration and emergency response activities, and effects to critical habitat are anticipated to be similar to those under the Proposed Action alternative.

4.2.6 Water Resources

4.2.6.0 Building Construction Activities

Impacts to water resources from building construction activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.6.1 Linear Projects

Impacts to water resources from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.6.2 Habitat Restoration, Enhancement, and Management Activities

Impacts to water resources would be less as only those impacts resulting from habitat restoration, enhancement, and management actions at parks/natural areas/open spaces would occur under the No Action alternative.

4.2.6.3 Agricultural Activities

Impacts to water resources from agricultural activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.6.4 Emergency Activities

Impacts to water resources from emergency activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.7 Socioeconomic/Environmental Justice

4.2.7.0 Building Construction Activities

Socioeconomic impacts from building construction activities would be the same under the No Action alternative as under the Proposed Action alternative, except private landowners would incur additional costs associated with seeking incidental take coverage from the USFWS, which costs may include species surveys, preparation of a habitat conservation plan, and mitigation; and Benton County would not be required to use its tax revenues or other sources of income to pay the mitigation costs of private landowners within the Fender's Blue Zone whose residential, farm, and forest development activities impact Fender's blue butterfly habitat. Property taxes received by Benton County would be less over the permit term due to construction delays.

4.2.7.1 Linear Projects

Socioeconomic impacts from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.7.2 Habitat Restoration, Enhancement, and Management Activities

Socioeconomic impacts from habitat restoration, enhancement, and management activities at parks/natural areas/open spaces would be the same under the No Action alternative as under the Proposed Action alternative. Implementation of the HCP conservation measures would not occur. Under the Proposed Action alternative, mitigation for Fender's blue butterfly impacts on private lands would be incurred by the County. Since the County would not be paying for private landowner mitigation, County taxes would be used for other purposes.

4.2.7.3 Agricultural Activities

Socioeconomic impacts from agricultural activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.7.4 Emergency Activities

Socioeconomic impacts from emergency activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.8 Cultural and Archaeological Resources

4.2.8.0 Building Construction Activities

Cultural and archaeological resource impacts from building construction activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.8.1 Linear Projects

Cultural and archaeological resource impacts from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.8.2 Habitat Restoration, Enhancement, and Management Activities

Cultural and archaeological resource impacts from habitat restoration, enhancement, and management activities at parks/natural areas/open spaces are expected to be the same for the No

Action alternative as for the Proposed Action alternative. Under the No Action alternative, the HCP conservation measures would not be implemented, and thus would not result in possible impacts to cultural and archaeological resources.

4.2.8.3 Agricultural Activities

Impacts to cultural and archaeological resources from agricultural activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.9 Air Quality

4.2.9.0 Building Construction Activities

Impacts to air quality from building construction activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.9.1 Linear Projects

Impacts to air quality from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.9.2 Habitat Restoration, Enhancement, and Management Activities

Impacts to air quality for habitat restoration, enhancement, and management activities under the No Action alternative are expected to be less than under the Proposed Action alternative, as the HCP conservation measures would not be implemented. However, such differences in air quality impacts between the two alternatives are anticipated to be minor.

4.2.9.3 Agricultural Activities

Impacts to air quality from agricultural activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.9.4 Emergency Activities

Impacts to air quality from emergency activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.10 Transportation

4.2.10.0 Building Construction Activities

Impacts to transportation from building construction activities are anticipated to be similar to those under the Proposed Action alternative.

4.2.10.1 Linear Projects

Impacts to transportation from linear projects are anticipated to be similar to those under the Proposed Action alternative.

4.2.10.2 Habitat Restoration, Enhancement, and Management Activities

Impacts to transportation from habitat restoration, enhancement, and management activities at parks/natural areas/open spaces are expected to be the same for the No Action alternative as for the Proposed Action alternative. Under the No Action alternative, impacts to transportation from

implementation of the HCP conservation measures would not occur. These impacts under the Proposed Action alternative are considered negligible.

4.2.10.3 Agricultural Activities

Impacts to transportation from agricultural activities are anticipated to be similar to those under the Proposed Action alternative.

4.3 Cumulative Impacts

This section considers the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

The amount and quality of prairie habitat has declined substantially over the last 150 years due to (1) land conversion activities (from prairie habitat to agricultural, residential, commercial, industrial, roadways), (2) proliferation of invasive species, and (3) tree and shrub encroachment resulting from suppression of natural and human caused disturbance regimes (fire). This loss of habitat has resulted in a decline in species diversity and productivity; and has resulted in the listing of five of the Covered Species.

To what extent Covered Species populations have been lost is not known, as there are no accurate records on species population figures. However, what is known, is that Covered Species continue to decline as prairie habitat continues to be lost.

Cumulative effects (both historical and current) from the loss of prairie habitat include, but are not limited to, the degradation in water quality (agriculture, industrial, residential), altered hydrologic regimes (damming and straightening of the Willamette River), degradation of air quality (burning of fossil fuels to run vehicles, heat homes), and changes in soil features (disruption of soil profile due to grading, compaction and excavation).

Now and into the future, additional prairie habitat (both in and outside the Fender's Blue Zone) could be lost through land conversion activities. Persons wanting to convert their prairie habitat to tree farms or vineyards would need incidental take coverage from the USFWS if the property is occupied by Fender's blue butterfly. Prairie habitat, including habitat supporting Fender's blue butterfly, could be lost to inaction on the part of the landowner. If nothing is done to control or reverse the proliferation of invasive species or tree and shrub encroachment, the prairie habitat will also be lost.

Predicting the future is always difficult, and for purposes of this EA, impacts to physical, biological, and human resources that may occur beyond the 50-year Permit term are not foreseeable. What is known is that Benton County's population will continue to grow.

4.3.0 Proposed Action Alternative

4.3.0.0 Building Construction Activities

There are currently 84,663 buildings on record in Benton County, of which 1,531 (606 dwellings and 925 other buildings) are within the Fender's Blue Zone (Benton County GIS Data 2009). Many of these buildings were constructed prior to the listing of Fender's blue butterfly under the Endangered Species Act in 2000. The construction of 1,280 new buildings, (including homes, agricultural buildings, accessory buildings, additions to buildings, medical hardship dwellings), two rural schools, and two rural fire stations would continue to degrade prairie habitat within the Fender's Blue Zone. These activities would result in habitat loss, fragmentation, and degradation, which would negatively affect Fender's blue butterfly and its habitat. Construction of these buildings will result in the loss of 105.2 ha (260.3 ac) of Fender's blue butterfly habitat, in addition to the 244.2 ha (603.5 ac) already lost to existing development in the Fender's Blue Zone[20].

Construction of these new buildings would also have minor impacts on climate, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, and transportation resources. However, these impacts would not be expected to differ from those already occurring within the Fender's Blue Zone.

While impacts to Fender's blue butterfly habitat have most likely occurred during the 244.2 ha (603.5 ac) of ground disturbance resulting from past construction in the Fender's Blue Zone, as no incidental take permits have been issued for Fender's blue butterfly in this area, likely no mitigation has been completed to date. While 105.2 ha (260.3 ac) of prairie habitat supporting Fender's blue butterfly would be lost through construction of new buildings, mitigation would be required for all building construction projects covered by the Permit. The proposed mitigation would occur at a 1:1 ratio, through enhancement of 20-24 ha (50-60 ac) of high quality prairie habitat supporting Fender's blue butterfly to be protected, through conservation easements, in perpetuity. This prairie habitat would be enhanced thereby increasing the amount of Fender's blue butterfly host and nectar species habitat present.

4.3.0.1 Linear Projects

Prairie habitat has been lost to linear projects, such as roads and installation of utility lines (e.g., telephone, natural gas water, and wastewater). As of 2009, Benton County manages approximately 1,550 ha (3,830 ac) of right-of-way (including vegetated roadsides, gravel shoulder, and road surface). Approximately 50% the right-of-way is covered by the road surface and gravel shoulder, while the other 50% is vegetated. Over the Permit term, up to 24.8 ha (61.2 ac) (approximately 50% of which is vegetated, and much of it degraded) of the 1,550 ha (3,830 ac) of County right-of-way would be further modified from the construction of Benton County road projects (e.g., widening and converting a gravel road to a paved road, or adding paved shoulders to an existing road). The County has projected the maximum potential impact from road construction projects (a total of 17) that may occur under the HCP Permit, however the HCP details the County's planned process to avoid and minimize impacts where possible. These

[20] Impacted area calculated using HCP-estimated disturbance area for vacant lot home construction and vacant lot accessory building construction. See Chapter 5 of the HCP.

projects have the potential to reduce the amount of prairie habitat remnants available along roadsides. The full extent of impacts from linear projects, including water and wastewater management, however, is not known.

Prairie habitat within the County or ODOT's road rights-of-way is not expected to change in terms of quality of habitat as a result of road maintenance activities (including vegetation management) and work authorized within the County's rights-of-way, however, some Covered Species, maybe affected by the covered activities over the Permit term. The County and ODOT will mitigate for any impacts to the Covered Species from road construction and maintenance activities, typically at a $\geq$ 3:1 ratio, resulting in a net benefit in Nelson's checkermallow, Kincaid's lupine, Fender's blue butterfly native nectar species, and peacock larkspur.

The City of Corvallis has constructed water and wastewater facilities in the past, and such construction may have impacted prairie habitat and Covered Species. The City will need to construct new facilities in the future as the City's population increases and as existing infrastructure degrades and needs replacement. Future impacts to the Covered Species is estimated at 10 Nelson's checkermallow, for which the City will mitigate with the augmentation 30-50 (depending on timing of mitigation -see Chapter 6 of the HCP) Nelson's checkermallow plants at a mitigation site with existing Nelson's checkermallow. This project will result in a net increase in Nelson's checkermallow.

Telephone utility maintenance activities on private lands in the future will primarily involve replacing existing facilities with conduit (the activity to be covered in the HCP). This would impact an estimated 2.41 ha (5.96 ac) of ground, including work within existing road surfaces, within the Fender's Blue Zone. The same area of ground was likely disturbed to initially install the facilities to be replaced. After replacement occurs, maintenance of facilities will require very minimal ground disturbance, as cables can be "pulled" through existing conduit, with no additional trenching required. Roughly 10% of Pioneer Telephone Cooperative's lines are above ground, and it is estimated that 50% of these above ground lines will be buried in the future (G. Vick, pers. comm. 2009). However, the number of people needing telephone lines to their homes will decline over the years as people move away from the use of landlines or alternate technologies. Pioneer Telephone Cooperative would mitigate for these impacts at a 1:1 ratio at the Benton County Fender's Blue Butterfly Conservation Areas. The impacts to Fender's Blue Butterfly habitat are anticipated to be negligible.

Natural gas utility installation and replacement activities on private lands in the future will primarily involve replacing existing lines (roughly 15% of existing lines) and installing new lines in areas of expansion (an estimated 10% increase in total lines) . This would impact an estimated 7.2 ha (17.7 ac) of ground, 90% of which would take place within existing roads, within the Fender's Blue Zone. Of this impact area, 0.42 ha (1 ac) was likely disturbed to initially install the facilities to be replaced. Overall, roughly 90% of NW Natural's lines are under or will be placed under roads (J. Payson, pers. comm. 2009). NW Natural would mitigate for these impacts at a 1:1 ratio at the Benton County Fender's Blue Butterfly Conservation Areas. The impacts to Fender's Blue Butterfly habitat are anticipated to be negligible.

Cumulative effects from covered linear projects to climate, topography/soil, vegetation, threatened and endangered species, wildlife and fish, water resources, air quality, socio-economic, and transportation resources are expected to be minor

4.3.0.2 Habitat Restoration, Enhancement, and Management Activities

Habitat restoration, enhancement, and management activities at existing and newly identified conservation and mitigation areas are intended to help reverse the loss of Covered Species and prairie habitat, particularly on public lands. Any negative impacts to the Covered Species from these activities have been (for activities already undertaken) and will be (for future activities under the Proposed Alternative) short term and temporary; long-term effects have been and would continue to be beneficial.

These activities would have negligible cumulative impacts on climate, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, and transportation resources.

4.3.0.3 Agricultural Activities

Owens Farm historically was prairie habitat, but was converted to agricultural production over 70 years ago. The City of Corvallis purchased 53.2 ha (131.5 ac) of Owens Farm in 2002. Of this amount, approximately 28.3 ha (70 ac) is currently farmed for grass or hay seed production, and will continue to be farmed into the future. The City of Corvallis prepared a draft Open Space Management Plan for the property in 2004 (Satre & Associates) and conserving the agricultural resource lands was a number one priority for the property. The property is an active agricultural operation representing the community's agricultural heritage, providing cultural and educational opportunities (Satre & Associates 2004). Cumulative impacts over the years have included soil compaction from farm equipment, grazing, and planting of agricultural crops; channelization of drainageways and use of fill material to increase the amount of farmable land; and loss of topographic relief from the grading of existing slopes.

Agricultural operations at Owens Farm will continue regardless of which alternative is selected, with the potential for impacts to Nelson's checkermallow, a Covered Species, through spraying and mowing operations. No additional loss of prairie habitat is anticipated. The City's ownership of Owens Farm includes a 10.4 ha (25.6 ac) parcel on the east side of Highway 99.

Agricultural activities would have negligible cumulative impacts on climate, threatened and endangered species, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, cultural and archaeological, and transportation resources.

Emergency activities have been on-going for many years and will continue into the future. The impacts to the physical, biological, and human environment from these activities are not known. Emergency activities occurring within County or ODOT rights-of-way would not impact high-quality prairie habitat as most rights-of-way have been manipulated for many years. The few exceptions are SMAs. Covered Species within Type 1 ROW Special Management Areas would be protected, and if impacts to the species or its habitat were to occur, the County would restore the species following the emergency activity causing the impact.

Emergency activities related to fire fighting and hazardous materials cleanup would have short term effects to the resources, with the underlying activity (fire, hazardous material spill) causing the greatest threat to Covered Species, although a fire in prairie habitat would be beneficial to the Covered Species in the long-term, provided not all of the Fender's blue butterfly or Taylor's checkerspot butterfly habitat was burned at one time, resulting in complete loss of that butterfly population. The likelihood of hazardous material spill is small, with most spills likely to occur with the County or ODOT's right-of-way. That being the case, the prairie habitat and potential for effects to the Covered Species is low. In the long term, prairie habitat would not be lost, but the quality of that habitat could be affected as a result of these activities.

Emergency activities would have negligible cumulative impacts on climate, threatened and endangered species, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, cultural and archaeological, and transportation resources.

4.3.1 No Action Alternative

4.3.1.0 Building Construction Projects

Cumulative impacts from building construction projects under the No Action alternative are not anticipated to be significantly different from those identified under the Proposed Action alternative. Most likely the same number of new buildings (1,280) would be constructed. Under the No Action alternative, since the landowner is required to avoid impacting the Fender's blue butterfly and its habitat, it is possible less habitat would be affected under the Proposed Action alternative. Take would be authorized on an individual project-by-project basis. Under the Proposed Action, the landowner does not have to avoid impacts to Fender's blue butterfly habitat. Rather, it is assumed that the property possesses such habitat and at what amount (See Chapter 5 of the HCP), and that amount will be impacted and mitigated.

Cumulative effects from public service facility construction (schools and fire stations) would not differ between the two alternatives. Under both alternatives, the County will survey for Fender's blue butterfly and its habitat on lands to be acquired for these purposes, and the County will attempt to avoid impacts, and where impacts are unavoidable, mitigate for such impacts.

Under the No Action alternative, agricultural activities would have negligible cumulative impacts on climate, threatened and endangered species, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, cultural and archaeological, and transportation resources.

4.3.1.1 Linear Projects

Cumulative effects from linear project would not differ between the two alternatives. The same number of projects would likely take place, but would be addressed with individual consultations and permits as needed with the Oregon Department of Agriculture or the USFWS. Under the both alternatives, linear projects would have negligible cumulative impacts on climate, threatened and endangered species, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, cultural and archaeological, and transportation resources.

4.3.1.2 Habitat Restoration, Enhancement, and Management Activities

Under the No Action alternative, habitat management at parks/natural areas/open spaces would have no future cumulative long-term negative impacts as habitat restoration, enhancement, and management activities would be undertaken to conserve existing prairie habitat, thereby maintaining and increasing the number of Covered Species populations at these areas.

The HCP implementation, at least with respect to the mitigation aspect, would not occur under the No Action alternative. These activities were designed to replace the loss of existing Covered Species resulting from implementation of the covered activities outlined in the Proposed Action. Mitigation from home, forest, and farm development would occur in a fragmented, piecemeal fashion on-site, rather than at the 20-24 ha (50-60 ac) Benton County Fender's Blue Butterfly Conservation Areas. Large parcels of high quality habitat will typically have greater species richness and net conservation value than more numerous, smaller and fragmented parcels of low quality habitat.

Habitat restoration, enhancement, and management activities under the No Action alternative would have negligible cumulative impacts on climate, threatened and endangered species, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, cultural and archaeological, and transportation resources.

4.3.1.3 Agricultural Activities

Cumulative effects from agricultural activities would not differ between the two alternatives. Under the No Action alternative, agricultural activities would have negligible cumulative impacts on climate, threatened and endangered species, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, cultural and archaeological, and transportation resources.

4.3.1.4 Emergency Activities

Cumulative effects from emergency activities would not differ between the two alternatives. Under the No Action alternative, emergency activities would have negligible cumulative impacts on climate, threatened and endangered species, topography/soil, vegetation, wildlife and fish, water resources, air quality, socio-economic, cultural and archaeological, and transportation resources.

4.4 Summary of Environmental Consequences

During the Permit term, the population of Benton County is anticipated to increase by an additional 60,310 persons or 24,818 households[21]. The Permit will authorize take associated with the construction of an additional 195 new homes, 41 medical hardship dwellings (of which four will require utilities not associated with the main residence), 513 accessory structures, 413 structure additions, 118 agricultural buildings, two rural schools and two rural fire stations. The impacts to climate, topography/soil, vegetation, wildlife and fish, threatened and endangered species, water resources and quality, air quality, cultural and archaeological resources, socio-

[21] Figure is based on a 10% increase in population per every ten years, through 2060, divided by the number of persons per household (2.43).

economic and environmental justice, and transportation from these new buildings, as well as the other covered activities, are minor in comparison to the expected growth over the next 50-years. See Appendix E: Environmental Consequences Summary.

Table 4.7 shows the current known abundance of the Covered Species in Benton County, the amount of take requested, and what percentage of the total population the take represents. While the habitat restoration, enhancement, and management activities would have short term negative effects on prairie vegetation, fish and wildlife, and threatened and endangered prairie species, in the long-term effects would be beneficial to the Covered Species. The Permit would not appreciably reduce the likelihood of survival and recovery of Covered Species in the wild.

Table 4.7 Estimated Impacts from Covered Activities on Known/Projected Covered Species Populations.

	Bradshaw's lomatium (#)	Willamette daisy (#)	peacock larkspur (#)	Nelson's checkermallow (#)	Kincaid's lupine (m^2) outside the Fender's Blue Zone	Kincaid's lupine (m^2) inside the Fender's Blue Zone	Native Nectar Species for Fender's Blue (m^2)[22]	Non-Native Nectar Species for Fender's Blue (m^2)	Fender's blue butterflies (estimated #)	Taylor's checkerspot butterfly habitat (m^2)	Taylor's checkerspot butterflies (estimated #)
Abundance of Covered Species on all lands	1,572	426	4,432	3,351	418	8,234*	153,834**	233,577**	76,820	8,777	737
Amount of permanent take requested	2	1	56	222	8	402	8,570	12,218	4,253	57	5
Percentage of known population for which take is requested	0.13	0.23	1.26	6.62	1.91	4.9	5.6[23]	5.23	5.54	0.65	0.65

*Adjusted projected abundance, based on actual abundance of Kincaid's lupine on public or Cooperator lands, and projected abundance on private lands, assuming an average of 0.028% cover.

** Projected abundance, based on average native nectar species cover of 1.39% along roadsides and 1.7% in all other areas, and non-native nectar species cover of 1.36% along roadsides and 2.8% in all other areas.

[22] This estimate applies only to private lands within the Fender's Blue Zone.

5 Consultation and Coordination with Others

The consultation and coordination process focused on public and agency involvement throughout the development of the HCP. An HCP Planning Team was created to provide overall development and direction of the HCP. Stakeholder and Technical Advisory Committees were formed to help direct development of the HCP. The HCP process included public meetings, presentations, and outreach materials. Ultimately the final decisions regarding the HCP were made by the Benton County Board of Commissioners.

5.1 Public Meetings

Five series of public meetings were held to help guide the preparation of the HCP.

January 22, 2007: Benton County held a public meeting in Corvallis to present the HCP process and goals, describe the species to be covered, and provide a schedule for completion of the HCP.

October 15, 2007: Benton County held a public meeting in Corvallis to provide County residents with an update of activities undertaken by the County including field survey results, hotspot mapping, potential conservation measures, and development of a Prairie Conservation Strategy.

January 27, 28, and 31, 2009: Benton County held public meetings in Corvallis, Wren, and Kings Valley respectively to present the draft HCP to the public.

September 16, 2009: Benton County held a public meeting in Corvallis to present the revised draft HCP to the public, prior to submittal of the draft HCP, IA, and Permit application to the USFWS. The HCP was revised based on comments received at the January 2009 meetings.

October 12, 2010. In coordination with the USFWS public comment period on the draft HCP and EA, Benton County held a public meeting in Corvallis to present the draft HCP to the public and answer questions.

5.2 Public Outreach

Public outreach included development of newsletters, brochures, letters to private landowners within the Fender's Blue Zone, private landowner workshops, and a website, plus numerous presentations. Between 2006 and 2009, Benton County staff and consultants made over 20 presentations regarding the preparation of the HCP to interest groups (e.g., Marys River Watershed Council, Long Tom Watershed Council, Oregon Oak Working Group), at workshops (e.g., Prairie Plant Workshop, Prairie Restoration Workshop, Streaked Horned Lark Workshop), at conferences (Oregon Parks and Recreation Association), and as a guest lecturer at the University of Oregon.

5.3 Stakeholder Advisory Committee

Benton County established a Stakeholder Advisory Committee made up of local, state, and federal agency representatives, watershed groups, conservation groups, forestry groups, and private citizens (Appendix F of the HCP). Meetings were held in 2006, 2007, 2008, and 2009. The purpose of the Stakeholder Advisory Committee was to provide guidance on issues pertaining to covered species, covered activities, covered entities, and proposed conservation measures.

5.4 Technical Advisory Committee

Benton County established a Technical Advisory Committee made up of experts in the field of botany, ornithology, and lepidoptery, as well as Benton County staff (HCP Appendix F). The Technical Advisory Committee was divided into subcommittees to address specific issues related to and provide recommendations for plants, butterflies, and the Streaked Horned Lark (later dropped from consideration). Meetings were held in 2006, 2007, 2008, and 2009.

5.5 HCP Planning Team

The Benton County Prairie Species Habitat Conservation Plan was developed by Benton County and its contractors, the Institute for Applied Ecology and Jerry Davis, former Benton County Natural Areas and Parks Director. Benton County and its contractors met regularly with representatives from the U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife, and Oregon Department of Agriculture to address seek guidance on preparation of HCP. Benton County staff and consultants also met regularly with Benton County Commissioners during the development of the HCP and related documents.

- The Environmental Assessment was developed by Benton County and its contractor the Institute for Applied Ecology on behalf of the U.S. Fish and Wildlife Service. The HCP planning team and County Staff provided assistance in developing the EA.

5.6 Public Review of Draft Environmental Assessment

The draft Environmental Assessment was available for 32-day public review. A Notice of Availability was mailed to interested parties, agencies, and news media, and the draft EA and HCP were posted on the USFWS' website (http://www.fws.gov/oregonfwo/) and Benton County website (http://www.co.benton.or.us/). Copies of the draft EA and HCP were available at USFWS' Oregon Fish and Wildlife Office for persons requesting copies of the document.

6 Glossary and Acronyms

Adverse modifications: A direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species.
Candidate species: Candidate species are plants and animals for which the U.S. Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.
Certificate of Inclusion: This is a document issued by Benton County that enrolls a landowner into the HCP for purposes of obtaining coverage under the county's incidental take permit.
Conservation: As defined by Section 3 of the ESA, to use and the use of all methods and procedures necessary to bring any endangered or threatened species to the point at which the measures provided are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resource management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, regulated taking.
Conservation measure: A specific conservation tool employed in a specific location. May include, but is not limited to, habitat acquisition and habitat restoration.
Cooperative Agreement: An agreement between Benton County and anyone wishing to obtain incidental take coverage under the County's Permit. The agreement will specify the obligations of the parties.
Cooperator: Non-federal public agencies, a utility company and conservation organization whose activities are likely to affect one or more of the Covered Species, and who have elected to obtain coverage under the County's incidental take permit.
Covered Activity: These are activities that are included in the HCP and covered for incidental take by the incidental take permit.
Covered Species: These are species that are included in the HCP and covered for incidental take by the incidental take permit.
Critical habitat: Specific areas within the geographic area occupied by the species on which are found those physical and biological features essential to the conservation of the species and which may require special management considerations or protection.
Critical sensitive species: Species for which listing as threatened or endangered is appropriate if immediate conservation action are not taken or a species at risk throughout its range, or a disjunct population (geographically isolated).
Cumulative effects: Impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes the action.
Diapause: A state of dormancy.
Ecoregion: A relatively large land and water area containing geographically distinct assemblages of natural communities, with approximate boundaries. These communities share a large majority of their species, dynamics, and environmental conditions, and function together effectively as a conservation unit at the continental and global scales.
Ecosystem: A discrete unit that consists of living and nonliving parts, interacting to form a stable system.

Effectiveness Monitoring: Monitoring to determine whether the restoration or enhancement techniques are meeting the management objective.
Endangered species: Those species threatened with extinction throughout all, or a significant portion, of their range. Species can be listed as endangered or threatened for a number of reasons, including disease or predation. Natural or human factors affecting chances for survival: over utilization for commercial, scientific, or recreational purposes, or current or threatened destruction of habitat or range.
Enteric Fermentation: Fermentation taking place in the digestive systems of ruminant animals, such as cattle.
EPA: Environmental Protection Agency
Federal Nexus: The federal Endangered Species Act requires that federal agencies (including the U.S. Fish and Wildlife Service) ensure, in consultation with the U.S. Fish and Wildlife Service (USFWS), that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered and threatened species or result in the destruction or adverse modification of habitat of such species that is determined critical by the USFWS.
Fender's Blue Zone: Area of potential habitat for Fender's blue butterfly, determined by mapping grassland and oak habitat within the 2km (1.2 mi) flight distance (dispersal distance) of known populations of the butterfly.
Graminoids: Grasses, sedges, and rushes.
Habitat: The living place of a species or community characterized by its physical or biotic properties.
Habitat Conservation Plan (HCP): A plan that outlines ways of maintaining, enhancing, and protecting a given habitat type needed to protect species. The plan usually includes measures to minimize impacts, and may include provisions for permanently protecting land, restoring habitat, and relocating plants or animals to other areas. The HCP is required before an incidental take permit will be issued.
Harass: To intentionally or negligently, through act or omission, create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns such as breeding, feeding, and sheltering.
Harm: To perform an act that kills or injures wildlife; may include significant modification of habitat or degradation when it kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering.
Host plant: A particular plant species required of butterflies during egg laying and for food during the larvae and pupae life stage.
Impacts: Impacts may be negative or positive. Negative impacts are ecological stresses to a species and the source of that stress. Positive impacts are impacts whose net effect is beneficial to the species, and may include such activities as mowing or burning.
Implementation Agreement: Agreement between Benton County, Oregon Department of Agriculture and the U.S. Fish and Wildlife Service that describes the terms of the HCP, describes remedies and recourse should any of the parties to the agreement fail to perform their obligations, and provides assurances to Benton County that as long as the terms of the HCP, the Permit (USFWS only), and this Agreement are performed, no additional mitigation will be required of Benton County by USFWS or ODA, except as provided for in the Agreement or required by law.

Inbreeding depression: Reduced fitness (reproductive success) in a given population as a result of inbreeding.
Incidental take: Take that results from, but is not the purpose of, carrying out an otherwise lawful activity.
Incidental take permit: A Permit issued under section 10(a)(1)(B) of the ESA to a non-federal party undertaking an otherwise lawful project that might result in the take of a threatened or endangered species. An application for an incidental take Permit is subject to certain requirements, including preparation of habitat conservation plan.
Indirect effect: An effect caused by the action, but taking place later in time than the action or further removed in distance, but is still reasonably certain to occur (foreseeable) (See 40 CFR 1508.8).
Invasive species: Those species present in a specified region only as a direct or indirect result of human activity.
Listed species: A species, subspecies, or distinct population segment that has been added to the federal list of endangered and threatened wildlife and plants.
Monitoring: Repeated measurements carried out in a consistent manner so that observations are comparable over time.
Native species: Those species present in part or all of a specified range without direct or indirect human intervention, growing within their native range and natural dispersal potential.
Nectar Plant: A particular plant species required of adult butterflies for food/energy.
ODA: Oregon Department of Agriculture
ODOTB Oregon Department of Transportation.
OSU: Oregon State University.
Prairie Conservation Area (PCA): Lands were Covered Species are present or where there is suitable habitat for the introduction of Covered Species. These lands are under public ownership or conservation easement and set aside for active conservation, and where habitat restoration, and enhancement, and management activities will take place. The purpose of these sites is to manage select habitat for the Covered Species, including reducing or managing for current threats to species. Some of the PCAs will be used for mitigation for impacts to the Covered Species resulting from covered activities in the Proposed Action alternative.
Primary Constituent Element (PCE): A physical or biological feature essential to the conservation of a species for which its designated or proposed critical habitat is based on, such as space for individual and population growth, and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and habitats that are protected from disturbance or are representative of the species= historic geographic and ecological distribution.
Population: A group of individuals of a species living in certain areas maintaining some degree of reproductive isolation.
Range: The geographic area a species is known to or believed to occupy.
ROW: Roadside right-of-way.
Safe Harbor Agreement: A Safe Harbor Agreement (SHA) is a voluntary agreement between USFWS and a non-federal landowner to promote habitat management for listed species on non-federal lands. During the term of the agreement, the landowner sets aside all or a portion of a property for listed species habitat management. By entering into the agreement, the USFWS provides the landowner with assurances that if habitat management attracts or increases the

population of a listed animal species, when the agreement ends the landowner may use the property in any legal manner that does not place the species below the baseline condition assessed at the beginning of the agreement. An agreement is only entered into when the USFWS finds the covered species will receive a net conservation benefit from the management actions to be taken by the landowner. The USFWS has developed a programmatic Fender's blue butterfly SHA to streamline the enrollment process for private landowners (USFWS 2008a). The coverage area includes Benton County and neighboring counties.

Senescencing: Dying off at the end of a season (annuals) or approaching dormancy (perennials).

Sink population: A population with a higher mortality rate than birth rate.

Source Population: A population with a higher birth rate than mortality rate; a self sustaining population capable of dispersing to other populations.

Special Management Area (SMA): Areas with road rights-of-way designated by Benton County and the Oregon Department of Transportation, where in rare and sensitive species (including the Covered Species) are located. These areas receive different management regimes than other rights-of-way

Species: A group of organisms resembling one another, and includes subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate, fish, or wildlife that interbreeds when mature.

Species of Concern: An informal term referring to a species that may need conservation action due to declining population sizes. Similar terms include "species at risk" and "imperiled species". Such species receive no legal protection, nor is there any guarantee that the species will be listed in the future.

Stochastic event: A random event which causes species extinction due to demographic changes (birth and death rates, age, sex cohorts), loss of genetic diversity, or unusual environmental factors (wet springs, dry summers, extremely cold winters).

Take: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct; may include significant habitat modification or degradation if it kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, and sheltering.

Terms and conditions: Required actions described in an incidental take permit under section 10 or Incidental Take Statement intended to implement the Reasonable and Prudent Measures under section 7.

Threatened species: A species that is likely to become endangered in the foreseeable future.

USFWS: United States Fish and Wildlife Service.

Viable: A viable population has a sufficient number of individuals, reproduction by those individuals, and habitat conditions to persist over time.

Watershed: An area of land draining to a common point.

7 Literature Cited

16 U.S.C. 1531-1544. 2002. Endangered Species Act of 1973, as amended. Accessed on September 16, 2009 at: http://epw.senate.gov/esa73.pdf.

50 CFR 17.22(b)(2). 2008. Title 50 – Wildlife and Fisheries, Chapter I – U.S. Fish and Wildlife Service, Department of the Interior, Part 17 – Endangered and Threatened Wildlife and Plants, Subpart D – Endangered Wildlife. Published by the U.S. Government Printing Office.

50 CFR 17.32(b)(2). 2008. Title 50 – Wildlife and Fisheries, Chapter I – U.S. Fish and Wildlife Service, Department of the Interior, Part 17 – Endangered and Threatened Wildlife and Plants, Subpart D – Threatened Wildlife. Published by the U.S. Government Printing Office.

59 Federal Register 7629. 1994. EXECUTIVE ORDER 12898 OF FEBRUARY 11, 1994: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Accessed on September 16, 2009 at: http://www.epa.gov/fedrgstr/eo/eo12898.htm

Audubon Society of Corvallis. 2008. Christmas Bird Count. Accessed on June 22, 2009 at: http://www.audubon.corvallis.or.us/bird_counts.shtml.

Altman, B. 1997. Distribution, Abundance, and Habitat Associations of Declining and State Sensitive Bird Species Breeding in Willamette Valley Grasslands. Report to the Oregon Department of Fish and Wildlife.

Altman, B. 1999. Status and Conservation of State Sensitive Grassland Species in Willamette Valley. Unpublished Report for Oregon Department of Fish and Wildlife, Corvallis, Oregon. 60 pp.

Altman, B. 2000. Conservation Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington. Prepared for the Oregon-Washington Partners-in-Flight.

Alverson, E.R. 2005. Preserving Prairies and Savannas in a Sea of Forest: A Conservation Challenge in the Pacific Northwest. Plant Talk No. 40. Accessed on December 7, 2006 at: http://www.plant-talk.org/stories/40forest.html

Bangs, B.L., P.D. Scheerer, S.E. Tippery, M.A. Weeber, and S.E. Jacobs. 2008. Progress Report – 2008 Oregon Chub Investigations. Report prepared for the Oregon Department of Fish and Wildlife.

Benton County. 2001. Benton County Transportation System Plan, Public Works Department. Ordinance 2001-0173. 152 pp + appendices

Benton County. 2002. Fort Hoskins Historic Park. Accessed on June 18, 2009 at: http://www.co.benton.or.us/parks/documents/fh_brochure.pdf

Benton County. 2010. Prairie Species Habitat Conservation Plan. 159 pp plus appendices. www.co.benton.or.us/parks/hcp

City of Corvallis. 2009. City of Corvallis 2009 Water Quality Report. Accessed on May 11, 2009 at: http://www.ci.corvallis.or.us/downloads/pw/wqreport.pdf.

City of Philomath. 2003. Source Water Assessment Brochure. City of Philomath Public Works PWS # 4100624 . 14 pp.

Csuti, B., A.J. Kimberling, T.A. O'Neil, M.M. Shaughnessy, E.P. Gaines, and M.M. P. Huso. 1997. Atlas of Oregon Wildlife: Distribution, Habitat, and Natural History. Oregon State University Press. 492 pp.

Hill, R.L. 2004. Ecologists Trying to Boost the Numbers of the Fragile Beauties Campaign for Federal Protection, and the Oregon Zoo Begins Captive-Rearing Program. The Oregonian. May 19, 2004. http://www.oregonwild.org/fish_wildlife/taylor-s-checkerspot-butterfly

Johnson, D.H. and T. A. O'Neil (managing directors). 2001. CD-ROM Matrixes for Wildlife-Habitat Relationships in Oregon and Washington. Oregon State University Press, Corvallis Oregon.

Karl, T.R. and K.E. Trenberth. 2003. Modern Global Climate Change. Science 302:1719-1723.

Kaye, T.N. and C. Benfield. 2005. Kincaid's lupine and Fender's blue butterfly studies in the West Eugene Wetlands: monitoring, mowing, pig effects, and evaluating foliar cover as a measure of abundance. Unpublished report to the Eugene District BLM. Institute for Applied Ecology, Corvallis, Oregon.

Kaye, T.N. and A.S. Thorpe. 2006. *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine) and *Icaricia icarioides fenderi* (Fender's blue butterfly) in the West Eugene Wetlands: monitoring, reintroduction success, and evaluation of experimental treatments: 2006 progress report. Institute for Applied Ecology, Corvallis, Oregon. 29 pp.

Macdonald, C. 2000. Status of At-Risk Species, Habitats, and Conservation Activities in the Willamette Valley Ecoregion, Oregon. Final Report prepared by The Nature Conservancy for the U.S. Fish and Wildlife Service.

Monroe, M.C., A.C. Watts, and L.N. Kobziar. 2009. Where There's Fire, There's Smoke: Air Quality and Prescribed Burning in Florida. Prepared by the School of Forest Resources and Conservation, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Accessed on 15-July-2009 at: http://edis.ifas.ufl.edu/FR058.

Neary, D.G.; Ryan, K. C.; and L.F. DeBano,, eds. 2005. (revised 2008). Wildland fire in ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol.4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 250 p.

National Marine Fisheries Service. 1999a. Endangered and Threatened Species: Threatened Status for Three Chinook Salmon Evolutionarily Significant Units in Washington and Oregon, and Endangered Status of One Chinook Salmon ESU in Washington; Final Rule; Federal Register 64: 14308) (March 24).

National Marine Fisheries Service. 1999b. Endangered and Threatened Species: Threatened Status for Two ESUs of Chum Salmon in Washington and Oregon, for Two ESUs of Steelhead in Washington and Oregon, and for Ozette Lake Sockeye Salmon in Washington; Rules; Federal Register 64: 14507-14517 (March 25).

National Marine Fisheries Service. 2005a. Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. Federal Register 70: 52487-52627. (September 2).

National Marine Fisheries Service. 2009. GIS Data of Salmon Critical Habitat. http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/CH-GIS-Data.cfm

Noss, R.F. and R.L. Peters. 1995. Endangered Ecosystems: A Status Report on American's Vanishing Habitat and Wildlife. Unpublished report for the Defender's of Wildlife. pp 151.

Oregon Department of Agriculture. 2007. Oregon Administrative Rule 603, Division 73. Plants: Wildflowers and Endangered, Threatened, and Candidate Species. Accessed on December 21, 2007 at: http://arcweb.sos.state.or.us/rules/OARS_600/OAR_603/603_073.html

Oregon Department of Environmental Quality, Environmental Protection Agency, and StreamNet. 2003. Figure 340A Fish Use Designations* Willamette Basin, Oregon. Accessed on May 11, 2009 at: http://www.deq.state.or.us/wq/rules/div041/fufigures/figure340a.pdf

Oregon Department of Environmental Quality, Environmental Protection Agency, and StreamNet. 2005. Figure 340B Salmon and Steelhead Spawning Use Designations, Willamette Basin, Oregon. Accessed on May 11, 2009 at: http://www.deq.state.or.us/wq/rules/div041/fufigures/figure340b.pdf

Oregon Department of Environmental Quality. 2003. 2003 Oregon Ground Water Conditions. Accessed on May 11, 2009 at: http://www.deq.state.or.us/wq/pubs/factsheets/groundwater/orgwconditions.pdf

Oregon Department of Environmental Quality. 2005. Table 340A Designated Beneficial Uses, Willamette Basin (340-041-0340). Accessed on May 11, 2009 at: http://www.deq.state.or.us/wq/rules/div041/dbutables/table340a.pdf

Oregon Department of Environmental Quality. 2006. Willamette Basin TMDL: Upper Willamette Subbasin Chapter 10: Upper Willamette Subbasin TMDL. Accessed at: on April 28, 2009.

Oregon Department of Environmental Quality. 2008a. Fact Sheet: Groundwater Basics for Drinking Water Protection. Accessed on May 11, 2009 at: http://www.deq.state.or.us/wq/pubs/factsheets/drinkingwater/GroundwaterBasics.pdf

Oregon Department of Environmental Quality. 2008b. Air Quality Index. Accessed on September 12, 2008 at: http://www.deq.state.or.us/aq/planning/index.htm

Oregon Department of Fish and Wildlife. 2006. Oregon Conservation Strategy. Oregon Department of Fish and Wildlife, Salem, Oregon.

Oregon Department of Fish and Wildlife. 2008. Threatened and Endangered Species. Accessed on January 21, 2009 at: http://www.dfw.state.or.us/wildlife/diversity/species/docs/Threatened_and_Endangered_Species.pdf

Oregon Department of Transportation. 2007. Oregon Department of Transportation - District 4 Maintenance District Map. Accessed on May 26, 2009, at: http://www.oregon.gov/ODOT/TD/TDATA/gis/docs/districtmaps/dist4.pdf

Oregon Department of Water Resources. 2007. Critical Ground Water Allocations. Accessed on May 11, 2009 at: http://www.wrd.state.or.us/OWRD/GW/gw_critical_allocations.shtml

Oregon Department of Water Resources and Oregon Department of Land Conservation and Development. 2002. Ground Water Supplies in the Willamette Basin. Accessed on May 11, 2009 at: http://www1.wrd.state.or.us/pdfs/RptGWSuppliesWmBasin10-2002.pdf

Oregon Natural Heritage Information Center. 2007. Rare, Threatened and Endangered Species of Oregon. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon. 100 pp.

Oregon Secretary of State. 2009. Oregon Blue Book. Accessed on June 15, 2009 at: http://bluebook.state.or.us/local/counties/counties02.htm.

Pearson, S.F. and B. Altman. 2005. Range-wide Streaked Horned Lark (*Eremophila alpestris strigata*) Assessment and Preliminary Conservation Strategy. Washington Department of Fish and Wildlife, Olympia, WA. 25 pp.

Pendergrass, K.L., P.M. Miller, J.B. Kauffman, and T.N. Kaye. 1999. Role of Fire in Maintenance of an Endangered Plant Species, *Lomatium bradshawii*. Ecological Applications 4:1420-1429.

Primozich, D. and R. Bastasch. 2004. Draft Willamette Subbasin Plan. Prepared for The Northwest Power and Conservation Council. Accessed on January 23, 2009 at: http://www.nwcouncil.org/fw/subbasinplanning/willamette/plan/

Ross, D. 2005. 2005 Surveys for Taylor's Checkerspot (*Euphydryas editha taylorii*) in Benton County, Oregon. Report submitted to the U.S. Fish and Wildlife Service, Portland Office. 6 pp.

Ross, D. 2006. 2006 Surveys For Taylor's Checkerspot (*Euphydryas editha taylori*) in Benton County, Oregon. A Report to The Xerces Society and U.S. Fish & Wildlife Service. 9 pp.

Ross, D. 2007. 2007 Surveys for Taylor's checkerspot (*Euphydryas editha taylori*) in NW Oregon: population estimates at two critical Benton County sites. A report to The Xerces Society and US Fish & Wildlife Service. 8pp.

Ross, D. 2008. 2008 Population Estimates for Taylor's Checkerspot at Fitton Green Natural Area and Beazell Memorial Forest. A Report to Benton County Natural Areas and Parks Department and U.S. Fish and Wildlife Service (Portland, OR). 8 pp.

Ross, D. 2009. 2009 Population Estimates for Taylor's Checkerspot at Fitton Green Natural Area and Beazell Memorial Forest. A Report to Benton County Natural Areas and Parks Department and U.S. Fish and Wildlife Service (Portland, OR). 8 pp.

Roth, E., B. Taylor, and E. Scheuering. 2004. Pacific Coast Joint Venture Implementation Plans: Draft Willamette Valley. Unpublished report prepared for the Oregon Habitat Joint Venture. 26 pp.

Satre & Associates. 2004. Owens Farm Open Space Management Plan. Prepared for the City of Corvallis. 63 pp.

Schultz, C.B. and K.M. Dlugosch. 1999. Nectar and Host Plant Scarcity Limit Populations of an Endangered Oregon Butterfly. Oecologia 119:231-238.

Schultz, C.B., P.C. Hammond and M.V. Wilson. 2003. Biology of Fender's Blue Butterfly (*Icaricia icariodes fenderi*, Macy), an Endangered Species of Western Oregon Native Prairies. Natural Areas Journal 23(1):61-71.

State of North Carolina. 2008. Household Water Conservation. Accessed on August 26, 2009 at: http://www.savewaternc.org/HomeConserve.asp.

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

Thorson, T.D., Bryce, S.A., Lammers, D.A., Woods, A.J., Omernik, J.M., Kagan, J., Pater, D.E., and J.A Comstock. 2003. Ecoregions of Oregon (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000). Accessed on January 26, 2009 at: http://www.epa.gov/wed/pages/ecoregions/or_eco.htm

U.S. Census Bureau. 1990 Census of Population and Housing, Summary Tape File 1 (100% Data) Matrices P1, P3, P5, P6, P8, P11, P15, P16, P23, H1, H2, H3, H5, H8, H10, H18A, H21, H23, H23B, H32, H32B, H41.. Accessed on January 27, 2009 at: http://factfinder.census.gov/servlet/QTTable?_bm=n&_lang=en&qr_name=DEC_1990_STF1_DP1&ds_name=DEC_1990_STF1_&geo_id=05000US41003

U.S. Census Bureau. 2000. State and County QuickFacts. Data derived from Population Estimates, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report. Accessed on June 15, 2009 at: http://quickfacts.census.gov/qfd/states/41/41003.html

U.S. Census Bureau. 2009. State and County QuickFacts. Data derived from Population Estimates, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits, Consolidated Federal Funds Report. Accessed on June 15, 2009 at: http://quickfacts.census.gov/qfd/states/41/41003.html

U.S. Environmental Protection Agency. 2009a. Greenhouse Gas Emissions, Greenhouse Gas Overview. Accessed on August 10, 2009 at: http://www.epa.gov/climatechange/emissions/index.html#ggo

U.S. Environmental Protection Agency. 2009b. 2009 U.S. Greenhouse Gas Inventory Report: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007. Accessed on August 10, 2009 at: http://www.epa.gov/climatechange/emissions/downloads09/Energy.pdf

U.S. Environmental Protection Agency. 2009c. Nonroad Engines and Air Pollution. Accessed on June 9, 2009 at: http://www.epa.gov/agriculture/tfuel.html#Nonroad%20Engines%20and%20Air%20Pollution

U.S. Fish and Wildlife Service. 1990. Determination of threatened status for the Northern Spotted Owl. Federal Register (55):26114-26194.

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

U.S. Fish and Wildlife Service. 1993b. Endangered and Threatened Wildlife and Plants: Threatened Status for the Plant Sidalcea nelsoniana (Nelson's checkermallow) – Final Rule. Federal Register 58:8235-8243 (February 12).

U.S. Fish and Wildlife Service. 1996. Final designation of critical habitat for the marbled murrelet. Federal Register 61:26256-26320.

U.S. Fish and Wildlife Service. 1997. Recovery Plan for the threatened marbled murrelet (*Brachyramphus marmoratus* in Washington, Oregon and California. Portland, Oregon. 203 pp.

U.S. Fish and Wildlife Service. 1998a. Recovery Plan for the Threatened Nelson's Checkermallow (Sidalcea nelsoniana). Portland, Oregon. 61 pp.

U.S. Fish and Wildlife Service. 1998b. Oregon Chub *(Oregonichthys crameri)* Recovery Plan. Portland, Oregon. 69+ pp.

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

U.S. Fish and Wildlife Service. 2000b. Recovery Plan for the Golden Paintbrush (Castilleja levisecta) U.S. Fish and Wildlife Service, Portland, Oregon. 51 pp.

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

U.S. Fish and Wildlife Service. 2006. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Fender's blue butterfly (Icaricia icarioides fenderi), *Lupinus sulphureus ssp. kincaidii* (Kincaid's lupine), and *Erigeron decumbens var. decumbens* (Willamette daisy); Final Rule. Federal Register 71:63861-63977.

U.S. Fish and Wildlife Service. 2008a. Species Fact Sheet: Fender's blue butterfly Icaricia icarioides fenderi. Accessed on January 20, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/FendersBlueButterfly/default.asp

U.S. Fish and Wildlife Service. 2008b. Species Fact Sheet: Kincaid's lupine Lupinus sulphureus ssp. Kincaidii. Accessed on January 20, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/KincaidsLupine/default.asp.

U.S. Fish and Wildlife Service. 2008c. Species Fact Sheet: Willamette daisy Erigeron decumbens var. decumbens. Accessed on January 20, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/WillametteDaisy/default.asp

U.S. Fish and Wildlife Service. 2008d. Species Fact Sheet: Bradshaw's desert parsley Lomatium bradshawii (also known as Bradshaw's lomatium). Accessed on January 20, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/BradshawsLomatium/default.asp

U.S. Fish and Wildlife Service. 2008e. Species Fact Sheet: Nelson's checker-mallow Sidalcea nelsoniana. Accessed on January 20, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/NelsonsCheckerMallow/default.asp

U.S. Fish and Wildlife Service. 2008f. Species Fact Sheet: Golden paintbrush Castilleja levisecta. Accessed on January 21, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/GoldenPaintbrush/default.asp

U.S. Fish and Wildlife Service. 2008g. Federally Listed, Proposed, Candidate and Species of Concern under the Jurisdiction of the Fish and Wildlife Service Which May Occur Within Benton County, Oregon. U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office. 3pp.

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

U.S. Fish and Wildlife Service. 2008i. Species Fact Sheet: Taylor's checkerspot butterfly (Euphydryas editha taylori). Accessed on September 11, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/TaylorsCheckerspot/

U.S. Fish and Wildlife Service. 2008j. Species Fact Sheet: Streaked Horned Lark (Eremophila alpestris strigata). Accessed on September 11, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/StreakedHornedLark/

U.S. Fish and Wildlife Service. 2008k. Species Fact Sheet: Water howellia Howellia aquatilis. Accessed on January 20, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/WaterHowellia/

U.S. Fish and Wildlife Service. 2008l. Species Fact Sheet: Northern Spotted Owl Strix occidentalis caurina. Accessed on January 21, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/NorthernSpottedOwl/

U.S. Fish and Wildlife Service. 2008m. Revised designation of critical habitat for the Northern Spotted Owl. Federal Register (73):47326-47522.

U.S. Fish and Wildlife Service. 2008n. Final Recovery Plan for the Northern Spotted Owl, *Strix occidentalis caurina.* U.S. Fish and Wildlife Service, Portland, Oregon. xii + 142 pp.

U.S. Fish and Wildlife Service. 2008o. Species Fact Sheet: Marbled Murrelet Brachyramphus marmoratus. Accessed on January 21, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/MarbledMurrelet/

U.S. Fish and Wildlife Service. 2008p Species Fact Sheet: Oregon chub Oregonichthys crameri. Accessed on January 20, 2009 at: http://www.fws.gov/oregonfwo/Species/Data/OregonChub/

U.S. Fish and Wildlife Service. 2008q. Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Marbled Murrelet. Proposed rule. 73 FR 44678-44701.

U.S. Fish and Wildlife Service. 2009a. Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Marbled Murrelet. Proposed rule; reopening of public comment period. 74 FR 6852-6853.

U.S. Fish and Wildlife Service. 2009b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Oregon Chub (*Oregonichthys crameri*); Proposed Rule 74 FR 10412-10453.

U.S. Fish and Wildlife Service. 2010. Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington. U.S. Fish and Wildlife Service, Portland, Oregon. x + 212 pp.

U.S. Geological Services, Oregon Water Science Center. 1996. Oregon Hydrologic Units List and Map. Accessed on May 4, 2009 at: http://or.water.usgs.gov/data_dir/orehuclist.html and http://or.water.usgs.gov/Imgs/maps/or_huc_map.pdf.

Western Regional Climate Center. 2006a. Corvallis State University, Oregon: Period of Record General Climate Summary – Temperature. Accessed at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?orcorv on January 22, 2009.

Western Regional Climate Center. 2006b. Corvallis State University, Oregon: Period of Record General Climate Summary – Precipitation. Accessed on January 22, 2009 at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?orcorv

Wilson, M.V. 1998a. Upland Prairie: Contributed Chapter Part I the U.S. Fish and Wildlife Service Willamette Basin Recovery Plan. Report submitted to the U.S. Fish and Wildlife Service, Oregon State Office. 24 pp.

Wilson, M.V. 1998b. Wetland Prairie: Contributed Chapter Part I the U.S. Fish and Wildlife Service Willamette Basin Recovery Plan. Report submitted to the U.S. Fish and Wildlife Service, Oregon State Office. 23 pp.

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

Wilson, M.V. and Oregon State University. 2006. Willamette Valley Prairies: Research from Oregon State University. Common Plant Species of the Willamette Valley Prairies. Accessed on January 22, 2009 at: http://oregonstate.edu/~wilsomar/Plants.htm

Wilson, M. V., P. C. Hammond and C. B. Schultz. 1997. Interdependence of the Fender's blue butterfly and Oregon's native prairies. in T. Kaye, A. Liston, R. M. Love, D. L. Luoma, R. J. Meinke, & M. V. Wilson (editors) Conservation and Management of Native Plants and Fungi. Native Plant Society of Oregon, Corvallis, OR. 82-87.

Wilson, M. V., T. Erhart, P. C. Hammond, T. N. Kaye, K. Kuykendall, A. Liston, A. F. Robinson, C. B. Schultz, and P. M. Severns. 2003. The biology of Kincaid's lupine (Lupinus sulphureus spp. kincaidii), a threatened species of western Oregon native prairies. Natural Areas Journal 23: 72-83.

Xerces Society, Friends of the San Juans, Oregon Natural Resources Council, Northwest Ecosystem Alliance, and Center for Biological Diversity. 2002. Petition to Emergency List Taylor's (Whulge) Checkerspot Butterfly (*Euphydryas editha taylorii*) as an Endangered Species under the U.S. Endangered Species Act. Downloaded on July 11, 2006 from http://www.xerces.org/documents/Taylors_Checkerspot_Petition.pdf.

Personal Communications

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Nick Testa, Oregon Department of Agriculture, 2009
Gary Vick, Pioneer Telephone Cooperative, 2009
Greg Verret, Benton County, 2007 and 2009

Appendix A. List of Soils within Benton County HCP Plan Area

Soil Type	Acreage
Abiqua silty clay loam, 0 to 3 percent slopes	158.72
Abiqua silty clay loam, 3 to 5 percent slopes	261.50
Abiqua silty clay loam, high ppt, 0 to 3 percent slopes	16.43
Abiqua silty clay loam, high ppt, 3 to 5 percent slopes	10.88
Abiqua silty clay loam, rarely flooded, 0 to 3 percent slopes	6.52
Alsea loam, 0 to 5 percent slopes	12.21
Alsea loam, rarely flooded, 0 to 3 percent slopes	3.09
Amity silt loam, 0 to 3 percent slopes	180.46
Apt-McDuff complex, 30 to 50 percent slopes	23.25
Apt-McDuff complex, 5 to 30 percent slopes	35.32
Aquents, 0 to 3 percent slopes	3.68
Awbrig silty clay loam, 0 to 2 percent slopes	47.91
Bashaw clay, 3 to 12 percent slopes	56.47
Bashaw clay, flooded, 0 to 3 percent slopes	400.96
Bashaw clay, nonflooded, 0 to 3 percent slopes	419.62
Bashaw silty clay loam, nonflooded, 0 to 3 percent slopes	264.67
Bellpine-Jory complex, 12 to 20 percent slopes	94.57
Bellpine-Jory complex, 2 to 12 percent slopes	75.60
Bellpine-Jory complex, 20 to 30 percent slopes	79.49
Bellpine-Jory complex, 30 to 60 percent slopes	68.19
Bohannon-Preacher complex, 30 to 60 percent slopes	28.80
Bohannon-Preacher complex, 60 to 90 percent slopes	1.19
Briedwell gravelly loam, 0 to 7 percent slopes	46.82
Briedwell gravelly loam, 7 to 20 percent slopes	3.66
Burntwoods-Oldblue complex, 30 to 60 percent slopes	4.41
Camas gravelly sandy loam, 0 to 3 percent slopes	6.89
Camas gravelly sandy loam, relict bar, 0 to 3 percent slopes	27.42
Caterl-Laderly-Romanose complex, 30 to 60 percent slopes	0.88
Chapman loam, 0 to 3 percent slopes	22.36
Chapman loam, high ppt, 0 to 3 percent slopes	0.13
Chehalem silty clay loam, 0 to 3 percent slopes	19.43
Chehalem silty clay loam, 3 to 12 percent slopes	3.90
Chehalis silt loam, 0 to 3 percent slopes	44.34
Chehalis silt loam, high ppt, 0 to 3 percent slopes	2.00
Chehalis silty clay loam, 0 to 3 percent slopes	164.54
Chismore-Pyburn complex, 0 to 3 percent slopes	1.03
Chismore-Pyburn complex, 3 to 12 percent slopes	8.32
Cloquato silt loam, 0 to 3 percent slopes	55.52
Coburg complex, rarely and occasionally flooded, 0 to 3 percent	35.84
Coburg silty clay loam, 0 to 3 percent slopes	20.09

Soil Type	Acreage
Coburg silty clay loam, rarely flooded, 0 to 3 percent slopes	122.37
Concord silt loam, 0 to 2 percent slopes	51.62
Conser silty clay loam, 0 to 3 percent slopes	177.17
Dayton silt loam, 0 to 2 percent slopes	113.40
Dayton silt loam, clay substratum, 0 to 2 percent slopes	7.15
Digger-Bohannon complex, 5 to 30 percent slopes	10.62
Digger-Remote-Umpcoos complex, 30 to 60 percent slopes	5.03
Digger-Umpcoos-Remote complex, 60 to 90 percent slopes	3.16
Dixonville-Gellatly complex, 12 to 30 percent slopes	3432.02
Dixonville-Gellatly complex, 30 to 60 percent slopes	761.70
Dixonville-Gellatly-Witham complex, 2 to 12 percent slopes	2019.30
Dupee silt loam, 12 to 20 percent slopes	1.10
Dupee silt loam, 3 to 12 percent slopes	144.77
Elsie silt loam, 0 to 7 percent slopes	49.60
Elsie silt loam, 7 to 15 percent slopes	8.36
Fluvents-Fluvaquents complex, 0 to 3 percent slopes	2.50
Fluvents-Fluvaquents complex, high ppt, 0 to 3 percent slopes	1.26
Formader-Hemcross complex, 35 to 60 percent slopes	1.11
Goodin-Dupee-Chehulpum complex, 12 to 20 percent slopes	10.70
Goodin-Dupee-Chehulpum complex, 2 to 12 percent slopes	4.74
Harslow-Kilchis-Rock outcrop complex, 60 to 90 percent slopes	0.78
Helmick silt loam, 3 to 12 percent slopes	23.05
Helvetia silt loam, 2 to 7 percent slopes	1.86
Hemcross-Klistan complex, 30 to 60 percent slopes	7.34
Holcomb silt loam, 0 to 3 percent slopes	76.28
Honeygrove-Peavine complex, 3 to 30 percent slopes	60.95
Honeygrove-Peavine complex, 3 to 30 percent slopes, basalts	28.55
Honeygrove-Peavine complex, 30 to 60 percent slopes	27.29
Honeygrove-Peavine complex, 30 to 60 percent slopes, basalts	10.29
Honeygrove-Shivigny complex, 3 to 30 percent slopes	9.12
Jory silty clay loam, 12 to 20 percent slopes	220.78
Jory silty clay loam, 2 to 12 percent slopes	929.80
Jory silty clay loam, 20 to 30 percent slopes	59.13
Jory silty clay loam, sediments, 12 to 20 percent slopes	73.62
Jory silty clay loam, sediments, 2 to 12 percent slopes	128.93
Jory silty clay loam, sediments, 20 to 30 percent slopes	16.80
Jory-Dupee complex, 2 to 12 percent slopes	47.04
Jory-Gelderman complex, 12 to 30 percent slopes	1115.64
Jory-Nekia complex, 20 to 30 percent slopes	0.29
Kirkendall-Nekoma-Quosatana complex, 0 to 3 percent slopes	43.83
Klistan-Harslow complex, 30 to 60 percent slopes	7.72
Linslaw loam, 0 to 3 percent slopes	0.39
Linslaw loam, 3 to 8 percent slopes	3.81
MacDunn-Price-Ritner complex, 60 to 90 percent slopes	135.28

Soil Type	Acreage
Malabon silty clay loam, 0 to 3 percent slopes	43.87
Malabon sitly clay loam, rarely flooded, 0 to 3 percent slopes	81.24
McAlpin silty clay loam, 0 to 3 percent slopes	581.36
McAlpin silty clay loam, 3 to 6 percent slopes	31.31
McAlpin silty clay loam, high ppt, 0 to 3 percent slopes	1.08
McAlpin silty clay loam, high ppt, 3 to 6 percent slopes	3.28
McAlpin silty clay loam, rarely flooded, 0 to 3 percent slopes	261.19
McBee silty clay loam, 0 to 3 percent slopes	49.45
McBee silty clay loam, nonflooded, 0 to 3 percent slopes	16.31
Meda-Treharne-Wasson complex, 2 to 20 percent slopes	28.93
Nekoma-Fluvaquents complex, 0 to 3 percent slopes	36.44
Newberg fine sandy loam, 0 to 3 percent slopes	19.84
Newberg fine sandy loam, high ppt, 0 to 3 percent slopes	4.77
Newberg loam, 0 to 3 percent slopes	40.56
Oldblue-Burntwoods complex, 5 to 30 percent slopes	18.39
Pengra silt loam, 2 to 12 percent slopes	60.46
Philomath silty clay loam, 3 to 12 percent slopes	104.37
Pilchuck fine sandy loam, 0 to 3 percent slopes	0.85
Pits	2.71
Preacher-Blachly-Bohannon complex, 5 to 30 percent slopes	6.24
Preacher-Bohannon complex, 5 to 35 percent slopes	10.51
Preacher-Bohannon-Slickrock complex, 35 to 60 percent slopes	20.64
Price-MacDunn-Ritner complex, 30 to 60 percent slopes	1795.93
Salem gravelly silt loam, 0 to 3 percent slopes	5.37
Santiam silt loam, 2 to 8 percent slopes	167.41
Santiam silt loam, 8 to 20 percent slopes	32.93
Shivigny-Honeygrove complex, 30 to 60 percent slopes	11.10
Slickrock gravelly medial loam, 3 to 25 percent slopes	14.58
Treharne-Eilertsen-Zyzzug complex, 0 to 7 percent slopes	94.24
Verboort silty clay loam, 0 to 3 percent slopes	13.20
Waldo silty clay loam, 0 to 3 percent slopes	408.62
Waldo silty clay loam, high ppt, 0 to 3 percent slopes	4.83
Wapato silty clay loam, 0 to 3 percent slopes	11.11
Wapato silty clay loam, high ppt, 0 to 3 percent slopes	0.09
Water	47.00
Wellsdale-Willakenzie complex, 20 to 30 percent north slopes	9.34
Wellsdale-Willakenzie-Dupee complex, 12 to 20 percent north slopes	20.89
Wellsdale-Willakenzie-Dupee complex, 2 to 12 percent slopes	83.42
Willakenzie loam, 12 to 20 percent slopes	24.69
Willakenzie loam, 2 to 12 percent slopes	53.69
Willakenzie loam, 20 to 30 percent slopes	16.21
Willakenzie loam, 30 to 60 percent slopes	9.11
Willakenzie-Wellsdale complex, 12 to 20 percent south slopes	53.23

Soil Type	Acreage
Willakenzie-Wellsdale complex, 20 to 30 percent south slopes	0.42
Willamette silt loam, 0 to 3 percent slopes	80.43
Willamette silt loam, 3 to 12 percent slopes	130.80
Witham silty clay loam, 12 to 20 percent slopes	76.30
Witham silty clay loam, 2 to 12 percent slopes	1032.12
Witzel-Ritner complex, 12 to 30 percent slopes	152.19
Witzel-Ritner complex, 3 to 12 percent slopes	55.80
Witzel-Ritner complex, 30 to 60 percent slopes	246.80
Woodburn silt loam, 0 to 3 percent slopes	234.57
Woodburn silt loam, 12 to 20 percent slopes	0.99
Woodburn silt loam, 20 to 55 percent slopes	1.02
Woodburn silt loam, 3 to 12 percent slopes	42.33
Total	**19027.92**

Appendix B: Native Vegetation of Wet and Upland Prairies

Native Vegetation of Wet Prairies

Scientific Name	Common Name
TREES AND SHRUBS	
Fraxinus latifolia	Oregon ash
Rosa nutkana	Nootka rose
Spirea douglasii	Douglas spirea
GRASSES, SEDGES, AND RUSHES	
Beckmannia syzigachne	American sloughgrass
Carex unilateralis	One-sided sedge
Carex densa	Dense sedge
Danthonia californica	California oatgrass
Deschampsia cespitosa	tufted hairgrass
Eleocharis acicularis	needle spikerush
Eleocharis palustris	creeping spikerush
Glyceria occidentalis	western mannagrass
Hordeum brachyantherum	meadow barley
Juncus bufonius	toad rush
Juncus nevadensis	sierra rush
Juncus tenuis	slender rush
Panicum capillare	common witchgrass
Panicum occidentale	western witchgrass
FORBS	
Boisduvalia densiflora	dense spike primrose
Brodiaea coronaria	crown brodiaea
Camassia quamash	common camas
Cardamine penduliflora	Willamette Valley bittercress
Centaurium muehlenbergii	Muehlenberg's centaury
Centunculus minimus	chaffweed
Downingia elegans	blue calico-flower
Epilobium paniculatum	tall annual willowherb
Eriophyllum lanatum	Oregon sunshine
Eryngium petiolatum	coyote thistle
Galium spp.	bedstraw
Gnaphalium palustre	lowland cudweed
Grindelia integrifolia	Oregon gumweed
Heterocodon rariflorum	rareflower hetercodon
Lotus fomosissimus	seaside bird's foot trefoil
Lotus purshianus	American bird's foot trefoil
Madia glomerata	mountain tarweed
Microseris laciniata	cutleaf silverpuffs
Myosotis laxa	bay forget-me-not
Plagiobothrys figuratus	fragrant popcornflower
Plagiobothrys scouleri	Scouler's popcornflower
Plogyonum douglasii	Douglas' knotweed
Prunella vulgaris var. lanceolata	lance selfheal
Sidalcea virgata	dwarf checkermallow
Sisyrinchium angustifolium	narrowleaf blue-eyed grass

Scientific Name	Common Name
Veronica scutellata	skullcap speedwell
Zigadenus venenosus	death camas

(Wilson and OSU, 2006).

Native Vegetation of Upland Prairies

Scientific Name	Common Name
TREES AND SHRUBS	
Quercus garryana	Oregon white oak
Psudotsuga menziesii	Douglas fir
Rhus diversiloba	Poison oak
Rosa gymnocarpa	Baldhip rose
GRASSES	
Elymus glaucus	blue wild rye
Festuca idahoensis var. *roemeri*	Roemer's fescue
Danthonia californica	California oatgrass
Achnatherum lemmonii	Lemmon's needlegrass
Koeleria macrantha	prairie junegrass
Agrostis diegoensis	seashore bentgrass
Bromus carinatus	California brome
Elymus trachycaulus	slender wheatgrass
FORBS	
Achillea millefolium	yarrow
Agoseris grandiflora	Bigflower agoseris
Allium amplectens	narrowleaf onion
Apocynum androsaemifolium	spreading dogbane
Aquilegia Formosa	western columbine
Aster hallii	Hall's aster
Balsamorhiza deltoidea	deltoid balsamroot
Brodiaea coronaria	crown brodiaea
Calochortus tolmiei	Tolmie star-tulip
Cirsium callilepis	fewleaf thistle
Clarkia amoena	farewell-to-spring
Clarkia gracilis	slender clarkia
Comandra umbellata	bastard toadflax
Convolvulus nyctagineus	nightblooming false bindweed
Daucus pusillus	American wild carrot
Delphinium menziesii	Menzie's larkspur
Dichelsostemma congestum	ookow
Dodecatheon hendersonii	Henderson's shooting star
Epilobium paniculatum	tall annual willowherb
Eriophyllum lanatum	Oregon sunshine
Erythronium oregonum	giant white fawnliy
Fragaria virginiana	mountain strawberry
Fritillaria lanceolata	checker lily
Geranium oreganum	Oregon germanium
Grindelia integrifolia	Oregon gumweed
Habenaria elegans	elegant piperia

Scientific Name	Common Name
Iris tenax	toughleaf iris
Lathyrus holochlorus	thinleaf pea
Lomatium macrocarpum	bigseed biscuitroot
Lomatium nudicaule	barestem bisquitroot
Lomatium utriculatum	common lomatium
Lotus formosissimus	seaside's bird'sfoot trefoil
Lotus purshiana	American's bird's foot trefoil
Lupinus arbustus	spur lupine
Lupinus bicolor	minature lupine
Madia elegans	common madia
Madia gracilis	slender tarweed
Marah oreganus	wild cucumber
Plectritis congesta	shortspur seablush
Potentilla gracilis	slender cinquefoil
Prunella vulgaris var *lanceolata*	lance self-heal
Ranunculus occidentalis	western buttercup
Sanicula bipinnatifida	purple sanicle
Sidalcea campestris	meadow checkermallow
Sidalcea virgata	rosy checkermallow
Silene hookeri	Hooker's silene
Sisyrinchium douglasii	Douglas' blue-eyed grass
Trifolium macraei	Chilean clover
Triteleia hyacinthina	white brodiaea
Vicia Americana	American vetch
Wyethia angustifolia	California compass plant
Zigadenus venenous	death camas

(Wilson and OSU 2006)

Appendix C. Wildlife in Benton County Prairies

Mammals of Prairie Habitat in Benton County

Common Name	Scientific Name
Big brown bat	*Eptesicus fuscus*
Black bear	*Ursus americanus*
Bobcat	*Lynx rafus*
Brush rabbit	*Sylvilagus bachmani*
California ground squirrel	*Spermophilus beecheyi*
California myotis	*Myotis californicus*
Coast mole	*Scapanus orarius*
Common gray fox	*Urocyon cineroargenteus*
Common raccoon	*Procyon lotor*
Coyote	*Canis latrans*
Creeping vole	*Microtus oregoni*
Deer mouse	*Permyscus maniculatus*
Dusky-footed woodrat	*Neotoma fuscipes*
Elk	*Cervus elaphus*
Gray tailed vole	*Microtus canicaudus*
Hoary bat	*Lasiurus cinereus*
Little brown myotis	*Myotis lucifugus*
Long eared myotis	*Myotis evotis*
Long legged myotis	*Myotis volans*
Long-tailed vole	*Microtus longicaudus*
Long-tailed weasel	*Mustela frenata*
Mink	*Mustela vison*
Mule deer	*Odocoileus hemionus*
Red fox	*Vulpes vulpes*
Silver haired myotis	*Lasionycteris noctivagans*
Striped skunk	*Mephitis mephitis*
Townsend's mole	*Scapanus townsendii*
Townsend's vole	*Microtus townsendii*
Vagrant shrew	*Sorex vagrans*
Virginia opossum	*Didelphis virginiana*
Western pocket squirrel	*Thomomys mazama*
Western spotted skunk	*Spilogale gracilis*
Yuma myotis	*Myotis yumanensis*

*Extripated

Source: Csuti, et al. 1999, O'Neil, et al. 2001

Birds of Prairie Habitat in Benton County

Common Name	Scientific Name
*Acorn Woodpecker	*Melanerpes formicivorus*
*American Crow	*Corvus brachyrhynchos*
*American Kestrel	*Falco sparverius*
*American Robin	*Turdus migratorius*
*Bald Eagle	*Haliaeetus leucocephalus*
*Barn Owl	*Tyto alba*
*Barn Swallow	*Hirundo restica*
*Black-capped Chickadee	*Parus atricapillus*
*Blue-winged Teal	*Anas discors*
*Brewer's Blackbird	*Euphagus cyanocephalus*
*Brown Creeper	*Certhia Americana*
*Brown Headed Cowbird	*Molothrus ater*
*California Quail	*Callipepla californica*
*Chipping Sparrow	*Spizella passerine*
*Cinnamon Teal	*Anas cyanoptera*
*Cliff Swallow	*Petrochelidon pyrrhonata*
*Common Nighthawk	*Chordeiles minor*
*Common Raven	*Corvus corax*
*Common Yellowthroat	*Geothlypis trichas*
*Cooper's Hawk	*Accipiter cooperii*
*Downy Woodpecker	*Picoides pubescens*
*European Starling	*Sturnus vulgaris*
*Great Blue Heron	*Ardea Herodias*
*Great Horned Owl	*Bubo virginianus*
*Hairy Woodpecker	*Picoides villosus*
*Horned Lark (Streaked)	*Eremophilia alpestris* var. *strigata*
*House Sparrow	*Passer domesticus*
*House Wren	*Troglodytes aedon*
*Killdeer	*Charadrius vociferus*
*Lazuli Bunting	*Passerina amoena*
*Mountain Quail	*Oreortyx pictus*
*Mourning Dove	*Zenaida macroura*
*Northern Flicker	*Colaptes auratus*
*Northern Harrier	*Circus cyaneus*
*Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*
*Orange Crowned Warbler	*Vermivora celata*
*Peregrine Falcon	*Falco peregrinus*
*Red Winged Blackbird	*Agelaius phoeniceus*
*Red-breasted Sapsucker	*Sphyrapicus ruber*
*Red-tailed Hawk	*Buteo jamaicensis*
*Ring-necked Pheasant	*Phasianus colchicus*
*Rock Dove	*Columba livia*

Common Name	Scientific Name
*Rufous Hummingbird	*Selasphorus rufus*
*Savanna Sparrow	*Passerculus sandwichensis*
*Sharp-shinned Hawk	*Accipiter striatus*
*Short-eared Owl	*Asio flammeus*
*Song Sparrow	*Melospiza melodia*
*Tree Swallow	*Tachycineta bicolor*
*Turkey Vulture	*Cathartes aura*
*Vaux's Swift	*Chaetura vauxi*
*Vesper Sparrow	*Pooecetes gramineus*
*Violet-Green Swallow	*Tachycineta thalassina*
*Western Bluebird	*Sialia Mexicana*
*Western Kingbird	*Tyrannus verticalis*
*Western Meadowlark	*Sturnella neglecta*
*Western Scrub Jay	*Aphelocoma californica*
*Western Wood-Pewee	*Contopus sordidulus*
*White-breasted Nuthatch	*Sitta carolinesis*
*White-crowned Sparrow	*Zonotrichia leucophyrys*
*White-tailed Kite	*Elanus leucurus*
*Wild Turkey	*Meleagris gallopavo*
*Wilson's Snipe	*Gallinago Delicata*
Black Phoebe	*Sayornis nigricans*
Gadwall	*Anas strepera*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Great Egret	*Ardea alba*
Greater Yellowlegs	*Tringa melanoleuca*
Green-winged Teal	*Anas crecca*
Merlin	*Falco columbarius*
Northern Shoveler	*Anas clypeata*
Northern Shrike	*Lanius excubitor*
Rough-legged Hawk	*Buteo lagopus*
Ruby-crowned Kinglet	*Regulus calendula*

* Denoted bird breeds in Benton County

Source: Csuti, et al. 1997, Corvallis Audubon Society 2008, O'Neil, et al. 2001

Butterflies in Benton County

Common Name	Scientific Name
Acmon Blue	*Plebejus acmon*
American Lady	*Vanessa virginiensis*
Anise Swallowtail	*Papilio zelicaon zelicaon*
Arctic Skipper	*Carterocephalus palaemon nr. skada*
Boisduval's Blue	*Plebejus icarioides nr. fenderi*
Bramble Green Hairstreak	*Callophrys perplexa nr. perplexa*
Bremner's (Zerene) Fritillary	***Speyeria zerene nr. bremnerii*

Common Name	**Scientific Name**
Acmon Blue	*Plebejus acmon*
Brown Elfin	*Callophrys augustinus iroides*
Cabbage White	*Pieris rapae*
California Sister	*Adelpha californica*
California Tortoiseshell	*Nymphalis californica*
Callippe Fritillary	***Speyeria callippe ssp.*
Chalcedona Checkerspot	*Euphydryas chalcedona colon*
Checkered White	**Pontia protodice*
Clodius Parnassian	*Parnassius clodius claudianus*
Clouded Sulphur	**Colias philodice eriphyle*
Common Buckeye	**Junonia coenia*
Common Checkered Skipper	*Pyrgus communis ssp.*
Common Roadside Skipper	*Ambliscirtes vialis*
Common Wood Nymph	*Cercyonis pegala ariane*
Dreamy Duskywing	*Erynnis icelus*
Dun Skipper	*Euphyes vestris vestris*
Eastern Tailed Blue	*Cupido comyntas sissona*
Fender's (Boisduval's) Blue	*Plebejus icarioides fenderi*
Field Crescent	*Phyciodes pulchella nr. pulchella*
Golden Hairstreak	*Habrodais grunus herri*
Gray Hairstreak	*Strymon melinus atrofasciata*
Great Copper	***Lycaena xanthoides nigromaculata*
Great Purple Hairstreak	*Atlides halesus corcorani*
Great Spangled Fritillary	*Speyeria cybele pugetensis*
Green Comma	*Polygonia faunus rusticus*
Greenish Blue	***Plebejus saepiolus ssp.*
Hedgerow Hairstreak	*Satyrium saepium saepium*
Hoary Comma	*Polygonia gracilis zephyrus*
Hydaspe Fritillary	*Speyeria hydaspe ssp.*
Juba Skipper	*Hesperia juba*
Lorquin's Admiral	*Limenitis lorquini ilgae*
Margined White	*Pieris marginalis marginalis*
Milbert's Tortoiseshell	*Aglais milberti subpallida*
Monarch	*Danaus plexippus plexippus*
Mourning Cloak	*Nymphalis antiopa antiopa*
Mylitta Crescent	*Phyciodes mylitta mylitta*
Ochre Ringlet	*Coenonympha tullia eunomia*
Orange Sulphur	*Colias eurytheme*
Oreas Anglewing	*Polygonia oreas silenus*
Painted Lady	*Vanessa cardui*
Pale Tiger Swallowtail	*Papilio eurymedon*
Persius Duskywing	*Erynnis persius ssp.*
Pine White	*Neophasia menapia menapia*
Propertius Duskywing	*Erynnis propertius*

Common Name	**Scientific Name**
Acmon Blue	*Plebejus acmon*
Purplish Copper	*Lycaena helloides helloides*
Red Admirable (Admiral)	*Vanessa atalanta rubria*
Sachem	*Atalopedes campestris campestris*
Sara's Orangetip	*Anthocharis sara flora*
Satyr Anglewing	*Polygonia satyrus neomarsyas*
Silver-spotted Skipper	*Epargyreus clarus californicus*
Silvery Blue	*Glaucopsyche lygdamus incognitus*
Sonoran Skipper	*Polites sonora nr. siris*
Spring Azure	*Celastrina echo echo*
Sylvan Hairstreak	*Satyrium sylvinus nootka*
Tailed Copper	*Lycaena arota ssp.*
Taylor's (Edith's) Checkerspot	*Euphydryas editha taylori*
Two-banded Checkered Skipper	*Pyrgus ruralis ruralis*
West Coast Lady	*Vanessa annabella*
Western Meadow Fritillary	*Boloria epithore chermocki*
Western Tailed Blue	*Cupido amyntula amyntula*
Western Tiger Swallowtail	*Papilio rutulus rutulus*
Western White	**Pontia occidentalis occidentalis*
Woodland Skipper	*Ochlodes sylvanoides sylvanoides*

*A rare stray
**Probably extirpated from Benton County.
Source: D. Ross, Personal Communication 2009.

Appendix D: Listed Non-Prairie Species in Benton County

Water howellia: Water howellia (*Howellia aquatilis*) was listed as threatened in 1994 under the federal ESA (USFWS 2008k). The species is not listed under Oregon's ESA (ODA 2007). No recovery plan has been prepared for this species. Critical habitat has not been designated for Water howellia.

Water howellia is a wetland plant. The species is extirpated from Oregon, with known populations in Washington, Idaho, Montana, and California. The most recently reported sightings in Oregon were in 1977. Historically, the species occurred along the Columbia River floodplain and the broad valley of the Willamette River (USFWS 2008k).

Northern Spotted Owl: The Northern Spotted Owl (*Strix occidentalis caurina*) was listed as threatened in 1990 under the federal ESA (USFWS 1990). The Northern Spotted Owl is listed as threatened under Oregon's ESA (ODFW 2008l). A final recovery plan was published in 2008 (USFWS 2008n); and critical habitat was designated in 1992 and revised in 2008 (USFWS 2008m).

Northern Spotted Owls live in forested habitats characterized by dense canopy closure of mature and old-growth trees, standing snags, live trees with broken tops, and abundant logs where they nest, roost, and feed (USFWS 2008l).

The Northern Spotted Owl potentially occurs in Benton, Clackamas, Clatsop, Columbia, Coos, Curry, Deschutes, Douglas, Hood River, Jackson, Jefferson, Josephine, Klamath, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, and Yamhill Counties (USFWS 2008m).

Threats include timber harvesting of mature and old-growth trees, loss of habitat due to land conversions. Another threat, resulting from loss of adjacent habitat, is the invasion of the Barred Owl.

Marbled Murrelet: The California, Oregon, and Washington populations of the Marbled Murrelet (*Brachyramphus marmoratus*) were listed as threatened in 1992 under the federal ESA (USFWS 2008o). The Marbled Murrelet is listed as threatened under Oregon's ESA (ODFW 2008). A recovery plan was published in 1997 (USFWS 1997). Critical habitat was designated in 1996 (USFWS 1996), however the USFWS in 2008 proposed revising the area designated as critical habitat (2008q), and in 2009 requested additional comments on its proposed rule to re-designate critical habitat (USFWS 2009a).

The Marbled Murrelet is small, robin sized seabird feeding primarily on fish and invertebrates in marine waters and nesting up to 80 km (50 miles) inland in forest stands with old growth characteristics (USFWS 2008o). Marbled Murrelets favor large, un-fragmented stands of old growth for nesting.

Marbled Murrelet potentially occur Benton, Clatsop, Coos, Curry, Douglas, Lane, Lincoln, Polk, Tillamook, and Yamhill Counties (USFWS 2008o).

The primary cause for decline is loss of old growth nesting habitat resulting from commercial timber harvests, human caused fires, and land conversions activities (USFWS 2008o). Increased fragmentation allows avian predators to prey on the species, including eggs.

Oregon chub: The Oregon chub (*Oregonichthys crameri*) was listed as endangered in 1993 under the federal ESA (USFWS 1993). In May, 2009, the USFWS issues a proposed rule to reclassify the Oregon chub from endangered to threatened (2009c). Oregon has not listed this species as either threatened or endangered under its ESA. A recovery plan was published in 1998 (USFWS 1998b). Critical habitat has been proposed, but not yet designated for Oregon chub (USFWS 2009b).

Oregon chub is an aquatic species. They are found in off-channel habitat such as oxbows, beaver ponds, backwater sloughs, side channels, flooded marshes. These habitats have little or no water flow, and aquatic vegetation for hiding and spawning (USFWS 2008p). Oregon chub can be found in Benton, Marion, Lane, Linn, and Polk Counties. There are two Oregon Chub populations in Benton County: one at the William L. Finley National Wildlife Refuge and in another in the Bull Run Creek (Bangs et al. 2008). Neither of these populations is located on non-federal public lands, nor within the Fender's Blue Zones.

Threats to this species include habitat loss, fragmentation, alteration; non-native fish and amphibian species; chemical spills and runoff from herbicides and pesticides; water withdrawals, diversions, or fill and removal activities; sedimentation; and population fragmentation (USFWS 2008p).

Appendix E: Summary of Environmental Consequences by Alternative

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
Climate	Building Construction Project	The burning of fossil fuels during construction will emit greenhouse gases into the environment. These emissions are anticipated to be short term and minor. The burning of fossil fuels for transportation, and operation of schools, fire stations, homes, accessory buildings, medical hardship buildings, additions to structures will emit greenhouse gases into the environment. These emissions are anticipated to minor, although on-going. Not all buildings will be constructed at once, therefore, these emissions will increase over the term of the Permit.	Impacts to climate from greenhouse gas emissions are anticipated to be similar to those under the Proposed Action alternative.
	Linear Projects	Use of motorized equipment during construction and maintenance activities will emit greenhouse gases into the atmosphere. These emissions are anticipated to be short-term and minor. As new, more fuel efficient equipment is used, fewer greenhouse gases will be emitted.	Impacts to climate from greenhouse gas emissions are anticipated to be similar to those under the Proposed Action alternative.
	Habitat Restoration, Enhancement, and Management Activities	Impacts to the climate from greenhouse gases emitted by motorized vehicles and prescribed burning would be minor. The amount of habitat to be burned in a given year, and the frequency of burns is low. Motorized equipment (including vehicles) used for mowing, mechanical brush removal, etc. may occur annually, but will only occur several weeks each year. Cattle used for habitat management purposes will emit methane, a greenhouse gas, however, the number of cattle to be used for such purposes on OSU property is not anticipated to be greater than the number of cattle that currently occupy the property.	Impacts to climate from greenhouse gas emissions from habitat restoration, enhancement, and management activities at parks/natural areas/open spaces are anticipated to be similar to those under the Proposed Action alternative. While the HCP conservation measures would not occur, impacts to Fender's blue butterfly habitat would require on-site mitigation. Since most mitigation would occur on private property, activities would

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
			most likely be limited to mowing. Mowing would generate greenhouse gas emissions.
	Agricultural Activities	Impacts to the climate from greenhouse gas emissions are anticipated to be on-going, but minor. Only a small area (approximately 28.3 ha [70 acres]) is managed for agricultural purposes. This a very small amount of acreage compared to the amount of agricultural lands in Benton County.	Impacts to climate from greenhouse gas emissions are anticipated to be similar to those under the Proposed Action alternative.
	Emergency Activities	Impacts to the climate from greenhouse gas emissions are anticipated to be negligible from emergency activities.	Impacts to climate from greenhouse gas emissions are anticipated to be similar to those under the Proposed Action alternative.
Topography/Soils	Building Construction Project	Some topographic relief may be affected by construction projects depending on the slope of an individual lot. However, such impacts are expected to be minor. Soil compaction will occur from the use of heavy equipment during construction, and from buildings. Such impacts are anticipated to be minor.	Impacts to topography/soil are anticipated to be similar to those under the Proposed Action alternative.
	Linear Projects	Soil compaction will occur from the use of heavy equipment during construction and maintenance activities. Road maintenance activities are not anticipated compact soil as most equipment is driven on the road surface. Topographic impacts are not anticipated.	Impacts to topography/soil are anticipated to be similar to those under the Proposed Action alternative.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Habitat Restoration, Enhancement, and Management Activities	Soil compaction will occur from the use of heavy equipment for activities such as mowing, racking. Topographic changes are not anticipated.	Impacts to topography/soil are anticipated to be similar to those under the Proposed Action alternative.
	Agricultural Activities	Topographic changes are not anticipated. No additional soil compaction or changes in soil features are anticipated.	Impacts to topography/soil are anticipated to be similar to those under the Proposed Action alternative.
	Emergency Activities	Impacts to topography/soil are anticipated to be minor. Soil compaction will occur in areas where emergency vehicles are needed, areas cleaned of hazardous material spills, and areas utilized by fire fighting equipment. Topography may be affected in areas where fire fighting activities occur and from hazardous material spill cleanups.	Impacts to topography/soil are anticipated to be similar to those under the Proposed Action alternative.
Vegetation	Building Construction Project	Up to 100.9 ha (249.5 ac) of vegetation would be permanently removed through the construction of buildings (homes, accessory buildings, etc.). Vegetation would be temporarily removed during installation of utilities and septic systems, and placement of medical hardship buildings (which are on site temporarily). Up to 4.4 ha (10.8 ac) of vegetation would be permanently removed through construction of two rural schools and two rural fire stations.	Impacts to vegetation are anticipated to be similar to those under the Proposed Action alternative.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Linear Projects	Vegetation loss would occur from road construction projects. Up to 24.8 ha (61.2 ac) would be impacted from road construction activities. Road maintenance activities are not anticipated to permanently impact vegetation, which is mostly non-native. Vegetation loss from water and wastewater activities would be both permanent (structures) and temporary (underground pipelines). Vegetation loss from telephone utility and construction activities would be temporary (underground cable). Vegetation loss from activities authorized within the County's ROW would be permanent (driveways) and temporary (underground utilities).	Impacts to vegetation are anticipated to be similar to those under the Proposed Action alternative.
	Habitat Restoration, Enhancement, and Management Activities	Vegetation would be lost using solarization and shade cloth, however, these techniques are used in areas heavily infested with invasive species. Impacts to vegetation from mowing, spraying, and burning would be short-term. The long-term effects would be beneficial.	Impacts to vegetation from habitat restoration, enhancement, and management activities at parks/natural areas/open spaces would not differ between the two alternatives. The HCP conservation measures would not occur. While short-term negative effects would be avoided, long-term beneficial effects would not occur.
	Agricultural Activities	No permanent impacts to non-crop vegetation would occur under this alternative.	No permanent impacts to vegetation would occur under this alternative.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Emergency Activities	The amount of vegetation to be affected is not known. Fire fighting activities would affect vegetation through the construction of fire lines. The fire itself would have a long-term benefit to vegetation in the area burned. Vegetation would be affected by cleanup of hazardous material spills. However, the impacts from the cleanup are anticipated to be smaller than the impacts from the spill itself. Vegetation from emergency vehicles responding to an accident would be minor, and would most likely occur within the County or ODOT's right-of-way. With the exception of the ROW Special Management Areas, the majority of vegetation within rights-of-way area is non-native.	Impacts to vegetation are anticipated to be similar to those under the Proposed Action alternative.
Wildlife and Fish	Building Construction Activities	Building construction activities would result in the direct and indirect loss of wildlife and its habitat. Most impacts are expected to be permanent, but minor. Total habitat loss should not exceed 100.9 ha (249.5 ac).	Impacts to wildlife and fish are anticipated to be similar to those under the Proposed Action alternative.
	Linear Projects	Linear Projects would result in the direct and indirect loss of wildlife and its habitat. Impacts are anticipated to be minor. A bridge construction project could have impacts on fish and/or fish habitat.	Impacts to wildlife and fish are anticipated to be similar to those under the Proposed Action alternative.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Habitat Restoration, Enhancement, and Management Activities	Habitat restoration, enhancement, and management activities would result in the short-term direct and indirect loss of wildlife and its habitat. However, these activities over the long term would improve wildlife and fish habitat.	Impacts to wildlife and fish are anticipated to be similar to those under the Proposed Action alternative for activities at Parks/Natural Areas/Open Spaces. The HCP conservation measures would not occur. However, mitigation for impacts to Fender's blue butterfly habitat would occur on-site and wildlife, and potentially fish, would be affected by mitigation efforts.
	Agricultural Activities	No additional impacts to fish and wildlife are anticipated.	Impacts to wildlife and fish are anticipated to be similar to those under the Proposed Action alternative.
	Emergency Activities	Impacts to fish and wildlife are unknown, but likely to occur. The underlying activity would cause as much, if not greater harm to fish and wildlife.	Impacts to wildlife and fish are anticipated to be similar to those under the Proposed Action alternative.
Threatened and Endangered Species	Building Construction Activities	The construction of 1,280 homes, medical hardship dwellings, accessory buildings, agricultural buildings, and building additions in the Fender's Blue Zones would result in impacts to Fender's blue butterfly habitat in the amount of 346 m^2 (3,730 ft^2) Kincaid's lupine and 5,364 m^2 (57,740 ft^2) of native nectar species. Construction of two rural fire stations and two rural schools could would result in impacts to Fender's blue	Landowners would need to survey their property for Fender's blue butterfly or its habitat, and if present and impacts to the species or its habitat were unavoidable, obtain incidental take coverage only from the USFWS. The private landowners would mitigate for such impacts on-site. Such mitigation

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
		butterfly habitat in the amount of 12.3 m^2 (116.5 ft^2) Kincaid's lupine and 222 m^2 (2,393 ft^2) of native nectar species. The County would first survey the property and make every effort to avoid impacts. Unavoidable impacts would be mitigated. Private landowners would receive take authorization from either the County (through a certificate of inclusion) or from the USFWS. These impacts would be mitigated at a 1:1 ratio at Benton County Fender's Blue Butterfly Conservation Areas – Fender's blue butterfly habitat on which conservation easements would be acquired (up to 20-24 ha [50-60 ac] of high quality prairie habitat) and protected in perpetuity. Butterfly habitat at these sites would be enhanced. Benton County residents would pay the cost of private landowner mitigation, where the landowner obtains take coverage from Benton County. The other six Covered Species do not have take authorization on private lands within the Fender's Blue Zone.	would be piecemeal, small, fragmented, and over the long-term, not likely to benefit the species. Landowners requiring an incidental take permit may be required to prepare a habitat conservation plan. Landowners would incur higher costs (surveying, mitigation) and time delays (can only survey during the butterfly's flight period). Mitigation for impacts on private lands would be paid for and conducted by the landowner, rather than by Benton County. For rural fire station and school construction activities, impacts would be the same under either alternative. However, take authorization requests and mitigation would be obtained on a project-by-project basis.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Linear Projects	The Linear Projects covered under the Proposed Action have the potential to affect Fender's blue butterfly habitat (Kincaid's lupine and native nectar species), Nelson's checkermallow, peacock larkspur, and Kincaid's lupine habitat not occupied by Fender's blue butterfly. These impacts would be mitigated based on a 1:1 ratio or 3:1 ratio.	Under the No Action alternative, these projects would still occur, however, take authorization from the USFWS (absent a federal nexus) would only be required for those projects impacting Fender's blue butterfly or its habitat (Kincaid's lupine or native nectar species). State and local Cooperators would be required to obtain authorization from the Oregon Department of Agriculture to impact the covered plant species located on lands owned or managed by the state or local Cooperators.
	Habitat Restoration, Enhancement, and Management Activities	Short-term negative effects to the Covered Species would occur as result of the covered habitat restoration, enhancement, and management activities. However, the overall long-term effects would be beneficial by preserving prairie habitat for the Covered Species. No mitigation is required for habitat restoration, enhancement, and management activities.	The County would not be required to enhance the 20-24 ha (50-60 ac) high quality prairie habitat supporting Fender's blue butterfly acquired through conservation easements. Mitigation for impacts to Fender's blue butterfly from private landowner, Benton County, and Cooperator's impacts would occur on-site.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Agricultural Activities	Agricultural activities are likely to impact 10 Nelson's checkermallow plants. The City would mitigate for these impacts at their Lancaster property at a 3:1 ratio for pre-mitigation or a 5:1 ratio for concurrent mitigation.	Under this alternative, the City would seek authorization from the Oregon Department of Agriculture to impact the species. No request for take authorization from USFWS would be required (no federal nexus).
	Emergency Activities	The County and Cooperators are seeking take authorization for all Covered Species for emergency activities. Mitigation to occur at PCAs based on 3:1 ratio for pre-mitigation or a 5:1 ratio for concurrent mitigation.	Under this alternative, the Cooperators would seek "after-the-fact" take authorization for any impacts to Fender's blue butterfly or its habitat from emergency activities. Take authorization for impacts to the other Covered Species is not required from USFWS, absent a federal nexus. State and local Cooperators would be required to obtain authorization from the Oregon Department of Agriculture to impact the covered plant species located on lands owned or managed by the state or local Cooperators.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
Water Resources	Building Construction Project	Additional water resources would be needed to accommodate the increase in growth of the Fender's Blue Zones. Impacts to water resources is expected to multiply over the Permit term as more and more people move into the Fender's Blue Zone. Water quality could be affected by increased erosion and sedimentation through storm-water runoff.	Impacts to water resources are anticipated to be similar to those under the Proposed Action alternative.
	Linear Projects	No impacts to water quantity are anticipated. Impacts to water quality are anticipated to be minor.	Impacts to water resources are anticipated to be similar to those under the Proposed Action alternative.
	Habitat Restoration, Enhancement, and Management Activities	No impacts to water quantity are anticipated. Impacts to water quality are anticipated to be minor.	Impacts to water resources are anticipated to be similar to those under the Proposed Action alternative.
	Agricultural Activities	No new impacts to water quantity or water quality are anticipated.	Impacts to water resources are anticipated to be similar to those under the Proposed Action alternative.
	Emergency Activities	Impacts to water quantity and water quality are not known, and would depend on where the emergency activity takes place. Some minor impacts to water quantity and quality are anticipated.	Impacts to water resources are anticipated to be similar to those under the Proposed Action alternative.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
Cultural and Archaeological Resources	Building Construction Project	Building construction projects have the potential to impact archaeological resources.	Impacts to cultural and archaeological resources are anticipated to be similar to those under the Proposed Action alternative.
	Linear Projects	Linear Projects have the potential to impact archaeological resources. A cultural resource survey should be conducted prior to undertaking these activities.	Impacts to cultural and archaeological resources are anticipated to be similar to those under the Proposed Action alternative.
	Habitat Restoration, Enhancement, and Management Activities	Habitat restoration, enhancement and management activities have the potential to impact archaeological resources. A cultural resource survey should be conducted prior to undertaking these activities.	Impacts to cultural and archaeological resources are anticipated to be similar to those under the Proposed Action alternative.
	Agricultural Activities	No impacts to archaeological resources are anticipated from these activities. Agricultural activities have been on-going for over 70 years at Owens Farm.	Impacts to cultural and archaeological resources are anticipated to be similar to those under the Proposed Action alternative.
	Emergency Activities	Emergency activities have the potential to impact archaeological resources.	Impacts to cultural and archaeological resources are anticipated to be similar to those under the Proposed Action alternative.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
Socio-Economic/ Environmental Justice	Building Construction Project	No Environmental Justice issues. New jobs in construction could be generated. The addition of 1,280 new buildings would increase property taxes providing additional revenues to the city and County.	Socio-economic impacts are anticipated to be similar to those under the Proposed Action alternative. No environmental justice issues.
	Linear Projects	No Environmental Justice issues. New jobs in the design and construction could be generated for road construction projects. New jobs could be generated for work authorized within the County's right-of-way.	Socio-economic impacts are anticipated to be similar to those under the Proposed Action alternative. No environmental justice issues.
	Habitat Restoration, Enhancement, and Management Activities	No Environmental Justice issues. A few jobs could be generated from these activities. Consultants would be hired to conduct monitoring, plant augmentation, mowing, prescribed burning, spraying activities.	Socio-economic impacts are anticipated to be similar to those under the Proposed Action alternative. No environmental justice issues.
	Agricultural Activities	No Environmental Justice issues. No new socio-economic impacts are anticipated.	Socio-economic impacts are anticipated to be similar to those under the Proposed Action alternative. No environmental justice issues.
	Emergency Activities	No Environmental Justice issues. The nature of the activity makes it difficult to predict the amount of impacts from this activity. However, as population increases, the need for additional emergency activities is anticipated. These impacts are anticipated to be minor.	Socio-economic impacts are anticipated to be similar to those under the Proposed Action alternative. No environmental justice issues.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
Air Quality	Building Construction Project	Motorized equipment used for building construction will emit pollutants into the air. These emissions are anticipated to be short term (less than two years) and minor. Emissions from the construction of new homes, buildings, school, and fire stations are anticipated to be on-going, and will increase during the Permit term. These impacts are anticipated to be minor. Air pollutants from motor vehicles (personal cars/trucks, school buses, fire trucks) are expected to increase as the population increases. However, annual emissions could decrease, despite the increase in the number of vehicles on the road, from the use of more energy efficient vehicles.	Impacts to air quality are anticipated to be similar to those under the Proposed Action alternative.
	Linear Projects	Motorized equipment used for construction of all Linear Projects would emit pollutants into the air. These impacts are anticipated to be short-term (< 2 years) and minor.	Impacts to air quality are anticipated to be similar to those under the Proposed Action alternative.
	Habitat Restoration, Enhancement, and Management Activities	Motorized equipment and burning would emit pollutants into the air. These impacts, while on-going (throughout the Permit term), are expected to be short term (< one month) in duration, and minor.	Impacts to air quality from habitat restoration, enhancement, and management activities are expected to be less under the No Action alternative. Since mitigation activities are not required under this alternative, less land would be burned.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Agricultural Activities	No additional impacts to air quality are anticipated from this activity. The level of service is estimated to remain the same through the Permit term, although as old equipment is replaced, cleaner burning equipment may be acquired lessening the impacts to air quality.	Impacts to air quality are anticipated to be similar to those under the Proposed Action alternative.
	Emergency Activities	No significant impacts to air quality are anticipated from emergency activities than those impacts already occurring.	Impacts to air quality are anticipated to be similar to those under the Proposed Action alternative.
Transportation	Building Construction Project	Minor Impacts to transportation system from increased number of vehicles using the County's road system as a result of new home construction and two new rural fire stations and two new rural schools. As the number of vehicles on the road increases, so does road deterioration.	Impacts to transportation are anticipated to be similar to those under the Proposed Action alternative.

Environmental Component	Covered Activity	Proposed Action Alternative	No Action Alternative
	Linear Projects	Road construction and maintenance projects will improve the transportation system. Work authorized within the County's rights-of-way is anticipated to have negligible effects on the County's transportation system through possible lane closures while work is being accomplished. Water and wastewater management may add additional vehicles to transportation network during construction, operations, and maintenance of the system. However, these impacts are anticipated to be negligible. Utility construction and maintenance activities will have negligible impacts on the County's transportation system.	Impacts to transportation are anticipated to be similar to those under the Proposed Action alternative.
	Habitat Restoration, Enhancement, and Management Activities	No anticipated impacts.	Impacts to transportation are anticipated to be similar to those under the Proposed Action alternative.
	Agricultural Activities	No anticipated impacts.	Impacts to transportation are anticipated to be similar to those under the Proposed Action alternative.
	Emergency Activities	Negligible impacts to transportation system occurring with potential road closures following an accident.	Impacts to transportation are anticipated to be similar to those under the Proposed Action alternative.