Draft Environmental Assessment

Central Oregon Wildfire Mitigation Project

Klamath County, Oregon

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FEMA

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500 C Street, SW
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This document was prepared for:

FEMA Region X
130 - 228th Street, SW
Bothell, WA 98021

by:

URS Group, Inc.
1501 4th Avenue, Suite 1400
Seattle, WA 98101

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Acronyms and Abbreviations

APE	Area of Potential Effects
BLM	Bureau of Land Management
CAA	Clean Air Act of 1970
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
County	Klamath County
DPS	distinct population segment
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act of 1981
F.R.	Federal Register
GIS	Geographic Information System
IHMT	Interagency Hazard Mitigation Team
MBTA	Migratory Bird Treaty Act of 1918
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NRHP	National Register of Historic Places
O_3	ozone
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife

OEM	Oregon Office of Emergency Management
OHWM	ordinary high water mark
ORBIC	Oregon Biodiversity Information Center
Pb	lead
PDM	Pre-Disaster Mitigation
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns or less
PM_{10}	particulate matter with a diameter of 10 microns or less
SHPO	State Historic Preservation Officer
SO_2	sulfur dioxide
TMDL	Total Maximum Daily Load
USFS	U.S. Forest Service
URS	URS Group, Inc.
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQMP	Water Quality Management Plan
WUI	Wildland-Urban Interface

Glossary

Area of Potential Effects: Geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if such properties exist. The APE is influenced by the scale and nature of the undertaking.

Best Management Practice: Environmental protective measure for conducting projects in an environmentally responsible manner.

Crown fire: Fire that involves the tops of the canopy trees in the forest; can spread rapidly.

Defensible space: Clearings between wildland vegetation and structures.

Extirpated: Condition of a species that has ceased to exist in a geographic area.

Fuels reduction: Removal of excess flammable vegetation through thinning, limbing, or other methods to reduce the potential for severe wildfires.

Limbing: Removal of large tree limbs to reduce fuel load and the potential for crown fires.

Loam: Well-drained soils composed of sand, silt, and clay in relatively even proportions.

Ordinary high water mark (OHWM): The point on a bank or shore up to which the presence and action of the water leaves a distinct mark by erosion, destruction of terrestrial vegetation, or other easily recognized characteristic.

Oregon Forestland-Urban Interface Fire Protection Act (Senate Bill 360): Requires property owners in forestland-urban interface areas identified by county committees to reduce excess vegetation around structures and drives.

Prescribed burn: Any fire ignited for vegetation management.

Slash: Vegetative debris created by property clearing, right-of-way clearing, and forest management activities.

Suppression: Response to wildland fire that results in curtailment of fire spread and elimination of all identified threats from the fire.

Thinning: Partial removal of trees, branches, or shrubs from a stand to reduce fuel loads.

Wildfire: Unwanted wildland fire.

Wildland-urban interface: Line, area, or zone where structures and other human development meet or intermingle with vegetative fuels in wildlands.

SECTION ONE INTRODUCTION

Klamath County, OR, has applied for fiscal year 2010 funding under the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation (PDM) grant program for financial assistance for the Central Oregon Wildfire Mitigation Project in Klamath County (County) in southern Oregon (Proposed Action).

The Proposed Action targets the communities of Bly Mountain, Chiloquin, Crescent Lake, Keno, and Scott Creek. "Community" refers to the area surrounding and the residents who live near a natural feature (e.g., Scott Creek) or manmade feature (e.g., Keno). The five communities are all in Klamath County and are referred to collectively as the project area.

Table 1-1 is a list of the communities that comprise the project area and the number of acres, lots, and structures in each community. The locations of the communities are shown in Appendix A, Figures 1 through 6.

Table 1-1: Acreage, Number of Lots, and Structures in the Five Communities in the Project Area

Community	Acres	Lots	Structures
Bly Mountain	3,232	570	50
Chiloquin	1,011	400	90
Crescent Lake	328	250	210
Keno	1,355	300	300
Scott Creek	490	50	20

The objective of the PDM grant program is to fund pre-disaster mitigation planning and projects that primarily address natural hazards for States, Territories, and federally recognized Indian Tribes to reduce risks to vulnerable populations and structures while also reducing reliance on funding from actual disaster declarations. The PDM is administered by the Oregon Office of Emergency Management (OEM).

This Environmental Assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. §§ 4321–4327); the President's Council on Environmental Quality (CEQ) regulations to implement NEPA (40 CFR. Parts 1500–1508); and FEMA's regulations implementing NEPA (44 CFR Part 10). FEMA is required to consider potential environmental impacts before funding or approving actions or projects.

The purpose of this EA is to analyze the potential environmental impacts of the Klamath County Central Oregon Wildfire Mitigation Project. FEMA will use the findings in this EA to determine whether an Environmental Impact Statement is required or a Finding of No Significant Impact (FONSI) should be issued.

SECTION TWO PURPOSE AND NEED

The purpose of the PDM grant program is to reduce overall risks to vulnerable populations and structures, while also reducing reliance on funding from actual disaster declarations. The purpose of this project is to enhance protection for residents and firefighters in the five project area communities and reduce the overall potential impacts of a catastrophic wildfire. The need for this action is detailed below.

According to the *Klamath County Community Wildfire Protection Plan* (Klamath County 2007), the project area communities were identified as being in the wildland-urban interface (WUI). Communities with 10 or more wildfires per 100,000 acres per year were rated as High for fire occurrence, and communities with fewer than 10 wildfires per year were rated as Moderate for fire occurrence (Klamath County 2007). Project area wildfire ratings were as follows:

- Bly Mountain. Located in the mid-County WUI Area, Bly Mountain includes homes west of State Highway 140. Between 1986 and 2003, about eight wildfires that burned 180 acres per 100,000 acres occurred per year in the Mid County WUI. These wildfires resulted in a fire history rating of Moderate.[1]
- Chiloquin. Located in the Chiloquin WUI Area, Chiloquin includes homes north of Chiloquin along Sprague River Road. Between 1986 and 2003, about 14 wildfires that burned 180 acres per 100,000 acres occurred per year in the Chiloquin WUI. These wildfires resulted in a fire history rating of High.[1]
- Crescent Lake. Located in the Walker Range WUI Area, Crescent Lake includes homes west of State Highway 58 near Crescent Lake. Between 1986 and 2003, about 20 wildfires that burned 20 acres per 100,000 acres occurred per year in the Walker Range WUI. These wildfires resulted in a fire history rating of High.
- Keno. Located in the Keno WUI Area, Keno includes homes west of U.S. Highway 97 near Worden, homes south of Keno in the Chase Mountains, homes in Lakewoods Village along Clover Creek Road, and homes north of Keno and State Highway 66 along Jake Road. Between 1986 and 2003, about 12 wildfires that burned 15 acres per 100,000 acres occurred per year in the Keno WUI. These wildfires resulted in a fire history rating of High.
- Scott Creek. Situated in the Sand Creek WUI Area, Scott Creek includes homes east of U.S. Highway 97 near Crater Lake National Park. Between 1986 and 2003, about eight wildfires that burned 5 acres per 100,000 acres occurred per year in the Sand Creek WUI. These wildfires resulted in a fire history rating of Moderate.

The *Klamath County Community Wildfire Protection Plan* assigned a high weighted hazard rating to each WUI project area based on surface fire behavior, the presence of

[1] Acres burned for the Chiloquin WUI Area and Mid County WUI Area do not include the Lone Pine Fire of 2002 which burned over 30,000 acres (Klamath County 2007).

a crown fire, structural vulnerability, and fire frequency and intensity (Klamath County 2007).

The *Klamath County Multi-Jurisdictional Hazard Mitigation Plan* (Klamath County 2007) rated the probability (10- to 35-year period) and vulnerability (more than 10 percent of population affected) of a wildfire for Klamath County. The project area communities have a high risk of wildfires, high hazards once a wildfire starts (e.g., because of weather, topography, fuel), and moderate protection capabilities (Klamath County 2011).

Because of fire suppression, logging, and other human activities, the forests in Klamath County have changed significantly, and areas that have historically faced frequent and less severe wildfires now encounter less frequent but more severe fires. The number of wildland fires has increased with population growth, but much of Klamath County remains rural and federally owned land accounts for 56 percent of the land in the County. The average number of fires per year exceeds 130, with approximately 2,300 acres burned annually. Over 43,755 acres were burned in wildfires of 500 acres or larger between 1990 and 2008. The largest, the 30,809-acre Lone Pine Fire of 1992, burned several structures and resulted in the evacuation of hundreds of residents. Total fire suppression costs recorded by the Klamath-Lake District of ODF for the period of 1990 to 2008 reached nearly $60 million. Dispersed communities in the County often have no formal fire protection, and records showed that 7,580 residential parcels were unprotected in 2007 (Klamath County 2007).

In addition to characterizing wildfire risks and prioritizing mitigation, the County's Land Development Code requires that all new development in areas with medium, high, or extreme hazard ratings on the Wildland Hazard Ratings map in its Comprehensive Plan incorporate wildfire safety standards. These standards address building construction materials, subdivision infrastructure/design, and defensible space consistent with the Oregon Forestland-Urban Interface Fire Protection Act of 1997 (Senate Bill 360) standards (Klamath County 2014c). These current requirements do not fully address wildfire vulnerabilities in WUI developments built before the standards were adopted.

SECTION THREE ALTERNATIVES

This section discusses the No Action Alternative, the Proposed Action, to which FEMA funding would contribute, and the other alternatives that were considered and dismissed.

3.1 NO ACTION ALTERNATIVE

Under the No Action Alternative, no FEMA-funded fuels reduction and mitigation would occur in the project area. The risk of wildfires in the WUI would continue due to existing untended heavy-ladder fuel and poor access for emergency responders. At-risk property owners would continue to implement wildfire mitigation activities on their own initiative, or as otherwise assisted or required by the County or homeowners association or insurance providers.

3.2 PROPOSED ACTION

The description of the Proposed Action is based primarily on the 2010 PDM grant application and updates from Klamath County.

Klamath County would work with local fire departments and districts to implement the Proposed Action. The County would work with the local fire district to use their Intterra system to rate lots with structures when fuels reduction work is completed. Ratings would be added to the Wildfire Risk Education mapping application which helps homeowners and firefighters become more aware of fire risks (Keno Rural Fire Protection District 2014). The Proposed Action would consist of the following activities over 24 months, which would be implemented only for the property owners in the project area who elect to participate:

- Plan, supervise, manage, and administer project activities and funding.
- Develop and adopt program criteria, policies, and operating guidelines.
- Communicate project readiness to property owners and compile a working inventory of participants.
- Conduct assessments of participating properties, determine appropriate treatment strategies, and establish buffers for avoidance areas.
- Hire contractors or use County staff to implement treatment measures where participating property owners need assistance.
- Inspect treated properties for compliance.
- Administer grant funds, manage matching contributions, and authorize and monitor expenditures.
- Monitor and evaluate program effectiveness and adjust if needed to achieve treatment goals.

- Prepare and submit status reports and communicate project results to OEM.
- Explore ways to make the program self-sustaining over the long term.

The Proposed Action would be implemented according to the Firewise guidelines for defensible space in *Introduction to Firewise Principles* (NFPA 2009). The National Fire Protection Association (NFPA) Firewise program is sponsored by the U.S. Forest Service (USFS), U.S. Department of the Interior, and National Association of State Foresters.

The Firewise guidelines for defensible space (NFPA 2009) include the following:

- Create a defensible space zone with at least a 30-foot radius around a structure's foundation as a primary fuel break. The radius may be expanded to provide additional defensible space around structures on steep slopes.
- Plant grass and small islands of fire-resistant plants in the defensible space.
- Trim trees in the defensible space so the lowest branches are 6 to 10 feet above the ground.
- Space plants in the defensible space so the plants or plant canopies do not touch; use wider spacing along slopes.
- Plant fire- or drought-resistant plants in the defensible space.
- Do not remove all vegetation in the defensible space because doing so can increase soil erosion, especially on sloped areas, which are found in much of the project area.

Appendix A, Figure 7, illustrates the Firewise guidelines, and Figure 8 shows an example of a treated home.

The County's requirements for fuels reduction projects, intended to mirror Senate Bill 360 standards, are listed in Appendix B, would also be followed. The requirements pertain to, for example, dead and downed materials, tree and shrub thinning, and nonflammable construction materials. The requirements also describe a secondary fuel break which would extend 20 to 70 feet depending on the risk classification and the type of roofing on the structure.

Examples of the types of vegetation to be treated are ponderosa pines (*Pinus ponderosa*), Douglas firs (*Pseudotsuga menziesii*), lodgepole pines (*Pinus contorta*), junipers (*Juniperus occidentalis*), sagebrush, bitterbrush, and invasive species. Ladder fuels and other biomass would be treated, consistent with the Oregon Forestland-Urban Interface Fire Protection Act (Senate Bill 360), using chainsaws, clippers, brush mowers, and masticators. Vegetative debris would be chipped and spread onsite, with some limited burning of piles, or hauled away and disposed of at the Klamath County Transfer Station and Recycling Centers at Chemult, Chiloquin, Crescent, Keno, and Sprague River. Burning of piles onsite would typically require a permit and compliance

with regulations from local fire departments and Klamath County Air Quality. Klamath County Air Quality must be contacted prior to burning and it issues County-wide burn bans and other restrictions including an open burning window, daylight burning only, and size limits (Klamath County Air Quality 2014).

Limited ground disturbance would occur during fuel-reduction activities. No work would be allowed in wetlands or water bodies. Per Oregon Department of Forestry (ODF) water protection rules, vegetation management activities would be restricted within riparian management areas between 10 to 100 feet from a stream's ordinary high water mark (OHWM) depending on the size of the stream (i.e., small, medium, large) and water classification (i.e., fish use, domestic use, all other streams) (ODF 2014, OAR 629-635). Riparian management area restrictions would include retaining understory vegetation within 10 feet of the OHWM, trees within 20 feet of the OHWM, all trees leaning over a channel, and all downed wood and snags (ODF 2014, OAR 629-640). Work would also be prohibited within 100 feet of the OHWM of Crescent Creek at the Crescent Lake community, the Klamath River at the Keno community, and the Sprague River and Williamson River at the Chiloquin community. The purpose of this condition is to avoid potential impacts to Endangered Species Act of 1973 (ESA)–listed aquatic species. Project area specific stream buffers would be established during the initial site assessment for property owner participants.

Project activities would occur in the project area on properties that were developed prior to the County's existing wildfire safety land development codes. See Table 1-1 for a list of the acreages and number of lots in the communities that comprise the project area. As part of this project, the County anticipates treating a total of about 1,200 acres scattered within these communities.

The site assessment and treatment plan would be documented for each participating property using the checklist in Appendix C. Participating property owners would provide personal labor and/or materials and commit to maintain the property's defensible space once established for 5 years.

3.3 ALTERNATIVES CONSIDERED AND DISMISSED

Three alternatives were considered and dismissed.

The first alternative involved more stringent County and community restrictions to control fires and protect residents than the Proposed Action and would consist of restricting development in the WUI, requiring fire-safe building construction and materials, and mandating wildfire-resistant landscape features. These measures could be incorporated into the Klamath County and local comprehensive plans, zoning ordinances, building codes, and other agency plans. The measures are potentially more intrusive and unenforceable and would require time for government and/or citizen approval and implementation.

The second alternative was the removal of vegetation through prescribed burning, but the risk of an escaped fire would be high considering the treatment objective is to establish defensible space close to existing structures. Multiple burn locations throughout the project area would be required to effectively manage fuel loads. Prescribed burning is most effective in areas with existing light fuel loads and few structures. The risk to the residual forest increases the heavier the fuel load or the higher the elevations. This alternative was dismissed because it was considered too dangerous.

The third alternative was the replacement of flammable structural materials with fire-resistant materials. This alternative would not address the lack of defensible space or heavy fuel loads. It would also be more costly and less effective than vegetation removal.

SECTION FOUR AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

This section discusses the potential impacts of the No Action Alternative and the Proposed Action on six categories of environmental resources (physical, water, biological, cultural, socioeconomic, and recreation). The cumulative potential environmental impacts are also discussed (see Section 4.7).

The impact analysis follows the same approach for all resource categories. When possible, quantitative information is provided to establish potential impacts, and the potential impacts are evaluated qualitatively based on the criteria listed in Table 4-1.

Table 4-1: Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/negligible	The resource area would not be affected, or changes would either be non-detectable or if detected, the effects would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have both localized and regional impacts. Impacts would be within or below regulatory standards, but historical conditions would be altered temporarily. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences on local and regional levels. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, but long-term changes to the resource would be expected.

Impacts are predicted based on the degree of change or loss of the resource from the baseline conditions. Impacts may be direct or indirect. Direct impacts are caused by an action and occur at the same time and place as the action. Indirect impacts are caused by an action and occur later or are farther removed from the area but are still reasonably foreseeable (40 CFR Part 1508).

4.1 PHYSICAL RESOURCES

4.1.1 Geology and Soils

The majority of Klamath County, including the project area, is part of the upper Klamath Basin. The upper Klamath Basin spans parts of the Sierra-Cascade Mountain province to the west and the Basin and Range province to the east. In the upland areas of the basin to the north, the Wood and Williamson Rivers originate from the eastern flank of Mount Mazama (Crater Lake). To the east, the Sprague and Lost Rivers flow westward from more arid parts of the basin (USGS 2013). Within Klamath County, Western Cascades volcanic rocks, ranging in age from 22 to 20 million years old, are overlain by

High Cascades volcanic rocks that are approximately 7.6 million years old (Mertzman 2005).

The topography of the upper Klamath Basin consists of basin-and-range-style faulting, which has divided the basin into a series of small subbasins (down-dropped blocks of the earth's crust resulting from extension or pulling of the crust). Vertical displacements are generally less than 330 feet but can exceed 1,000 feet (USGS 2013).

Soils in the project area are predominantly gravelly/coarse loam and sand (ranging from well-drained to poorly drained) overlaying volcanic deposits, with areas of exposed bedrock. Wind and water typically cause the most erosion in the project area. Major soil types include Nuss-Royst association, Woodcock association, Bly-Royst complex, Shanahan gravelly loamy coarse sand, Royst stony loam, Maset coarse sandy loam, Lorella very stony loam, Fordney loamy fine sand, and Calimus fine sandy loam (USDA 2014).

The Farmland Protection Policy Act of 1981 (FPPA), as amended (7 U.S.C. §§ 4201 et seq.), requires that Federal agencies minimize the extent to which their programs contribute to the unnecessary conversion of prime farmland, unique farmland, and land of statewide or local importance to non-agricultural uses. Farmlands subject to FPPA requirements may be forestland, pastureland, or cropland, but cannot be urban built-up land. The project area contains the following areas of prime farmlands and farmlands of statewide or unique importance: approximately 3,187 acres in Bly Mountain, 985 acres in Chiloquin, and 851 acres in Keno. Prime farmlands and farmlands of statewide or unique importance are not available for Crescent Lake or Scott Creek (USDA 2014).

4.1.2 Air Quality

The Clean Air Act (CAA) of 1970, as amended (42 U.S.C. §§ 7401–7661) requires that States adopt ambient air quality standards. The standards have been established to protect the public from potentially harmful amounts of pollutants.

Under the CAA, the U.S. Environmental Protection Agency (EPA) establishes primary and secondary air quality standards. Primary air quality standards protect the public health, including the health of sensitive populations such as people with asthma, children, and older adults. Secondary air quality standards protect public welfare by promoting ecosystem health and preventing decreased visibility and damage to crops and buildings (EPA 2013).

The EPA has set National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants: ozone (O_3), particulate matter (particulate matter with a diameter of 2.5 microns or less [$PM_{2.5}$], particulate matter with a diameter of 10 microns or less [PM_{10}]), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and lead (Pb) (EPA 2013).

The Klamath Falls Urban Growth Boundary (about 1.5 miles east of the Keno community) was designated by the EPA in 2009 as a nonattainment area for particulate matter ($PM_{2.5}$). A nonattainment geographic area is an area that has not consistently met the NAAQS. Particulate matter, when inhaled, can accumulate and aggravate respiratory conditions, particularly asthma. Unhealthy accumulation of $PM_{2.5}$ is typically a wintertime problem in the Klamath Falls Basin because of cold air inversions that trap emissions near the ground. The two predominant sources of particulates in Klamath Falls in the winter are residential wood heating and road dust from motor vehicle travel. Other sources of $PM_{2.5}$ emissions include fuel oil use, large and small industry, forest and agricultural fires, open burning, and other fuel combustion sources. In 2012, Oregon Department of Environmental Quality (ODEQ) adopted the attainment plan for Klamath Falls and it was sent to the EPA. Once Klamath Falls meets the NAAQS for $PM_{2.5,}$ EPA will change designation to attainment with maintenance plan (ODEQ 2014a).

Given the frequency of wildfires in Oregon, ODEQ worked with other State and Federal agencies to produce the *Oregon Wildfire Response Protocol for Severe Smoke Episodes* (ODEQ 2014b), which addresses public health risk from severe smoke impacts and recommends public health actions and agency responsibilities. Wildfire smoke contains gases and fine particles, which include O_3, CO, and particulate matter (i.e., $PM_{2.5}$). The amount and duration of smoke exposure—and a person's age and degree of susceptibility—contribute to potential health problems. Communities exposed to wildfire smoke are advised to check current ODEQ air quality information, the Oregon Smoke Blog, and public health messages. Other recommendations include staying inside as much as possible, avoiding outdoor physical activity, keeping windows and doors closed, and recirculating air conditioners. Generally, those that are most at risk from wildfire smoke are older adults, children, pregnant women, smokers, and individuals with respiratory infections or cardiovascular disease.

4.1.3 Climate Change

Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions (CEQ 2010) contains guidance on how Federal agencies should consider climate change in their decisions and suggests that quantitative analysis should be done if an action would release more than 25,000 metric tons of greenhouse gases per year.

The climate varies widely in the County, mainly due to great differences in elevation, which ranges from 4,000 feet in Klamath Falls to 8,000 feet at the top of Crater Lake. During the winter, colder temperatures and higher precipitation occur in the High Plateau along the Cascade Crest, including the project area, except Keno which is in high desert prairie near Klamath Falls. Temperatures in degrees Fahrenheit range from highs in the 80s in the summer to the 40s in winter, and lows range from the 40s in the summer to the 20s in the winter (Oregon Climate Service 2014). The average annual precipitation ranges from 14 inches of rainfall at Klamath Falls to 67 inches in Crater

Lake National Park. Average annual snowfall ranges from 32 inches of rainfall at Klamath Falls to 490 inches of snowfall in Crater Lake National Park.

Global and regional climate change is expected to accelerate in the coming decades. According to the *Oregon Climate Assessment Report* (OCCRI 2010), temperatures could increase by 0.2 to 1 degree per decade. Warmer, drier summers are predicted, with summer precipitation decreasing 14 percent by the 2080s (OCCRI 2010). Generally, hotter and drier conditions contribute to larger wildfires and longer fire seasons. Increased fire probability in the region as a result of changing climatic conditions in the coming years could increasingly put communities in the wildland-urban interface at risk.

4.1.4 Consequences of Alternatives

No Action Alternative

Under the No Action Alternative, FEMA would not provide funding for vegetation removal; however, some wildfire mitigation activities would be expected to continue as initiated by property owners, through existing local programs or requirements, or as required by homeowners insurance providers. There would be no impacts on geology. Soil resources in the project area would be affected by erosion if vegetation is burned in a catastrophic wildfire; steep slopes would be particularly affected. A significant loss of mature vegetation along steep slopes could increase the risk of landslides and thus risks to proximate structures and infrastructure.

No increase in open burning and associated negative air quality effects would occur in the County from project area participants burning piles of vegetative debris onsite. Open burning would continue to occur regularly by property owners in the County in accordance with restrictions set forth by local fire departments and Klamath County Air Quality.

In the event of a wildfire, air quality would likely decline, putting the elderly, school children, and other vulnerable populations at risk. Depending on the air quality advisory, the public could be advised to change their daily activities, including outdoor work and essential errands, and school cancellations could occur. If the risk of wildfires increases as a result of climate change, the project area could be even more vulnerable to wildfire impacts in the decades ahead. Although wildfires are a natural element of the ecosystem, a large wildfire can release more than 25,000 metric tons of greenhouse gases, thereby incrementally contributing to overall climate change. Adverse impacts would range from minor to moderate, depending on the severity and location of a wildfire and the subsequent air pollution and soil erosion.

Proposed Action

Adverse impacts on geology and climate would be negligible based on the scale of the project and the limited ground-disturbing activities. Ground-disturbing activities may occur if shrub and tree roots are removed. However, in most cases, thinning and limbing would provide sufficient fuels reduction, and complete removal of shrubs and trees (including roots) would be limited. Some soil could be disturbed during project activities, but adverse impacts would be negligible based on the low-impact nature of vegetation removal by hand and the proposed protective stream buffers. Since the project does not involve changes in land use, no impacts to prime or unique farmlands will occur.

An increase in open burning could occur in the County from a minimal number of project area participants burning piles of vegetative debris onsite. While this could have a temporary negative affect on air quality in the project area, it would be minor because of the limited anticipated increase in open burning which would be scattered geographically and occur at different times of the year, along with restrictions from Klamath County Air Quality, including avoidance during the wildfire season.

Fuel-reduction activities would occur on a localized scale and focus on protection of structures in contiguous areas, thus likely reducing the spread/severity of wildfires. Reducing the risk or severity of wildfires would generally have a positive effect on air quality and climate change because of the consequent reduction in air pollution and greenhouse gas releases. Air quality and associated $PM_{2.5}$ emissions in the Klamath Falls nonattainment area would benefit from a reduction in wildfire risk.

4.2 WATER RESOURCES

4.2.1 Surface Water

Numerous streams flow through the project area in the Upper Klamath Basin, including, Crescent Creek, Klamath River, Larkin Creek, Modoc Billy Creek, Scott Creek, Sprague River, and Williamson River. Lakes and springs near the project area include Crescent Lake, Keno Reservoir, Klamath Lake, and Larkin Spring.

The project area is in the Lost, Sprague, Upper Klamath, and Williamson subbasins (USGS 2013). Streams within these subbasins (by community) are as follows:

- **Bly Mountain**. Modoc Billy Creek, an intermittent stream, flows northeast through the community in the Sprague subbasin. Intermittent tributaries to Buck Creek and Wildhorse Creek flow south from the community in the Lost subbasin.
- **Chiloquin**. Larkin Creek, a perennial stream, flows through the northern community in the Williamson subbasin. The Williamson River is directly adjacent to the western edge of this community. An intermittent tributary to Sprague River crosses the southern part of the community in the Sprague subbasin. The Sprague River is directly adjacent to the western edge of this community.

- **Crescent Lake**. Cold Springs Creek and a tributary to Crescent Creek are both perennial streams that flow through the northern part of the community. Johnston Creek is an intermittent stream that drains into Cold Springs Creek in the community. Crescent Creek, a perennial stream, flows within and adjacent to the southern part of the community. The community is in the Little Deschutes subbasin.
- **Keno**. An intermittent tributary to Klamath River flows through the northwestern part of the community, which is directly north of the Klamath River. Two intermittent tributaries to Klamath River also flow through the northeastern, southeastern, and southwestern part of the community. The community is in the Lost and Upper Klamath subbasins.
- **Scott Creek**. Scott Creek, a perennial stream, flows through the community in the Williamson subbasin.

The Klamath River extends in the Upper Klamath Basin from the headwaters at the Upper Klamath Lake to the Iron Gate Dam. The Upper Klamath Basin is approximately 5.2 million acres and includes six subbasins, four of which fall within the project area (OSU 2014).

4.2.2 Wild and Scenic Rivers

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations.

Rivers may be designated for the National Wild and Scenic Rivers System by Congress or, if certain requirements are met, the Secretary of the Interior. Each river is administered by either a Federal or State agency. Designated segments need not include the entire river and may include tributaries. For federally administered rivers, the designated boundaries generally extend to an average of 0.25 mile on either bank in the Lower 48 states to protect river-related values.

Rivers are classified as wild, scenic, or recreational. Wild river areas are generally inaccessible except by trail, with primitive, unpolluted watersheds or shorelines. Scenic river areas are accessible in places by roads, with largely primitive and undeveloped shorelines. Recreational river areas are readily accessible by road or railroad, may have development along the shoreline, and may have undergone some impoundment or diversion in the past.

A 4-mile reach of Crescent Creek is classified as recreational within the Crescent Lake community. The reach was designated in October 1988 and is managed by USFS. This reach of Crescent Creek stretches from the Crescent Creek Dam to the Odell Butte. It flows through a narrow canyon with old-growth pine in the lower portion (south of the community). The scenery is considered the key feature of this reach (NWSR 2014).

Although portions of the Klamath River, North Fork Sprague River, and Wildhorse Creek are designated as Wild and Scenic rivers, these reaches are 4 or more miles from the project area and will not be discussed further.

4.2.3 Water Quality

Section 303(d) of the Clean Water Act of 1977, as amended (33 U.S.C. § 1313(d)(2)), establishes requirements for States and Tribes to identify and prioritize water bodies that do not meet water quality standards. Data from ODEQ were queried to determine whether any streams in the project area are considered impaired or waters of concern. Streams where standards are not met are identified as water quality limited and are assigned a status of either Category 5 or Category 4a, which are described below as applicable (ODEQ 2012a). Total Maximum Daily Loads (TMDLs) are the maximum amount of a pollutant that a stream can receive and still meet water quality standards, and being below those standards typically requires a Water Quality Management Plan (WQMP). Category 5 waters are water quality limited and a TMDL is required; Category 4a waters are TMDL approved for a water quality standard. Category 3 waters have insufficient data to determine whether a standard is met. Water quality concerns within or near the project area are as follows:

- **Chiloquin**. Sprague River in the community is rated Category 3 for dissolved oxygen and Category 4a for temperature. Williamson River in the community is rated Category 5 for dissolved oxygen and Category 4a for temperature (ODEQ 2012a). The Upper Klamath Lake Drainage TMDL and WQMP (ODEQ 2002) addressed concerns about stream temperatures and dissolved oxygen for Sprague River and Williamson River; EPA approved the TMDL and WQMP in 2002.
- **Crescent Lake**. Cold Springs Creek in the community is rated Category 3 for dissolved oxygen. Crescent Creek in the community is rated Category 3 for dissolved oxygen and Category 5 for temperature (ODEQ 2012a). ODEQ is working with partners on the Upper Deschutes and Little Deschutes subbasins' TMDLs (ODEQ 2012b) to address concerns about stream temperature in Crescent Creek. However, progress is currently on hold due to litigation concerning temperature standards.
- **Keno**. Klamath River in the community is rated Category 5 for dissolved oxygen (ODEQ 2012a). The Upper Klamath and Lost River subbasins' TMDLs and WQMPs (ODEQ 2010) addressed concerns about stream dissolved oxygen for Klamath River. The TMDL and WQMP document was submitted to EPA for approval in 2010.

The stream temperature standard is designed to protect cold water fish (salmonids) rearing and spawning as the most sensitive beneficial use. Stream temperatures are affected by the condition of riparian vegetation and associated shading, which screens the water's surface from the direct rays of the sun. A certain minimum amount of

dissolved oxygen must be present in water for aquatic life to survive. Dissolved oxygen can be reduced in streams due to temperature, turbidity, and sediments (ODEQ 2002).

4.2.4 Wetlands

Executive Order (EO) 11990, Protection of Wetlands, requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and to limit potential damage if an activity affecting a wetland cannot be avoided.

According to the National Wetlands Inventory (USFWS 2014a), wetland complexes vary widely in the project area and occur primarily along intermittent and perennial streams. The wetlands and associated streams in the project area communities are as follows:

- Bly Mountain has approximately 12 acres of freshwater emergent wetlands and 1 acre of freshwater forested/shrub wetland. These areas are primarily associated with Modoc Billy Creek.
- Chiloquin has approximately 51 acres of freshwater emergent wetlands, 27 acres of freshwater forested/shrub wetland, 4 acres of freshwater ponds, and 1 acre of riverine wetlands. These areas are primarily associated with Larkin Creek and Sprague River.
- Crescent Lake has approximately 3 acres of freshwater emergent wetlands, 53 acres of freshwater forested/shrub wetland, and 1 acre of riverine wetlands. These areas are primarily associated with Crescent Creek and Cold Spring Creek.
- Keno has approximately 1 acre of freshwater emergent wetlands and 1 acre of freshwater ponds. These areas are primarily associated with Klamath River.
- Scott Creek has approximately 16 acres of freshwater emergent wetlands, 1 acre of freshwater forested/shrub wetlands, and 7 acres of freshwater ponds. These areas are primarily associated with Scott Creek.

4.2.5 Floodplains

EO 11988, Floodplain Management, requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

The Flood Insurance Rate Maps for the project area, Panels 4101091200B, 4101090765B, and 4101090735B (FEMA 1984), show floodplains associated with Klamath River, Sprague River, and Williamson River that are designated Zone A, which is subject to inundation by the 1-percent-annual-chance flood event (100-year floodplain). Portions of the floodplains in the Chiloquin and Keno communities are developed with residential structures. The hillsides surrounding the streams are

characterized by relatively steep slopes, resulting in narrow to moderate floodplains that are between 100 to 200 feet wide.

Major flooding has occurred in the Sprague River, Williamson River, Klamath River, and Upper Klamath Lake. Severe flooding occurred along these rivers in 1964. According to the *Klamath County Multi-Jurisdictional Natural Hazards Mitigation Plan,* the probability of a future flood event has been rated as high (10- to 35-year period), and the level of vulnerability to a future flood event has been rated as moderate (between 1 and 10 percent of the population could be impacted by a future flood event) (Klamath County 2011). Klamath County's Flood Insurance Rate Maps are being updated in 2014.

4.2.6 Consequences of Alternatives

No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to reduce vegetation around residences, however, some wildfire mitigation activities would be expected to continue as initiated by property owners, through existing local programs and requirements, or as required by homeowners insurance providers. Thus, existing conditions and risks to water resources would not change. Properties with maintained defensible space would be expected to be less vulnerable to catastrophic wildfires and thus less likely to contribute to post-burn erosion and sedimentation of surface waters to the Crescent Creek Wild and Scenic River and wetlands. In the event of a wildfire, impacts to the water quality, including sedimentation, of surface water, the Crescent Creek Wild and Scenic River, and wetlands would be minor to moderate, depending on the size and intensity of the fire and subsequent erosion due to the loss of vegetation. A significant loss of mature vegetation along steep slopes can increase the risk of landslides into surface waters, wetlands, and floodplains and change local hydrologic and hydraulic conditions.

Proposed Action

Local, short-term minor impacts to surface water from sedimentation during vegetation removal could occur. To minimize impacts, vegetation management activities would be restricted within riparian management areas between 10 to 100 feet from a stream's OHWM (ODF 2014, OAR 629-635). Riparian management area restrictions would include retaining understory vegetation with 10 feet of the OHWM, trees within 20 feet of the OHWM, all trees leaning over a channel, and all downed wood and snags (ODF 2014, OAR 629-640). These restrictions would minimize the release of sediments by limiting ground-disturbing activities near streams. Project area specific stream buffers would be established during the initial site assessment for property owner participants.

Long-term minor adverse impacts to water quality, including temperature and dissolved oxygen, could occur but would be minimized by adhering to stream buffers described

above. ODEQ and EPA consider four streams to be impacted for these parameters near the project area: Sprague River, Williamson River, Crescent Creek, and Klamath River. However, project activities are not anticipated to further degrade water quality.

Potential adverse impacts to the Wild and Scenic River reach of Crescent Creek are not anticipated because of adherence to the above discussed stream buffers on tributaries to the river and as a result of project activities being relatively distant from the designated reach.

Most riparian wetlands would be avoided by restricting work within riparian management areas. If these work-restriction buffers are not followed, there would be the potential for minor to moderate adverse impacts, depending on the intensity of fuels reduction activities.

Impacts on floodplains are not anticipated. The stream buffers described above would be required. The Proposed Action would not increase flood elevations or velocities because modifications to banks would not occur and land in the floodplain would not be built up. If work is not restricted in the stream buffers, there would be potential for localized minor to moderate adverse impacts, depending on the intensity of fuels reduction activities. Vegetation removal in the WUI would not promote floodplain occupancy.

In the long term, the mitigated properties that maintain defensible space would be expected to be less vulnerable to catastrophic wildfires and thus less likely to contribute to post-burn erosion and sedimentation of water resources. Thus, depending on the scale of participation and how contiguous the mitigated properties are, the Proposed Action is expected to have a minor positive effect on water resources from the reduced wildfire vulnerabilities in treated locations.

4.3 BIOLOGICAL RESOURCES

4.3.1 Vegetation

Vegetation in the County varies from forested, mountainous terrain in the Cascades to the west and high plateau to the north and east to the Klamath River drainage and high desert prairie to the south. Oregon vegetation data from the Northwest Habitat Institute were used to assess vegetation communities in the County and project area (NWHI 2000). Predominant conifer forest species include ponderosa pine, lodgepole pine, mountain hemlock (*Tsuga mertensiana*), western juniper, incense-cedar (*Calocedrus decurrens*), grand fir (*Abies grandis*), and Douglas fir. Grasslands, shrubland, and sagebrush steppe are common in the southeast portion of the County in the high desert prairie, and agriculture is common along major rivers valleys and surrounding Upper Klamath Lake and Klamath Marsh. Agricultural crops include barley, oats, and forage land (USDA 2012). The project area is generally heavily forested but agricultural land, grasslands, and sagebrush steppe are present along river valleys and roads. Invasive

non-native plants are also present in the project area, especially along streams and roads.

- Bly Mountain is predominantly ponderosa pine and western juniper forests. Grasslands and sagebrush steppe are also common along Modoc Billy Creek and roads.
- Chiloquin is predominantly ponderosa pine and lodgepole pine forests. Agricultural land, grasslands, and riparian plant communities are present along Larkin Creek, Sprague River, and Williamson River.
- Crescent Lake is predominantly ponderosa pine, lodgepole pine, grand fir, mountain hemlock, and Douglas fir forests. Grasslands and riparian plant communities are present in Crescent Creek, Cold Springs Creek, and Johnston Creek.
- Keno is predominantly ponderosa pine and western juniper forests. Agriculture, grasslands, and sagebrush steppe are also common along Klamath River and roads.
- Scott Creek is predominantly ponderosa pine and lodgepole pine forests. Grasslands are present in rural properties along roads.

The overgrowth of trees, forest floor fuels, and an abundance of dead or dying vegetation in the project area contribute to a substantially elevated risk of wildland fires that is difficult to control.

4.3.2 Wildlife and Fish

The U.S. Fish and Wildlife Service (USFWS) Office of Migratory Bird Management maintains a list of migratory birds (50 CFR § 10.13). The Migratory Bird Treaty Act of 1918 (MBTA), as amended (16 U.S.C. §§ 703–711), provides Federal protections for migratory birds and their nests, eggs, and body parts from harm, sale, or other injurious actions. The act includes a “no take” provision.

Common MBTA bird species of the mixed conifer forest of this region include bald eagle (*Haliaeetus leucocephalus*), Cassin’s finch (*Carpodacus cassinii*), olive-sided flycatcher (*Contopus cooperi*), pinyon jay (*Gymnorhinus cyanocephalus*), and Williamson’s sapsucker (*Sphyrapicus thyroideus*). Common MBTA bird species of shrubland of this region include brewer's sparrow (*Spizella breweri*), calliope hummingbird (*Stellula calliope*), ferruginous hawk (*Buteo regalis*), and sage thrasher (*Oreoscoptes montanus*). A list of the MBTA species common in Klamath County is provided in Appendix D. The Klamath Basin is part of the Pacific Flyway and is considered a major stopover location for avian species. Ducks, geese, herons, egrets, grebes, and other water-loving birds congregate in the lakes and wetlands of the Klamath Basin. The nesting season for migratory birds is generally from April 15 through July 31, depending on species and location (City of Portland 2010).

Resident mammals include such species as coyote (*Canis latrans*), pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), porcupine (*Erethizon dorsatum*), deer mouse (*Peromyscus maniculatus*), bushy-tailed woodrat (*Neotoma cinerea*), voles (*Microtus* spp.), yellow-pine chipmunk (*Tamias amoenus*), and Douglas squirrel (*Tamiascirurus douglasii*) (Eder 2002).

Typical reptiles in the project area may include such species as western fence lizard (*Sceloporus occidentalis*), western skink (*Eumeces skiltonianus*), gopher snake (*Pituophis catenifer*), and garter snake (*Thamnophis* sp.). Amphibians may include bullfrog (*Rana catesbeiana*), Pacific treefrog (*Pseudacris regilla*), and Great Basin spadefoot (*Spea intermontana*).

Common warm-water fish species found in the upper Klamath Lake watershed include largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), bullhead (*Ameiurus)*, black crappie (*Pomoxis nigromaculatus*), white crappie (*Pomoxis annularis*), bluegill (*Lepomis macrochirus*), pumpkinseed (*Lepomis gibbosus*), yellow perch (*Perca flavescens*), warmouth (*Lepomis gulosus*), channel catfish (*Ictalurus punctatus*), and Sacramento perch (*Archoplites interruptus*) (ODFW 2014).

4.3.3 Threatened and Endangered Species and Critical Habitat

The Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §§ 1531–1544), was established to conserve, protect, and restore Threatened and Endangered species and their habitats. Section 7 of the ESA (16 U.S.C. § 1536) requires Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species and do not result in adverse modification to designated critical habitat.

The USFWS database identified seven Threatened and Endangered species with potential to occur in the project area (USFWS 2014b). There are no National Marine Fisheries Service–listed species with potential to occur in the project area. Six of the seven Threatened and Endangered species are known to occur within the project area. They are Oregon spotted frog (*Rana pretiosa*), bull trout (*Salvelinus confluentus*), shortnose sucker (*Chasmistes brevirostris*), Lost River sucker (*Deltistes luxatus*), gray wolf (*Canis lupus*), and northern spotted owl (*Strix occidentalis caurina*). The six species are discussed in more detail below.

The other Threatened and Endangered species is Applegate's milk-vetch (*Astragalus applegatei*). A historical record occurs at a site along the Klamath River, within 0.5 mile of the Keno community. This site was last found in 1931; widespread habitat conversion to fields and pastures since then has likely extirpated this species at the Keno community (USFWS 2009).

Applegate’s milk-vetch is not discussed further in this EA because it has no potential to occur within the project area.

Proposed critical habitat for Oregon spotted frog is present in the Crescent Lake community. Critical habitat for northern spotted owl also abuts the northeastern corner of the Crescent Lake community. Critical habitat for bull trout occurs near but not in the Crescent Lake community. Critical habitat for Lost River sucker and shortnose sucker occurs near but not in the Chiloquin and Keno communities.

Oregon Spotted Frog

Oregon spotted frog was listed as threatened on August 29, 2014 (79 F.R. 51658–51710). Critical habitat was proposed on August 29, 2013, but it is not yet final (78 F.R. 53537–53579). This species occupies emergent wetland habitats in forested landscapes, though it is not typically found under forest canopy. Oregon spotted frog is completely dependent on perennial bodies of water (e.g., a spring, pond, lake, sluggish stream, irrigation canal, roadside ditch). It does not have a terrestrial life stage as many other species of frog do. They are known to occur in sites as small as 2.5 acres and as large as 4,915 acres. They are known to occur at the present time in the Williamson River sub-basin (Klamath Marsh–Jack Creek, west of Klamath Marsh and Williamson River above Klamath Marsh), Upper Klamath Lake sub-basin (Wood River and Klamath Lake watersheds), and Upper Klamath sub-basin (Spencer Creek and Jenny Creek) (79 F.R. 51658–51694). None of these occupied areas are within the project area.

Proposed critical habitat for Oregon spotted frog occurs at the Crescent Lake community along Cold Spring, Crescent and Johnston Creeks, and associated wetlands. According to USFWS biologists, Oregon spotted frog would not be present in terrestrial habitats, even if they were mapped as critical habitat. This determination was confirmed by USFWS biologist Jennifer O'Reilly (USFWS 2014c).

Bull Trout

The USFWS issued a final rule listing for the bull trout in the coterminous United States as a threatened species on November 1, 1999 (USFWS 1999). A revised draft recovery plan for the species was released in 2014 (USFWS 2014d). On September 30, 2010, the USFWS designated critical habitat for bull trout throughout its U.S. range (USFWS 2010).

Bull trout have stringent requirements for cold water and clean gravel to rear and reproduce, and spawning usually occurs in mountain streams fed by snow-melt or springs fed by snow fields (Goetz et al. 2004). The habitat components required by bull trout are often summed up by the "Four C's": cold, clean, complex, and connected. Bull trout exhibit patchy distributions because even under pristine conditions, the required habitat components are not ubiquitous throughout river basins.

Bull trout in Klamath County are part of the Klamath River distinct population segment (DPS), but the species does not occur within any "core areas" of the Klamath Recovery Unit (USFWS 2014d). The Crescent Lake community is the exception: it occurs in the

Coastal Recovery Unit and drains to the Upper Deschutes River Historic Core Area (USFWS 2014d), though it does not fall within the core area. The nearest critical habitat for bull trout occurs 1.5 miles north of the Crescent Lake community in Odell Creek and Odell Lake and 3 miles west of the Chiloquin community in Crooked Creek. Bull trout have been identified in Crescent Creek, which runs through the Crescent Lake community (ORBIC 2014).

Lost River Sucker and Shortnose Sucker

Both Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*) are Federally and Oregon-listed Endangered species. A recovery plan was finalized in 1993 and revised in 2013. Designated critical habitat was finalized on December 11, 2012 (77 F.R. 73740–73768). They are endemic to the upper Klamath River Basin and spawning is known to occur on the Williamson River and Sprague River (USFWS 2013). These species are found in Sprague River in the Chiloquin community and Klamath River in the Keno community (ORBIC 2014).

Lost River sucker and shortnose sucker are relatively tolerant of degraded water quality conditions, including temperature and dissolved oxygen, but water quality often becomes poor enough to affect both species, especially in summer. Habitat for these species has declined due to the conversion of wetlands to agricultural use and the construction of irrigation and hydroelectric facilities. Both communities are in the Upper Klamath Lake Recovery Unit (USFWS 2013).

Designated critical habitat for both species occurs in the vicinity of the Chiloquin and Keno communities in the Upper Klamath Lake Unit. At Chiloquin, the Sprague River is approximately 50 feet west of the community (Figure 3). At Keno, the Klamath River runs through the middle of several sub-areas, though it does not occur within the community. At the nearest point, critical habitat is approximately 400 feet from the project area. This habitat was occupied by both species at the time of critical habitat designation (77 F.R. 73740–73768).

Gray Wolf

Gray wolves are generalists that use a broad spectrum of elevations and habitats. They typically avoid areas with greater than 1 mile of road per square mile, primarily because of the increased human presence in those areas (Thiel 1985; Wisdom et al. 2000). However, they may inhabit areas with greater road densities if those habitats are adjacent to relatively undeveloped areas (Mech 1989). Wolves den in areas near forest cover and ungulates for prey that are away from human activity. Denning is from mid-April to July, and wolves are sensitive to disturbance during that time. They use rendezvous sites for resting and gathering areas after the pups are mobile enough to leave the den. Rendezvous sites are often around meadows near forested stands that provide resting areas under trees. Ungulates comprise 85 to 95 percent of their diet,

and beavers, snowshoe hares, and other small animals may make up the remainder. Carrion and livestock may also be a food source (Mech 1970; Witmer et al. 1998). In Oregon, the gray wolves are concentrated in the northeast corner of the state.

Areas of known wolf activity include an individual collared as “OR7” in Klamath and Jackson County. This individual has a mated and produced a pup in 2014 in the Rogue River-Siskiyou National Forest (ODFW 2014). The nearest project area to Rogue River-Siskiyou National forest is more than 10 miles to the east.

Northern Spotted Owl

The northern spotted owl is a Federal and Oregon State-listed species. The northern spotted owl was listed as threatened on June 26, 1990 (55 F.R. 26114–26194). A draft recovery plan was published in 1992 (USFWS 1992). An update on the status and trends for this species was published in 2011, including Geographic Information System (GIS) modeling of suitable habitat (Davis et al. 2011).

The northern spotted owl is a forest bird that inhabits old-growth coniferous and mixed conifer-hardwood forests from British Columbia through northern California. Suitable habitats for spotted owls provide elements necessary for nesting, roosting, foraging, and dispersal. Characteristics of nesting and roosting on the east slope of the Cascade Mountains in Oregon generally includes a narrow forested band below the high-elevation subalpine forests and above the low-elevation lodgepole pine/ponderosa pine forests. Habitat in the Deschutes National Forest includes stands of mixed conifer, ponderosa pine with white fir understory, and mountain hemlock with subalpine fir. Suitable habitat is naturally fragmented by instrusions of lava and other forest types, as well as by recent harvest or wildfires. Suitable habitat is not found in large patches but usually occurs as inclusions within a larger stand. In addition, trees with various structural deformities (cavities, broken tops, mistletoe infections) and large snags are also characteristic of northern spotted owl habitat, as well as accumulated fallen trees and debris on the forest floor (USFWS 1992). Most nest and roost sites are within forest stands with heavy canopy habitat and semi-open understory. In the Deschutes National Forest, nest trees are predominantly large Douglas fir trees. Foraging and dispersal habitats may be in younger, more open and fragmented forests than those associated with nesting and roosting (USFWS 1992)

No known northern spotted owl nests occur in any of the project area communities (ORBIC 2014; USFS 2014b). There is no northern spotted owl habitat at the Scott Creek or Bly Mountain communities (Willy 2014). At the Keno community, the forest is not considered suitable for northern spotted owls. The eastern portion of the Chiloquin community is also not suitable habitat; the western portion may have a small amount of dispersal habitat mixed with not suitable habitat (Willy 2014). There is no designated critical habitat for northern spotted owl within the project area.

The Crescent Lake community is surrounded by the Deschutes National Forest. Portions of the Deschutes National Forest to the north and east of Crescent Lake are considered suitable for northern spotted owl nesting, roosting and foraging (USFS 2014a). A professional biologist conducted a site visit to Crescent Lake on October 7, 2014 to evaluate northern spotted owl habitat. The forest community at Crescent Lake is largely comprised of small diameter lodgepole pine, not previously limbed or thinned. There were a few Engelmann spruce (*Picea engelmannii*) and Douglas fir intermixed with the lodgepole pine. Quaking aspen (*Populus tremuloides*) and willow (*Salix* spp.) occurred intermittently, mostly near road edges and water features. According to USFS guidance (USFS 2014b), this forest composition is not considered suitable northern spotted owl habitat for the Deschutes National Forest region. This determination was confirmed by USFWS biologist Jennifer O'Reilly (USFWS 2014c).

4.3.4 Other Special-Status Species

Three species are listed in Klamath County as Candidate Species under the ESA: fisher (*Martes pennanti*), greater sage-grouse (*Centrocercus urophasianus*), and whitebark pine (*Pinus albicaulis*). Candidate Species are those that have been petitioned and are actively being considered for listing as Endangered or Threatened under the ESA. Candidate Species are afforded no protection under the ESA. In 1980, a fisher was trapped near Fawn Lake, approximately 2.5 miles northwest of the Crescent Lake community (ORBIC 2014). Greater sage-grouse is not known to occur in forested habitat. Whitebark pine occurs in high-elevation alpine forests, which does not occur in the project area.

Data from the Oregon Biodiversity Information Center (ORBIC) was queried for other known special-status species in and near the project area (ORBIC 2014). The resulting data show that Oregon State Vulnerable species American Marten (*Martes americana*) and Federal Species of Concern Pacific pond turtle (*Actinemys marmorata*) are in the Crescent Lake community. A gray wolf record from 1930 also exists in this area, though the species has since been extirpated. At the Chiloquin community, Pacific pond turtle and Federal Species of Concern Klamath largescale sucker (*Catostomus snyderi*) are known to occur in the Sprague River and associated wetlands.

The Keno community includes historical records of Federal Species of Concern short-podded thelypody (*Thelypodium brachycarpum*) and polished willow (*Salix laevigata*) (ORBIC 2014).

The Federal Bald and Golden Eagle Protection Act prohibits the taking of either species, including their parts, nests, or eggs. Bald eagles are abundant in the Upper Klamath Basin, especially in winter. A bald eagle winter roosting concentration is known to occur in Bear Valley, approximately 3,700 feet from a portion of the Keno community. This winter roost was first documented in 1897. It is considered the largest winter roost for

bald eagles in the Klamath Basin. The area is used November to March, with a peak of 100 to 300 eagles in January (ORBIC 2014).

In general, bald eagle nest locations have not been monitored since 2005 to 2006, when this species was ESA delisted. Numerous bald eagle nests are known from Klamath County, but none are presently known within 660 feet of the project area (ORBIC 2014). Bear Valley National Wildlife Refuge was established in 1978 to protect this roost (USFWS 1996).

4.3.5 Consequences of Alternatives

No Action Alternative

Under the No Action Alternative, vegetation management activities would not be funded; however, some wildfire mitigation activities would be expected to continue as initiated by property owners, through existing local programs and requirements, or as required by homeowners insurance providers. The existing high risk of vegetation loss from catastrophic wildfires would continue, as would vulnerabilities to biological resources (e.g., wildlife and fish).

Vegetation management activities could cause minor localized and temporary disturbance to wildlife, including ESA-listed species. There would be human activity or noise associated with chainsaws, chippers, brush mowers, and masticators. Future uncontrolled wildfires, especially catastrophic fires, could affect wildlife through the loss of habitat or the mortality of individuals. These impacts to biological resources could be minor to moderate, depending on the severity and location of the wildfires.

Proposed Action

Vegetation

As defensible spaces are established and maintained as part of the Proposed Action, various disturbances from work crews, removal of individual small trees and brush, and hand pruning or limbing may result in local, indirect, and minor adverse effects on native plant communities. Examples of the types of vegetation to be treated are ponderosa pines, Douglas firs, lodgepole pines, junipers, sagebrush, bitterbrush, and invasive species. However, many of the properties have non-native ornamental or weedy species in the potential treatment areas. Trimming or removing these plants would not negatively affect native plant communities. Because these activities involve negligible ground-disturbance and would be done mostly by hand, the potential is low that new invasive plant species populations would become established or that existing populations would expand as a result of the Proposed Action.

Wildlife, Fish, and Threatened and Endangered Species

Wildfire fuel-reduction activities to establish the defensible spaces could have minor, localized, and scattered impacts on wildlife through habitat modification. Various factors, including changes in food sources, shelter, population density, and dispersal effort, would determine the severity of impacts to non-listed wildlife. Adverse effects from maintenance of defensible spaces would be negligible.

No permanent conversion of forested habitat to other types of habitat is anticipated as part of the Proposed Action. The project area would remain as upland forest habitat, and wildlife habitat would in general remain intact. The Proposed Action would focus only on limited thinning of existing forest and removing biomass near structures.

Temporary disturbance to wildlife could occur from the physical presence of workers and by noise generated from the equipment used (e.g., chainsaws, chippers, brush mowers, masticators). The disturbance is anticipated to be of short duration (no more than a few days) on each property during the first year. The disturbance could result in temporary avoidance of the area by wildlife. Additional disturbance may occur once a year for at the 5-year maintenance period. Impacts on wildlife from the temporary disturbance are considered minor because of the short duration of work on any given parcel. Impacts are also considered minor because the most intense treatment would occur within a limited radius of existing homes and structures where localized human activity already occurs.

Work that occurs during the summer bird breeding season (generally mid-April through late-July) may have minor impacts on nesting birds and birds protected under the MBTA. The disturbance could result in abandonment of nesting efforts or displacement from preferred foraging areas, which would affect ground-nesting and shrub-nesting birds to a greater extent than birds that nest in the upper canopy of trees. Cavity-nesting birds such as woodpeckers and nuthatches may be disproportionally affected because of the emphasis on removal of dead or dying trees (snags). To minimize the potential for migratory bird effects, initial treatment activities will be precluded during the nesting season, unless a project site survey determines there would be no migratory birds affected by treatment activities. Small mammals and reptiles may lose some habitat as a result of the removal of downed wood.

The Proposed Action would benefit wildlife habitat and species in the long term by reducing the risk of catastrophic loss from future wildfires, in terms of habitat degradation and mortality.

There would be no impact to ESA-listed aquatic species (e.g., bull trout, Oregon spotted frog, shortnose sucker, Lost River sucker) because work would be prohibited within 100 feet of the OHWM of the Sprague River and Williamson River at the Chiloquin community, Crescent Creek at the Crescent Lake community, and the Klamath River at the Keno community. Vegetation management activities would be restricted within

riparian management areas between 10 to 100 feet from a stream's OHWM (ODF 2014, OAR 629-635). Riparian management area restrictions would include retaining understory vegetation within 10 feet of the OHWM, trees within 20 feet of the OHWM, all trees leaning over a channel, and all downed wood and snags (ODF 2014, OAR 629-640). Project area specific stream buffers would be established during the initial site assessment for property owner participants. Most riparian wetlands would be avoided by restricting work within the above buffers.

Impacts on the northern spotted owl are considered negligible. No known nests occur in or near the project area, and there is no suitable habitat in the project area.

Impacts on the bald eagle winter roosting population would be avoided because work would be prohibited during November through March, when the known roost in the Bear Valley National Wildlife Refuge may be vulnerable to disturbance.

There would be no impact to Applegate's milk vetch, gray wolf, or other special-status species because they are not known to occur in the project area.

4.4 CULTURAL RESOURCES

Cultural resources consist of locations of human activity, occupation, or use identified through field inventory, historic documentation, or oral evidence. The term encompasses historic properties as defined by the National Register of Historic Places (NRHP), including archaeological and architectural properties as well as sites or places of traditional cultural or religious importance to Native American Tribes or other social or cultural groups.

Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (16 U.S.C. § 470f), requires that activities needing Federal permits or using Federal funds undergo a review process to consider historic properties that are listed in or may be eligible for listing in the NRHP. The State Historic Preservation Officer (SHPO) is the Federal agency's primary Section 106 partner. Because Section 106 is a process by which the Federal Government assesses the effects of its undertakings on historic properties, it is the primary regulatory framework used in the NEPA process to determine impacts on cultural resources.

In accordance with Section 106, FEMA has delineated the Area of Potential Effects (APE) for the project area, which is approximately 6,416 acres in Bly Mountain, Chiloquin, Crescent Lake, Keno, and Scott Creek, encompassing about 1,700 lots (Appendix A, Figures 2 through 6).

4.4.1 Ethnographic and Historical Context

Ethnographic Period

During the ethnographic period, the project area was within the territory used primarily by the Klamath, a Lutuami-speaking group that occupied the Klamath-Sprague River Basin to the north of Bly Mountain. The closely related Modoc occupied the Lower Klamath Basin and Lost River area to the south as far as the mountains beyond Goose Lake, and the Yahooskin Bands of Snake (Northern Paiute) occupied the area east of the Yamsay Mountain, south of Lakeview, and north of Fort Rock. Under the terms of the Klamath Treaty of 1864, the Klamath, Modoc, and the Yahooskin Bands of Snake Indians ceded most of south-central Oregon, approximately from the Cascade Range summit to Harney Lake, and from the south end of Goose Lake to Lava Butte, near Bend. The treaty allowed the Klamath to retain much of their homeland to serve as a reservation to be occupied by all three groups, who were recognized as one tribe, the Klamath (Stern 1966). In 1954, the Klamath Tribes and their reservation were terminated from Federal recognition. The reinstatement and Federal recognition of the tribe occurred in 1986, but the land base of the tribe was not restored (Stern 1998).

The Klamath practiced a seasonal subsistence and settlement system that included living in permanent settlements during the winter and moving among resource camps (i.e., fishing stations, root-gathering camps, and hunting camps) during the summer. Winter villages were composed of clusters of two to eight houses concentrated along rivers and marshes. The houses were typically circular semi-subterranean earthen lodges up to 40 to 50 feet in diameter and were occupied by an extended family. Mat-covered lodges were built at temporary summer camps (Spier 1930; Stern 1998).

The Klamath were primarily riverine in orientation; however, marshlands also played an important role in Klamath economic life (Spier 1930). Fish, including several species of suckers and salmon, and plants, particularly the bulbs or seeds of wokas (Nuphar polysepalum), camas (Camassia quamash), and epos (Perideridia sp.), were considered the primary food staples for the Klamath. These resources were collected in bulk during the summer and fall months and processed and stored for winter consumption (Barrett 1910; Spier 1930). The Klamath also relied on a variety of small and large game, berries, nuts, seeds, and the cambium layer of pine bark (Ray 1963; Spier 1930; Stern 1998). This pattern of subsistence and settlement was established throughout prehistory and persisted into the ethnographic period until Euroamerican settlement and subsequent establishment of reservations resulted in a disruption to the native economy in the Klamath Basin by the middle of the nineteenth century.

Historical Period

Exploration and Contact

Fur trappers from the Hudson's Bay Company were the first Euroamericans to record contact with Klamath people in the early 1820s. Peter Skene Ogden, a trapper, had been sent on multiple expeditions to expand the Canadian company's reach in the Oregon Country; he led a brigade that arrived in the Klamath Basin in 1826 (Beckham 2000). Other trappers and explorers followed in subsequent years, including prospectors looking for gold following the 1849 California gold rush and settlers migrating westward.

Most settlers followed the primary route of the Oregon Trail, located well north and east of Klamath County, but those who headed south followed the Applegate Trail or Southern Emigrant Route, a spur that cuts through the Black Rock Desert and Klamath Basin and leads west to the Rogue River Valley. It was an old fur trapper trail that was identified in 1846 by an exploring party that included Jesse and Lindsay Applegate and Levi Scott (Beckham 2000). The Applegate Trail facilitated settlement of the Klamath Basin and the Rogue Valley.

Early Settlement

The first Euroamericans to settle and remain in the Klamath Basin did so in the late 1860s, but only in small numbers (Tonsfeldt 1990). Early settlers were cattle ranchers who used the riparian grasslands for grazing. Westward migration and settlement of the Oregon Country was in full swing by the 1860s. While the first wave of settlers ended up in the valleys west of the Cascade and Siskiyou Ranges, the second wave began the settlement of lands east of the Cascades and Siskiyous. Many of these settlers were cattle ranchers or sheep farmers looking for large tracts of rangeland for their livestock.

By 1882, the Klamath Basin population was large enough to divide Klamath County from Lake County. Linkville, later renamed to Klamath Falls, was designated as the county seat (Tonsfeldt 1990). Most of Klamath County's population, then as now, was in the county's south-central region.

Railroads and Logging

Although the first railroad in Klamath County was Southern Pacific's Weed (California) to Klamath Falls route, built in 1909, the Pacific Railroad Survey had passed through the Klamath Basin in 1855 and identified the Klamath Basin as being on the ideal path of both north/south and east/west connector routes (Tonsfeldt 1990). The Weed to Klamath Falls railroad began as the Weed Lumber Company's logging railroad, and it dramatically improved transportation to the Klamath Basin and opened the area to logging (Tonsfeldt 1990). Over the course of the first half of the twentieth century, multiple logging railroads were built in Klamath County to transport logs from the forests

to the mills and lumber from the mills to markets. Before the arrival of the railroads, the few mills that existed in Klamath County produced lumber primarily for the local market, because of the lack of efficient transportation. Once the rail connection was established, logging dramatically increased in the forests of Klamath County and many new mills were created (Bowden 2003). Mill towns like Chiloquin, Sprague River, and Bly flourished during the logging boom of the 1920s (Tonsfeldt 1990). During the course of the twentieth century, the logging industry in Klamath County experienced boom-and-bust cycles as a result of economic and environmental factors.

Agriculture and Irrigation

As noted above, many of the early settlers were cattle ranchers. Agriculture in the Klamath Basin was slower to develop due to the high elevation and alkali soils. Southern Klamath County receives an average of about 9 to 17 inches of precipitation a year (depending on the area), which is not sufficient for many crops (Foster 2002). As a result, irrigation projects were needed to make farming possible. As of 1903, about 10,000 acres in the Klamath Basin were being irrigated by privately funded irrigation projects (Foster 2002).

After President Theodore Roosevelt signed the Reclamation Act of 1902, the Reclamation Service (later to become the Bureau of Reclamation) initiated the Klamath Project, one of the most ambitious early reclamation projects (Klamath County Historical Society 1984). For the Klamath Project, the Reclamation Service proposed to divert the Lost River so that it no longer flowed into Tule Lake in Northern California. The diverted river would instead provide irrigation water to farmers in the Klamath Basin, and the former Tule Lake basin, lacking an inlet, would dry up and become available for farming. Lower Klamath Lake, also in Northern California, would similarly be deprived of its inlet to create additional farmland (Foster 2002).

Implementation of the Klamath Project in the 1900s and 1910s was controversial, because in 1908 President Roosevelt designated Lower Klamath Lake as the nation's first wildlife refuge in recognition of the lake's importance to migratory waterfowl (Foster 2002). Tule Lake was later designated as a National Wildlife Refuge as well. Dewatering these two lakes resulted in massive bird and fish die-offs. To further complicate the matter, the Klamath and Modoc tribes had historically relied on fish from the Klamath Basin. Water rights and the allocation of water between environmental and agricultural needs has been a constant theme throughout the past century.

Federal Lands

The majority of Klamath County is under Federal ownership. Crater Lake National Park was established in 1902 and its lodge was opened in 1915. National Forests include the Rogue River-Siskiyou, Fremont-Winema, and Deschutes. National Wildlife Refuges include the Klamath Marsh, Bear Valley, and Lower Klamath. The Bureau of Land Management (BLM) also owns a substantial amount of land in the County. Federal

management of these lands has defined allowable uses and the types of development that has occurred (Beckham 2000; Tonsfeldt 1990).

Towns and Communities

- **Bly.** In the late nineteenth century, the small community of Bly formed with a combined hotel and store. The town acquired the name Bly in 1883 after the establishment of Klamath County from Jackson County in 1882. The post office was established in 1883, and later an additional store and hotel, a saloon, and other businesses developed (McArthur and McArthur 2003). The development of Bly was slow until 1928 to 1929, when the construction of the OC&E Railroad line extended toward Bly. Growth continued to accelerate with the establishment of two logging operations and a sawmill in 1931. Ranching and agriculture also remained common occupations for residents (Klamath County Historical Society 1984). The name Bly comes from the Klamath word p'lai, meaning “up” or “high,” referring to its location up the Sprague River from the Yainax Sub-agency.

- **Chiloquin.** The town of Chiloquin was initially a campsite for the Klamath Tribe, and early fur trappers passed through and traded with the Klamath. Chiloquin was within the original Klamath Reservation, so non-tribal settlers were required to purchase allotments to obtain land. The town’s location at the confluence of the Sprague and Williamson Rivers made it appealing to Euroamerican settlers who were mainly loggers, millworkers, and cattlemen. The railroad depot was built in 1912, and the town was incorporated in 1926, with a population of 2,000 (Klamath County Historical Society 1984). Chiloquin’s economy suffered greatly during the Great Depression of the 1930s, when a number of mills and box factories either closed or burned. The last mill in town closed in 1988.

- **Crescent Lake.** Crescent Lake is an unincorporated community west of the eponymous lake. The Southern Pacific Company built a station named Simax near the north end of the lake, but later re-named it Crescent Lake. Shortly after the railroad was completed, the post office was established in 1927 (McArthur and McArthur 2003). The lake itself is a popular recreational area in the Deschutes National Forest.

- **Keno.** The Applegate Trail extends through the town of Keno, named after the first postmaster’s dog in 1887. Josiah Doten, a cattle rancher and butcher, platted the town that year, but his last name was rejected as a town name for its similarity to Dayton (Sisemore 1941). Early residents were cattle ranchers and businesses that supported them, followed by loggers and mill workers in the 1910s and 1920s.

4.4.2 Identification of Historic Properties

The identification of historic properties was completed by URS Group, Inc. (URS) archaeologists Anisa Becker, M.A., and Stephanie Butler, M.A., and URS architectural historian Martha Richards, M.A., who meet the Secretary of the Interior's Professional Qualification Standards for their disciplines. Analysis was based on review of information from digital photographs, readily available materials collected during a desktop review, and a confidential search of the Oregon SHPO Archaeological Database and the Oregon Historic Sites Database. The records search was conducted in August and September 2014 to determine the presence or absence of previously recorded properties and the extent of survey coverage in and near the APE.

Aboveground Historical Resources

Although the Oregon SHPO database includes 50 resources listed as being in the towns of Bly, Chiloquin, Crescent Lake, and Keno, the online map only shows one resource, the Crescent Creek Cottages, as being in the project APE. The last County-wide survey was conducted in 1990 by Ward Tonsfeldt, so any resources that were built between 1941 and 1964—resources that became 50 years old after the 1990 survey—would only be included in the SHPO database if they were surveyed for some other reason, such as Section 106 compliance. The 1990 survey also excluded incorporated towns, so any potentially historic resources in Chiloquin would not have been a part of that survey. U.S. Geological Survey (USGS) topographic maps and aerial photographs show that there are a number of buildings within the project APE, and it is likely that a field survey of the project area would reveal additional historic resources that were not previously recorded.

- **Crescent Lake.** One previously documented historic property is present within the Crescent Lake community. The Crescent Creek Cottages are a complex of four recreational cottages and an associated store that were built in 1936. They are considered potentially NRHP-eligible.
- **Keno.** One aboveground historic resource, the Applegate Trail, is present within the Keno community. The Applegate Trail is recommended as eligible for listing in the NRHP. The segment within the community has not been field-verified, but it is shown in the SHPO database.
- **Bly Mountain, Chiloquin, and Scott Creek.** No previously documented aboveground historic resources.

Archaeological Resources

- **Bly Mountain.** Six archaeological resources are found in the northern and northeastern portion of the Bly Mountain community. In addition to the archaeological resources, traditional cultural properties should be considered in the Bly Mountain community. Mountains are often considered sacred in Klamath-

Modoc culture, and a number of stacked rock features have been documented in the Bly Mountain area. Ethnographic accounts indicate that these features may represent power quest activities and Bly Mountain may be an area of traditional use for spiritual activities (Boynton et al. 2009).

- **Keno.** Twelve archaeological resources have been documented in the northwestern portion of the Keno community.
- **Chiloquin, Crescent Lake, and Scott Creek.** No archaeological resources have been documented.

4.4.3 Summary of Documented Cultural Resources

The cultural resources found within the project area are listed in Table 4-2. Eighteen archaeological resources consisting of nine historic-era sites (including railroad grades and debris scatters), two precontact sites (including rock features and a camp), two multiple component sites, three precontact isolates, and two historic-era isolates are found in the project area. All archaeological sites are considered potentially eligible for listing in the NRHP, and isolated finds are considered ineligible for listing in the NRHP. Two aboveground historic resources, the Applegate Trail and the Crescent Creek Cottages, are also present; both resources are recommended as eligible for listing in the NRHP.

Table 4-2: Previously Documented Cultural Resources within the Project Area

Site/Isolate No.	Name	Description	Eligibility	**Community**
35KL2425	Bend of the River Camp Site	100 pieces of debitage, a few tools, and fire-cracked rocks (FCRs). Features include bedrock mortars and milling slab. Site measures 340 x 241 meters.	Unevaluated	Keno
35KL2833	N/A	Small late historic trash dump consisting of cans, ceramics, and glass fragments. Site surface is 6.25 square meters. Site form also notes 10–99* pieces of lithic debitage. * SHPO states this number could be an error or an incomplete site form and needs field verification.	Unevaluated	Keno
35KL2834	Maple Castoria Site	Late historic can and glass dump with metal and glass domestic trash, between 40 and 50 artifacts. Site surface is 4 square meters^2.	Unevaluated	Keno
35KL2835	N/A	Several hundred cans, bottles, glass, and other artifacts. Site surface is 4,500 square meters^2. Site form also notes 500* pieces of lithic debitage. * SHPO states this number could be an error or an incomplete site form and needs field verification.	Unevaluated	Keno

Site/Isolate No.	Name	Description	Eligibility	**Community**
35KL3103	Weyerhaeuser 100 Railroad Grade	Segment of railroad grade measuring approximately 6,000 feet in length.	Unevaluated	Keno
35KL3338	Cliney Flat Edge Site	22 rock features from prehistoric era. Site measures 190 x 90 meters.	Unevaluated	Bly Mountain
35KL3712	BlyMt12-Site 6 Road Grade	Road grade measuring approximately 0.25 mile in length.	Unevaluated	Bly Mountain
646-1	N/A	Historic scatter of 14 institutional-size cans.	Unevaluated	Keno
646-2	N/A	Historic scatter of 500 cans and bottles. Site measures 40 x 35 meters.	Unevaluated	Keno
646-3	Vehicle chassis	Stripped cab of a Ford vehicle.	Unevaluated	Keno
646-4-1 thru 646-4-11	N/A	Series of 11 discrete dumps along 80-m stretch totaling 700 cans, fragments of ceramic and glass, lard and paint buckets, vehicle tire, and cot and vehicle springs.	Unevaluated	Keno
646-6	N/A	Historic scatter of 75 cans	Unevaluated	Keno
Can Dump #5	N/A	Historic scatter of 24 sanitary and condensed milk cans and fragments of clear -glass canning jars. Site measures 10 x 10 meters.	Unevaluated	Bly Mountain
Lithic Isolate #1	N/A	Obsidian flake	Not eligible	Bly Mountain
Can Isolate #1	N/A	Two large blasting powder cans.	Not eligible	Bly Mountain
Can Isolate #2	N/A	Several large blasting powder cans.	Not eligible	Bly Mountain
IF-JS-1	N/A	Three obsidian flakes; 10-meter-diameter area.	Not eligible	Keno
646-5	N/A	Banded gray and black obsidian lithic debitage.	Not eligible	Keno
N/A	Applegate Trail	Trail.	Eligible	Keno
N/A	Crescent Creek Cottages	Complex of four recreational cottages and associated store, built 1936 along Highway 58.	Eligible-contributing	Crescent Lake

Previously documented cultural resources are rare, primarily because the lands within the project area are largely privately held or County-owned, and have not been inventoried. Areas that have been surveyed have a variety of precontact and historic-era cultural resources. Because the areas that have been inventoried have resulted in the identification of historic and precontact archaeological sites, similar resources would be expected to occur within areas that have never been inventoried for cultural resources. Each of the five project area communities is likely to have evidence for precontact use given the large areal extent of the project and the variety of sensitive

landforms present, such as streams, rock outcrops, ridges, and terraces. Aboveground historic resources that were not previously recorded may also be present within the project APE.

4.4.4 Consequences of Alternatives

No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to reduce fuels in selected areas of Klamath County; however, some wildfire mitigation activities would be expected to continue as initiated by property owners through existing local programs or requirements or as required by homeowners insurance providers. Ground-disturbing activities associated with these activities would be limited. Thus, the potential to impact cultural resources is also expected to be limited. The archaeological sites and historic properties in the project area and others not yet identified would continue to be at risk to damage from wildfires.

Proposed Action

The Proposed Action would reduce fuels around residences in five project area communities in Klamath County. Under the Proposed Action, fuels and other biomass would be removed by means of chainsaws, chippers, brush mowers, and masticators. Areas targeted for vegetation removal include at least a 30-foot radius around main residential structures. Landowners and contractors would conduct vegetation-removal activities by hand, including thinning and trimming. Vegetative debris would be chipped and spread on-site or piled, with some limited burning of piles, or disposed of at one of the Klamath County transfer station and recycling centers. Ground-disturbing activities with the potential to impact cultural resources associated with the project are therefore expected to be limited.

Aboveground Resources

According to the Oregon Historic Sites Database, two historic resources, the Crescent Creek Cottages in the Crescent Lake community, and the Applegate Trail in the Keno community, are within the project APE. Both resources are recommended as eligible for listing in the NRHP. Because no work is proposed on structures, the potential to affect these and unidentified aboveground historic properties is negligible. Depending on the scale and location of treated properties, the Proposed Action could benefit unidentified historic buildings by reducing their vulnerability to wildfires.

Archaeological Resources

The Proposed Action would be implemented in areas generally considered to be archaeologically sensitive, where surface or deeply buried cultural resources could be present, as evidenced by 18 previously recorded archaeological resources within

private and public lands in the APE. Because portions of the project area have not been previously surveyed, additional sites that have not yet been documented are likely present. These sites have not been evaluated for the NRHP and would be treated as potentially eligible.

Although direct impacts to previously documented archaeological sites are not anticipated, Klamath County would be required to avoid these resources as a precaution to prevent even minor potential disturbances, such as pedestrian traffic or vegetation removal across a site. In addition to avoiding known sites, to reduce the potential for impacts to cultural resources, work would be conditioned to maximize all machinery vehicles to stay within existing roads on both public and private lands. Tree limbs would be cut and hauled manually to the machinery staged on the roads. The proposed vegetation thinning and trimming around residential structures would have little potential to affect archaeological resources because of the proposed low-impact methods within a disturbed context. FEMA has determined that no additional identification or evaluation efforts are necessary and that the Proposed Action would have no effects on archaeological properties.

FEMA requires all its funded ground-disturbing projects to protect cultural resources during site work. In the event of an unanticipated discovery—and in compliance with State and Federal laws protecting cultural resources, including Section 106—all work is required to cease in the immediate vicinity of the find until the appropriate parties (including the SHPO) are consulted and an appropriate resolution plan is established.

FEMA provided these Section 106 findings and determinations in a formal letter to the SHPO, and received concurrence on October 16, 2014. Also, a Section 106 consultation letters dated September 30, 2014, was sent to the Klamath Tribe and no response has been received to date.

4.5 SOCIOECONOMIC RESOURCES

4.5.1 Public Safety

Residential development in the wildland-urban interface places communities at risk of a catastrophic wildfire and threatens public safety. Fire alerts, warnings, and evacuations are designed to prepare communities to be proactive in preventing wildfires and to respond immediately if an evacuation is declared. Wildfires can put homes directly at risk and also result in transportation and utility failures, flash flooding and mudslides, and air pollution concerns. Emergency responders typically coordinate with communities as wildfires approach and educate homeowners on how to protect their home and safely evacuate. It is important for the public to stay informed about the current risk of wildfire in their community and discuss an evacuation plan with families and neighbors. Many local and state media resources (e.g., television, radio,

newspaper, the Internet), telephone numbers, local emergency response offices, and word of mouth inform the public on wildfire risk in their area.

4.5.2 Environmental Justice

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from Federal programs, policies, and activities. Socioeconomic and demographic data for residents in the project vicinity were studied to determine if the Proposed Action would have disproportionate impacts on minority or low-income persons.

Data from the 2012 Census American Community Survey 5-year estimates for Klamath County were used to identify the minority[1] and low-income[2] compositions of the project area, which are in Census Tracts 9701, 9702, 9703, 9705, and 9709. In the project area communities, the minority population was approximately 12 percent and the poverty rate was approximately 19 percent (U.S. Census Bureau 2012). Because these levels are the same or lower than in Klamath County as a whole, minority and low-income populations are not considered to be present in the project area.

4.5.3 Consequences of Alternatives

No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to reduce fuels; however, some wildfire mitigation activities would be expected to continue as initiated by property owners, through existing local programs and requirements, or as required by homeowners insurance providers. In the event of a wildfire, there would be an increased risk to public safety and emergency responders in these communities. Because project area communities have high hazards (e.g., weather, topography, fuel) and moderate protection capabilities, an evacuation and emergency response in these communities could be challenging. There are no minority or low-income populations in the project area; therefore, no disproportionally high and adverse effect would occur.

[1] A minority is "a person who is: (1) Black (a person having origins in any of the black racial groups of Africa); (2) Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); (3) Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or (4) American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through Tribal affiliation or community recognition)" (U.S. Census Bureau 2014).

[2] A person with low income is identified as "one whose median household income is at or below the Department of Health and Human Services poverty guidelines" (USHHS 2013). Income data based on Department of Health and Human Services guidelines are difficult to gather, so U.S. Census Bureau data are often used for environmental justice analyses.

Proposed Action

Properties with maintained defensible space would be expected to be less vulnerable to catastrophic wildfires. Reducing the risk or severity of wildfires would generally have a positive effect on public safety and emergency responders because of the consequent reduction in risk to structures, roads, utilities, and air pollution. The project area was chosen as a high priority for mitigation based solely on the need to protect residences from wildfires; demographics were not a factor in the decision. Furthermore, there are no minority or low-income populations in the project area.

4.6 RECREATION

Klamath County is home to many recreational activities (e.g., fishing, hiking, horseback riding, kayaking, boating, biking, birding, hunting, golf). The following recreational areas are adjacent to or near the project area:

- **Deschutes National Forest**. This National Forest contains seven campgrounds (total of 151 campsites), four day-use sites, and three trailheads associated with Crescent Lake near the project area community (USFS 2014c).
- **Fremont-Winema National Forest**. This National Forest has 2.3 million acres and it ranges from heavily timbered in the west to the open Klamath River Basin in the east. The basin contains marshes and meadows associated with Upper Klamath Lake and the Williamson River. Some recreation sites near the project area include the Scott Creek Campground and trail and the Williamson River Campground and trail near the Chiloquin community (USFS 2014d).
- **Collier Memorial State Park**. This State park is approximately 30 miles north of Klamath Falls, near the Chiloquin community. The park contains 68 campsites, a four-corral primitive horse camp and trailhead, a relocated pioneer village, an outdoor museum of historic logging equipment, and hiking trails (OPRD 2014).
- **Cy Bingham Park**. This Klamath County park features 10 campsites, picnic tables, and restrooms and is west of the town of Crescent and east of the project area (Klamath County 2014b).
- **Moore Park**. This regional park (managed by the City of Klamath Falls) includes trails, viewpoints, 68 picnic tables, tennis and volleyball courts, and soccer fields (Klamath Falls 2014). It is about 4 miles north of the Keno community on the south shore of Upper Klamath Lake.

4.6.1 Consequences of Alternatives

No Action Alternative

Under the No Action Alternative, FEMA would not provide funding to reduce fuels; however, some wildfire mitigation activities would be expected to continue as initiated by property owners, through existing local programs and requirements, or as required

by homeowners insurance providers. In the event of a wildfire, ingress and egress to recreational areas could be disrupted. Depending on the size and severity of the wildfire, portions of nearby forests or parks could be damaged or destroyed. Adverse impacts would range from minor to major.

Proposed Action

Project activities would directly avoid recreational areas because private property is targeted in residential areas, but they would occur just outside the boundaries of the Deschutes National Forest and Fremont-Winema National Forest near the Chiloquin, Crescent Lake, and Scott Creek communities. Vegetation removal activities would be coordinated with managing agencies, as required. Thinning and limbing of trees and shrubs is not anticipated to adversely affect recreational activities or viewpoints. Depending on the location and size of treated properties, the Proposed Action could provide some minor benefits to recreational areas by complementing wildfire mitigation that occur within them and help reduce the spread of wildfires.

4.7 CUMULATIVE IMPACTS

CEQ regulations for implementing NEPA require an assessment of cumulative effects during the decision-making process for Federal projects. Cumulative effects are defined as:

> … 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 (40 CFR § 1508.7).

Cumulative effects were determined by combining the effects of these alternatives with other past, present, and reasonably foreseeable future actions.

Ongoing wildfire mitigation activities on neighboring tracts of land; as initiated by residential landowners and private, local, State, or Federal entities that are similar in scale to those of the Proposed Action would further reduce the possibility of an intense and widespread wildfire in the project area. The Klamath County Planning Department property development standards are shown in Appendix B. These standards apply to all new developments zoned Forestry and Forestry/Range and to all new developments located in an area identified as having a medium, high, or extreme hazard rating on the wildland hazard ratings map in the comprehensive plan. BLM, National Park Service, ODF, USFWS, and USFS have ongoing fuels reduction programs through prescribed burning and thinning in South Central Oregon near the project area. These agencies have a combined 52 active prescribed burning projects totaling 17,887 acres in 2014 (Lakeview Interagency Fire Center 2014). The nearest prescribed burns to the project area include Bly Ridge about 3 miles east of the Bly Mountain community, Nine Mile

about 6 miles south of the Chiloquin community, and Sting about 8 miles south of the Scott Creek Community. ODF also has ongoing fuels reduction thinning projects in state forest in Klamath County: including 220 acres in Sun Pass State Forest located 4 miles north of the Chiloquin community and west of U.S. Highway 97 (ODF 2010).

Given the small scale and scattered distribution of acreage proposed for treatment by the Proposed Action, when combined with other activities that are planned by the County, State and Federal entities, the Proposed Action is not expected to have adverse cumulative impacts on geology or soils; air quality; climate; water resources, wetlands, or floodplains; wildlife or fish (including ESA-listed species and habitat); historic or archaeological resources; socioeconomic resources or environmental justice; or recreation because no project impacts are anticipated.

Cumulative impacts to wildfire adapted vegetation communities are possible as a result the treatment methodology (limited thinning, removing brush and lower limbs) altering understory characteristics. However, the impacts are expected to be minor, because this methodology may mimic some of the vegetation management effects of periodic low intensity natural wildfires. Furthermore, the cumulative effect of treating contiguous properties reduces the risk of a catastrophic wildfire and consequent widespread loss of vegetative cover. The Proposed Action when combined with other wildfire mitigation activities will reduce overall wildfire risk and benefit public safety.

SECTION FIVE AGENCY COORDINATION AND PUBLIC INVOLVEMENT

During project development, Klamath County coordinated with surrounding jurisdictions, local agencies, homeowners, and landowners in the project area. During preparation of this EA, the SHPO and Klamath Tribe were also contacted for comment.

FEMA initiated the NEPA scoping process by sending out a scoping notice on July 19, 2014, to agencies and interested parties. The purpose of the scoping process was to inform agencies and stakeholders about the Proposed Action and allow the public, organizations, agencies, and Tribes to provide comments regarding the scope of the project, the proposed alternatives, and any environmental and historic preservation issues of concern that should be considered in the draft EA. The 30-day period for scoping comments ended on August 20, 2014. No substantive comments were received.

A public notice is required for the draft EA; a copy of this notice is provided as Appendix E. The public, Tribes, and agencies will have the opportunity to comment on the EA for 30 days after publication of the notice. The notice identifies the action, the location of the proposed target communities, the participants, and the location of the draft EA, and indicates how to submit comments. FEMA will review all substantive written comments for issues that need to be addressed with the County and will incorporate any resolutions into the final EA, as appropriate.

The *State of Oregon Enhanced Mitigation Plan* (Oregon Partnership for Disaster Resilience 2012), the *Klamath County Multi-Jurisdictional Natural Hazards Mitigation Plan* (Klamath County 2011), the *Klamath County Wildfire Protection Plan* (Klamath County 2007), the *Chiloquin-Agency Lake Rural Fire Protection District Community Wildlife Protection Plan* (Chiloquin-Agency Lake Rural Fire Protection District 2005), the *Keno Community Wildfire Protection Plan* (Keno Rural Fire Protection District 2006), and the *Walker Range Community Wildfire Protection Plan* (Walker Range Forest Protective Association 2012) are relevant to public involvement efforts supporting this draft EA.

5.1 STATE OF OREGON NATURAL HAZARDS MITIGATION PLAN

The *State of Oregon Natural Hazards Mitigation Plan* (Oregon Partnership for Disaster Resilience 2012) performed a risk assessment to identify natural hazards, outlined strategies, programs, and goals for each hazard, and proposes mitigation strategies. Preparation of the plan included coordination with State and local stakeholders. The Oregon Partnership for Disaster Resilience facilitated the plan process and the Interagency Hazard Mitigation Team (IHMT) for the State served as the plan's coordinating body. The IHMT consists of about 20 State agencies and organizations. The *State of Oregon Natural Hazards Mitigation Plan* is intended to be used as a resource for the development and/or update of local natural hazard mitigation plans.

The 11 primary natural hazards are coastal erosion, drought, dust storm, earthquake, fire, flood, landslide, tsunami, volcano, windstorm, and winter storm. Wildfire is a common and widespread natural hazard in Oregon, and 22 Oregon communities that border Federal lands are at risk of damage from wildfire. Several hundred additional communities that are in the WUI are also at risk from wildfire.

5.2 KLAMATH COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

The *Klamath County Multi-Jurisdictional Natural Hazards Mitigation Plan* (Klamath County 2011) identifies and summarizes hazard-specific annexes and provides goals and action items to implement mitigation strategies. The lead agencies that developed the plan were the Oregon Partnership for Disaster Resilience, Klamath County, and Klamath Falls. The Project Steering Committee consisted of county and local officials and organizations; other consulting entities included Federal, State, and local agencies and the public.

The seven primary natural hazards covered by the plan are drought, earthquake, flood, landslide, volcanic eruption, wildfire, and winter storm. The County rated the probability (10- to 35-year period) and vulnerability (more than 10 percent of population affected) of a wildfire. The project area communities are listed in the plan as communities with high risk of wildfires, at high hazard once a wildfire starts (e.g., weather, topography, fuel), and with moderate protection capabilities.

5.3 KLAMATH COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

The *Klamath County Community Wildfire Protection Plan* (Klamath County 2007) was prepared to better understand the communities at risk of wildfire. The Community Fire Committee collaborated with Federal, State, and local agencies and solicited public input during the planning process. The plan identifies goals and objectives, action plans, and protection and hazard-reduction recommendations. Ten WUI areas, including the project area communities, were analyzed during the development of this wildfire protection plan.

Priorities in the plan include creating defensible space within 100 feet of structures and in high-fire-hazard private lands, landscape modifications, community involvement, fuel breaks, and other local measures.

5.4 CHILOQUIN-AGENCY LAKE RURAL FIRE PROTECTION DISTRICT COMMUNITY WILDFIRE PROTECTION PLAN

The *Chiloquin-Agency Lake Rural Fire Protection District Community Wildlife Protection Plan* (Chiloquin-Agency Lake Rural Fire Protection District 2005) has a primary goal to "help create communities that are fire safe and at low risk to damage from wildland fires." The Chiloquin Community Wildfire Committee consists of Federal, State, and

local officials and organizations and citizens collaborating during the planning process. The plan identifies fire hazards and structural vulnerabilities, emergency operations, protection and hazard reduction recommendations, and community outreach.

Priorities in the plan include creating defensible space within 100 feet of structures and in high-fire-hazard public/private lands in priority treatment areas A through J.

5.5 KENO COMMUNITY WILDFIRE PROTECTION PLAN

The *Community Wildfire Protection Plan: Keno, Oregon (*Keno Rural Fire Protection District 2006) was prepared in collaboration with Klamath County, ODF, USFS, local fire districts, and other agency representatives and public participation. The plan identifies fire hazards in the area, structural vulnerabilities, emergency management, a management action plan, and a monitoring and evaluation approach.

5.6 WALKER RANGE COMMUNITY WILDFIRE PROTECTION PLAN

The *Walker Range Community Wildfire Protection Plan* (Walker Range Forest Protective Association 2012) was updated by the Steering Committee to develop an action plan and performance measures that will be assessed annually. The Steering Committee includes local fire districts and associations, ODF, USFS, and private timber representatives. The action plan goals and objectives include hazardous-fuels reduction, community infrastructure development, defensible space, fire readiness, and prevention education. The wildland fire assessment in the plan assesses risks and vulnerabilities, ranks communities at risk, and identifies the WUI across the plan area.

SECTION SIX PERMITTING, PROJECT CONDITIONS, AND MITIGATION MEASURES

No permits are anticipated for the Proposed Action. Activities in the project area would comply with the project's scope of work methodology, described in Section 3.

Klamath County would comply with the following project conditions and mitigation measures:

- The County is responsible for selecting, implementing, monitoring, and maintaining Best Management Practices to control erosion and sedimentation, reduce spills and pollution, and provide wetland and habitat protection.
- The County is responsible for securing all applicable local, State, and Federal permitting before site work and complying with any conditions therein.
- In the event that cultural resources are discovered during project activities—and in compliance with State and Federal laws protecting cultural resources, including Section 106 of the NHPA—work in the immediate vicinity would cease, the area would be secured, and the SHPO and FEMA would be notified.
- Any change to the approved scope of work would require re-evaluation for compliance with NEPA and other laws and EOs before implementation.
- Klamath County would be required to avoid identified archaeological sites as a precaution to prevent minor potential disturbances, such as pedestrian traffic or vegetation removal across a site. Work is also conditioned to maximize all machinery vehicles to stay within existing roads on both public and private lands.
- Work would be prohibited in the southern-most Keno community between November and March of each year to avoid impacts to the Bear Valley bald eagle winter roost.
- Work would be restricted within riparian management areas per the ODF water protection rules. Project area specific stream buffers would be established during the initial site assessment for property owner participants.
- To minimize potential impacts to migratory nesting birds, vegetation removal should occur from late summer to mid-winter, outside of the typical migratory bird-nesting season (April 15 to July 31). If removal activities must take place during the nesting season, the County will ensure that a qualified professional conducts a breeding bird survey before removal activities begin in order to avoid disturbances or "take" as defined by the MBTA. Surveys should be coordinated with the USFWS to determine if a permit under MBTA is required or if other measures can be taken to address impacts to migratory birds or active nests. This information must be documented on the project site assessment and treatment plan (Appendix C).

- Work would be prohibited within 100 feet of the OHWM of Crescent Creek in the Crescent Lake community, the Klamath River in the Keno community, and the Sprague River and Williamson River in the Chiloquin community. The purpose of this condition is to avoid impacts on ESA-listed aquatic species.

SECTION SEVEN CONCLUSION

The draft EA evaluates environmental and historic resources that could be affected by the Proposed Action. The evaluation does not identify any significant adverse impacts associated with the resources of geology or soils; air quality; climate; water resources, wetlands, or floodplains; vegetation; wildlife or fish (including ESA-listed species and habitat); historic or archaeological cultural resources; socioeconomic resources or environmental justice; or recreation. Implementing the Proposed Action, which is relatively small scale because of the widely scattered nature of properties expected to be treated, along with any conditions outlined in the initial site assessment (Appendix C), associated with permits or approvals, is expected to avoid or minimize adverse effects associated with the action.

Following public involvement, FEMA will determine whether to issue a FONSI for the Proposed Action.

SECTION EIGHT LIST OF PREPARERS

URS Group Inc.

Anisa Becker, Archaeologist

Julie Blakeslee, AICP, Senior Planner

Stephanie Butler, Archaeologist

Joel Hancock, AICP, Environmental Planner

Sarah McDaniel, RPA, Archaeologist

Jennifer Pretare, PhD, Senior Biologist

Martha Richards, RPA, Architectural Historian

FEMA

Science Kilner, FEMA Reviewer

SECTION NINE REFERENCES

Barrett, S.A. 1910. *The Material Culture of the Klamath Lake and Modoc Indians of Northeastern California and Southern Oregon*. University of California Publications in American Archaeology and Ethnology 5:239–292, Berkeley, CA.

Beckham, Stephen Dow. 2000. *The Gerber Block: Historical Developments on the Public Rangelands in Klamath County, Oregon*. Klamath Falls, OR: Bureau of Land Management (2000).

Bowden, Jack. 2003. *Railroad Logging in the Klamath Country*. Hamilton, MT: Oso Publishing Company (2003).

Boynton, Michael, Amy E. Foutch, Judith A. Chapman, and John L. Fagan. 2009. *Archaeological Survey for the Proposed Reconstruction of OR 140 Deer Run-Ritter Road (Bly Mountain) MP 25.17 to 34.43, Klamath County, Oregon*. Archaeological Investigations Northwest (AINW) Report No. 2334 (September 1, 2009).

CEQ (Council on Environmental Quality). 2010. "Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions." Memorandum for Heads of Federal Departments and Agencies from Nancy H. Sutley, Chair, Council on Environmental Quality (February 18, 2010).

Chiloquin–Agency Lake Rural Fire Protection District. 2005. *Chiloquin–Agency Lake Rural Fire Protection District Community Wildlife Protection Plan*. Available at https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/4013/Chiloquin_Wildfire_Protection_Plan.pdf?sequence=1. Accessed August 2014.

City of Portland. 2010. Terrestrial Ecology Enhancement Strategy Guidance: Avoiding impacts on nesting birds during construction and revegetation projects. Environmental Services Department. October 2010, version 2. Accessed at: http://www.portlandoregon.gov/bes/index.cfm?a=322164

Davis, R.J., K.M. Dugger, S. Mohoric, L. Evers, and W.C. Aney. 2011. *Northwest Forest Plan, the First 15 Years (1994–2008): Status and Trends of Northern Spotted Owl Populations and Habitats*. Gen. Tech. Rep. PNWGTR-850. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 2011. 147 p.

Eder, T. 2002. *Mammals of Washington and Oregon*. Lone Pine Publishing. 351 p.

EPA (U.S. Environmental Protection Agency). 2013. Air Pollution and the Clean Air Act. Last updated August 15, 2013. Available at http://www.epa.gov/air/caa/. Accessed August 2014.

FEMA (Federal Emergency Management Agency). 1984. Flood Map Service Center. Available at https://msc.fema.gov/portal. Accessed August 2014.

———. 2014. FEMA PDM Program. Project Site Documentation for Wildfire Fuels Reduction Projects.

Foster, Doug. 2002. “Refuges and Reclamation Conflicts in the Klamath Basin, 1904–1964.” *Oregon Historical Quarterly*, vol. 103, no. 2 (Oregon Historical Society, Portland, OR).

Goetz, F.A., E. Jeanes, E. Beamer, G. Hart, C. Morello, M. Camby, C. Ebel, E. Conner, and H. Berge. 2004. *Bull Trout in the Nearshore, Preliminary Draft*. U.S. Army Corps of Engineers, Seattle, WA; R2 Resource Consultants, Inc., Redmond, WA; Skagit River System Cooperative, La Conner, WA; Seattle City Light, Seattle, WA; and King County Department of Natural Resources and Parks, Seattle, WA.

Keno Rural Fire Protection District. 2006. *Community Wildfire Protection Plan: Keno, Oregon*. Keno Rural Fire Protection District. Available at http://www.oregon.gov/odf/fire/kenocwpp.pdf. Accessed August 2014.

———. 2014. Oregon Ready, Set, Go! Keno Rural Fire Protection District. Available at http://oregonrsg.org/. Accessed November 2014.

Klamath County. 2007. *Klamath County Community Wildfire Protection Plan*. Available at http://www.oregon.gov/odf/fire/kccwpp.pdf. Accessed August 2014.

———. 2011. *Klamath County Multi-Jurisdictional Natural Hazards Mitigation Plan*. Available at http://klamathcounty.org/depts/ems/HazardMitPlan.pdf. Accessed August 2014.

———. 2014a. Chapter 60, Planning Department Development Standards. Klamath County Planning Department. Available at http://www.klamathcounty.org/depts/planning/downloads/Codes_Plans/LandDevCode/LDCChapter60.pdf. Accessed August 2014.

———. 2014b. Klamath County Community Development – Parks Division. Available at http://www.klamathcounty.org/depts/cdd/parks/parks.asp. Accessed August 2014.

———. 2014c. Chapter 69, Land Development Code. Klamath County Planning Department. Available at: http://www.klamathcounty.org/depts/planning/downloads/Codes_Plans/LandDevCode/LDC_TOC.pdf. Accessed December 2014.

Klamath County Air Quality. 2014. Klamath County Air Quality Advisory. Available at http://www.klamathair.org/. Accessed September 2014.

Klamath County Historical Society. 1984. *The History of Klamath Country, Oregon*. Portland, OR: Taylor Publishing Company (1984).

Klamath Falls. 2014. Parks. Available at http://ci.klamath-falls.or.us/. Accessed August 2014.

Lakeview Interagency Fire Center. 2014. Prescribed Fire. Available at http://scofmp.org/useoffire.shtml. Accessed September 2014.

McArthur, Lewis A., and Lewis L. McArthur. 2003. *Oregon Geographic Names*. Portland, OR: Oregon Historical Society Press (2003).

Mech, L.D. 1970. *The Wolf: The Ecology and Behavior of an Endangered Species.* Reprinted 1981. Minneapolis, MN: University of Minnesota Press (1970).

———. 1989. "Wolf Population Survival in an Area of High Road Density." *Am. Midl. Nat.* 121:387–389.

Mertzman, S.A. 2005. *The Geology of the Western Margin of the Upper Klamath River Basin, Oregon*. American Geophysical Union.

NFPA (National Fire Protection Association). 2009. "Introduction to Firewise Principles." 2d ed.

NWHI (Northwest Habitat Institute). 2000. Oregon Current Vegetation Types. Available at http://www.nwhi.org/index/gisdata. Accessed August 2014.

NWSR (National Wild and Scenic Rivers). 2014. Crescent Creek, Oregon. Available at http://www.rivers.gov/rivers/crescent.php. Accessed August 2014.

OCCRI (Oregon Climate Change Research Institute). 2010. *Oregon Climate Assessment Report*. December 2010. Available at occri.net/wp-content/uploads/2011/01/OCAR2010_v1.2.pdf. Accessed August 2014.

ODEQ (Oregon Department of Environmental Quality). 2002. *Upper Klamath Lake Drainage Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP)*. Portland, OR: Oregon Department of Environmental Quality, May 2002. Available at http://www.deq.state.or.us/wq/tmdls/docs/klamathbasin/ukldrainage/tmdlwqmp.pdf. Accessed August 2014.

———. 2010. *Water Quality Report: Upper Klamath and Lost River Subbasins Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP)*. Portland, OR: Oregon Department of Environmental Quality, December 2010. Available at http://www.deq.state.or.us/wq/tmdls/docs/klamathbasin/uklost/KlamathLostTMDLWQMP.pdf. Accessed August 2014.

———. 2012a. Oregon's 2012 Integrated Report. Available at http://www.oregon.gov/deq/WQ/Pages/Assessment/2012report.aspx. Accessed August 2014.

———. 2012b. Upper Deschutes and Little Deschutes Subbasins TMDLs. Available at http://www.deq.state.or.us/wq/tmdls/docs/deschutesbasin/upperLittle/DataSummaryRpt2009.pdf. Accessed August 2014.

———. 2014a. Air Quality: Maintenance and Nonattainment Areas. Available at http://www.deq.state.or.us/aq/planning/index.htm. Accessed August 2014.

———. 2014b. *Oregon Wildfire Response Protocol for Severe Smoke Episodes*. Version 2.0. June 3, 2014. Available at http://www.deq.state.or.us/aq/burning/docs/WFresponse.pdf. Accessed August 2014.

ODF (Oregon Department of Forestry). 2010. *Fuel-reduction Project Underway on Sun Pass State Forest*. Available at http://www.oregon.gov/odf/pages/newsroom/newsreleases/2010/nr1016.aspx. Accessed September 2014.

———. 2014. Forest Land Management. Available at http://arcweb.sos.state.or.us/pages/rules/oars_600/oar_629/629_tofc.html. Accessed September 2014.

ODFW (Oregon Department of Fish and Wildlife). 2014. Warm Water Fishing in Oregon. Available at http://www.dfw.state.or.us/resources/fishing/warm_water_fishing/Klamath_lake.asp Accessed September 2014.

OPRD (Oregon Parks and Recreation Department). 2014. Explore Oregon State Parks. Available at http://www.oregonstateparks.org/. Accessed August 2014.

ORBIC (Oregon Biodiversity Information Center). 2014. Biodiversity Data and Report for Klamath County (July 2014).

Oregon Climate Service. 2014. Klamath County, Oregon. Available at http://www.ocs.orst.edu/. Accessed August 2014.

Oregon Partnership for Disaster Resilience. 2012. *State of Oregon Natural Hazards Mitigation Plan.* Salem, OR: University of Oregon's Community Service Center, February 2012. Available at http://www.oregon.gov/LCD/HAZ/docs/OR_NHMP_2012.pdf. Accessed August 2014.

OSU (Oregon State University). 2014. Klamath Basin: Background Information. Available at http://oregonstate.edu/dept/kbrec/klamath-basin. Accessed August 2014.

Ray, V.F. 1963. *Primitive Pragmatists: The Modoc Indians of Northern California*. Seattle, WA: University of Washington Press (1963).

Sisemore, Linsy. 1941. *History of Klamath County Oregon: Its Resources and its People*. Edited by Linsy Sisemore. Klamath County, OR.

Spier, Leslie. 1930. *Klamath Ethnography*. University of California Publications in American Archaeology and Ethnology 30. Berkeley, CA: University of Californian Press (1930).

Stern, Theodore. 1966. *The Klamath Tribe: A People and Their Reservation*. American Ethnological Society Monograph 41. Seattle, WA: University of Washington Press (1966).

———. 1998. "Klamath and Modoc." In: *Handbook of North American Indians*, Volume 12, *Plateau*, edited by D.E. Walker Jr. Washington, DC: Smithsonian Institution (1998).

Thiel, R.P. 1985. "Relationships between Road Densities and Wolf Habitat Suitability in Wisconsin." *Am. Midland Nat.* 113(2):404–407.

Tonsfeldt, Ward. 1990. *Historical Resource Survey: Rural Klamath County, Oregon*. Salem, OR: Oregon State Historic Preservation Office (1990).

U.S. Census Bureau. 2012. American Community Survey 5-year estimates. Available at http://factfinder2.census.gov. Accessed August 2014.

———. 2014. Race. Last revised July 8, 2013. Available at http://www.census.gov/topics/population/race/about.html. Accessed August 18, 2014.

USDA (U.S. Department of Agriculture). 2012. Census of Agriculture. Available at http://www.agcensus.usda.gov/. Accessed August 2014.

———. 2014. Web Soil Survey. USDA Natural Resources Conservation Service. Available at websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed August 2014.

USFS (U.S. Forest Service). 2014a. GIS data for suitable northern spotted owl habitat in the Deschutes National Forest. Received via email from Lindsey Kiesz, USFS GIS specialist to URS biologist Jennifer Pretare. September 15, 2014.

———. 2014b. Email communication from Lauri Turner, USFS biologist at Deschutes National Forest to URS biologist Jennifer Pretare. September 15, 2014.

———. 2014c. Deschutes and Ochoco and Crooked River National Grassland: Recreation. Available at http://www.fs.usda.gov/recmain/deschutes/recreation. Accessed August 2014.

———. 2014d. Fremont-Winema National Forest: Recreation. Available at http://www.fs.usda.gov/recmain/fremont-winema/recreation. Accessed August 2014.

USFWS (U.S. Fish and Wildlife Service). 1992. "Endangered and Threatened Wildlife and Plants: Determination of Critical Habitat for the Northern Spotted Owl." 57 Fed. Reg. 1,796, 1,809 (January 15, 1992).

———. 1996. *Final Environmental Assessment for the Bear Valley National Wildlife Refuge Bald Eagle Habitat Improvement Project*. Klamath Basin National Wildlife Refuge Complex, Klamath County, OR. June 13, 1996. Available at http://www.fws.gov/uploadedFiles/Bald%20Eagle%20Habitat%20Improvement%20Project-Final%20Environmental%20Assessment.pdf. Accessed August 2014.

———. 1999. "Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for Bull Trout in the Coterminous United States; Final Rule." 64 Fed. Reg. 58909–58933 (November 1, 1999).

———. 2009. Applegate's Milk-Vetch 5-Year Review Summary and Evaluation. Klamath Falls, OR: U.S. Fish and Wildlife Service field office (January 2009).

———. 2010. "Revised Designation of Critical Habitat for Bull Trout in the Coterminous United States; Final Rule." 75 Fed. Reg. 63898 (October 18, 2010).

———. 2013. *Revised Recovery Plan for the Lost River Sucker and Shortnose Sucker*. Available at http://ecos.fws.gov/docs/recovery_plan/RRP.LstRvrSckr&ShrtnsSckr_1.pdf. Accessed August 28, 2014.

———. 2014a. National Wetlands Inventory. Available at http://www.fws.gov/wetlands/Data/Mapper.html. Accessed August 2014.

———. 2014b. Information, Planning and Conservation System. Available at http://ecos.fws.gov/ipac/. Accessed August 28, 2014.

———. 2014c. E-mail communication from Jennifer O'Reilly USFWS biologist, Bend, Oregon to URS biologist Jennifer Pretare. October 23, 2014.

———. 2014d. *Revised Draft Recovery Plan for the Coterminous United States Population of Bull Trout*. Portland, OR: USFWS Pacific Region (September 4, 2014).

USGS (U.S. Geological Survey). 2013. Upper Klamath Basin Ground-Water Study. Available at or.water.usgs.gov/projs_dir/or180/background.html. Accessed August 2014.

(U.S. Health & Human Services). 2013. 2013 Poverty Guidelines. Available at http://aspe.hhs.gov/poverty/13poverty.cfm. Accessed August 18, 2014.

Walker Range Forest Protective Association. 2012. *Walker Range Community Wildfire Protection Plan*. Available at http://www.crescentrfpd.com/uploads/WR_CWPP_2012_final.pdf Accessed August 2014.

Willy, Elizabeth. 2014. E-mail communication from Elizabeth Willy, Fish and Wildlife Biologist, Klamath Field Office, USFWS, to Jennifer Pretare, biologist, URS Group, Inc. (September 17, 2014).

Wisdom, M.J., R.S. Holthausen, B.C. Wales, C.D. Hargis, V.A Saab, D.C. Lee, W.J. Hann, T.D. Rich, M.M. Rowland, W.J. Murphy, and M.R. Eames. 2000. *Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-Scale Trends and Management Implications*. Gen. Tech. Rep. PNW-GTR-485. (Quigley, T.M., tech ed.; Interior Columbia Basin Ecosystem Management Project: Scientific assessment.) Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station (2000).

Witmer, G.W, S.K. Martin, and R.D. Sayler. 1998. *Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates*. Gen. Tech. Rep. PNW-GTR-420. (Quigley, T.M. ed.; Interior Columbia Basin Ecosystem Management Project: Scientific assessment.) Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station (1998).

Appendix A
Figures

Appendix B
Klamath County Fuel Break/Property Development Standards (Code 69.070)

KLAMATH COUNTY FUEL BREAK/PROPERTY DEVELOPMENT STANDARDS (Code 69.070)

Property fuel breaks, landscaping and maintenance may be planned in accordance with the guidelines found in "Protecting your Home from Wildfire," available from the Klamath County Planning Department or ODF.

The following Klamath County fuel break/property development standards code 69.070 would be followed:

A. Primary Fuel Break: all residences shall create and maintain a primary fuel break not less than 30 feet in width extending from the wall line of the structure. Primary fuel breaks consist of vegetation less than 3 inches high. Isolated landscape trees are acceptable if no branches overhang. Trees shall be thinned to 15 feet between tree crowns, and dead limbs near or over-hanging any structure shall be removed.

B. Secondary Fuel Break: beyond a primary fuel break, residences shall create and maintain a secondary fuel break not less than 70 feet wide on the downslope side of a residence and 35 feet on all other sides. Extend the fuel break to 100 feet on the downhill side where steep slopes or dense vegetation are present. Secondary fuel breaks consist of live trees and shrubbery pruned to reduce the possibility of fire reaching roofs of structures or the crowns of trees. Low-growing plants and grasses are to be maintained to prevent the build-up of flammable fuels.

C. Wherever practicable, fences shall be constructed of nonflammable materials and maintained to eliminate the build-up of flammable refuse.

D. Outbuildings and accessory structures will meet the same standards as the residence or primary structure in terms of building construction and fuel breaks.

Source: Klamath County (2014a)

Appendix C
Project Site Documentation for Wildfire Fuels Reduction Project

Site Information

Landowner Name (print):
Mailing Address:
Mailing City/State/Zip:
Property Address (or taxlot): Size (acres):
Phone: Email:

Pre-Mitigation Assessment

Number of acres proposed for treatment:

☐ Provided photos of pre-mitigation conditions.

Type of Work Proposed	**Site Characteristics Requiring Additional Protection**
☐ Create defensible space: distance around structures (ft.): number of structures: ☐ Clear roof and gutters ☐ Reduce fuels along driveway ☐ Ladder fuel reduction ☐ Other site work (explain below):	☐ Stream ☐ Lake ☐ Wetland ☐ Sensitive bird site ☐ T&E species ☐ Other: ☐ No Issues

Additional Details

Specific Site Characteristics: Provide a description of the existing site conditions in terms of fuels/vegetation, structures/improvements, and topography.

Protected Natural Resources: Use the area below to describe sensitive resources on or next to the property that requires protection. Include water bodies, wetlands, wildlife sites, etc. by name or other identifier.

Tree and Vegetation Retention/Vegetative Buffers: Describe the vegetative buffers and other trees/vegetation that will be retained during and after operations to prevent damage to any protected natural resources.

Practices

Describe the specific fuels treatment practices that will be utilized to protect the identified sensitive resources.

I certify that the above information provided in the Pre-Mitigation Assessment is true and correct:

Landowner Signature: Date:

Subgrantee Rep.: Signature: Date:

Post-Mitigation Verification

- ☐ There were changes to the work proposed and/or site conditions and resource protections presented in the Pre-Mitigation Assessment. A description of these changes is attached or described below.
- ☐ Provided photos of post-mitigation site conditions.
- ☐ Entered into GIS database

Match Valuation

Work Intensity	Value / Acre		# of		Total Value
Low (thin and pile slash)	$240	X		=	
Medium (thin and pile slash)	$360	X		=	
Medium/Heavy. (thin and pile slash)	$460	X		=	
Heavy (thin and pile slash)	$580	X		=	
Very Heavy (thin and pile slash)	$680	X		=	
Load and Haul	$300	X		=	
Burn - piles	$220	X		=	
Other site work		X		=	

I certify that the above information provided in the Post-Mitigation Verification is true and correct and that non-Federal resources were used in performing the work described in the match valuation above:

Landowner Signature: Date:

Subgrantee Rep.: Signature: Date:

Source: FEMA (2014)

Appendix D
Migratory Bird Species in Klamath County

The following migratory bird species are common to the region that includes Klamath County.

Common Name	Scientific Name
Bald eagle	*Haliaeetus leucocephalus*
Brewer's sparrow	*Spizella breweri breweri*
Burrowing owl	*Athene cunicularia*
Calliope hummingbird	*Stellula calliope*
Cassin's finch	*Carpodacus cassinii*
Eared grebe	*Podiceps nigricollis*
Ferruginous hawk	*Buteo regalis*
Greater sage grouse	*Centrocercus urophasianus*
Green-tailed towhee	*Pipilo chlorurus*
Least bittern	*Ixobrychus exilis*
Olive-Sided flycatcher	*Contopus cooperi*
Pinyon jay	*Gymnorhinus cyanocephalus*
Purple finch	*Carpodascus purpureus*
Rufous hummingbird	*selasphorus rufus*
Sage thrasher	*Oreoscoptes montanus*
Snowy plover	*Charadrius alexandrinus*
Williamson's sapsucker	*Sphyrapicus thyroideus*
Willow flycatcher	*Empidonas traillii*
Yellow rail	*Coturnicops noveboracensis*

Source: USFWS (2014b)

Appendix E
Public Notice

PUBLIC NOTICE

Federal Emergency Management Agency
Draft Environmental Assessment
Central Oregon Wildfire Mitigation Project in Klamath County

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) proposes to provide funding to Klamath County for a fuels reduction project in Klamath County, OR. Funding would be provided as authorized by Section 203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act.

FEMA has prepared a Draft Environmental Assessment (EA) for the proposed project pursuant to the National Environmental Policy Act of 1969 and FEMA's implementing regulations at Title 44 of the Code of Federal Regulations Part 10. The draft EA evaluates alternatives for compliance with applicable environmental laws, including Executive Orders 11990 (Protection of Wetlands), 11988 (Floodplain Management), and 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations). The alternatives that are evaluated in the draft EA are (1) no action and (2) fuels reduction in the communities of Bly Mountain, Chiloquin, Crescent Lake, Keno, and Scott Creek (Proposed Action).

The draft EA is available to the public on FEMA's Website at http://www.fema.gov/environmental-historic-preservation-documents and will be available on December 13, 2014, at the Keno Library, at 15555 Highway 66, Keno, OR 97627.

If no significant issues are identified during the comment period on the draft EA, FEMA will finalize the draft EA, issue a Finding of No Significant Impact (FONSI), and fund the project. The FONSI will be available to the public at http://www.fema.gov/environmental-historic-preservation-documents. Unless substantive comments on the draft EA are received, FEMA will not publish another notice for this project.

The deadline for submitting written comments on the draft EA is January 11, 2015, at 5 p.m. Comments should be mailed to Science Kilner, Deputy Regional Environmental Officer, FEMA Region X, 130 228th Street SW, Bothell, WA 98021; e-mailed to science.kilner@fema.dhs.gov; or faxed to 425-487-4613.