3.5 Terrestrial Resources

This section describes existing conditions of terrestrial resources in the Area of Analysis and analyzes potential impacts that the Proposed Project would have on these resources. Terrestrial resources include existing terrestrial vegetation and rare natural communities[108] and their value as habitat for wildlife; terrestrial special-status[109] wildlife and plant species; use and dependence of terrestrial species on riparian, wetland, and aquatic reservoir habitat; and terrestrial wildlife corridors.

A moderate number of comments were received during the NOP public scoping process relating to terrestrial resources (see Appendix A). The majority of commenters stated that the existing reservoirs provide breeding and resting habitats for many wildlife species, and these species should be considered and studied to assess impacts from dam removal. For example, one commenter recommended that the best available science be used to inform dam removal and riparian restoration planning and that robust regional avian science and conservation objectives be integrated into planning and evaluation. Comments associated with aquatic wildlife (e.g., whales and sea lions) are addressed in Section 3.3 *Aquatic Resources*. A summary of the terrestrial resource comments received during the NOP public scoping process, as well as the individual comments themselves, are presented in Appendix A.

3.5.1 Area of Analysis

The Area of Analysis for terrestrial resources (Figure 3.5-1) is the California portion of the Klamath Basin that may be influenced by the Proposed Project and focuses on terrestrial resources downstream from the dams proposed for removal, within the reservoir footprints, and upstream of and surrounding the reservoirs in areas that may be impacted by construction activities.

For this EIR, the Area of Analysis for terrestrial resources is subdivided into two areas, the Primary Area of Analysis and the Secondary Area of Analysis (Figure 3.5-1). The Primary Area of Analysis includes areas associated with proposed dam removal activities and reaches of the Klamath River that have the potential to be affected by dam removal, whereas the Secondary Area of Analysis accounts for potential future actions during the transfer of Parcel B lands to the respective states (i.e., California or Oregon), or to a designated third-party transferee following dam removal (see also Section 2.7.10 *Land Disposition and Transfer*. The analysis for this EIR focuses mainly on the Primary Area of Analysis. For the Secondary Area of Analysis, the EIR briefly reviews potential

[108] Rare natural communities are defined as those natural community types with a state ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable).

[109] Special-status species are defined as those species listed, proposed, or under review as endangered or threatened under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA); and those designated by the USDA Forest Service as sensitive or watch list species. Additional listings for plants include those listed as rare under the California Native Plant Protection Act and/or included on CDFW's most recent *Special Vascular Plants, Bryophytes, and Lichens List* with a California Rare Plant Rank (CRPR) of 1, 2, 3, or 4 (CDFW 2017a). Additional listings for wildlife include those designated as a Species of Special Concern by CDFW; designated as Fully Protected under the California Fish and Game Code (Sections 3511, 4700, 5050, and 5515); and/or protected under the federal Bald and Golden Eagle Protection Act.

future actions on Parcel B lands following dam removal. However, because of uncertainty regarding what activities, their extent, and their precise location, this analysis is necessarily less detailed.

The Primary Area of Analysis is defined as the Limits of Work plus a 0.25-mile buffer, which includes the Proposed Project construction locations in California (e.g., Proposed Project facilities, staging and disposal areas, recreation locations, transmission lines), the Klamath River reaches from the Oregon-California state line to the Pacific Ocean, and the three California Lower Klamath Project reservoirs (Copco No. 1 Reservoir, Copco No. 2 Reservoir, and Iron Gate Reservoir) (Figure 3.5-1). The 0.25-mile buffer was included to account for terrestrial wildlife species that may occur adjacent to the Limits of Work and may be potentially affected by the Proposed Project activities. For northern spotted owl, the Primary Area of Analysis includes a 0.25-mile, 0.-5 mile, or up to a 1-mile buffer around the Limits of Work to address the potential for noise impacts due to blasting and revegetation activities from helicopters or use of heavy equipment (e.g., disking) as part of the Proposed Project. The northern spotted owl buffer is based on a disturbance distance, which is defined as the distance at which an owl, if present, could be distracted from its normal activity (USFWS 2008). Specifically, the Primary Area of Analysis for the northern spotted owl is a 1-mile buffer around Copco No. 1, Copco No. 2, and Iron Gate dams to account for the loudest noise disturbance distance associated with blasting, a 0.5-mile buffer around the reservoirs to account for the loudest noise disturbance distance associated with helicopter use, and a 0.25-mile buffer around all other areas within the Limits of Work to account for noise disturbance associated with heavy equipment (Figure 3.5-1). The Secondary Area of Analysis includes Parcel B lands (Figure 3.5-1).

Proposed Project activities have the potential to affect terrestrial resources at the following locations (a complete list of Proposed Project activities are provided in Section 2.7 *Proposed Project*):

- Copco No. 1—upgrading haul routes/bridges; establishing a disposal site; and removing four 69-kV transmission lines, recreation structures (i.e., Mallard Cove and Copco Cove), dam, penstocks, spillway gates, decks, piers, powerhouse intake structure, gate houses on right abutment, diversion control structure, powerhouse, switchyard, warehouse, and operator residence (see also Table 2.7-3 and Figure 2.7-2).
- Copco No. 2—upgrading haul routes/bridges; establishing a disposal site (same as Copco No. 1); and removing the 69-kV transmission lines, dam, power penstock intake structure, wooden-stave penstock, spillway, concrete pipe cradles, steel penstock, supports, anchors, powerhouse, and tailrace (see also Table 2.7-4 and Figure 2.7-2).
- Iron Gate—upgrading haul routes/bridges; establishing a disposal site; and removing the dam, unused transmission lines and diversion tunnel control gate and tunnel portals, penstock, fish facilities on dam, powerhouse, switchyard, recreation structures (i.e., Fall Creek recreation, Jenny Creek recreation, Wanaka Springs recreation, Camp Creek recreation, Juniper Point recreation, Mirror Cove recreation, Overlook Point recreation, Long Gulch recreation, Iron Gate Hatchery Public Use Area recreation), and water supply pipes (see also Table 2.7-5 and Figure 2.7-4).
- Improvements to the City of Yreka water supply pipeline.

- Modifications to the Fall Creek and Iron Gate hatcheries.

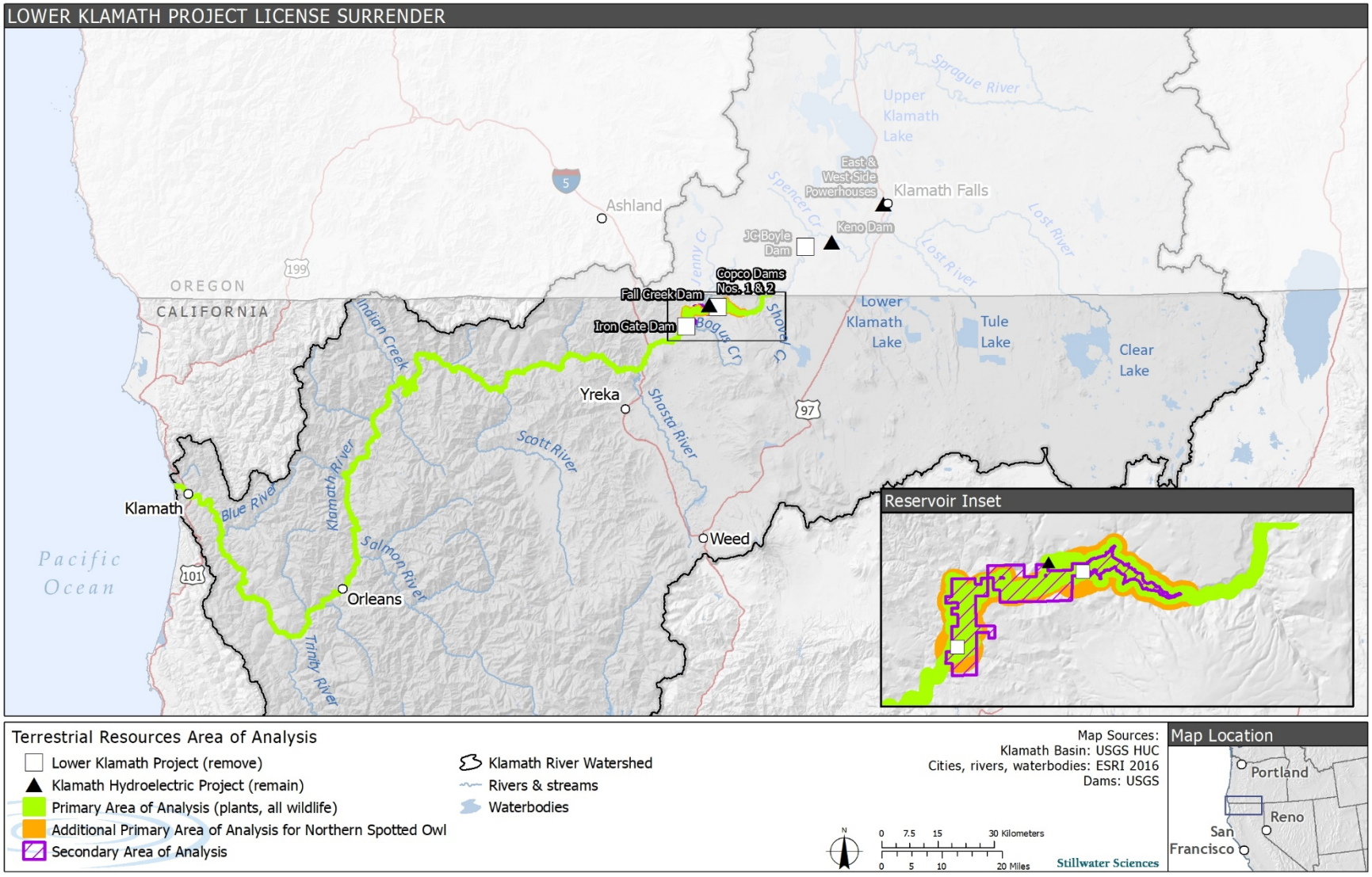

Figure 3.5-1. Area of Analysis for Terrestrial Resources.

3.5.2 Environmental Setting

This section provides a description of the environmental setting for terrestrial resources in the Primary Area of Analysis, including vegetation communities (current and historic), invasive plant species, culturally significant plant species, non-special-status wildlife, and special-status species (plants and wildlife).

The Primary Area of Analysis for terrestrial resources includes diverse habitats ranging from wetland surfaces just below sea level in the Klamath River Estuary (-0.16 ft elevation) to the slopes above the Upper Klamath River near the California-Oregon state line (3,428 ft elevation). The Primary Area of Analysis for terrestrial resources is within the California-Florisic Province and includes the High Cascade Subregion of the Cascade Region and the North Coast, North Coast Ranges, and Klamath Range Subregions of the Northwest Region as defined in The Jepson manual (Baldwin et al. 2012). The High Cascade Subregion is characterized by ponderosa pine (*Pinus ponderosa*), montane fir/pine, and lodgepole pine (*Pinus contorta* subsp. *murrayana*) forests. The North Coast Subregion supports coastal vegetation including coastal prairie, coastal marsh, coastal scrub, closed-cone pine/cypress forest and grand fir (*Abies grandis*)/Sitka spruce (*Picea sitchensis*) forest. The Outer North Coast Ranges District is characterized by very heavy rainfall and supports redwood (*Sequoia sempervirens*), mixed-evergreen and mixed-hardwood forests (Baldwin et al. 2012). The Klamath Range subregion is also characterized by heavy rainfall and is geologically old and serpentine-rich. The Klamath-Siskiyou mountain ranges are recognized for their biological diversity, supporting more than 3,000 plant species including 30 temperate conifer tree species including Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), ponderosa pine, and sugar pine (*Pinus lambertiana*) (CDFG 2006, Baldwin et al. 2012).

3.5.2.1 Vegetation Communities

Current Vegetation

Information in this section was obtained primarily from the PacifiCorp Final Technical Report on terrestrial resources prepared for the Klamath Hydroelectric Project (PacifiCorp 2004a,b) in combination with the Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG) datasets available through the California Land Cover Mapping and Monitoring Program (United States Department of Agriculture Forest Service [USDA] Forest Service 2017a) and data from USFWS (2017); additional information was obtained from the CDM Smith's 2018 surveys (CDM Smith 2018a) that covered a portion of the Primary Area of Analysis for terrestrial resources. Table 3.5-1 summarizes the vegetation cover types documented in the Primary Area of Analysis for terrestrial resources based on the California Wildlife Habitat Relationships (CWHR) System (California Department of Wildlife [CDFW] 2014a), and Figures 1 through 66 of Appendix G display the mapped vegetation. Additional habitat types mapped but not included in Table 3.5-1 include a total of 794 acres of agricultural lands (Cropland, Deciduous Orchard, and Pasture), 2,554 acres of developed areas, 1,286 acres of unvegetated habitat (barren, exposed rock and rock talus) and 10,938 acres of aquatic habitat (Riverine, Lacustrine and Marine; USDA Forest Service 2017a). Below is a general description of each CWHR vegetation type within California including specific information regarding the location and acreage of each type within the Primary Area of Analysis. Vegetation types with one acre or less in the Primary Area of Analysis for terrestrial resources are not included in this discussion.

Table 3.5-1. Vegetation Types Documented in the Primary Area of Analysis for Terrestrial Resources.[1]

CHWR Vegetation Cover Types (USDA-FS2017a, USFWS 2017a)	Reaches[2]				Total ac (Percent of total[3])
	Hydroelectric Reach (ac)	Middle Klamath River (ac)	Lower Klamath River (ac)	Klamath River Estuary (ac)	
Upland Habitats					
Annual Grassland (AGS)	1,726	3,405	47	45	**5,223 (9)**
Coastal Oak Woodland (COW)	0	397	1,002	0	**1,398 (3)**
Coastal Scrub (CSC)	0	0	59	32	**91 (<1)**
Douglas-Fir (DFR)	0	10,132	2,769	0	**12,902 (23)**
Jeffrey Pine (JPN)	0	62	0	0	**62 (<1)**
Juniper (JUN)	457	186	0	0	**643 (1)**
Klamath Mixed Conifer (KMC)	9	63	0	0	**72 (<1)**
Mixed Chaparral (MCH)	662	4,031	2	0	**4,694 (9)**
Montane Chaparral (MCP)	0	410	40	0	**450 (1)**
Montane Hardwood (MHW)	1,813	4,996	542	0	**7,350 (13)**
Montane Hardwood-Conifer (MHC)	2,656	8,722	2,500	21	**13,899 (25)**
Perennial Grassland (PGS)	12	238	4	0	**253 (<1)**
Ponderosa Pine (PPN)	68	931	0	0	**998 (2)**
Redwood (RDW)	0	5	905	55	**966 (2)**
Sierran Mixed Conifer (SMC)	1	2,196	0	0	**2,197 (4)**
Wet Habitats					
Estuarine (EST)	0	0	0	398	**398 (1)**
Montane Riparian (MRI)	180	830	894	130	**2,034 (4)**
Palustrine (PAL)[4]	129	508	431	290	**1,357 (2)**
Wet Meadow (WTM)	0	10	3	2	**15 (<1)**
Reach Totals[5]	**7,715**	**37,123**	**9,198**	**972**	**55,009**

[1] All vegetation types with a total of one acre or less documented in the Primary Area of Analysis for terrestrial resources are not included in this table.
[2] Defined in Figure 2.4-3.
[3] Percent of total for vegetation types within the terrestrial resources Primary Area of Analysis; excludes other habitat types (e.g., agricultural lands).
[4] Not a CWHR type; based on the Cowardin classification for wetlands and deepwater habits (Cowardin et al. 1979.
[5] Totals listed are based on numbers that were not rounded to the nearest acre so may vary slightly from the total derived from adding the acreages per vegetation type as they appear in the table.

Appendix H lists the rare natural communities[110] documented in the Proposed Project vicinity (i.e., the USGS 7.5-minute quadrangles in which the Primary Area of Analysis for terrestrial resources is located and the adjacent quadrangles) in CDFW's California

[110]Rare natural communities are defined as vegetation types with a ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) by CDFW.

Natural Diversity Database (CNDDB) (CDFW 2017a) and notes which of those rare natural communities have the potential to be present in the Primary Area of Analysis for terrestrial resources. CDM Smith's 2018 surveys (CDM Smith 2018a) classified vegetation to the alliance level[111] according to the online edition of *A Manual of California Vegetation* (CNPS 2018). Alliances documented during these surveys, including those that are considered rare natural communities, are noted below in the corresponding CWHR type with the exception of the stand of *Hesperocyparis bakeri* Woodland Alliance, a rare natural community, that was documented at Iron Gate Reservoir; it is not included in descriptions below as the corresponding CWHR type (Closed-cone Pine-cypress) has not been documented in the Primary Area of Analysis.

Upland Habitats

Annual Grassland

In California, Annual Grassland occurs throughout the state, mostly on flat plains to gently rolling foothills and on a variety of soil types (CDFW California Interagency Wildlife Task Group 2014a). Annual Grassland accounts for approximately nine percent (5,223 acres) of the Primary Area of Analysis for terrestrial resources and is most prevalent in the Hydroelectric Reach and the Middle Klamath River where it occurs in scattered patches that are most concentrated toward the northern end of the Hydroelectric Reach (Appendix G).

Annual Grassland is dominated by non-native, annual plant species. Common grasses include wild oats (*Avena* spp.), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), red brome (*Bromus madritensis*), and wild barley (*Hordeum* spp.). Common forbs include filaree (*Erodium* spp.), turkey mullein (*Ereomocarpus setigerus*), true clover (*Trifolium* spp.), bur clover (*Medicago* spp.), and popcorn flower (*Plagiobothrys* spp.) (CDFW California Interagency Wildlife Task Group 2014aCDFW California Interagency Wildlife Task Group 2014a). During 2018 surveys the following alliances (based on the online edition of *A Manual of California Vegetation* [CNPS 2018]) were documented that fall within the Annual Grassland CWHR type: *Bromus tectorum - Taeniatherum caput-medusae* Herbaceous Semi-Natural Alliance (Iron Gate, Copco No. 1, and Copco No. 2 reservoirs); and *Bromus* (*diandrus, hordaceus*) – *Brachypodium distachyon* Herbaceous Semi-Natural Alliance (Copco No. 1 and Copco No. 2 reservoirs; CDM Smith 2018a).

Coastal Oak Woodland

In California, Coastal Oak Woodland occurs in the coastal foothills and valleys from Trinity County to northern Baja California. Soils and parent material are extremely variable (CDFW California Interagency Wildlife Task Group 2014a). Coastal Oak Woodland accounts for approximately three percent (1,398 acres) of the Primary Area of Analysis for terrestrial resources and is most prevalent in the Lower Klamath River toward the eastern end of the reach. There are also a few scattered patches in the Middle Klamath River (Appendix G).

Coastal Oak Woodland is often dominated by Coast live oak (*Quercus agrifolia*). Other overstory species may include: Oregon oak (*Quercus garryana*), California black oak (*Quercus kelloggii*), canyon live oak (*Quercus chrysolepis*), Pacific madrone (*Arbutus menziesii*) and interior live oak (*Quercus wislizeni*); however, where these species

[111] A category of vegetation classification defined in A Manual of California Vegetation (CNPS 2018) describing repeating patterns of plants across a landscape with consistent plant species composition (CNPS 2018).

dominate, the habitat is considered Montane Hardwood. Typical Coastal Oak Woodland understory shrubs include: California blackberry (*Rubus ursinus*), creeping snowberry (*Symphoricarpos mollis*), and toyon (*Heteromeles arbutifolia*). The herbaceous layer includes natives such as western bracken fern (*Pteridium aquilinum*), California polypody (*Polypodium californica*), and miner's lettuce (*Claytonia perfoliata*), as well as a high percentage of non-native, annual grasses (e.g., bromes and oats) (CDFW California Interagency Wildlife Task Group 2014a). During 2018 surveys, the following alliances were documented that fall within the Coastal Oak Woodland CWHR type: *Quercus garryana* (tree) Woodland Alliance (a rare natural community; Iron Gate, Copco No. 1, and Copco No. 2 reservoirs) and *Quercus kelloggii* Forest Alliance (Copco No. 1 and Copco No. 2 reservoirs; CDM Smith 2018a).

Coastal Scrub

Coastal Scrub occurs discontinuously in a narrow band along the Pacific Coast on steep, south-facing slopes and on sandy, mudstone, or shale soils. It usually occurs within 20 miles of the ocean at elevations ranging from sea level to 3,000 feet (CDFW California Interagency Wildlife Task Group 2014a). Coastal Scrub accounts for less than one percent (91 acres) of the Primary Area of Analysis for terrestrial resources and occurs towards the southern end of the Lower Klamath River, and in larger patches closer to the Klamath River Estuary (Appendix G).

In exposed areas very close to the ocean, Coastal Scrub includes yellow bush lupine (*Lupinus arboreus*), which is naturalized to the area (Jepson Herbarium 2017) and many-colored lupine (*Lupinus variicolor*). Farther inland, and in more protected areas, the habitat type is dominated by coyote bush, blue blossom ceanothus, coffeeberry, bush monkey flower (*Mimulus aurantiacus*), blackberry (*Rubus spp.*), poison oak, and salal. Bracken fern, swordfern (*Polystichum californicum*), cow parsnip (*Heracleum lanatum*), several species of Indian paint brush (*Castilleja spp.*), yerba buena *(Satureja douglasii*), and California oatgrass *(Danthonia californica)* are common ground cover species (CDFW California Interagency Wildlife Task Group 2014a).

Douglas Fir

Douglas Fir occurs in the north Coast Range of California, from Sonoma County north to the Oregon border at elevations ranging from 500 to 2,000 feet and in the Klamath Mountains of California and Oregon at elevations from 1,000 to 4,000 feet (CDFW California Interagency Wildlife Task Group 2014a). Relative to the Redwood CWHR habitat type, Douglas Fir occurs on drier sites with poorer soils; soil types include sedimentary granitic and ultramafics (gabbro, peridotite, and serpentine) (CDFW California Interagency Wildlife Task Group 2014a). Douglas Fir accounts for approximately 23 percent (12,902 acres) of the Primary Area of Analysis for terrestrial resources and is most prevalent in the Middle Klamath River; large, dense patches are also concentrated along the Lower and Middle Klamath River reaches (Appendix G). Though it has not been documented, the rare natural community type, Upland Douglas Fir Forest, may be present within the areas classified as Douglas Fir in the Primary Area of Analysis for terrestrial resources (Holland 1986; Appendix H).

The Douglas Fir habitat type is composed of a canopy of at least 50 percent Douglas-fir and a sub-canopy level of broad-leaved evergreen trees. Plant species composition varies with soil parent material, moisture, topography, and disturbance history. Sub-dominant tree species on less rocky, dry soils include canyon live oak, tanoak (*Notholithocarpus densiflorus*), Pacific madrone, and California black oak. A wide range

of understory shrubs may be present, varying primarily by soil type and along a moisture gradient, and include the following: Oregon grape (*Berberis aquifolium*), California blackberry, dwarf rose (*Rosa gymnocarpa*), poison oak (*Toxicodendron diversilobum*), vine maple (*Acer circinatum*), California hazel (*Corylus cornuta*), salal (*Gaultheria shallon*), California rhododendron (*Rhododendron macrophyllum*), California laurel (*Umbellularia californica*), California buckthorn (*Rhamnus californica*), and white oak (CDFW California Interagency Wildlife Task Group 2014a).

Jeffrey Pine

Jeffrey Pine occurs in the Klamath Mountains, North Coast Range, Cascade Range, Modoc Plateau, Sierra Nevada, Transverse Range, and the Peninsular Range in California at elevations ranging from 500 to 9,500 feet. Jeffrey Pine habitat is associated with Douglas-fir at its lower elevations and subalpine conifer at its higher elevations in the Klamath Mountains (CDFW California Interagency Wildlife Task Group 2014a). Jeffrey Pine accounts for less than 1 percent (62 acres) of the Primary Area of Analysis for terrestrial resources; a few scattered patches occur in the Middle Klamath River (Appendix G).

Jeffrey Pine habitat is characterized by stands of Jeffrey pine (*Pinus jeffreyi*) as it is the dominant and typically the only species in the canopy layer. Jeffrey pines are generally 98 to 164 feet tall at maturity. Common species include other pines such as ponderosa, Coulter (*Pinus coulteril)*, sugar, and lodgepole pines, as well as red fir (*Abies magnifica*), white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), and black cottonwood (*Populus trichocarpa*). The secondary tree layer (i.e., a layer of trees below the canopy layer) is typically composed of aspen (*Populus tremuloides*) on moist sites, California black oak on mesic sites, and pinyon pine (*Pinus monophylla*) and western juniper (*Juniperus occidentalis*) on drier sites. Huckleberry (*Vaccinium spp.),* oak (*Quercus* spp.), manzanita (*Arctostaphylos* spp.), Fremont silktassel (*Garrya fremontii*), and coffeeberry (*Frangula* spp.) dominate the shrub layer (CDFW California Interagency Wildlife Task Group 2014a).

Juniper

In California, Juniper occurs in the Modoc Plateau, portions of the Cascades, higher elevations of the Sierra Nevada, a number of the smaller interior coast ranges, and parts of the Mojave Desert (CNPS 2018), at elevations ranging from 330 to 10,170 feet. Juniper accounts for approximately one percent (643 acres) of the Primary Area of Analysis for terrestrial resources and is most prevalent in the Middle Klamath River, with a few, scattered patches occurring in the Hydroelectric Reach (Appendix G).

Juniper habitat type is characterized by an open to dense overstory of juniper (*Juniperus* spp.) with grass and shrub understories. Junipers are generally 15 to 30 feet tall at maturity. Common species include white fir and Jeffery and ponderosa pines, as well as curl leaf mountain-mahogany (*Cercocarpus ledifolius*), antelope bitterbrush (*Purshia tridentata*), and big sagebrush (*Artemisia tridentata* subsp. *tridentata*) (CDFW California Interagency Wildlife Task Group 2014a, CNPS 2018). During 2018 surveys, *Juniperus occidentalis* Woodland Alliance was documented at Iron Gate Reservoir (CDM Smith 2018a).

Klamath Mixed Conifer

Klamath Mixed Conifer is found in the Klamath Region of northern California and southern Oregon. The region covers a complex of small mountain ranges, including the

Trinity Alps, which are characterized by glacially influenced topography of rugged steep slopes and deeply scoured terrain. Klamath Mixed Conifer is generally found between 4,500 and 6,900 feet (CDFW California Interagency Wildlife Task Group 2014a). Klamath Mixed Conifer accounts for less than one percent (72 acres) of the Primary Area of Analysis for terrestrial resources, with only a few scattered patches in the Middle Klamath River (Appendix G).

Klamath Mixed Conifer generally forms a dense overstory with a mixture of conifers and the occasional broad-leaved species. The understory is often a rich shrub layer, including small individuals of the overstory species, with a well-developed herbaceous layer. The dominant conifer species include white fir, Douglas-fir, ponderosa pine, incense cedar, and sugar pine. Shrub and herbaceous species include Sierra laurel (*Leucothoe davisiae*), Sadler oak (*Quercus sadleriana*), dwarf rose (*Rosa bridgesii*), thimbleberry (*Rubus parviflorus*), twinberry (*Lonicera involucrate*), rattlesnake plantain (*Goodyera oblongifolia*), and prince's pine (*Chimaphila* spp.) (CDFW California Interagency Wildlife Task Group 2014a).

Mixed Chaparral

Mixed Chaparral is an evergreen sclerophyllous shrubland type that occurs in the foothills and mid to upper mountain sides of the coast ranges as well as the Sierra Nevada, at elevations below 5,000 feet (Barbour et al. 2007). Mixed Chaparral can occur on all slope aspects and is most common on north-facing slopes at lower elevations. In these areas, shrubs adapted to dry conditions and soils with low nutrients are able to out-compete trees (CDFW California Interagency Wildlife Task Group 2014a). Mixed Chaparral accounts for approximately nine percent (4,694 acres) of the total acreage of the Primary Area of Analysis for terrestrial resources and is most prevalent in the Middle Klamath River, with dense patches occurring on the northern end of the Middle Klamath River (Appendix G).

Mixed Chaparral forms dense stands on thin soils found on steep, north-facing slopes and varies north-to-south and depending upon precipitation regime, aspect, and soil type. Common shrub species include chamise (*Adenostoma fasciculatum)*, toyon, California yerba-santa (*Eriodictyon californicum*), and silk-tassel (*Garrya* spp.) (CDFW California Interagency Wildlife Task Group 2014a). During 2018 surveys, the following alliances were documented that fall within the Mixed Chaparral CWHR type: *Ceanothus cuneatus* Shrubland Alliance (Iron Gate and Copco Nos. 1 and 2 reservoirs); *Rhus trilobata - Crataegus rivularis - Forestiera pubescens* Shrubland Alliance (a rare natural community; Iron Gate Reservoir); and *Cercocarpus montanus* Shrubland Alliance (Copco No. 1 and Copco No. 2 reservoirs; CDM Smith 2018a).

Montane Chaparral

In California, Montane Chaparral occurs in mountainous areas of mid-to high-elevation (3,000 to 10,000 ft) in the North Coast Ranges, Klamath and Cascades mountains, and in the Transverse Range in the south (CDFW California Interagency Wildlife Task Group 2014a). Montane Chaparral accounts for approximately one percent (450 acres) of the Primary Area of Analysis for terrestrial resources and is most prevalent in the Middle Klamath River in small patches immediately adjacent to the river (Appendix G).

Montane Chaparral, though markedly variable throughout California, is generally characterized by thick, dense stands of chaparral with little to no understory. In disturbed coniferous habitats, chaparral proliferates easily and may exclude other

vegetation. Common species include whitethorn ceanothus (*Ceanothus cordulatus*), snowbrush ceanothus (*Ceanothus velutinus*), greenleaf manzanita (*Arctostaphylos patulal)*, pinemat manzanita (*Arctostaphylos nevadensis)*, hoary manzanita (*Arctostaphlos canescens*), and bitter cherry (*Prunus emarginata*). Conifer and oak trees may occur in sparse stands or as scattered individuals within the chaparral type (CDFW California Interagency Wildlife Task Group 2014a).

Montane Hardwood

In California, Montane Hardwood occurs broadly west of the Cascade-Sierra Nevada crest and is often found on steep, rocky, south-facing slopes within the Sierra Nevada (CDFW California Interagency Wildlife Task Group 2014a). Montane Hardwood accounts for approximately 13 percent (7,350 acres) of the Primary Area of Analysis for terrestrial resources. It is most prevalent in the Middle Klamath River where it is most densely clustered towards the northern half (Appendix G).

Montane Hardwood forms a dense forest with a thick layer of leaf litter and sparse cover of herbaceous species. The dominant species in the tree canopy is canyon live oak except at higher elevations where it is replaced by huckleberry oak (*Quercus vacciniifolia)*. In the North Coast Range, species vary by elevation and may include Douglas-fir, tanoak, Pacific madrone, California laurel, California black oak, knobcone pine (*Pinus attenuata*), foothill pine, coast live oak, California white fir, and Jeffrey pine. Understory vegetation includes manzanita, mountain mahogany, poison oak, and a few forbs (CDFW California Interagency Wildlife Task Group 2014a).

Montane Hardwood-Conifer

In California, Montane Hardwood-Conifer occurs broadly and covers a continuous band along the Sierra Nevada (CDFW California Interagency Wildlife Task Group 2014a). Montane Hardwood-Conifer is the most common habitat type in the Primary Area of Analysis for terrestrial resources, accounting for approximately 25 percent (13,899 acres) of the Primary Area of Analysis, and is most prevalent in the Lower and Middle Klamath River (Appendix G).

Like Montane Hardwood, Montane Hardwood-Conifer forms a dense forest with a thick layer of leaf litter and sparse cover of herbaceous species. Dominant species in the tree canopy include tanoak and California black oak. Common species include ponderosa pine, Douglas-fir, incense-cedar, California black oak, tanoak, Pacific madrone, and Oregon white oak (CDFW California Interagency Wildlife Task Group 2014a). Within the Primary Area of Analysis for terrestrial resources, juniper is also an associate.

Perennial Grassland

Perennial Grassland occurs along the California coast from Monterey County northward and as relic stands within annual grassland habitat patches, generally below 3,280 feet (CDFW California Interagency Wildlife Task Group 2014a). Perennial Grassland accounts for less than one percent (253 acres) of the Primary Area of Analysis for terrestrial resources, and is most prevalent in the Middle Klamath River (Appendix G).

Perennial Grassland is dominated by perennial grass species such as California oatgrass and needlegrass species (*Stipa* spp.). Common species include a variety of native and non-native grasses and forbs including redtop (*Agrostis stolonifera*), soft chess, orchardgrass (*Dactylis glomerata*), Idaho fescue (*Festuca idahoensis*), Douglas iris (*Iris douglasiana*), and western bracken fern (CDFW California Interagency Wildlife

Task Group 2014a). During 2018 surveys, *Festuca idahoensis* Herbaceous Alliance was documented at Copco No. 1 and Copco No. 2 reservoirs (CDM Smith 2018a).

Ponderosa Pine

In California, Ponderosa Pine occurs broadly and covers extensive areas within the Sierra Nevada at elevations between 800 and 5,000 feet (CDFW California Interagency Wildlife Task Group 2014a). Ponderosa Pine accounts for approximately two percent (998 acres) of the Primary Area of Analysis for terrestrial resources, with several scattered patches in the northern half of the Middle Klamath River (Appendix G).

Ponderosa Pine forms an open forest of relatively small-diameter trees. Associated species vary depending on location and site conditions and may include white fir, incense-cedar, Jeffrey pine, sugar pine, Douglas-fir, canyon live oak, California black oak, Oregon white oak, Pacific madrone, tanoak, manzanita, ceanothus, and poison oak (CDFW California Interagency Wildlife Task Group 2014a). During 2018 surveys, *Pinus ponderosa* Forest Alliance was documented at Copco No. 1 and Copco No. 2 reservoirs (CDM Smith 2018a).

Redwood

Redwood habitat is generally present within two to 10 miles of the coast (CDFW California Interagency Wildlife Task Group 2014a) in areas of consistent fog, high summer humidity, cool temperatures, and well-developed soils (Shuford and Timossi 1989) and can be found in elevations ranging from sea level to 3,000 feet (CDFW California Interagency Wildlife Task Group 2014a). Forests of pure coast redwood transition to redwood/Douglas-fir forests farther inland (CDFW California Interagency Wildlife Task Group 2014a) along a gradient of increased evapotranspiration and inadequate soil moisture (Mahony and Stuart 2000, Van Wagtendonk et al. 2018). Coast redwood trees tend to taper out approximately 31 miles inland from the coast (CDFW California Interagency Wildlife Task Group 2014a). Redwood accounts for approximately two percent (966 acres) of the Primary Area of Analysis for terrestrial resources and is most prevalent in the Lower Klamath River, with dense patches closer to the coast and clustered patches in the center of the reach (Appendix G).

Redwood and Douglas-fir trees often co-occur in areas classified as the Redwood habitat type, with Douglas-fir occupying up to half of the canopy cover. The associated species mix varies both north-to-south, as well as inland from the coast. Common associated tree species include Douglas-fir, tanoak, and Pacific madrone, with the following species potentially contributing: Bishop pine, grand fir, golden chinquapin (*Chrysolepis chrysophylla*), western hemlock, red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*), California laurel, and nutmeg (*Torreya californica*). Shrub species include blue blossom (*Ceanothus thyrsiflora*), coyote brush (*Baccharis pilularis*), manzanita, and California huckleberry (CDFW California Interagency Wildlife Task Group 2014a).

Sierran Mixed Conifer

In California, Sierran Mixed Conifer dominates the middle elevations of the western slope of the northern Sierra Nevada, at elevations ranging from 2,500 to 4,000 feet (CDFW California Interagency Wildlife Task Group 2014a). Sierran Mixed Conifer accounts for approximately four percent (2,197 acres) of the Primary Area of Analysis for terrestrial resources and is concentrated in dense patches towards the northern end of the Middle Klamath River (Appendix G).

Sierran Mixed Conifer forms a dense forest, with tree crowns often touching. Various conifers co-dominate, including white fir, Douglas-fir, ponderosa pine, sugar pine, and incense-cedar; California black oak is also present. Common understory species include ceanothus, manzanita, tanoak, bitter cherry, mountain whitethorn, gooseberry (*Ribes* spp.), and rose (*Rosa* spp.) (CDFW California Interagency Wildlife Task Group 2014a).

Wet Habitats

Estuarine

Estuarine habitat occurs along coastal California at the mouth of perennial rivers (CDFW California Interagency Wildlife Task Group 2014a). Estuarine habitat accounts for approximately one percent (398 acres) of the Primary Area of Analysis for terrestrial resources and is located in the Klamath River Estuary (Appendix G).

Estuarine habitat includes areas that are periodically or permanently inundated, including open water portions of semi-enclosed coastal waters where tidal seawater is diluted by freshwater. California estuaries do not often conform to the classic description of an estuary due to a restricted coastal plain and stream flow regimes characterized by summer drought. Estuarine habitat contains a high density of a few species that are able to withstand an estuary's many physiological stressors, such as varying salinity. Suspended organisms, such as phytoplankton, occur in the open water of estuaries and are densest near the surface and in low-salinity areas in summer. Other associated species include algae (green and red) and eelgrass (*Zostera* spp.), which grow in dense stands in many subtidal estuarine habitats (CDFW California Interagency Wildlife Task Group 2014a).

Montane Riparian

Montane Riparian forest occurs in narrow bands along streams below 8,000 feet (CDFW California Interagency Wildlife Task Group 2014a). Montane Riparian habitat accounts for approximately four percent (2,034 acres) of the Primary Area of Analysis for terrestrial resources. It occurs along the river and reservoir shorelines in scattered patches throughout the Primary Area of Analysis for terrestrial resources but is most prevalent in the Lower and Middle Klamath River. A portion of the Middle Klamath River, from Iron Gate Dam to the Shasta River confluence, contains the highest percentage (approximately 41 percent) of Montane Riparian habitat in the Primary Area of Analysis for terrestrial resources (Appendix G).

Within the Klamath Range, Montane Riparian tends to be dominated by black cottonwood (*Populus balsamifera* subsp. *trichocarpa*) and may be codominant with bigleaf maple; dogwood (*Cornus* spp.), and boxelder (*Acer negundo*) are also present. At high elevations, quaking aspen and white alder (*Alnus rhombifolia*) may also be present. Oregon ash (*Fraxinus latifolia*), willow, and a high diversity of forbs are common associates (CDFW California Interagency Wildlife Task Group 2014a). Within the Primary Area of Analysis for terrestrial resources, the species composition of Montane Riparian varies by reach and includes the following subcategories as defined in PacifiCorp (2004a, b):

- riparian grassland: characterized by a dense herbaceous cover;
- riparian scrub: dominated by coyote willow and arroyo willow with Oregon ash saplings prevalent;

- riparian deciduous: characterized by a moderate canopy cover including coyote willow and shining willow and/or alder (white or red, depending on location), with moderate shrub and herb layers; and
- riparian mixed deciduous-coniferous: characterized by a dense tree layer that includes both deciduous riparian tree species and upland conifer tree species, moderate density shrub layer, and open herbaceous layer that includes reed canarygrass and devil's beggarstick (*Bidens frondosa*).

In the Lower Klamath River and Klamath River Estuary, red alder is dominant. The Middle Klamath River is typically populated with coyote willow, shining willow, Oregon ash, and Oregon oak. In the Hydroelectric Reach along the Copco No. 2 Bypass Reach, white alder is dominant and dense enough to prohibit establishment of coyote willow and reed canarygrass (PacifiCorp 2004a,b). During 2018 surveys, the following alliances were documented that fall within Montane Riparian CWHR type: *Fraxinus latifolia* Forest Alliance (Iron Gate, Copco No. 1, and Copco No. 2 reservoirs) and *Acer macrophyllum* Forest Alliance (Copco No. 1 and Copco No. 2 reservoirs; CDM Smith 2018a). These are both rare natural community types.

Palustrine

Palustrine is a habitat type defined in *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) that includes all non-tidal wetlands as well as wetlands in tidal areas where ocean-derived salinity is below 0.5 percent. They are by definition less than 20 acres in size, lack active wave-formed or bedrock shoreline features, and are less than 6 feet deep at low water. Palustrine habitat occurs throughout California on the perimeters of lakes, river channels, and estuaries, as well as in river floodplains, isolated catchments, and depressions on slopes. Palustrine habitat accounts for approximately two percent (1,357 acres) of the Primary Area of Analysis for terrestrial resources. It occurs to varying degrees along the Lower Klamath Project reservoirs and river reaches, primarily limited to small patches in protected locations and near reservoir inlets and tributary mouths. Palustrine habitat occurs throughout the Lower and Middle Klamath River reaches and is most densely clustered in the Klamath River Estuary and the northern end of the Middle Klamath River (Appendix G).

Palustrine habitat can be broken into the following categories: Palustrine Emergent Wetland, Palustrine Scrub-shrub Wetland, Palustrine Forested Wetland, and Palustrine Aquatic Bed. Palustrine Emergent Wetland is dominated by a dense herbaceous layer, commonly including cattails (*Typha* spp.), bulrushes, sedges, reed (*Phragmites australis*), manna grasses (*Glyceria* spp.), purple loosestrife (*Lythrum salicaria*), dock (*Rumex* spp.), and many species of smartweeds (*Polygonum* spp.) (Cowardin et al. 1979). Within the Primary Area of Analysis for terrestrial resources, emergent vegetation along the reservoirs includes sedge, rush, bentgrass, bulrush, and cattail. Palustrine Scrub-shrub Wetland is characterized by an open canopy with a moderate shrub layer. Within the Primary Area of Analysis for terrestrial resources, species such as coyote willow (*Salix exigua*) and arroyo willow (*Salix lasiolepis*) are prevalent and coyote willow dominates at the reservoirs. Palustrine Forested Wetland is characterized by a dense tree cover that includes hydrophilic tree species such as coyote willow and shining willow (*Salix lasiandra*), brown dogwood (*Cornus glabrata*), and arroyo willow. Finally, Palustrine Aquatic Bed is dominated by pondweeds (*Potamogeton* spp.) and coontail (*Ceratophyllum demersum*) (PacifiCorp 2004a,b). During 2018 surveys, the

following alliances were documented that fall within the Palustrine habitat type: *Typha (angustifolia, domingensis, latifolia)* Herbaceous Alliance (Iron Gate Reservoir); *Salix exigua* Shrubland Alliance (Iron Gate Reservoir); and *Schoenoplectus acutus* Herbaceous Alliance (Iron Gate, Copco No. 1, and Copco No. 2 reservoirs; CDM Smith 2018a).

Wet Meadow

Wet Meadow occurs along streams, areas with concave topography, and/or where springs or seeps provide abundant available water (Ratliff 1985). The habitat type usually occurs above 3,940 feet in the north of the Tahoe Basin and above 5,900 feet to the south of the Basin (CDFW California Interagency Wildlife Task Group 2014a). Wet meadows account for less than one percent (15 acres) of the Primary Area of Analysis for terrestrial resources, with the highest concentration (10 acres) in the Middle Klamath River (Appendix G).

The Wet Meadow habitat type is characteristically defined by its hydrology: seasonality and reliability of yearly water inflows and outflows largely determine the stability of this habitat type. It tends to succeed bog communities and in turn is succeeded by mesic meadows and dry meadows or forests. The Wet Meadow habitat type is variable throughout California, but generally supports graminoids, including a variety of sedges (e.g., Nebraska sedge [*Carex nebrascensis*] and beaked sedge [*Carex utriculata*]), reed grasses (*Calamagrostis* spp.) and bent grass (*Agrostis* spp.), and a variety of rushes (*Juncus* spp.), and a lower percentage cover of forbs such as Anderson aster (*Aster alpigenus*), primrose monkey flower (*Mimulus primuloides*), cow's clover (*Trifolium wormskioldii*), and small white violet (*Viola macloskeyi*). Shrub cover is present along the margins (CDFW California Interagency Wildlife Task Group 2014a). During 2018 surveys, *Poa pratensis* Herbaceous Semi-Natural Alliance was documented at Copco No. 1 and Copco No. 2 reservoirs (CDM Smith 2018a).

Historical Vegetation

The area where Copco No. 1 and Copco No. 2 reservoirs are currently located historically consisted of a wide floodplain confined by steep slopes and the distribution of Montane Riparian and Palustrine habitats were situated along several river bends (Figure 3.5-2); there were a total of 66.2 acres of Montane Riparian and 23.7 acres of Palustrine habitat (Table 3.5-2; EDAW 2000). Wet habitats were more limited at Iron Gate Reservoir and was confined to long, thin bands running along the Klamath River channel (Figure 3.5-3); there were 30.1 acres of Montane Riparian and 2.6 acres of Palustrine habitat (Table 3.5-2; EDAW 2000).

When the reservoirs were built, topography limited the establishment of Montane Riparian habitat but in many places the creation of the reservoir created a flat bench that facilitated Palustrine habitat establishment (PacifiCorp 2004a). Currently, there are 11.1 acres of Montane Riparian and 25.2 acres of Palustrine habitat within 300 feet of the reservoir footprint of Copco No. 1 and Copco No. 2 reservoirs and 4.7 acres of Montane Riparian and 27.1 acres of Palustrine habitat within 300 feet of the reservoir footprint of Iron Gate Reservoir (Table 3.5-2; Figures 3.5-4 and 3.5-5; PacifiCorp 2005).

Table 3.5-2. Comparison of Historical (EDAW 2000) and Current (PacifiCorp 2005) Wet Habitat Types at Copco Nos. 1 and 2 and Iron Gate Reservoirs.

CHWR Vegetation Cover Types	Copco Nos. 1 and 2 (ac)	Iron Gate Reservoir (ac)	Total ac
Historical (reservoir footprint) [1]			
Montane Riparian (MRI)	66.2	30.1	**96.3**
Palustrine (PAL)[2]	23.7	2.6	**26.3**
Current (within 300 feet of the reservoir footprint)			
Montane Riparian (MRI)	11.1	4.7	**15.8**
Palustrine (PAL)[2]	25.2	27.1	**52.3**

[1] No historical data is available outside of the reservoir footprint.
[2] Not a CWHR type; based on the Cowardin classification for wetlands and deepwater habits (Cowardin et al. 1979.

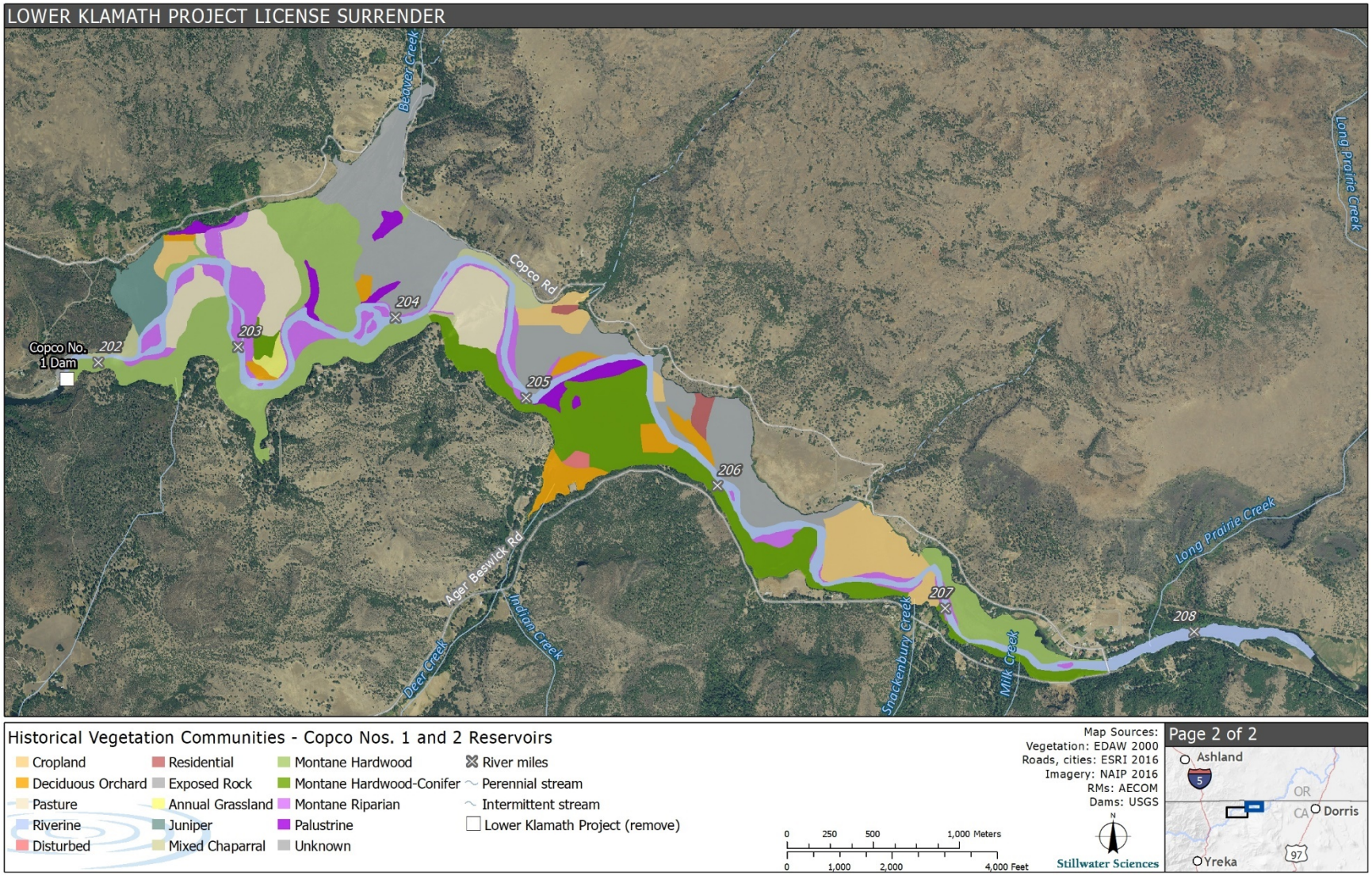

Figure 3.5-2. Historical Vegetation Types in Copco No. 1 and Copco No. 2 Reservoirs.

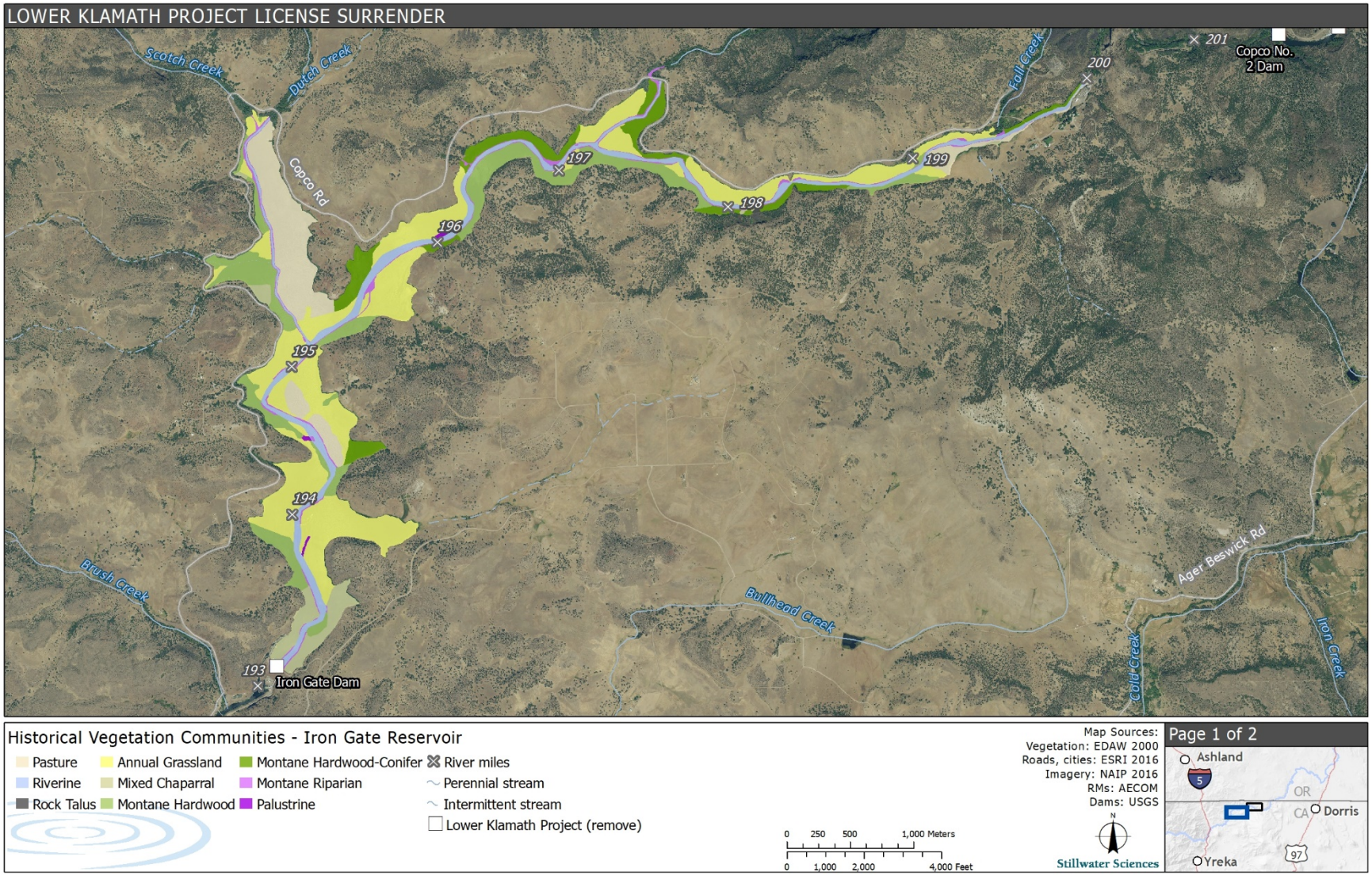

Figure 3.5-3. Historical Vegetation Types in Iron Gate Reservoir.

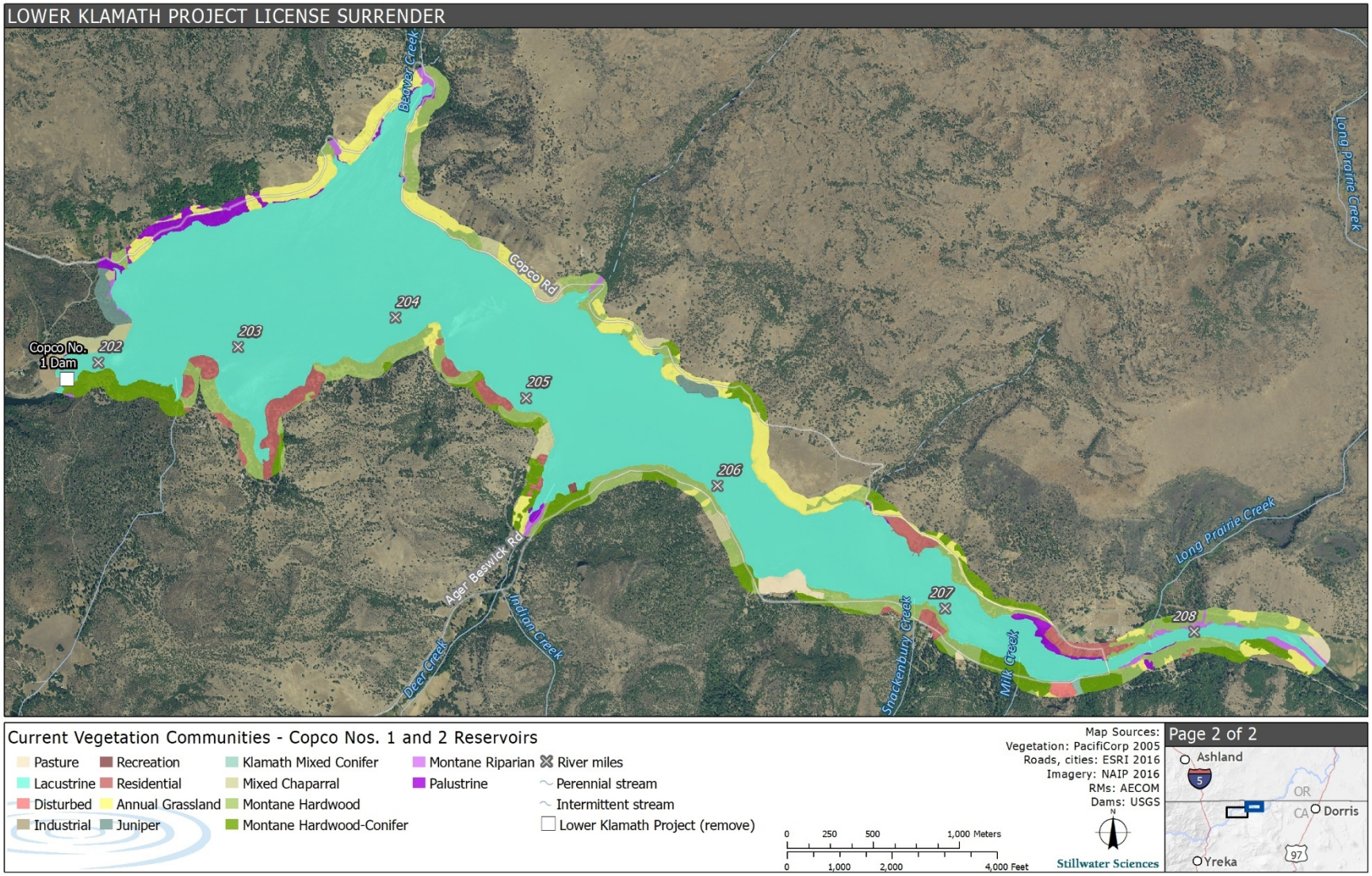

Figure 3.5-4. Current Vegetation Types within a 300-foot Buffer of Copco No. 1 and Copco No.2 Reservoirs.

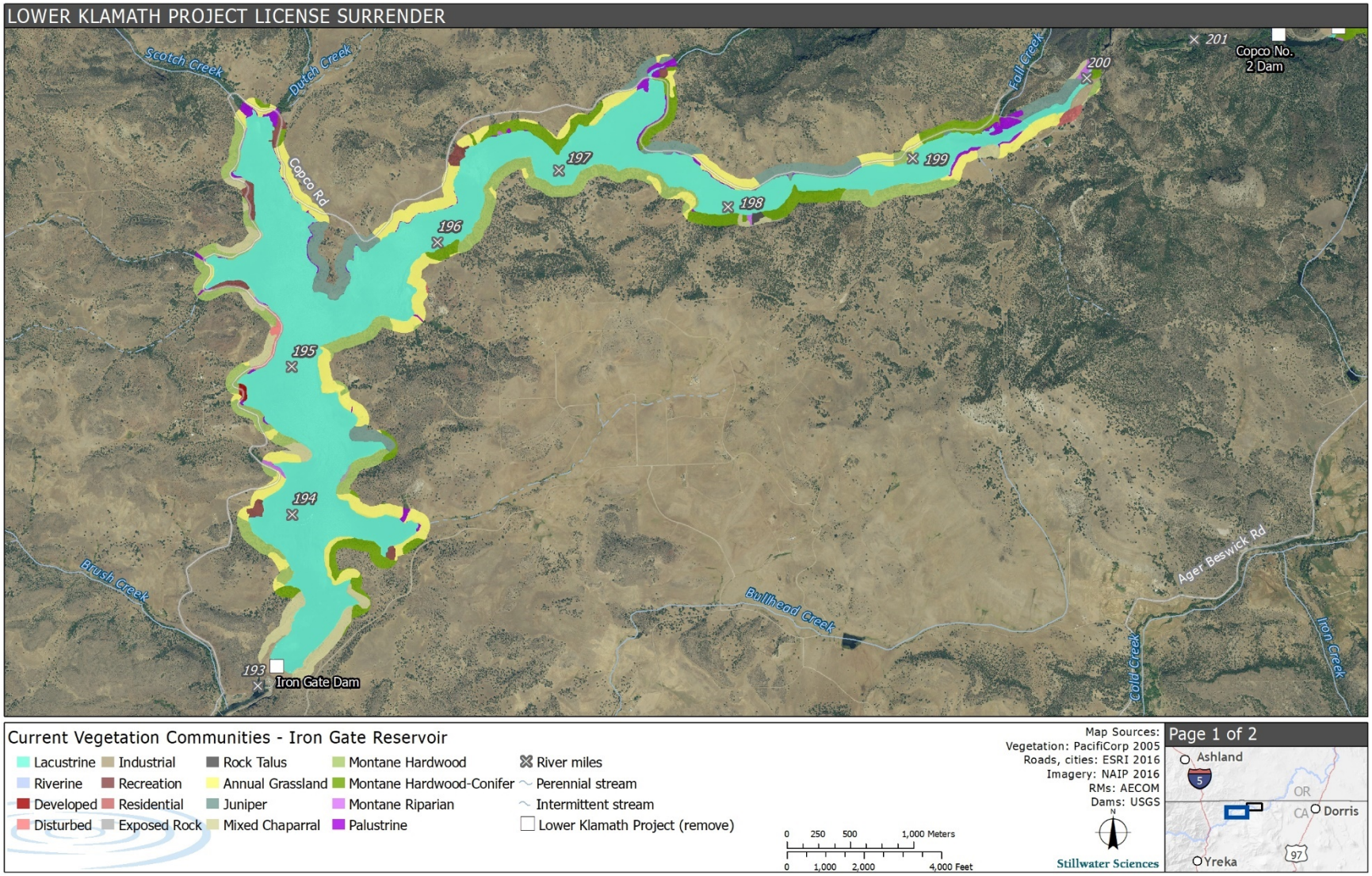

Figure 3.5-5. Current Vegetation Types within a 300-foot Buffer of Iron Gate Reservoir.

3.5.2.2 Invasive Plant Species

Multiple surveys for invasive plant species have been conducted in the Primary Area of Analysis for terrestrial resources. PacifiCorp conducted biological surveys in 2002, 2003, and 2004 (PacifiCorp 2004a,b) in the vicinity of the Primary Area of Analysis (PacifiCorp's study area overlaps but is not an exact match to the Primary Area of Analysis for terrestrial resources); vegetation surveys were conducted around the perimeter of Copco No. 1 and Iron Gate reservoirs in November 2009 and July 2010 (USBR 2011); and reconnaissance surveys were conducted in 2017 within the proposed Limits of Work and areas surrounding the reservoirs (Appendix B: *Definite Plan - Appendix J*). Twenty-two species of invasive plants have been documented within the vicinity of Primary Area of Analysis for terrestrial resources; based on available data, nine of the twenty-two species have been documented within the Primary Area of Analysis for terrestrial resources (Table 3.5-3).

Table 3.5-3. Invasive Plants Documented Within and in the Vicinity of the Primary Area of Analysis for Terrestrial Resources.

Scientific Name	Common Name	Data Source
Acroptilon repens	Russian knapweed	PacifiCorp (2004a,b)
Bromus tectorum	cheat grass	PacifiCorp (2004a,b)
Centaurea diffusa	diffuse knapweed	PacifiCorp (2004a,b)
Centaurea solstitialis[1]	yellow starthistle	PacifiCorp (2004a,b); USBR (2011); Bureau of Land Management (BLM) (2002); Appendix B: *Definite Plan – Appendix J*
Cirsium arvense	Canada thistle	PacifiCorp (2004a,b)
Cirsium vulgare	bull thistle	PacifiCorp (2004a,b)
Conium maculatum[1]	poison hemlock	Larson (2011); BLM (2002)
Cytisus scoparius	Scotch broom	PacifiCorp (2004a,b)
Elymus caput-medusae[1]	Medusahead	PacifiCorp (2004a,b); USBR (2011); Appendix B: *Definite Plan – Appendix J*
Fallopia japonica	Japanese knotweed	Hamilton (2011)
Hypericum perforatum[1]	St. John's wort	PacifiCorp (2004a,b); BLM (2002)
Isatis tinctoria[1]	Dyer's woad	PacifiCorp (2004a,b); EDAW (2004)
Lepidium draba[1]	hoary cress	PacifiCorp (2004a,b); EDAW (2004)
Lepidium latifolium	perennial pepperweed	PacifiCorp (2004a,b)
Linaria dalmatica subsp. *dalmatica*	Dalmatian toadflax	PacifiCorp (2004a,b)
Onopordum acanthium subsp. *acanthium*	Scotch thistle	PacifiCorp (2004a,b)
Persicaria wallichii	Himalayan knotweed	Hamilton (2011)
Phalaris canariensis	reed canary grass	Hamilton (2011)
Rubus armeniacus[1]	Himalayan blackberry	Hamilton (2011); BLM (2002); Appendix B: *Definite Plan – Appendix J*
Salvia aethiopis	Mediterranean sage	PacifiCorp (2004a,b)
Tribulus terrestris[1]	puncture vine	PacifiCorp (2004a,b); BLM (2002); EDAW (2004)
Xanthium spinosum[1]	spiny cocklebur	PacifiCorp (2004a,b); EDAW (2004)

[1] Species documented within the Primary Area of Analysis.

During the PacifiCorp biological surveys conducted in 2002, 2003, and 2004 (PacifiCorp 2004a,b), cheat grass (*Bromus tectorum*), yellow starthistle (*Centaurea solstitialis*), and medusahead (*Elymus caput-medusae*) were the most widespread invasive plants within the study area, and bull thistle (*Cirsium vulgare*) and Canada thistle (*Cirsium arvense*) were also pervasive (PacifiCorp 2004a,b). Many of the surveyed invasive plant species were found in uplands or near the riparian/upland interface and were abundant in areas where ground disturbance was evident (e.g., maintenance areas associated with power plants, transmission lines, flowlines, recreation sites, and roads). Along the Klamath River in high flow reaches, reed canarygrass was a commonly observed riparian plant species (PacifiCorp 2004a).

3.5.2.3 Culturally Significant Plant Species

Many plants in the Primary Area of Analysis for terrestrial resources were used by Native American Tribes in the Klamath River region as food sources (see also Section 3.12.2.1 *Cultural Chronology and Ethnography*); examples include seeds of wocus (yellow pond lily, *Nuphar lutea* subsp*olysepala*) and rootstocks of broad-leaved cattail (*Typha latifolia*) and bur reed (*Sparganium emersum*). Other plants such as hardstem bulrush (*Schoenoplectus acutus* var. *occidentalis*), cattails, and willows (*Salix* spp.) were used for basketry, clothing, and shelter (Larson and Brush 2010). Many of these plants are still culturally important today. Culturally significant plants used for food sources by the Yurok Tribe include acorns, seaweed, salal, wild grape (*Vitis californica*), various roots and berries including salmonberry (*Rubus spectabilis*), huckleberry and gooseberry and currants (O'Rourke 2017, 2016). Culturally significant plants used for food sources by the Shasta people include buckeye (*Aesculus californica*), pine nuts, manzanita berries, and a variety of other plants; acorns were a staple of the Shasta people's diet (Dixon 1907, Silver 1978).

Culturally significant plants used for basketry by the Yurok and/or Karuk tribes include alder (*Alnus* spp.), bear grass (*Xerophyllum tenax*), black maidenhair fern (*Adiantum capillus-veneris*), chain fern (*Woodwardia fimbriata*), chitum bark (*Frangula purshiana*), cottonwood (*Populus* spp.), hazel sticks (*Corylus cornuta*), mosses, sugar pine , redwood, spruce (*Picea* spp.), tobacco (*Nicotiana*), wild grape, Oregon grape and willow sticks and roots (O'Rourke 2017, 2016 and Hillman 2017, 2016) Many of these same plants are important medicinal plants used in healing and ceremony (Yurok Tribe Environmental Program 2009).

Culturally significant plants used as materials for fabrics and utensils by the Yurok include tanoak acorns, hazelnuts, pepperwood nuts (*Umbelleria californica*), berries, grasses, and bushes. Tall redwood trees are considered culturally significant by the Yurok as they used as part of the constitution and blessing and for the construction of canoes. Finally, culturally significant plants used as trade items by the Yurok include sugar pine nuts, tobacco seed, and juniper beads (O'Rourke 2017, 2016).

3.5.2.4 Non-special-status Wildlife

Information regarding non-special-status wildlife was compiled from surveys conducted by KRRC in 2018 and PacifiCorp in 2002 and 2003. The 2018 general wildlife surveys consisted of walking-transect surveys within a buffer of 0.25 mile of the proposed Limits of Work and via a boat along reservoir shorelines and open water (Appendix B: *Definite Plan*). The 2018 surveys focused on special-status species; however, some California

non-special-status species of birds were also documented. PacifiCorp conducted terrestrial wildlife surveys in a variety of habitats in 2002 and 2003 and detected (or documented from other sources, such as BLM surveys from 2000 and 2001) numerous wildlife species (PacifiCorp 2004a). Targeted species surveys were conducted within areas that supported aquatic, wetland, and riparian habitats for amphibian breeding and refuge; upland and aquatic habitats for reptiles (e.g., snakes and turtles), and habitats for birds such as talus and mixed riparian habitats, sagebrush, aquatic, wetlands, pastures, and buildings. PacifiCorp also monitored mammal habitat surrounding Project facilities using track surveys, photographic bait stations, and structure monitoring for bat use. Incidental observations of species were also documented. Although the 2002 and 2003 PacifiCorp surveys are more than 15 years old, the wildlife previously documented have a reasonable potential of occurring in California under existing conditions as habitat conditions have not substantively changed since the surveys were conducted (e.g., reservoirs are still present).

Below is a summary of the numerous non-special status amphibians, reptiles, birds, and mammals documented, in or near the Primary Area of Analysis for terrestrial resources in California by KRRC, PacifiCorp, and BLM (PacifiCorp 2004a, CDM Smith 2018c). Species documented only in the J.C. Boyle Peaking Reach (by PacifiCorp or BLM) are noted in parenthesis when it was not clear if the species was observed in California or Oregon. Regardless, due to the proximity of the J.C. Boyle Peaking Reach to the state line, it is reasonable to assume that these species have the potential to occur in California.

- Non-special-status amphibians–Pacific giant salamander, western toad, Pacific treefrog, and non-native bullfrog;
- Non-special-status reptiles—southern alligator lizard, western fence lizard, striped whipsnake, California mountain kingsnake, California kingsnake, gopher snake, common kingsnake, common garter snake, and western rattlesnake (species documented only in J.C. Boyle Peaking Reach included western yellow-bellied racer, western terrestrial garter snake, ringneck snake, rubber boa, western skink);
- Non-special-status-birds—mountain quail, double-crested cormorant, herons (great blue, black-crowned night), great egret, bufflehead, osprey, hawks (sharp-shinned, Cooper's), great-horned owl, terns (Forster's, Caspian), woodpeckers (acorn, pileated, Lewis'), black phoebe, black-capped chickadee, pygmy nuthatch, blue-gray gnatcatcher, western bluebird, and Swainson's thrush, (species documented only in J.C. Boyle Peaking Reach include, prairie falcon, flammulated owl, and merlin). Surveys conducted by KRRC in May 2018 also documented several osprey nests on platforms located on top of electrical poles in the Iron Gate Reservoir area (CDM Smith 2018c); and
- Non-special-status mammals—western harvest mouse, montane vole, woodrat (dusky-footed, bushy-tailed), squirrel (western gray, California ground), black-tailed deer, elk, bobcat, beaver, mink, river otter, mountain lion, and Yuma myotis (bat).

Surrounding areas also support habitat for wild horse herds, bighorn sheep, and habitat components critical for deer to winter in the area. CDFW has identified areas north and south of Iron Gate Reservoir, Copco No. 2 Reservoir, Copco No. 1 Reservoir, and the Klamath River upstream to the Oregon-California state line as critical deer wintering habitat (CDFW 2014a). CDFW identifies wintering range to include habitat elements important to the survival of deer in the winter, which may include corridors essential for

movement, staging areas where deer temporarily congregate, and high-quality winter forage (CDFW 2014a). This area represents one of the largest contiguous areas of deer winter range in the southern Oregon and northern California region. BLM's Pokegama Wild Horse Herd Management Area lies primarily in Oregon, but also includes portions in California north of the Klamath River. PacifiCorp reported that the wild horse herd roams throughout the area, from locations near Fall Creek to near J.C. Boyle Dam (PacifiCorp 2004a). Wild horse herds have also been documented along the western shore of Iron Gate Dam and based on data provided by CDFW in 2017, bighorn sheep are located along the north side of Copco No. 1 Reservoir and northeast of the confluence of Shovel Creek and the Klamath River (Figure 3.5-6).

Wildlife such as egrets, herons, raptors, river otters, and bears may forage on natural-origin or Iron Gate Hatchery-produced out-migrating salmonids (coho, fall-run Chinook, and steelhead) and adult returns (see Section 3.3.2.1 *Aquatic Species*). CDFW operates Iron Gate Hatchery, with an annual production goal of 75,000 coho salmon smolts, 6 million fall-run Chinook salmon yearlings and smolts, and 200,000 steelhead smolts (CDFW 2014b, detailed in Section 3.3.2.3 *Habitat Attributes Expected to be Affected by the Proposed Project*). However, the ability to meet the production goals varies annually based on adult returns and hatchery performance (e.g., no steelhead have been released since 2012 due to low returns of adult steelhead). While natural returns typically outnumber hatchery returns for all species, the proportion of the adult salmon escapement composed of Iron Gate Hatchery returns has historically been substantial. For fall-run Chinook salmon, around 35 percent of age 3 returning adults to the mid-Klamath River are Iron Gate Hatchery-produced (KRTT 2011, 2012, 2015), as well as approximately 30 percent of all coho salmon adult returns (CDFW 2014b, detailed in Section 3.3.5.9 *Aquatic Resource Impacts*). Under current conditions, no adult steelhead returning have been hatchery-produced since around 2012.

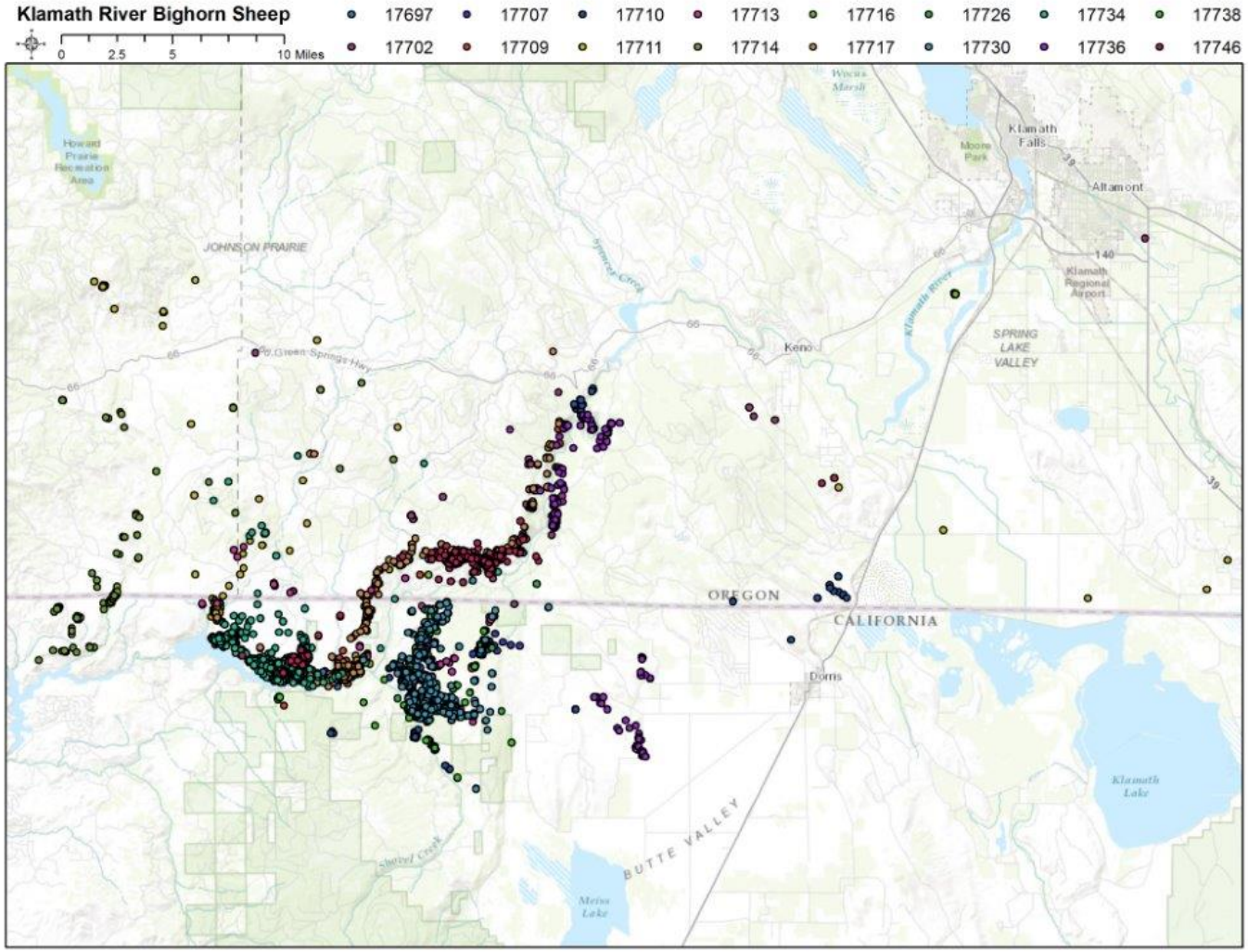

Figure 3.5-6. Bighorn Sheep 2017 Collar Data for the Klamath Basin (M. Harris, Senior Environmental Scientist, CDFW, pers. comm., October 2017).

3.5.2.5 Special-status Species

The list of special-status species known, or with the potential to occur, in the Primary Area of Analysis for terrestrial resources was developed by querying the following:

- CNDDB list of state and federal proposed endangered, threatened, candidate species, including those with BLM sensitive status (CDFW 2017a);
- USFWS list of federally listed and proposed endangered, threatened, and candidate species (USFWS 2017b);
- California Native Plant Society (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2017);
- USDA Forest Service Pacific Southwest Region's (Region 5) documented occurrences of sensitive animals and sensitive and special interest plants (USDA Forest Service 2003 and 2017b);
- BLM species list (S. Acridge, Resource Management Supervisor, BLM, pers. comm., July 2017); and
- NMFS West Coast Region species list of endangered and threatened species and critical habitat (2017).

The database queries for CNDDB, USFWS, and CNPS were each based on a search of the Proposed Project Vicinity, which includes the USGS 7.5-minute quadrangles in which the Primary Area of Analysis for terrestrial resources is located and the adjacent quadrangles (Appendix I). Occurrence information for special-status species was based on studies conducted by PacifiCorp, KRRC, and available information on the presence of birds in the area from the eBird database (eBird 2018).

PacifiCorp conducted focused surveys for special-status species in 2002, 2003, and 2004 (PacifiCorp 2004a,b). These results are incorporated into Appendix J, which lists all positive occurrence data for special-status species within the Proposed Project Vicinity. PacifiCorp collected wildlife data in 2002 and/or 2003 which included, but was not limited to, the following types of surveys: breeding amphibians in ponds and wetlands; stream-dwelling amphibians in selected tributary streams; upland amphibian surveys; Oregon spotted frog surveys at four wetlands near J.C. Boyle and Keno reservoirs; foothill yellow-legged frog surveys at ten Klamath River mainstem and tributary sites meeting basic criteria for habitat suitability; western pond turtle basking surveys and suitable nesting habitat mapping; snake hibernacula surveys focused on areas located between roads/recreation sites and the river and selected rock talus areas; upland reptile surveys at 137 plots; small mammal trapping and track surveys with bat stations; bat roost surveys; bird surveys using avian point count and area searches in survey plots and along reservoir and shoreline habitats; protocol surveys for northern spotted owl and northern goshawk, and broadcast calls for great gray owls; and data collected opportunistically during other studies (e.g., fish electrofishing).

Results of wildlife surveys conducted by KRRC in 2017 and available data from 2018 are incorporated into this analysis and are also provided in Appendix B: *Definite Plan – Appendix J* and KRRC (CDM Smith 2018c,d); some surveys are anticipated to continue into 2019.

Special-status Plants

Table 3.5-4 lists the special-status plant species with potential to occur in the Primary Area of Analysis for terrestrial resources based on the CNDDB, USFWS, and CNPS database queries (plant species elevation information in CDFW 2017a and CNPS 2017 is provided in metric units). Fifty-three of these species are associated with wetland and/or riparian habitats. Species that were documented in the Proposed Project Vicinity but have an elevation range that is higher than the Primary Area of Analysis for terrestrial resources or that occur in habitats not represented in the Primary Area of Analysis were excluded. The number of species that have been documented in the Primary Area of Analysis for terrestrial resources and are included in the CNDDB, USFWS, and/or CNPS database includes 14 special-status vascular and three special-status bryophyte species. Although not present in the CNDDB, USFWS, and CNPS databases, Egg Lake monkey-flower (*Mimulus pygmaeus*) was documented in the vicinity of Fall Creek Dam A/B – City of Yreka Water Supply Diversion (Figure 2.7-15) during the CDM Smith's 2018 surveys (CDM Smith 2018b); this species has a California Rare Plant Rank (CRPR) status of 4.2 and is found on volcanic and clay soils in vernally mesic areas including Great Basin scrub, lower montane coniferous forest, meadows and seeps and pinyon and juniper woodlands. No federally listed or state-listed species have been documented within the Primary Area of Analysis for terrestrial resources but 11 have the potential to occur.

Table 3.5-4. Special-status Plant Species with the Potential to Occur in the Primary Area of Analysis for Terrestrial Resources.

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Vascular Plants						
Abronia umbellata var. *breviflora*	pink sand-verbena	–/–/–/BLMS/1B.1	June–October	0–10	Coastal dunes	Potential habitat within the Primary Area of Analysis
Allium siskiyouense	Siskiyou onion	–/–/–/–/4.3	(April) May–July	855–2,500	Rocky and sometimes serpentine soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Androsace elongata subsp. *acuta*	California androsace	–/–/–/–/4.2	March–June	150–1,305	Chaparral, cismontane woodland, coastal scrub, meadows and seeps, pinyon and juniper woodland, and valley and foothill grassland	Potential habitat within the Primary Area of Analysis
Angelica lucida	sea-watch	–/–/–/–/4.2	May–September	0–150	Coastal bluff scrub, coastal dunes, coastal scrub, and coastal salt marshes and swamps	Potential habitat within the Primary Area of Analysis
Antennaria suffrutescens	evergreen everlasting	–/–/–/–/4.3	January–July	500–1,600	Serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Arabis aculeolata	Waldo rockcress	–/–/–/–/2B.2	April–June	410–1,800	Serpentine soils in broadleafed upland forest, lower montane coniferous forest, and upper montane coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a).
Arabis mcdonaldiana	McDonald's rockcress	FE/CE/–/FSS/1B.1	May–July	135–1,800	Serpentine soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Arabis modesta	modest rockcress	–/–/–/–/4.3	March–July	120–800	Chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Arabis oregana	Oregon rockcress	–/–/–/–/4.3	May	600–1,830	Serpentine soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Arctostaphylos hispidula	Howell's manzanita	–/–/–/–/4.2	March–April	120–1,250	Serpentine or sandstone soils in chaparral	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Arctostaphylos nortensis	Del Norte manzanita	–/–/–/–/4.3	February	500–800	Often serpentine soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Arnica cernua	serpentine arnica	–/–/–/–/4.3	April–July	500–1,920	Serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Arnica spathulata	Klamath arnica	–/–/–/–/4.3	May–August	640–1,800	Serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Asarum marmoratum	marbled wild-ginger	–/–/–/–/2B.3	April–August	200–1,800	Lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Astragalus umbraticus	Bald Mountain milk-vetch	–/–/–/–/2B.3	May–August	150–1,250	Sometimes on roadsides in cismontane woodland and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Balsamorhiza lanata	woolly balsamroot	–/–/–/BLMS/1B.2	April–June	800–1,895	Rocky, volcanic soils in cismontane woodland	Potential habitat within the Primary Area of Analysis
Bensoniella oregana	bensoniella	–/CR/FSS/–/1B.1	May-July	915–1,400	Bogs and fens, lower montane coniferous forest, meadows and seeps	Potential habitat within the Primary Area of Analysis
Boechera koehleri	Koehler's stipitate rockcress	–/–/FSS/–/1B.3	(March) April–July	155–1,660	Serpentine, rocky soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Calamagrostis bolanderi	Bolander's reed grass	–/–/–/–/4.2	May–August	0–455	Mesic soils in bogs and fens, broadleafed upland forest, closed-cone coniferous forest, coastal scrub, meadows and seeps, freshwater marshes and swamps, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Calamagrostis crassiglumis	Thurber's reed grass	–/–/–/–/2B.1	May–August	10–60	Mesic soils in coastal scrub and freshwater marshes and swamps	Potential habitat within the Primary Area of Analysis
Calamagrostis foliosa	leafy reed grass	–/CR/–/BLMS/4.2	May–September	0–1,220	Rocky soils in coastal bluff scrub and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Callitropsis nootkatensis	Alaska cedar	Petition to list/–/–/–/4.3		650–2,500	Upper montane coniferous forest	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Calochortus greenei	Greene's mariposa lily	–/– /FSS/BLMS/1B.2	June–August	1,035–1,890	Volcanic soils in cismontane woodland, meadows and seeps, pinyon and juniper woodland, and upper montane coniferous forest	Documented during PacifiCorp surveys at Iron Gate Reservoir, Copco No. 1 & No. 2 (PacifiCorp 2004a; CDMB Smith 2018b). Several occurrences on CNDDB along Klamath River (2017a).
Calochortus monanthus	single-flowered mariposa lily	–/–/–/BLMS/1A	June	745–800	Meadows and seeps	Potential habitat within the Primary Area of Analysis
Calochortus persistens	Siskiyou mariposa lily	–/CR/FSS/BLMS/ 1B.2	June–July	1,000–1,860	Rocky, acidic soils in lower montane coniferous forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Calycadenia micrantha	small-flowered calycadenia	–/–/FSS/–/1B.2	June-September	5–1,500	Roadsides, rocky, talus, scree, sometimes serpentine soils and sparsely vegetated areas in chaparral, volcanic meadows and seeps, and valley and foothill grassland	Potential habitat within the Primary Area of Analysis
Cardamine angulata	seaside bittercress	–/–/–/–/2B.1	(January) March–July	25–915	Wet areas and streambanks in lower montane coniferous forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Carex buxbaumii	Buxbaum's sedge	–/–/–/–/4.2	March–August	3–3,300	Bogs and fens, mesic soils in meadows and seeps, and marshes and swamps	Potential habitat within the Primary Area of Analysis
Carex hystericina	porcupine sedge	–/–/–/–/2B.1	May–June	610–915	Streambanks in marshes and swamps	Potential habitat within the Primary Area of Analysis
Carex lenticularis var. *limnophila*	lagoon sedge	–/–/–/–/2B.2	June–August	0–6	Often gravelly soils along shores, beaches in bogs and fens, marshes and swamps, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Carex leptalea	bristle-stalked sedge	–/–/–/–/2B.2	March–July	0–700	Bogs and fens, mesic areas of meadows and seeps, marshes and swamps	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Carex lyngbyei	Lyngbye's sedge	–/–/–/–/2B.2	April–August	0–10	Brackish or freshwater marshes and swamps	Potential habitat within the Primary Area of Analysis
Carex praticola	northern meadow sedge	–/–/–/–/2B.2	May–July	0–3,200	Mesic areas of meadows and seeps	Potential habitat within the Primary Area of Analysis
Carex saliniformis	deceiving sedge	–/–/–/–/1B.2	June (July)	3–230	Mesic soils in coastal prairie, coastal scrub, meadows and seeps, and coastal salt marshes and swamps	Potential habitat within the Primary Area of Analysis
Carex scabriuscula	Siskiyou sedge	–/–/–/–/4.3	May–July	710–2,345	Mesic, sometimes serpentine soils in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Carex serpenticola	serpentine sedge	–/–/–/–/2B.3	March–May	60–1,200	Mesic, serpentine soils in meadows and seeps	Potential habitat within the Primary Area of Analysis
Carex viridula subsp. *viridula*	green yellow sedge	–/–/–/–/2B.3	(June) July–September (November)	0–1,600	Bogs and fens, freshwater marshes and swamps, and mesic North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Castilleja ambigua var. *humboldtiensis*	Humboldt Bay owl's-clover	–/–/–/BLMS/1B.2	April–August	0–3	Coatal salt marshes and swamps	Potential habitat within the Primary Area of Analysis
Castilleja brevilobata	short-lobed paintbrush	–/–/–/–/4.2	April–July	120–1,700	Serpentine soils and edges and openings in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Castilleja elata	Siskiyou paintbrush	–/–/–/–/2B.2	May–August	0–1,750	Often serpentine soils in bogs and fens, and seeps in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Castilleja litoralis	Oregon coast paintbrush	–/–/–/–/2B.2	June	15–100	Sandy soils in coastal bluff scrub, coastal dunes, and coastal scrub	Potential habitat within the Primary Area of Analysis
Chaenactis suffrutescens	Shasta chaenactis	–/–/–/–/1B.3	May–September	750–2,800	Sandy, serpentine soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Chamaesyce hooveri	Hoover's Spurge	FT/–/–/–/1B.2	July–September (October)	25–250	Vernal pools	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Chrysosplenium glechomifolium	Pacific golden saxifrage	–/–/–/–/4.3	February–June	10–220	Streambanks, sometimes seeps, sometimes roadsides in North Coast coniferous forest, and riparian forest	Potential habitat within the Primary Area of Analysis
Cirsium ciliolatum	Ashland thistle	–/CE/–/BLMS/2B.1	June–August	800–1,400	Cismontane woodland and valley and foothill grassland	Potential habitat within the Primary Area of Analysis
Collomia tracyi	Tracy's collomia	–/–/–/–/4.3	June–July	300–2,100	Rocky, sometimes serpentine soils in broadleafed upland forest and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Coptis laciniata	Oregon goldthread	–/–/–/–/4.2	(February) March–May (September–November)	0–1,000	Mesic soils in meadows and seeps and streambanks in North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Cornus canadensis	bunchberry	–/–/–/–/2B.2	May–July	60–1,920	Bogs and fens, meadows and seeps, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Cypripedium californicum	California lady's-slipper	–/–/–/–/4.2	April–August (September)	30–2,750	Usually serpentine soils in bogs and fens, seeps and streambanks and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Cypripedium fasciculatum	clustered lady's-slipper	–/–/FSS/–/4.2	March–August	100–2,435	Usually serpentine soils in seeps and streambanks, lower montane coniferous forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/–/4.2	March–August	185–2,225	Broadleafed upland forest, cismontane woodland, lower montane coniferous forest, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Darlingtonia californica	California pitcherplant	–/–/–/–/4.2	April–August	0–2,585	Serpentine soils in bogs and fens, and meadows and seeps	Potential habitat within the Primary Area of Analysis
Dicentra formosa subsp. *oregana*	Oregon bleeding heart	–/–/–/–/4.2	April–May	425–1,485	Serrpentinite soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Draba carnosula	Mt. Eddy draba	–/–/FSS/–/1B.3	July–August	1,935–3,000	Serpentine, rocky soils in subalpine coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Empetrum nigrum	black crowberry	–/–/–/–/2B.2	April–June	10–200	Coastal bluff scrub and coastal prairie	Potential habitat within the Primary Area of Analysis
Epilobium oreganum	Oregon fireweed	–/– /FSS/BLMS/1B.2	June–September	500–2,240	Mesic soils in bogs and fens, lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Epilobium rigidum	Siskiyou Mountains willowherb	–/–/–/–/4.3	July–August	150–1,200	Serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Epilobium septentrionale	Humboldt County fuchsia	–/–/–/–/4.3	July–September	45–1,800	Sandy or rocky soils in broadleafed upland forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Erigeron bloomeri var. *nudatus*	Waldo daisy	–/–/–/–/2B.3	June–July	600–2,300	Serpentine soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Eriogonum congdonii	Congdon's buckwheat	–/–/–/–/4.3	(May) June–August (September)	800–2,345	Rocky, serpentine soils in lower montane coniferous forest openings	Potential habitat within the Primary Area of Analysis
Eriogonum hirtellum	Klamath Mountain buckwheat	–/–/FSS/–/1B.3	July–September	610–1,900	Serpentine soils in chaparral, lower montane coniferous forest, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Eriogonum nudum var. *paralinum*	Del Norte buckwheat	–/–/–/–/2B.2	June–September	5–80	Coastal bluff scrub and coastal prairie	Documented within the Primary Area of Analysis (CDFW 2017a)
Eriogonum siskiyouense	Siskiyou buckwheat	–/–/–/–/4.3	(June) July–September	970–2,740	Rocky, often serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Eriogonum ternatum	ternate buckwheat	–/–/–/–/4.3	June–August	305–2,225	Serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Eriogonum ursinum var. *erubescens*	blushing wild buckwheat	–/–/–/BLMS/1B.3	June–September	750–1,900	Rocky soils, scree, and talus in montane chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Erysimum concinnum	bluff wallflower	–/–/–/–/1B.2	February–July	0–185	Coastal bluff scrub, coastal dunes, and coastal prairie	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Erysimum menziesii	Menzies' Wallflower	FT/CE/–/–/1B.1	March–September	0–35	Coastal dunes	Potential habitat within the Primary Area of Analysis
Erythronium hendersonii	Henderson's fawn lily	–/–/FSS/–/2B.3	April–July	300–1,600	Lower montane coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a)
Erythronium howellii	Howell's fawn lily	–/–/–/–/1B.3	April–May	200–1,145	Sometimes serpentine soils in lower montane coniferous forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Erythronium oregonum	giant fawn lily	–/–/–/–/2B.2	March–June (July)	100–1,150	Sometimes serpentine soils and in rocky openings in cismontane woodland and meadows and seeps	Documented within the Primary Area of Analysis (CDFW 2017a)
Erythronium revolutum	coast fawn lily	–/–/–/–/2B.2	March–July (August)	0–1,600	Bogs and fens, streambanks, broadleafed upland forest, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Eucephalus vialis	wayside aster	–/–/FSS/–/1B.2	June–September	910–1,545	Gravelly soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Fritillaria gentneri	Gentner's fritillary	FE/–/–/–/1B.1	April–May	1,005–2,970	Sometimes serpentine soils in chaparral, cismontane woodland, and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Galium serpenticum subsp. *scotticum*	Scott Mountain bedstraw	–/–/–/BLMS/1B.2	May–August	1,000–2,075	Serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Gentiana setigera	Mendocino gentian	–/–/FSS/–/1B.2	(April–July) August–September	335–1,065	Mesic soils in lower montane coniferous forest, and meadows and seeps	Potential habitat within the Primary Area of Analysis
Gilia capitata subsp. *pacifica*	Pacific gilia	–/–/–/–/1B.2	April–August	5–1,665	Coastal bluff scrub, openings in chaparral, coastal prairie, and valley and foothill grassland	Potential habitat within the Primary Area of Analysis
Gilia millefoliata	dark-eyed gilia	–/–/–/BLMS/1B.2	April–July	2–30	Coastal dunes	Potential habitat within the Primary Area of Analysis
Glehnia littoralis subsp. *leiocarpa*	American glehnia	–/–/–/–/4.2	May–August	0–20	Coastal dunes	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Helianthus bolanderi	serpentine sunflower	–/–/–/–/4.2	June-November	150–1,525	Serpentine seeps in chaparral and cismontane woodland	Documented during PacifiCorp surveys south of Iron Gate Reservoir (PacifiCorp 2004a)
Hesperocyparis bakeri	Baker cypress	–/–/–/–/4.2		820–1,995	Serpentine or volcanic soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Horkelia sericata	Howell's horkelia	–/–/–/–/4.3	May–July	60–1,280	Serpentine or clay soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Hymenoxys lemmonii	alkali hymenoxys	–/–/–/–/2B.2	June–August (September)	240–3,390	Great Basin scrub, lower montane coniferous forest, and subalkaline meadows and seeps	Potential habitat within the Primary Area of Analysis
Iliamna latibracteata	California globe mallow	–/–/FSS/–/1B.2	June–August	60–2,000	Montane chaparral, lower montane coniferous forest, mesic soils in North Coast coniferous forest, and streambanks in riparian scrub. Often in burned areas	Potential habitat within the Primary Area of Analysis
Iris bracteata	Siskiyou iris	–/–/–/–/3.3	May–June	180–1,070	Serpentine soils in broadleafed upland forest and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Iris innominata	Del Norte County iris	–/–/–/–/4.3	May–June	300–2,000	Serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Iris tenax subsp. *klamathensis*	Orleans iris	–/–/–/–/4.3	April–May	100–1,400	Lower montane coniferous forest, often in disturbed areas	Potential habitat within the Primary Area of Analysis
Juncus dudleyi	Dudley's rush	–/–/–/–/2B.3	July–August	455–2,000	Mesic soils in lower montane coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a)
Juncus regelii	Regel's rush	–/–/–/–/2B.3	August	760–1,900	Mesic soils in meadows and seeps and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Kopsiopsis hookeri	small groundcone	–/–/–/–/2B.3	April–August	90–885	North Coast coniferous forest	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Lathyrus delnorticus	Del Norte pea	–/–/–/–/4.3	June–July	30–1,450	Often serpentine soils in lower montane coniferous forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Lathyrus japonicus	seaside pea	–/–/–/–/2B.1	May–August	1–30	Coastal dunes	Potential habitat within the Primary Area of Analysis
Lathyrus palustris	marsh pea	–/–/–/–/2B.2	March–August	1–100	Mesic soils in bogs and fens, coastal prairie, coastal scrub, lower montane coniferous forest, marshes and swamps, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Layia carnosa	beach layia	FE/CE/–/–/1B.1	March–July	0–60	Coastal dunes, and sandy soils in coastal scrub	Potential habitat within the Primary Area of Analysis
Lewisia cotyledon var. *heckneri*	Heckner's lewisia	–/–/–/BLMS/1B.2	May–July	225–2,100	Rocky soils in lower montane coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a)
Lewisia cotyledon var. *howellii*	Howell's lewisia	–/–/–/–/3.2	April–July	150–2,010	Rocky soils in broadleafed upland forest, chaparral, cismontane woodland, and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/–/–/3.2	(April) May–August	765–2,365	Openings, ridgetops, often slate, sometimes rhyolite tuff in upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Lewisia oppositifolia	opposite-leaved lewisia	–/–/FSS/–/2B.2	April-May (June)	300–1,220	Mesic soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Lilium bolanderi	Bolander's lily	–/–/–/–/4.2	June–July	30–1,600	Serpentine soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Lilium occidentale	western lily	FE/CE/–/–/1B.1	June–July	2–185	Bogs and fens, coastal bluff scrub, coastal prairie, coastal scrub, freshwater marshes and swamps, and openings in North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Lilium pardalinum subsp. *vollmeri*	Vollmer's lily	–/–/–/–/4.3	(June) July–August	30–1,680	Bogs and fens, and mesic soils in meadows and seeps	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Lilium pardalinum subsp. *wigginsii*	Wiggins' lily	–/–/–/–/4.3	June–August	485–2,000	Mesic soils in bogs and fens, broadleafed upland forest, lower montane coniferous forest, meadows and seeps, and riparian scrub	Potential habitat within the Primary Area of Analysis
Lilium rubescens	redwood lily	–/–/–/–/4.2	April–August (September)	30–1,910	Sometimes serpentine soils in broadleafed upland forest, chaparral, lower montane coniferous forest, North Coast coniferous forest, and upper montane coniferous forest. Sometimes roadsides	Potential habitat within the Primary Area of Analysis
Limnanthes floccosa subsp. *floccosa*	woolly meadowfoam	–/–/–/–/4.2	March–May (June)	60–1,335	Vernally mesic soils in chaparral, cismontane woodland, and valley and foothill grassland, and vernal pools	Potential habitat within the Primary Area of Analysis
Listera cordata	heart-leaved twayblade	–/–/–/–/4.2	February–July	5–1,370	Bogs and fens, lower montane coniferous forest, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Lomatium howellii	Howell's lomatium	–/–/–/–/4.3	April–July	110–1,705	Serpentine soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Lomatium martindalei	Coast Range lomatium	–/–/–/–/2B.3	May–June(August)	240–3,000	Coastal bluff scrub, lower montane coniferous forest, and meadows and seeps	Potential habitat within the Primary Area of Analysis
Lomatium peckianum	Peck's lomatium	–/–/–/–/2B.2	April–May (June)	700–1,800	Volcanic soils in chaparral, cismontane woodland, lower montane coniferous forest, and pinyon and juniper woodland	Documented within the Primary Area of Analysis (CDFW 2017a)
Lomatium tracyi	Tracy's lomatium	–/–/–/–/4.3	May–June	455–1,950	Serpentine soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis

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Lupinus tracyi	Tracy's lupine	–/–/–/–/4.3	(May) June–July	895–2,000	Upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Lycopodiella inundata	inundated bog club-moss	–/–/–/–/2B.2	June–September	5–1,000	Coastal bogs and fens, mesic soils in lower montane coniferous forest, marshes and swamps and lake margins	Potential habitat within the Primary Area of Analysis
Lycopodium clavatum	running-pine	–/–/–/–/4.1	June–August (September)	45–1,225	Often edges, openings, and roadsides in mesic soils in lower montane coniferous forest and North Coast coniferous forest, and marshes and swamps	Potential habitat within the Primary Area of Analysis
Lysimachia europaea	arctic starflower	–/–/–/–/2B.2	June–July	0–15	Coastal bogs, fens, meadows, and seeps	Potential habitat within the Primary Area of Analysis
Micranthes marshallii	Marshall's saxifrage	–/–/–/–/4.3	March–August	90–2,130	Riparian forest, rocky steambanks	Potential habitat within the Primary Area of Analysis
Microseris laciniata subsp. *detlingii*	Detling's silverpuffs	–/–/–/–/2B.2	May–June	600–1,500	Clay soils in openings in cismontane woodland	Documented within the Primary Area of Analysis (CDFW 2017a)
Mitellastra caulescens	leafy-stemmed mitrewort	–/–/–/–/4.2	(March) April–October	5–1,700	Mesic soils in broadleafed upland forest, lower montane coniferous forest, meadows and seeps, and North Coast coniferous forest. Sometimes roadsides	Potential habitat within the Primary Area of Analysis
Moneses uniflora	woodnymph	–/–/–/–/2B.2	May–August	100–1,100	Broadleafed upland forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Monotropa uniflora	ghost-pipe	–/–/–/–/2B.2	June–August (September)	10–550	Broadleafed upland forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Montia howellii	Howell's montia	–/–/–/–/2B.2	(February) March–May	0–835	Meadows and seeps, North Coast coniferous forest, and vernal pools. Sometimes roadsides	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Oenothera wolfii	Wolf's evening-primrose	–/–/–/BLMS/1B.1	May–October	3–800	Sandy, usually mesic soils in coastal bluff scrub, coastal dunes, coastal prairie, and lower montane coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a)
Opuntia fragilis	brittle prickly-pear	–/–/–/–/2B.1	April–July	820–880	Volcanic soils in pinyon and juniper woodland	Potential habitat within the Primary Area of Analysis
Orcuttia tenuis	Slender Orcutt Grass	FT/CE/–/–/1B.1	May–September (October)	35–1,760	Often in gravelly vernal pools	Potential habitat within the Primary Area of Analysis
Orthocarpus pachystachyus	Shasta orthocarpus	–/–/–/BLMS/1B.1	May	840–850	Great Basin scrub, meadows and seeps, and valley and foothill grassland	Potential habitat within the Primary Area of Analysis
Oxalis suksdorfii	Suksdorf's wood-sorrel	–/–/–/–/4.3	May–August	15–700	Broadleafed upland forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Packera bolanderi var. *bolanderi*	seacoast ragwort	–/–/–/–/2B.2	(Jan–April) May–July (August)	30–650	Coastal scrub and North Coast coniferous forest. Sometimes roadsides	Potential habitat within the Primary Area of Analysis
Packera hesperia	western ragwort	–/–/FSS/–/2B.2	April-June	500–2,500	Serpentine soils in meadows and seeps and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Packera macounii	Siskiyou Mountains ragwort	–/–/–/–/4.3	June–July	400–915	Sometimes serpentine, often in disturbed areas in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Penstemon cinicola	ash beardtongue	–/–/–/–/4.3	June–August (September)	730–2,685	Volcanic, sandy or rocky soils in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Penstemon filiformis	thread-leaved beardtongue	–/–/–/BLMS/1B.3	May–August (September)	450–1,875	Rocky, often serpentine soils in cismontane woodland and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Phacelia greenei	Scott Valley phacelia	–/–/–/BLMS/1B.2	April–June	800–2,440	Serpentine soils in closed-cone coniferous forest, lower montane coniferous forest, subalpine coniferous forest, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Phlox hirsuta	Yreka phlox	FE/CE/–/–/1B.2	March–April	760–1,500	Serpentine soils, talus in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Pinguicula macroceras	horned butterwort	–/–/–/–/2B.2	April–June	40–1,920	Serpentine soils in bogs and fens	Potential habitat within the Primary Area of Analysis
Piperia candida	white-flowered rein orchid	–/–/–/BLMS/1B.2	(March) May–September	30–1,310	Sometimes serpentine soils in broadleafed upland forest, lower montane coniferous forest, and North Coast coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a)
Pityopus californicus	California pinefoot	–/–/–/–/4.2	(March–April) May–August	15–2,225	Mesic soils in broadleafed upland forest, lower montane coniferous forest, North Coast coniferous forest, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Pleuropogon refractus	nodding semaphore grass	–/–/–/–/4.2	(March) April–August	0–1,600	Mesic soils in lower montane coniferous forest, meadows and seeps, North Coast coniferous forest, and riparian forest	Potential habitat within the Primary Area of Analysis
Poa piperi	Piper's blue grass	–/–/–/–/4.3	April–May	100–1,460	Serpentine, rocky soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Polemonium carneum	Oregon polemonium	–/–/–/–/2B.2	April–September	0–1,830	Coastal prairie, coastal scrub, and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Potamogeton foliosus subsp. *fibrillosus*	fibrous pondweed	–/–/–/–/2B.3	July–October	5–1,300	Shallow freshwater marshes and swamps	Potential habitat within the Primary Area of Analysis
Prosartes parvifolia	Siskiyou bells	–/–/FSS/–/1B.2	May–September	700–1,525	Often roadsides, disturbed areas, and burned areas in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Pyrrocoma racemosa var. *congesta*	Del Norte pyrrocoma	–/–/–/–/2B.3	August–September	200–1,000	Serpentine soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Ribes laxiflorum	trailing black currant	–/–/–/–/4.3	March–July(August)	5–1,395	North Coast coniferous forest, sometimes roadsides	Potential habitat within the Primary Area of Analysis
Romanzoffia tracyi	Tracy's romanzoffia	–/–/–/–/2B.3	March–May	15–30	Rocky soils in coastal bluff scrub and coastal scrub	Potential habitat within the Primary Area of Analysis
Rosa gymnocarpa var. *serpentina*	Gasquet rose	–/–/–/–/1B.3	April–June(August)	400–1,725	Serpentine soils, often roadsides, sometimes ridges, streambanks, and openings in chaparral and cismontane woodland	Potential habitat within the Primary Area of Analysis
Rubus nivalis	snow dwarf bramble	–/–/–/–/2B.3	June–August	1,085–1,350	North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Sabulina howellii	Howell's sandwort	–/–/–/BLMS/1B.3	April–July	550–1,000	Serpentine and xeric soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Salvia dorrii var. *incana*	fleshy sage	–/–/–/–/3	May–July	300–1,295	Great Basin scrub and pinyon and juniper woodland	Documented during PacifiCorp surveys at Iron Gate Reservoir and along Klamath River from Iron Gate Dam to Shasta River (PacifiCorp 2004a)
Sanguisorba officinalis	great burnet	–/–/–/–/2B.2	July–October	60–1,400	Often serpentine soils in bogs and fens, broadleafed upland forest, meadows and seeps, marshes and swamps, North Coast coniferous forest, and riparian forest	Potential habitat within the Primary Area of Analysis
Sanicula peckiana	Peck's sanicle	–/–/–/–/4.3	March, May, June	150–800	Often serpentine soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Sanicula tracyi	Tracy's sanicle	–/–/FSS/–/4.2	April–July	100–1,585	Openings in cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Schoenoplectus subterminalis	water bulrush	–/–/–/–/2B.3	June–August(September)	750–2,250	Bogs and fens, marshes and swamps and montane lake margins	Potential habitat within the Primary Area of Analysis

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Scirpus pendulus	pendulous bulrush	–/–/–/–/2B.2	June, August	800–1,000	Mesic meadows and seeps, and freshwater marshes and swamps	Potential habitat within the Primary Area of Analysis
Sedum citrinum	Blue Creek stonecrop	–/–/–/–/1B.2	June	1,050–1,280	Serpentine and rocky soils in North Coast coniferous forest, talus, scree, or boulder crevices; sometimes roadsides	Potential habitat within the Primary Area of Analysis
Sedum laxum subsp. *flavidum*	pale yellow stonecrop	–/–/–/–/4.3	May–July	455–2,000	Serpentine or volcanic soils in broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Sedum laxum subsp. *heckneri*	Heckner's stonecrop	–/–/–/–/4.3	June–July	100–2,100	Serpentine or gabbroic soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Sedum oblanceolatum	Applegate stonecrop	–/–/–/–/1B.1	June–July	400–2,000	Rocky soils and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Sedum obtusatum spp. paradisum	Canyon Creek stonecrop	–/–/FSS/–/1B.3	May-June	300–1,900	Granitic, rocky soils in broadleafed upland forest, chaparral, lower montane coniferous forest, and subalpine coniferous forest	Potential habitat within the Primary Area of Analysis
Sidalcea celata	Redding checkerbloom	–/–/–/–/3	April–August	135–1,525	Sometimes serpentine soils in cismontane woodland	Potential habitat within the Primary Area of Analysis
Sidalcea elegans	Del Norte checkerbloom	–/–/–/–/3.3	May–July	215–1,365	Serpentine soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Sidalcea malachroides	maple-leaved checkerbloom	–/–/–/–/4.2	(March) April–August	0–730	Often in disturbed areas in broadleafed upland forest, coastal prairie, coastal scrub, North Coast coniferous forest, and riparian woodland	Potential habitat within the Primary Area of Analysis
Sidalcea malviflora subsp. *patula*	Siskiyou checkerbloom	–/–/–/BLMS/1B.2	May–August	15–880	Often roadcuts in coastal bluff scrub, coastal prairie, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Sidalcea oregana subsp. *eximia*	coast checkerbloom	–/–/–/BLMS/1B.2	June–August	5–1,340	Lower montane coniferous forest, meadows and seeps, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis

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Silene marmorensis	Marble Mountain campion	–/–/–/–/1B.2	June, August	170–1,250	Broadleafed upland forest, chaparral, cismontane woodland, and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Silene serpentinicola	serpentine catchfly	–/–/FSS/–/1B.2	May–July	145–1,650	SerpentineOpenings in serpentine gravelly or rocky soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Smilax jamesii	English Peak greenbrier	–/–/–/BLMS/4.2	May–July (August–October)	505–1,975	Streambanks and lake margins, mesic depressions, broadleafed upland forest, lower montane coniferous forest, marshes and swamps, North Coast coniferous forest, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Strepthanthus howellii	Howell's jewelflower	–/–/FSS/–/1B.2	July-August	305–1,500	Serpentine, rocky soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Strepthanthus oblanceolatus	Trinity River jewelflower	–/–/FSS/–/1B.2	April-June	20–420	Cismontane woodland	Potential habitat within the Primary Area of Analysis
Tauschia glauca	glaucous tauschia	–/–/–/–/4.3	April–June	80–1,700	Gravelly, serpentine soils in lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Thermopsis gracilis	slender false lupine	–/–/–/–/4.3	March–July	100–1,720	Chaparral, cismontane woodland, lower montane coniferous forest, meadows and seeps, and North Coast coniferous forest. Sometimes roadsides	Potential habitat within the Primary Area of Analysis
Thermopsis robusta	robust false lupine	–/–/FSS/–/1B.2	May–July	150–1,500	Broadleafed upland forest and North Coast coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a)
Tiarella trifoliata var. *trifoliata*	trifoliate laceflower	–/–/–/–/3.2	(May) June–August	170–1,500	Edges, moist shady streambanks in lower montane coniferous forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Tracyina rostrata	beaked tracyina	–/–/FSS/–/1B.2	May-June	90–750	Chaparral, cismontane woodland, and valley and foothill grassland	Potential habitat within the Primary Area of Analysis
Trifolium siskiyouense	Siskiyou clover	–/–/–/–/1B.1	June–July	880–1,500	Mesic meadows and seeps, sometimes streambanks	Potential habitat within the Primary Area of Analysis

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Trillium ovatum subsp. *oettingeri*	Salmon Mountains wakerobin	–/–/–/–/4.2	February–July	855–2,024	Mesic soils in lower montane coniferous forest, riparian scrub, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Triteleia grandiflora	large-flowered triteleia	–/–/–/–/2B.1	April–June	700–1,500	Great Basin scrub and Pinyon and juniper woodland	Potential habitat within the Primary Area of Analysis
Triteleia hendersonii	Henderson's triteleia	–/–/–/–/2B.2	May–July	760–1,200	Cismontane woodland	Potential habitat within the Primary Area of Analysis
Vaccinium coccineum	Siskiyou Mountains huckleberry	–/–/–/–/3.3	June–August	1,095–2,135	Often serpentine soils in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Vaccinium scoparium	little-leaved huckleberry	–/–/–/–/2B.2	June–August	1,036–2,200	Rocky soils in subalpine coniferous forest	Potential habitat within the Primary Area of Analysis
Veratrum insolitum	Siskiyou false-hellebore	–/–/–/–/4.3	June–August	45–1,635	Clay soils in chaparral and lower montane coniferous forest	Potential habitat within the Primary Area of Analysis
Viola howellii	Howell's violet	–/–/–/–/2B.2	May–June	655	North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Viola lanceolata ssp. *occidentalis*	western white bog violet	–/–/FSS/–/1B.2	April-September	100–990	Serpentine soils in bogs and fens, marshes and swamps	Potential habitat within the Primary Area of Analysis
Viola palustris	alpine marsh violet	–/–/–/–/2B.2	March–August	0–150	Coastal bogs and fens and mesic coastal scrub	Potential habitat within the Primary Area of Analysis
Viola primulifolia subsp. *occidentalis*	western white bog violet	–/–/–/–/1B.2	April–September	100–990	Serpentine bogs and fens and marshes and swamps	Potential habitat within the Primary Area of Analysis
Bryophytes						
Anomobryum julaceum	slender silver moss	–/–/–/–/4.2	N/A	100–1,000	Damp rock and soil on outcrops, usually on roadcuts in broadleafed upland forest, lower montane coniferous forest, and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Buxbaumia viridis	buxbaumia moss	–/–/FSS/BLMS/2B.2	N/A	975–2,200	Fallen wood or humus in lower montane coniferous forest, subalpine coniferous forest, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Discelium nudum	naked flag moss	–/–/–/–/2B.2	N/A	10–50	Clay banks in coastal bluff scrub	Documented within the Primary Area of Analysis (CDFW 2017a)

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Fissidens pauperculus	minute pocket moss	–/–/FSS/–/1B.2	N/A	10–1,024	Damp coastal soil in North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Mielichhoferia elongata	elongate copper moss	–/–/FSS/–/4.3	N/A	0–1,960	Metamorphic rock, usually acidic, usually vernally mesic, and sometimes carbonate soils in broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, and subalpine coniferous forest	Potential habitat within the Primary Area of Analysis
Orthotrichum holzingeri	Holzinger's orthotrichum moss	–/–/–/–/1B.3	N/A	715–1,800	Usually on rock in and along streams, and rarely on tree limbs in cismontane woodland, lower montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest	Documented within the Primary Area of Analysis (CDFW 2017a)
Ptilidium californicum	Pacific fuzz wort	–/–/–/BLMS/4.3	May–August	1,140–1,800	Usually epiphytic on live or dead trees, fallen and decaying logs, and stumps and rarely on humus over boulders in lower montane coniferous forest and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Trichodon cylindricus	cylindrical trichodon	–/–/–/–/2B.2	N/A	50–2,002	Sandy, exposed soil, roadbanks in broadleafed upland forest, meadows and seeps, and upper montane coniferous forest	Potential habitat within the Primary Area of Analysis
Triquetrella californica	coastal triquetrella	–/–/–/–/1B.2	N/A	10–100	Coastal bluff scrub and coastal scrub.	Documented within the Primary Area of Analysis (CDFW 2017a).
Lichen						
Bryoria pseudocapillaris	false gray horsehair lichen	–/–/–/–/3.2	N/A	0–90	Conifers in North Coast coniferous forest along the coast	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Calicium adspersum	spiral-spored guilded-head pin lichen	–/–/FSS/–/2B.2	N/A	200	Often restricted to bark of conifers over 200 years old in lower montane coniferous forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Peltigera gowardii	western waterfan lichen	–/–/FSS/–/4.2	N/A	1,065–2,620	On rocks in cold water creeks with little or no sediment or disturbance in riparian forest	Potential habitat within the Primary Area of Analysis
Ramalina thrausta	angel's hair lichen	–/–/FSS/–/2B.1	N/A	75–430	On dead twigs and other lichens in North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Sulcaria badia	groovy beard lichen	–/–/FSS/–/–	N/A	0–670	Mesic mixed hardwood/mid-mature *Pseudotsuga menziesii* forest, with additional hardwoods (*Quercus kelloggii*) occasional in the vicinity[4]	Potential habitat within the Primary Area of Analysis
Usnea longissima	Methuselah's beard lichen	–/–/–/BLMS/4.2	N/A	50–1,460	Tree branches, usually on old growth hardwoods and conifers in broadleafed upland forest and North Coast coniferous forest	Potential habitat within the Primary Area of Analysis
Fungi[5]						
Cudonia monticola		–/–/FSS/–/–	fruits primarily in spring	160–1,827	Common under conifers in mature moist coniferous forests in northern CA and the Pacific Northwest. Typically associated with very rotten wood	Potential habitat within the Primary Area of Analysis
Dendrocollybia racemosa	branched Collybia	–/–/FSS/–/–	fruits in autumn	Unknown	Grows on the remains of decayed mushrooms, or in duff of mixed hardwood-conifer woods in Pacific Northwest	Potential habitat within the Primary Area of Analysis
Otidea smithii		–/–/FSS/–/–	fruits August-December	381–1,144	Usually under conifer forests in Pacific Northwest and Norther California	Potential habitat within the Primary Area of Analysis
Phaeocollybia olivacea	Olive Phaeocollybia	–/–/FSS/–/–	fruits September-December	6–962	Grows on ground in mixed woods and under conifers in southern Oregon and northern California	Potential habitat within the Primary Area of Analysis

Scientific Name	Common Name	Status[1] Federal/ State/USDA Forest Service/ BLM/CRPR	Blooming Period[2,3]	Elevation Range (m)	California Habitat Associations[2]	Potential Habitat Or Documented Occurrence?
Rubroboletus pulcherrimus [Boletus pulcherrimus]	red-pored Bolete	–/–/FSS/–/–	fruits July–December	13–1,713	In mixed hardwood-conifer forests. Often found growing under conifers	Potential habitat within the Primary Area of Analysis
Tricholomopsis fulvescens		–/–/FSS/–/–	Unknown	above 1,000	Grows on rotting conifer logs in the Pacific Northwest and northern California	Potential habitat within the Primary Area of Analysis

[1] Status:
- Federal
  - FE Federally Endangered
  - FT Federally Threatened
  - – No federal status
- State
  - CE California State Endangered
  - CR California State Rare
  - – No state status
- USDA Forest Service
  - FSS USDA-FS Sensitive
  - – No USDA-FS status
- BLM
  - BLMS BLM Sensitive
  - – No BLM status
- California Rare Plant Rank (CRPR; formerly known as CNPS Lists)
  - List 1B Plants rare, threatened, or endangered in California and elsewhere
  - List 2B Plants rare, threatened, or endangered in California, but more common elsewhere
  - List 3 More information needed about this plant, a review list
  - List 4 Plants of limited distribution, a watch list
  - – No CRPR status
- CNPS Threat Ranks:
  - 0.1 Seriously threatened in California (high degree/immediacy of threat)
  - 0.2 Fairly threatened in California (moderate degree/immediacy of threat)
  - 0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

[2] CDFW (2017a), CNPS (2017) and Baldwin et al. (2012) unless otherwise cited.
[3] Species may bloom in months listed in parentheses but there are outside of the most common blooming range.
[4] USDA-FS 2012.
[5] Information sources include Aurora 1986, USDA_FS and BLM 2017.

Special-status Wildlife

To assess the possible effects of the Proposed Project on special-status species analyzed in this EIR, all special-status terrestrial wildlife species identified in the querying process described above (Section 3.5.2.5 *Special-status Species*) were evaluated for the potential to occur in the Proposed Project Vicinity (see Appendix Table J-3 for all wildlife species reviewed in the querying process) to determine inclusion for further analysis based on the following considerations: previously documented (including sightings from 1954) and known to occur in the Primary Area of Analysis for terrestrial resources, designated critical habitat is present in the Primary Area of Analysis, suitable habitat present in the Primary Area of Analysis, and/or potential to be affected by the Proposed Project. The 46 terrestrial special status determined to be appropriate for further analysis are six invertebrates, six amphibians, two reptiles, 23 birds, and nine mammals (Table 3.5-5). Habitat and occurrence information from CNDDB and 2002 and 2003 survey results from PacifiCorp (2004a) and 2018 surveys from KRRC (as referenced in Section 3.5.2.4 *Non-Special Status Wildlife*) are provided in Table 3.5.-5.

(see Section 3.3.2 *Environmental Setting* and Appendix Table A-1 for a discussion of aquatic special-status wildlife species such as Shasta crayfish, sea turtles, sea lion, and whales.)

Table 3.5-5. Suitable Habitat and Occurrence Information for Special-status Wildlife Species.

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Invertebrates			
Hooded lancetooth *Ancotrema voyanum*	--/--/BLMS	Limestone substrates, mostly in an elevation range of 550–3,100 feet	• Species was documented in 1992 approximately 4 miles southwest of Orleans and approximately 0.2 miles from the Klamath River (greater than 100 river miles (RM) downstream of Iron Gate Dam) (CDFW 2017a).
Oregon shoulderband *Helminthoglypta hertleini*	--/--/BLMS	Found on basaltic talus slopes where ground cover/moisture is present; adapted to dry conditions during a portion of the year	• Single occurrence has been documented approximately 100 RM downstream of Iron Gate Dam (no documentation date) (2017a).
Trinity shoulderband *Helminthoglypta talmadgei*	--/--/BLMS	Limestone rockslides, litter in coniferous forests, old mine tailings, and along shaded streams	• Single occurrence documented at mine tailings in 1954 more than 100 RM downstream of Iron Gate Dam (2017a).
Siskiyou shoulderband *Monadenia chaceana*	--/--/BLMS	Lower reaches of major drainages. Talus and rock slides, under rocks and woody debris in moist conifer forests, caves, and riparian corridors in shrubby areas	• Single occurrence has been documented approximately 0.25 RM downstream of Copco No. 2 Dam in a lava rockslide (no documentation date) (2017a).
Tehama chaparral *Trilobopsis tehamana*	--/--/FSS, BLMS	Rocky talus and under leaf litter or woody debris within approximately 330 feet of limestone outcrops	• Two occurrences in 1990 and 1994—one sighting near the Klamath River and another along the hill slope. Both occurrences are more 20 RM downstream of Iron Gate Dam (2017a).
Western bumblebee *Bombus occidentalis*	–/–/FSS	Shrub, chaparral, and open grassy areas (urban parks, mountain meadows)	• Six sightings from 1969 and earlier are located more than 70 RM downstream of Iron Gate Dam (2017a).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Amphibians			
Southern torrent (southern seep) salamander *Rhyacotriton variegatus*	–/SSC/FSS	In and adjacent to cold, permanent, well-shaded mountain springs, waterfalls, and seeps with rock substrate	• Not observed in California during the PacifiCorp surveys (PacifiCorp 2004a). • Approximately 10 sightings have been recorded, approximately 50 RM or more downstream from Iron Gate Dam typically along tributaries or at the confluence to the Klamath River; the most recent sighting was from 2007. • Found to be widespread in the tributaries of the Lower Klamath River (Green Diamond Resources Company 2006), but due to lack of suitable habitat, would not be expected to occur in the mainstem of the Lower Klamath River.
Scott Bar salamander *Plethodon asupak*	--/ST/--	Rocky forested areas, especially thick moss-covered talus; elevation range of 1,500–2,000 feet	• Not documented in California during the PacifiCorp surveys (PacifiCorp 2004a,b). • Documented at four locations approximately 30 RM downstream of Iron Gate Dam between 1996 and 2005 (CDFW 2017a).
Siskiyou Mountains salamander *Plethodon stormi*	--/ST/FSS	Loose rock talus on north-facing slopes or in dense wooded areas; also under bark near talus	• Not documented in California during the PacifiCorp surveys (PacifiCorp 2004a). • Documented at five locations approximately 30 RM downstream of Iron Gate Dam between 1972 and 2003 (CDFW 2017a).
Pacific tailed frog *Ascaphus truei*	–/SSC/–	In and adjacent to cold, clear, moderate- to fast-flowing, perennial mountain streams in conifer forest	• Not documented in California during the PacifiCorp surveys (PacifiCorp 2004a). • Observed at the confluence of a tributary approximately 60 RM downstream from Iron Gate Dam in 1989. Farther downstream, five additional sites are documented along tributaries to the Klamath or at the confluence (2017a). • Found to be widespread in the tributaries of the Lower Klamath River (Green Diamond Resources Company 2006), but due to lack of suitable habitat for these species, would not would be expected to occur in the mainstem of the Lower Klamath River.

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Foothill yellow-legged frog *Rana boylii*	Petition to list/ SCT, SSC/FSS, BLMS	Shallow tributaries and mainstems of perennial streams and rivers, typically associated with cobble or boulder substrate	• Documented on tributaries to the Klamath River (CDFW 2017a). • Documented in 2017 on the Lower Klamath River, approximately 13 RM upstream of the estuary (M. Wikaira Yurok Tribe to Parker Thaler, pers. comm., January 2018), approximately 20 RM upstream of the estuary by landowner Green Diamond in 1994 (CDFW 2017a), and approximately 50 RM downstream from Iron Gate Dam in 1970 and farther downstream in 1976 (CDFW 2017a). • Detections are rare in the Klamath Basin (AmphibiaWeb 2017) • PacifiCorp targeted surveys in 2003 at most likely habitat locations (including Bogus and Cottonwood Creek, approximately 0.2 and 7 miles downstream of Iron Gate Dam, respectively) detect no occurrences (PacifiCorp 2004a). • Historical localities were restricted to a relatively small area that consisted of the mainstem Klamath River in the Klamath River Canyon, California, and its nearby tributaries (Borisenko and Hayes 1999). • One frog observed at Boise Creek in 1999 (Hayes et al. 2016).
Northern red-legged frog *Rana aurora*	–/SSC/FSS	Breeds in still or slow-moving water with emergent and overhanging vegetation, including wetlands, wet meadows, ponds, lakes, and low-gradient, slow-moving stream reaches with permanent pools; uses adjacent uplands for dispersal and summer retreat	• Not documented in California during the PacifiCorp surveys (PacifiCorp 2004a). • A 1995 sighting was documented approximately 20 RM upstream of the Klamath River Estuary; species located along the north bank of the Klamath River along mats of vegetation (CDFW 2017a).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Reptiles			
Western pond turtle *Actinemys marmorata*	Petition to list/SSC/FSS, BLMS	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting	• Documented in 2018 at Iron Gate Reservoir with majority of observations along the northern half of the reservoir (Mirror Cove and near Camp Creek and Jenny Creek) and throughout Copco No. 1 Reservoir with majority of observations occurring in the northern Beaver Creek and Raymond Gulch coves. Also observed near the Copco Rd bridge at the upstream end of the reservoir (CDM Smith 2018c). • Considered common to abundant in many Lower Klamath Project reservoirs and reaches with suitable nesting habitat being present. During PacifiCorp 2002 and 2003 surveys, 6 turtles were documented in California portion of the J.C. Boyle peaking reach (12 at Copco No. 1 Reservoir, 18 in the beaver dam pond/wetland between Fall Creek and Iron Gate Reservoir, and 17 at Iron Gate Reservoir. Surveys downstream of the Iron Gate Dam to Shasta River documented one site with 9 turtles; however, it was noted that the survey had several gaps due to sites being inaccessible (PacifiCorp 2004a). • Documented basking during May 2018 wildlife surveys in the reservoirs-9 in Iron Gate Reservoir and between 31-36 in Copco No. 1 Reservoir (K. Stenberg, Principal, CDM Smith, pers. comm., July 2018). • Approximately 10 miles RM downstream of Iron Gate Dam, an individual was observed basking approximately 0.5 miles upstream of Williams Creek at the confluence of a tributary in November 2005 (CDFW 2017a).PacifiCorp (2002) indicated that most basking probably occurs in Iron Gate Reservoir when water levels decrease, and the turtles use emerging rocks and boulders; however low water levels reduce the amount of aquatic habitat and make bordering emergent wetlands less accessible due to increased distance (PacifiCorp 2004a).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Northern sagebrush lizard *Sceloporus graciosus*	–/–/BLMS	Inhabits sagebrush, chaparral, juniper woodlands, and dry conifer forests	• Documented during PacifiCorp surveys near the edge of a forested wetland along Iron Gate Reservoir (PacifiCorp 2004a). • Documented during 2018 surveys in several areas surrounding Copco No. 1 Reservoir including a large population in a rocky area to the east of Fall Creek, and Iron Gate Reservoir including Bogus Creek fish hatchery, Long Gulch Cove shoreline, Jenny Creek shorelines, and recreational areas (CDM Smith 2018c,d).
Birds			
American white pelican *Pelecanus erythrorhynchos*	–/SSC/–	Nests at lakes and marshes and uses almost any lake outside of the breeding season	• Documented during PacifiCorp surveys—55 pelicans on Copco No. 1 Reservoir and 107 pelicans on Iron Gate Reservoir (PacifiCorp 2004a). • Documented at Copco No. 1 and Iron Gate reservoirs (eBird 2018), • Documented during 2018 surveys throughout Copco No. 1 Reservoir near the dam and in Keaton Cove and at Iron Gate Reservoir, including Mirror Cove, Juniper Point, upstream extent of the reservoir, and near the boom in front of Iron Gate Dam (CDM Smith 2018c,d).
Barrow's goldeneye *Bucephala islandica*	–/SSC/–	May be found in northern California during the winter (non-breeding season) along open water and riverine habitat. Nests in cavities, including artificial nest boxes	• Documented during PacifiCorp surveys at Copco and Iron Gate reservoirs primarily between January and April (PacifiCorp 2004a), prior to northward migration. • Documented at Iron Gate Reservoir and on the Klamath River downstream of Iron Gate Dam (eBird 2018).
Common loon *Gavia immer*	–/SSC/–	Freshwater lakes, rivers, estuaries, and coastlines	• Documented during PacifiCorp surveys at Iron Gate Reservoir (PacifiCorp 2004a).
Bald eagle *Haliaeetus leucocephalus*	–, Bald and Golden Eagle Protection Act (BGEPA), SFP/SE, BLMS, FSS	Large bodies of water or rivers with abundant fish; uses adjacent snags or other perches; nests and winter communal roosts in advanced-successional conifer forest within approximately 1 mile of open water	• Documented during the KRRC surveys, two inactive bald eagle nests—one within 0.5 miles of Copco Reservoir and one located between 0.5–2 miles of Iron Gate Reservoir (S. Leonard, AECOM, Senior Water Resources Engineer, pers. comm, October 2018). • Documented in 1997 along the Klamath River, and approximately 2 miles from Copco No. 1 and No. 2 dams (CDFW 2017a). • Documented during PacifiCorp surveys at J.C. Boyle and Copco No. 1 reservoirs. The highest number of bald eagles (12) was found at Copco No.1 Reservoir (PacifiCorp 2004a,b).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Northern harrier *Circus cyaneus*	–/SSC/–	Nests, forages, and roosts in wetlands or along rivers or lakes, but also in grasslands, meadows, or grain fields	• Documented during PacifiCorp surveys along the Klamath River from Iron Gate Dam to Shasta River (PacifiCorp 2004a). • Documented along Copco No. 1 Reservoir, along Iron Gate Reservoir and tributaries, and Klamath River downstream of Iron Gate Dam (eBird 2018).
Northern goshawk *Accipter gentilis*	–/SSC/FSS, BLMS	Mature and old-growth stands of coniferous forest, middle and higher elevations; nests in dense part of stands near an opening	• Documented during PacifiCorp surveys flying over J.C. Boyle peaking reach (PacifiCorp 2004a). • Documented in 1981 more than 80 RM downstream of Iron Gate Dam (CDFW 2017a).
Swainson's hawk *Buteo swainsoni*	–/ST/BLMS	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain fields	• Documented occurrences within the Project Vicinity near agricultural fields approximately 10 miles east of Copco No. 1 Reservoir (CDFW 2017a).
Golden eagle *Aquila chrysaetos*	–/SFP/–	Open woodlands and oak savannahs, grasslands, chaparral, sagebrush flats; nests on steep cliffs or large trees	• Documented during PacifiCorp surveys along the lower reaches of the J.C. Boyle peaking reach and along Iron Gate and Copco No. 1 reservoirs (PacifiCorp 2004a). • Also documented along the Klamath River, downstream of Iron Gate Dam (eBird 2018). • Two active golden eagle nests were documented during the KRRC surveys within two miles of Copco No. 1 Reservoir and three inactive nests were documented within 2 miles of Iron Gate Reservoir (S. Leonard, AECOM, Senior Water Resources Engineer, pers. comm, October 2018). In May 2018, a golden eagle was observed at Copco No. 1 Reservoir perched on a slope on the northern shoreline, a pair was observed near a northern cove, and one was observed bathing in the shallow water (CDM Smith 2018c).
American peregrine falcon *Falco peregrinus*	–/SFP/–	Wetlands, woodlands, cities, agricultural lands, and coastal area with cliffs (and rarely broken-top, predominant trees) for nesting; often forages near water	• Documented around Iron Gate Reservoir (CDFW 2017a). • Documented of Iron Gate Dam along the Klamath River (eBird 2018).
Greater sandhill crane *Grus canadensis tabida*	–/ST, SFP/FSS, BLMS	Forages in freshwater marshes and grasslands as well as harvested rice fields, corn stubble, barley, and newly planted grain fields	• Documented nesting habitat at J.C. Boyle Reservoir in May 2018 (Appendix B: *Definite Plan – Appendix J*). • Documented during the PacifiCorp surveys at J C. Boyle Reservoir (PacifiCorp 2004a). Other sightings in ponds and near agricultural fields east of Yreka (CDFW 2017a).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Black tern *Chlidonias niger*	–/SSC/–	Nests semi-colonially in protected areas of marshes	• Documented during PacifiCorp surveys at J.C. Boyle Reservoir (PacifiCorp 2004a).
Western yellow-billed cuckoo *Coccyzus americanus*	FT/SE/FSS, BLMS No critical habitat proposed within the Primary Area of Analysis	Summer resident of valley foothill and desert riparian habitats; nests in open woodland with clearings and low, dense, scrubby vegetation	• Although not documented in the area, it has been noted that the species has the potential to be in the vicinity (PacifiCorp 2004a). • In coordination with state agencies, it has been noted that breeding habitat is unlikely in the area.
Northern spotted owl *Strix occidentalis caurina*	FT/ST, SSC/– Critical habitat designated approximately 0.5 miles south east of Copco No. 1 Reservoir	Typically in older forested habitats; nests in complex stands dominated by conifers, especially coastal redwood, with hardwood understories; some open areas are important for foraging	• Detected during PacifiCorp surveys southeast of Copco No. 1 Reservoir (PacifiCorp 2004a). • Activity center is located approximately 1.7 miles southeast of Copco No. 1 Reservoir (CDFW 2017c). • Designated critical habitat approximately 0.5 miles southeast of Copco No. 1 Reservoir and along the Klamath River approximately 40 RM downstream of Iron Gate Dam. • Critical habitat is located north of the Lower Klamath Project in the Jenny Creek basin, upstream of Copco No. 1 Reservoir, and along portions of the Lower Klamath River. Also documented on National Forest lands and along the Lower Klamath River on lands managed by Green Diamond Resources Company.
Great gray owl *Strix nebulosi*	–/SE/FSS	Dense, coniferous forest, usually near a meadow for foraging; nests in large, broken-topped snags	• Documented during PacifiCorp surveys east of Fall Creek near Jenny Creek (PacifiCorp 2004a).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Black swift *Cypseloides niger*	–/SSC/–	Nests in moist crevices behind or beside permanent or semi-permanent waterfalls in deep canyons, on perpendicular sea cliffs above surf, and in sea caves; forages widely over many habitats	• Not documented in California during the PacifiCorp surveys (PacifiCorp 2004a). • Single occurrence is known from 1982 along the banks of the Klamath River, over 100 RM downstream of Iron Gate Dam (CDFW 2017a).
Vaux's swift *Chaetura vauxi*	–/SSC/–	Redwood and Douglas-fir habitats with large snags, especially forest with larger basal hollows and chimney trees	• Documented during PacifiCorp surveys at Copco No. 1 and Iron Gate reservoirs, along the J.C. Boyle peaking reaches, along Fall Creek, and along Klamath River from Iron Gate Dam to Shasta River (PacifiCorp 2004a).
Black-backed woodpecker *Picoides arcticus*	Petitioned for listing filed in 2012. In October 2017, USFWS released a finding indicating listing of the species is not warranted (USFWS 2017b)/ Petitioned for listing filed in 2012. In May 2013, the Fish and Game Commission released a finding indicating listing of the species is not warranted (CDFW 2013)/–/–	Affinity to boreal and montane coniferous forests post-burn or following outbreaks of wood-burning beetles	• Not documented in the area; however, potential for the species to occur due to the presence of suitable habitat (coniferous forest).
Olive-sided flycatcher *Contopus cooperi*	–/SSC/–	Primarily advanced-successional conifer forests with open canopies	• Documented during PacifiCorp surveys along Iron Gate Reservoir and along J.C. Boyle peaking reach (PacifiCorp 2004a). • Observed during 2018 surveys at the northern coves and riparian woodlands at Copco No. 1 Reservoir (CDM Smith 2018c)

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Willow flycatcher *Empidonax traillii*	–/SE/FSS	Dense brushy thickets within riparian woodland often dominated by willows and/or alder, near permanent standing water; uses brushy, early-succession forests (e.g., clearcuts) in the Pacific Northwest	• Documented during PacifiCorp surveys in riparian and wetland habitats located along the shoreline of Copco No. 1 and Iron Gate reservoirs, along the J.C. Boyle peaking reach, and along Klamath River from Iron Gate Dam to Shasta River (PacifiCorp 2004a). • Documented Iron Gate Reservoir at Jenny Creek in 2008 (CDFW 2017a). • Observed during 2018 surveys at Copco No. 1 Reservoir in the northern cove at the confluence of West Fork Beaver Creek, Beaver Creek, and East Fork Beaver Creek in fringe willow (CDM Smith 2018c).
Purple martin *Progne subis*	–/SSC/–	Conifer, valley-foothill, montane-hardwood forests with large snags in open areas; most nest sites located in upper slopes of hilly terrain; also may nest in human-made structures with cavities	• Documented during PacifiCorp surveys upstream of the upper falls at Fall Creek (PacifiCorp 2004a). • Documented a few locations along the Klamath River, downstream of Iron Gate Dam (eBird 2018).Observed nesting during 2018 survey on a utility pole near the intersection of Copco Road and the dam access spur road (CDM Smith 2018c).
tricolored blackbird *Agelaius tricolor*	Petition to list/SCE, SSC/–	Feeds in grasslands and agriculture fields; nesting habitat components include open accessible water, a protected nesting substrate (including flooded or thorny vegetation), and a suitable nearby foraging space with adequate insect prey	• A single sighting in 2011 (eBird 2018) at Copco No. 1 Reservoir and potential for the species to occur due to the potential presence of suitable habitat (open foraging area adjacent to aquatic habitat). • Flock of approximately 25 observed in an agricultural field along Yreka Ager Road, located approximately 12 miles southwest of the Bogus Creek Fish Hatchery (CDM Smith 2018c).
Yellow warbler *Setophaga petechia*	–/SSC/–	Open-canopy, deciduous riparian woodland close to water, along streams or wet meadows	• Documented during PacifiCorp surveys at all Lower Klamath Project reservoirs and reaches (PacifiCorp 2004a). • Documented along the Klamath River downstream of Iron Gate Dam (eBird 2018). • Observed around Copco No. 1. Reservoir and most frequent in riparian woodlands and hillside seep areas and also at Iron Gate Reservoir, including Bogus Creek fish hatchery, Brush Creek, Camp Creek, and Jenny Creek (CDM Smith 2018c).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Yellow-breasted chat *Icteria virens*	–/SSC/–	Early-successional riparian habitats with a dense shrub layer and an open canopy	• Documented during PacifiCorp surveys in wetland and riparian habitats along J.C. Boyle peaking reach, at Copco No. 1 Reservoir, along Fall Creek, and along Klamath River from Iron Gate Dam to Shasta River (PacifiCorp 2004a). • Documented during 2018 surveys in the northern cove of Iron Gate Reservoir near Camp Creek and Horseshoe Ranch Wildlife Area, and at Fall Creek and along the southern portion of Copco No. 1 Reservoir, near Ager Beswick Road east of Keaton Cove (CDM Smith 2018c).
Mammals			
Western mastiff bat *Eumops perotis californicus*	–/SSC/–	Variety of habitats including desert scrub, chaparral, oak woodland, ponderosa pine, mid-elevation conifer (e.g., giant sequoia). Roosting habitat mostly associated with significant rock features. Forages seasonally at high elevations	• Not documented in California during PacifiCorp surveys (PacifiCorp 2004a). • Documented at Medicine Lake, Siskiyou County (Pierson and Rainey 1998). • Range includes the Primary Area of Analysis (CDFG 1997).
Townsend's western big-eared bat *Corynorhinus townsendii*	–/SSC/FSS, BLMS	Roosts in cavities, usually tunnels, caves, buildings, and mines, but also rock shelters, preferentially close to water. Caves near water's edge are favored.	• Not documented in California during the PacifiCorp surveys (PacifiCorp 2004a). • Two documented occurrences in 1997 at bridges approximately 40 RM downstream of Iron Gate Dam (CDFW 2017a). • Suitable habitat (e.g., man-made structures) are present in the Limits of Work. Structures providing habitat for a non-special-status bat species (Yuma myotis) were documented at the Copco No. 1 powerhouse and the Iron Gate south gatehouse (PacifiCorp 2004a), which may support other bat species.
Spotted bat *Euderma maculatum*	–/SSC/BLMS	Roosts in cracks, crevices, and caves, usually high in fractured rock cliffs solitary or in small groups	• Suitable habitat for this species (e.g., large dam faces) may be present in the Limits of Work. • Although not documented during PacifiCorp roost surveys, species speculated to be rare, but widely distributed, and as a result may be in Area of Analysis (PacifiCrop 2004a).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Pallid bat *Antrozous pallidus*	–/SSC/FSS, BLMS	Roosts in rock crevices, live or dead tree hollows, mines, caves, and a variety of vacant and occupied structures or buildings	• Not documented in California during PacifiCorp surveys (PacifiCorp 2004a); however, it was noted that species presence of a roost site was documented by one dead individual (Yuma myotis), and that it is possible that sites with confirmed evidence of bat use support aggregations of more than one species. • No CNDDB occurrences are documented within the Primary Area of Analysis. • Suitable habitat are present in the Limits of Work. Structures providing habitat for a non-special-status bat species (Yuma myotis) were documented at the Copco No. 1 powerhouse and the Iron Gate south gatehouse (PacifiCorp 2004a), which, along with other structures, trees, rock crevices in the area, may support other bat species.
Fringed myotis *Myotis thysanodes*	–/–/BLMS, FSS	Roosts in crevices, cavities, and foliage in a wide variety of habitats including rock crevices, caves, mines, buildings and bridges, and large-diameter snags	• Not documented in California during PacifiCorp surveys; however, it was noted that species presence of a roost site was documented by one dead individual (*Yuma myotis*), and that it is possible that sites with confirmed evidence of bat use support aggregations of more than one species. (PacifiCorp 2004a). • No CNDDB occurrences are documented within the Primary Area of Analysis. • Suitable habitat are present in the Limits of Work. Structures providing habitat for Yuma myotis were documented at the Copco No. 1 powerhouse and the Iron Gate south gatehouse (PacifiCorp 2004a), which, along with other structures, trees, rock crevices in the area, may support other bat species. • Habitat for myotis species inside Copco No. 1 C-12 gate house as a maternity roost of more than 2,000 Myotis spp. (species not noted) was confirmed in June 2018 and several hundred bats (species not noted) also roosting at Copco 1 diversion tunnel and Iron Gate diversion tunnel (KRRC 2018b).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
Long-eared myotis (*Myotis evotis*)	–/–/BLMS	Roosts in bridges, buildings, under exfoliating tree bark, and in hollow trees, caves, mines, cliff crevices, sinkholes, rocky outcrops on the ground	• Not documented in California during PacifiCorp surveys; however, it was noted that species presence of a roost site was documented by one dead individual (Yuma myotis), and that it is possible that sites with confirmed evidence of bat use support aggregations of more than one species. (PacifiCorp 2004a). • Suitable habitat (e.g., man-made structures) are present in the Limits of Work. • Habitat for myotis species inside Copco No. 1 C-12 gate house as a maternity roost of more than 2,000 Myotis spp. (species not noted) was confirmed in June 2018 and several hundred bats (species not noted) also roosting at Copco 1 diversion tunnel and Iron Gate diversion tunnel (KRRC 2018b).
Yuma myotis *Myotis yumanensis*	–/–/BLMS	Roosts in bridges, buildings, cliff crevices, caves, mines, and trees	• Structures providing habitat for Yuma myotis were documented at the Copco No. 1 powerhouse and the Iron Gate south gatehouse (PacifiCorp 2004a). • Habitat for myotis species inside Copco No. 1 C-12 gate house as a maternity roost of more than 2,000 Myotis spp. (species not noted) was confirmed in June 2018 and several hundred bats (species not noted) also roosting at Copco 1 diversion tunnel and Iron Gate diversion tunnel (KRRC 2018b).
Gray wolf *Canis lupus*	FE/SE/– No critical habitat designated	Range of habitats including temperate forests, mountains, tundra, taiga, and grasslands	• The Lower Klamath Project is not within or near the area of current wolf activity; however, have been previously documented in the area (CDFW 2017a; M. Harris, Senior Environmental Scientist, CDFW, pers. comm., October 2017). • Since December 2011, at least two packs of gray wolves and three separate individual wolves have been detected in California. Key wolf use areas to date have included western Lassen and eastern Siskiyou counties, although wolves have also been known to utilize parts of Modoc, Plumas, Shasta, and Tehama counties (M. Harris, Senior Environmental Scientist, CDFW, pers. comm., November 2017).

Common Name Scientific Name	Status[a] Federal/ State/USDA Forest Service, BLM	Habitat Association	Available Habitat and Occurrence Information within the Primary Area of Analysis
American badger *Taxidea taxus*	–/SSC/–	Shrubland, open grasslands, fields, and alpine meadows with friable soils	• Not documented in California during PacifiCorp surveys (PacifiCorp 2004a). • A single occurrence (unknown date) was documented approximately 2 miles upstream of Copco No. 1 Reservoir (CDFW 2017a).

[a] Status codes:

Federal
FT = Listed as threatened under the federal Endangered Species Act
BGEPA = Federally protected under the Bald and Golden Eagle Protection Act
FSS = USDA Forest Service Sensitive species
BLMS = Bureau of Land Management Sensitive Species

State
SE = Listed as Endangered under the California Endangered Species Act
ST = Listed as Threatened under the California Endangered Species Act
SCT = State Candidate Threatened
SSC = CDFW Species of Special Concern
SFP = CDFW Fully Protected species

3.5.2.6 Wildlife Corridors and Habitat Connectivity

Project reservoirs and waterways create substantial breaks in the connectivity of riparian habitat. Large mammals such as elk and deer are likely able to traverse narrow reservoirs, while these waterways may create barriers to small mammals, reptiles, and amphibians. In addition, canals, roads, powerhouses, and other facilities can block movement of amphibians and reptiles (PacifiCorp 2004a).

Riparian corridors facilitate dispersal of both aquatic and terrestrial wildlife. Riparian areas provide shade, cooler temperatures, and substrate for cover, breeding, or foraging for amphibians such as western toads and many bird species such as western yellow-billed cuckoo and yellow-breasted chat. Continuous riparian connectivity plays an important role during dispersal of juvenile birds, and reservoirs may support dispersal of juvenile birds in some areas (PacifiCorp 2004a).

Transmission power lines have the potential to cause bird mortality from collisions, particularly when transmission lines cross flight paths that birds use during seasonal migration or daily movements between foraging and nesting areas. PacifiCorp assessed transmission line configurations for raptor-safe design by evaluating electrocution and collision hazards relative to standards and guidelines for power lines described in the Edison Electric Institute's publications, Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996 (APLIC 1996) and Mitigating Bird Collisions with Power Lines: The State of the Art in 1994 (APLIC 1994) (PacifiCorp 2004a). PacifiCorp determined that there are three segments of transmission lines in California near areas of high waterfowl and wading bird use: one segment near the upstream end of Iron Gate Reservoir and two segments that cross Iron Gate Reservoir. The probability of avian collision is reduced at these sites as the lines do not pass between the reservoirs, rivers, major wetlands, or cropland that would attract foraging birds. Based on the date of this writing, no collisions or electrocutions have been documented by PacifiCorp personnel for any of the FERC Project-related transmission lines since a Memorandum of Understanding to document bird mortalities was filed in the 1980s between PacifiCorp and CDFW, ODFW, and USFWS (PacifiCorp 2004a).

3.5.3 Significance Criteria

Criteria for determining significant impacts on terrestrial resources are based upon Appendix G of the CEQA Guidelines (California Code of Regulations title 14, section 15000 et seq.) and professional judgment informed by best available data. Effects on terrestrial resources are considered significant if the Proposed Project would:

- Result in population-level impacts on state species of special concern, USDA Forest Service sensitive wildlife species on USDA Forest Service lands, or BLM sensitive species on BLM lands.

- Result in any of the following to the other types of special-status species[112]: not listed above: direct mortality or physical harm to individuals; degradation of habitat or a change in habitat conditions that would result in physiological impairment or that may affect the ability to perform essential behaviors such as migration, feeding, or reproducing; or abandonment of active bird nests or hibernacula or maternity bat roosts due to noise or structure removal (i.e., buildings, vegetation).
- Result in substantial removal or degradation of any riparian habitat or rare natural community.
- Result in substantial modifications of federally protected wetlands as defined by Section 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means.
- Result in population-level impacts to culturally significant plant species, or a substantial change in habitat conditions that support these plants.
- Result in a substantial reduction of acreage or degradation of habitat that supports rare natural communities, for instance, through the introduction or spread of invasive plants.
- Result in substantial interference with the movement of any native resident or migratory wildlife species or with documented native resident or migratory wildlife corridors.
- Conflict with any local policies protecting biological resources, such as a tree preservation policy, where the conflict would result in an adverse impact on terrestrial resources.
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan, where the conflict would result in an adverse impact on terrestrial resources.

3.5.4 Impact Analysis Approach

The impact analysis focused on the Primary Area of Analysis for terrestrial resources (area surrounding the Limits of Work and Klamath River downstream to the Pacific Ocean [see Section 3.5.1 *Area of Analysis*]). Property within the Secondary Area of Analysis for terrestrial resources would eventually be transferred to the respective states (i.e., California or Oregon) and managed for public interests (e.g., creation of open space, wetland and riverine restoration, river-based recreation, and grazing). Given that future land uses are speculative and potential impacts will vary, potential impacts to the Secondary Area of Analysis are not analyzed in this section. However, since the vegetation types, geology, climate, and hydrology of the Secondary Area of Analysis are similar to the Primary Area of Analysis, potential impacts from ground and noise

[112] Based on coordination with CDFW, significant impacts would occur if there is direct mortality or physical harm to special-status species which are defined as those species listed, proposed, or under review as endangered or threatened under the federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA); those designated by the USDA Forest Service as sensitive or watch list species; those listed as rare under the California Native Plant Protection Act and/or included on CDFW's most recent *Special Vascular Plants, Bryophytes, and Lichens List* with a California Rare Plant Rank (CRPR) of 1, 2, 3, or 4 (CDFW 2017a); those designated as a Species of Special Concern by CDFW, designated as Fully Protected under the California Fish and Game Code (Sections 3511, 4700, 5050, and 5515), and/or protected under the federal Bald and Golden Eagle Protection Act.

disturbance activities (e.g., wetland and riverine restoration activities, recreation activities) in the Secondary Area of Analysis are expected to be similar to those in the Primary Area of Analysis.

Evaluation of the Proposed Project considered both short- and long-term effects on terrestrial resources. Short-term effects were defined as impacts that have the potential to occur within two years of the action and long-term effects were defined as impacts that have the potential to occur two years or more after the activity is completed. The analysis considered the timing of the action as identified in Appendix H of the Definite Plan (e.g., pre-dam removal period [one to two years prior to drawdown], reservoir drawdown period [January to March, year of drawdown], dam removal period [spring, summer, and fall immediately after drawdown], post-dam removal period [after dam removal is complete], plant establishment period [Year 1], and maintenance and monitoring period [Years 2 to 5]). Short-term impacts on nesting birds were evaluated as a result of construction-related noise greater than ambient conditions, and species-specific noise impacts on northern spotted owl were assessed for a 1-mile buffer around all dams to account for the loudest noise disturbance distance associated with blasting, 0.5-mile buffer around all reservoirs to account for the loudest noise disturbance distance associated with helicopter use, and 0.25-mile buffer around all other areas within the Limits of Work to account for noise disturbance associated with heavy equipment. These northern spotted owl noise disturbance distances were developed in coordination with the Arcata USFWS office based on an estimation of auditory and visual disturbance effects (USFWS 2006).

There are some terrestrial species (amphibians, reptiles) that have an aquatic life history aspect in riverine habitats (river and on river banks) and thus impacts from flow and sediment were also evaluated. Outputs of sediment transport and hydrologic models were used to predict modifications to terrestrial vegetation communities and how those would affect riparian zones, wetlands, and aquatic habitats, as well as special-status wildlife and plant species. Additional information on hydrologic modeling is provided in Section 3.1.6 *Summary of Available Hydrology Information for the Proposed Project*. The terrestrial resources analysis also incorporated impacts due to upland habitat modification during construction (e.g., staging areas).

There are terrestrial special-status species that may inhabit upland habitat (plants, invertebrates, birds, mammals) along the Middle Klamath River, Lower Klamath River, and Klamath River Estuary. As discussed in Section 3.6 *Flood Hydrology*, anticipated flow rates would stay below historical peak flows and would not alter the 100-year floodplain in the Middle Klamath River downstream of Humbug Creek. Therefore, flow-related impacts on terrestrial upland species would be similar to those under existing conditions and are not analyzed further.

The evaluation of potential impacts on terrestrial resources due to the Proposed Project included development of measures to reduce significant impacts to the extent feasible. Where the State Water Board can implement the measures, they are analyzed as mitigation measures. In some cases, implementation of such terrestrial resources measures would be not be considered feasible for the purposes of CEQA because the State Water Board cannot ensure that they would occur. In these cases, recommended measures are provided that would reduce potential impacts if implemented by KRRC. However, the impact analysis herein does not rely on the implementation of these measures. Both the terrestrial resources mitigation measures and the

recommended measures are consistent with widely accepted professional best management practices for environmental protection and many of the measures were developed in consultation with CDFW and USFWS. In other cases, there are mitigation measures the State Water Board can ensure through the water quality certification. In these cases, the mitigation measure is considered as part of the impact analysis and determination of significance.

The following sources were assessed to determine the scope of existing local policies relevant to the Proposed Project:

- Del Norte County General Plan (Mintier & Associates et al. 2003):
  - Section 1 (Natural Resources/Conservation), Wildlife Habitat Resources, Policies 1.E.1, 1.E.2, 1.E.8, 1.E.9, 1.E.11, 1.E.12, 1.E.28, 1.E.29 and 1.E.33
- Humboldt County General Plan for Areas Outside of the Coastal Zone (Humboldt County 2017):
  - Conservation and Open Space Element, Biological Resources Policies BR-P7, BR-P9, BR-P10, and BR-P12
- Klamath County Comprehensive Plan (Klamath County 2010):
  - Goal 5 (Open Space, Scenic, and Historic Area and Natural Resources), Policies 3, 4, 10, 11, 12, and 16
- Siskiyou County General Plan (Siskiyou County 1980):
  - Deer Wintering Area Policies 28 and 29 (Siskiyou County n.d.)
  - The Conservation Element (Siskiyou County 1973), Wildlife Habitat, Objectives 1, 5–8

Most of the aforementioned policies (and objectives) are stated in generalized terms, consistent with their overall intent to protect terrestrial resources, including special-status wildlife and plant species as well as wetland, riparian, and rare natural communities. By focusing on the potential for impacts to specific special-status wildlife and plant species, as well as defined wetland, riparian, and rare natural communities within the terrestrial resources Area of Analysis, consideration of the more general local policies listed above is inherently addressed by the specific, individual analyses presented in Section 3.5.5 *[Aquatic Resources] Potential Impacts and Mitigation*. A subset of the existing local policies listed above contain more detailed information, including Del Norte County's General Plan Policy 1.E.29, which requires on-site mitigation for impacts on riparian vegetation, and Humboldt County's General Plan Policy BR-P9, which requires that oak mitigation be consistent with the provisions of CEQA, specifically Public Resources Code Section 21083.4. Del Norte County's General Plan Policy 1.E.29 is consistent with the Proposed Project actions regarding riparian vegetation (i.e., Reservoir Area Management Plan [Appendix B: *Definite Plan – Appendix H*]). The areas where there may be an impact on oaks due to Proposed Project construction activities (i.e., Limits of Work plus a 0.25-mile buffer, see also Section 3.5.1 *Area of Analysis*) are not within Humboldt County, so there would be no conflict with Humboldt County's General Plan Policy BR-P9.

The following sources were assessed to determine the scope of existing HCPs relevant to the Proposed Project and potential for overlap with the Primary Area of Analysis for Terrestrial Resources: (a) PacifiCorp's Interim Operations Habitat Conservation Plan for the Klamath Hydroelectric Project (PacifiCorp 2012) and (b) Green Diamond Forest

Habitat Conservation Plan (Green Diamond Resource Company 2018). These HCPs also provide generalized terms for protection of terrestrial resources, including special-status wildlife and plant species as well as wetland, riparian, and rare natural communities. By focusing on the potential for impacts to specific special-status wildlife and plant species, as well as defined wetland, riparian, and rare natural communities within the terrestrial resources Area of Analysis, the specific, individual analyses presented in Section 3.5.5 *[Aquatic Resources] Potential Impacts and Mitigation* address the HCPs.

3.5.5 Potential Impacts and Mitigation

3.5.5.1 Vegetation Communities

Potential Impact 3.5-1 Construction-related impacts on wetland and riparian vegetation communities.

Disturbances associated with construction areas, disposal sites, and haul roads where clearing, grading, and staging of equipment would occur could have short-term impacts on sensitive habitats, including wetlands and riparian habitats along reservoirs and river reaches. Heavy machinery traversing wetland and riparian areas could change local topography and impact wetland and riparian vegetation and could introduce increased levels of dust and runoff pollution to wetland and riparian areas that could degrade plant community conditions. Several of the bridges required for access to and from the dam sites would be replaced or upgraded prior to reservoir drawdown (see Potential Impact 3.22-2). Adjacent riparian vegetation under or adjacent to the existing or new bridges could be impacted during these activities. Additionally, removal of recreation sites could result in impacts on wetland and riparian vegetation (e.g., the Palustrine Forested Wetland at Iron Gate Reservoir). Wetland and riparian vegetation are likely to be present in the areas where construction activities are planned to occur; without surveys to document these habitats and measures to adequately protect them, these habitats would be likely to be degraded or removed and thus construction-related activities would result in a significant short-term impact.

Based on existing data for the Primary Area of Analysis for terrestrial resources (Section 3.5.2.1 *Vegetation Communities*), wetland and riparian habitats (Estuarine, Montane Riparian, Palustrine, and Wet Meadow) account for approximately five percent of the total acreage. The Proposed Project identifies a number of pre-construction measures to reduce impacts on these habitats. First, a wetland delineation would be conducted within the limits of construction around the dams and facilities, access and haul roads, and disposal sites in accordance with the 1987 USACE Wetland Delineation Manual (USACE 1987) and applicable Regional Supplements (i.e., Western Mountains, Valleys, and Coast Region [USACE 2010] and Arid West [USACE 2008]). The results of the wetland delineation would be incorporated into the Proposed Project design to avoid and minimize direct impacts on wetlands to the maximum extent feasible, and wetland areas adjacent to the construction Limits of Work would be fenced to prevent inadvertent entry. There could be impacts on wetlands if the fencing does not include an appropriate buffer (i.e., a prescribed distance from the edge of the wetland in which construction activities are prohibited); however, with implementation of Mitigation Measure TER-1, short and long-term impacts on wetland communities would be reduced to less than significant.

Additionally, the Proposed Project includes construction best management practices (Appendix B: *Definite Plan – Appendix J*) to reduce potential impacts on water quality in

wetlands and other survey waters during construction. The combination of these measures and implementation of Mitigation Measure WQ-1, as described in Potential Impact 3.2-4, would reduce potential impacts on wetlands to less than significant.

The Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*) includes details for the installation of native plants and aerial, barge, or hand seeding in appropriate areas to re-vegetate all areas disturbed during construction, including reservoir areas, demolition and disposal sites, staging, access and haul roads, and turn-arounds, with a goal of no net loss of wetland or riparian habitat acreage and functions. Wetlands established in restored areas would be monitored for five years or until the performance criteria (as defined in Appendix B: *Definite Plan – Appendix H*, Section 6.1.4) have been met. To minimize the introduction of invasive plant species into construction areas, construction vehicles and equipment would be cleaned with compressed water or air within a designated containment area to remove pathogens, invasive plant seeds, or plant parts, and disposed of in appropriate disposal facilities. The Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*) also includes a five-year monitoring plan with metrics to evaluate success of minimizing invasive exotic vegetation (i.e., percent relative cover by medium and low priority invasive plants [as defined in the Reservoir Area Management Plan] shall be less than the average at designated reference locations as follows: 25 percent in Year 1; 40 percent in Year 2; 55 percent in Year 3; 70 percent in Year 4; 90 percent in Year 5; and no high-priority invasive plants [as defined in the Reservoir Area Management Plan] shall be present in the Limits of Work at any time during the five-year monitoring).

Mitigation Measure TER-1 Establish a 20-foot buffer around delineated wetlands.
The KRRC shall establish a minimum of a 20-foot buffer around all delineated wetlands potentially affected by construction impacts to ensure there will not be any significant environmental impacts to wetlands by deterring heavy machinery from traversing the wetland and preventing runoff pollution from directly entering the wetland where doing so would not result in a significant environmental impact. The State Water Board has the authority to include this mitigation measure in its water quality certification for the project, and the measure is therefore feasible and used in this analysis to make a significance determination.

With the implementation of these measures, potential short-term impacts on wetlands and riparian areas from construction would be less than significant.

Significance
No significant impact in the short term with mitigation

Potential Impact 3.5-2 Short-term and long-term impacts on wetland and riparian vegetation communities along existing reservoir shorelines due to reservoir drawdown.
Under the Proposed Project, there would be reduction of existing wet habitat at Copco No. 1, Copco No. 2, and Iron Gate reservoirs (currently 15.8 acres of Montane Riparian and 52.3 acres of Palustrine habitat, Table 3.5-2) due to reservoir drawdown, as detailed below:

- Copco No. 1 Reservoir: The shoreline of Copco No. 1 Reservoir currently supports Palustrine Scrub-shrub Wetland where tributary channels enter the reservoir, and Palustrine Forested Wetland occurs along the northwest shore. Small patches of

Palustrine Emergent Wetland also currently exist along the shoreline. These communities would be lost due to reservoir drawdown.

- Copco No. 2 Reservoir: The southern slope of Copco No. 2 Dam currently supports a Palustrine Scrub-shrub Wetland and Palustrine Forested Wetland. Reservoir drawdown would reduce the extent of these wet habitats. These features are not anticipated to be entirely lost because Copco No. 2 Reservoir is relatively small and, therefore, the features will be in close in proximity to the newly exposed river channel.
- Copco No. 2 penstock: Currently, Copco No. 2 penstock leaks water that supports small, local patches of Palustrine Emergent Wetland. Dam and penstock removal would result in the loss of this vegetation.
- Iron Gate Reservoir: Vegetation along the shores of Iron Gate Reservoir includes some Montane Riparian and Palustrine habitat including Palustrine Forested Wetland in the day use and campground areas, and Palustrine Emergent Wetland and Palustrine Scrub-shrub Wetland along Jenny, Scotch, and Camp creeks where tributaries join the reservoir. Reservoir drawdown would reduce the extent of these wet habitats.

Degradation or removal of wetland and riparian habitat in the areas listed above would be a significant short-term and long-term impact.

The Proposed Project includes several actions to encourage rapid revegetation with native riparian species in the reservoir footprints as defined in the Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*) that would ensure no net loss of wetland or riparian habitat acreage and functions. Six locations in Copco No. 1 Reservoir and three locations in Iron Gate Reservoir would be targeted for restoration; these areas would undergo barge-mounted pressure washing/sediment jetting during reservoir drawdown and subsequently would be excavated to the historical floodplain elevation to help create wetlands, floodplain areas, and off-channel habitat features. As depicted in Figures 2.7-11 and 2.7-12, approximately 50 acres of riparian bank would be targeted for revegetation and approximately 100 acres of wetlands, floodplain, and off-channel habitat features would be targeted for restoration. The resulting acreage of restored riparian and wetland vegetation will vary depending on field conditions including the presence of cultural resources and human remains, changes in the topography following drawdown that affect the extent of restorable areas, and changes in topography that affect access; however, given that the proposed acreage to be restored (150 acres) is well above the total acreage potentially impacted (68 acres) the policy of no net loss is anticipated to be achieved.

In addition to restoration in these nine focus areas within Copco No. 1 and Iron Gate reservoirs, prior to drawdown, revegetation activities would include invasive plant species control within the Limits of Work, collection of native plant seed, and propagation of native plants. During the reservoir drawdown period (January to March) and directly afterward, proposed actions within the Limits of Work would include seeding (aerial or potentially barge) of exposed soils, salvaging and planting of existing wetland and riparian vegetation, and evaluation of restoration sites. Following reservoir drawdown (i.e., summer through fall), proposed actions within the Limits of Work would include additional seeding and weed control, and installation of live plants (poles, container plants) as well as acorns. After dam removal is complete and throughout the first year of plant establishment, activities would include additional seeding as necessary, invasive

species control, continued plant installation, plant maintenance, and adaptive management of installed habitat features within the Limits of Work.

During the maintenance and monitoring period (years 2 to 5 after revegetation is complete), additional re-seeding and re-planting will be performed in areas that failed to establish and previously seeded and planted areas will be maintained through weed control and irrigation system upkeep. Therefore, short-term impacts on wetland and riparian vegetation would be less than significant, as riparian and wetland vegetation would be actively reestablished along the new river channel and tributaries within the reservoir area in order to meet the proposed success criteria (i.e., percent relative cover at designated reference locations as follows: 70 percent in Year 1; 75 percent in Year 2; 80 percent in Year 3; 85 percent in Year 4; and 90 percent in Year 5).

Following drawdown of the reservoirs, existing upland vegetation is expected to remain unchanged and contribute to successional processes on newly exposed areas. Existing wetland-dependent vegetation along the margins of the reservoirs is expected to die out and transition to upland communities. Wetland species that occur near confluences are expected to conform to the riparian corridor width of the tributaries and over the subsequent years extend down the newly exposed mainstem river channel riparian corridor. Therefore, implementation of the Proposed Project may result in a long-term net increase in the areal extent of riparian and wetland habitat within the terrestrial resources Primary Area of Analysis, largely as part of natural recruitment along newly-exposed mainstem river channel riparian corridor within the former reservoir footprints, but also as a result of active restoration management. Moreover, restored wetlands would benefit from receiving marine-derived nutrients in salmon and other anadromous fish that would have access to Klamath River reaches upstream of Iron Gate Dam once the Lower Klamath Project reservoirs are removed (see also Potential Impact 3.5-27).

The Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*) also includes control of invasive plant species (referred to as invasive exotic vegetation [IEV] in the Reservoir Area Management Plan); actions would include invasive plant surveys during pre-dam removal years 1 and 2, invasive plant control during and after drawdown, and monthly inspections for compliance through year 5 and quarterly inspections from years 5 to 10 post-dam removal (Table 2.7-2). Control methods would include manual weed pulling, mowing or cutting, tilling and disking, grazing, solarization, and the potential use of herbicides. Herbicides would be applied as last resort and only use herbicides that have been approved by BLM, CDFW, RWQCB, USFWS, and NMFS. These control measures and monitoring efforts would ensure that impacts on native plant species would be less than significant.

Significance
No significant impact in the short term and long term

Potential Impact 3.5-3 Short-term and long-term impacts on wetland habitat downstream of the Lower Klamath Project dams due to erosion or sediment deposition.
In the reach from Iron Gate Dam to Cottonwood Creek, dam-released sediment may temporarily deposit in pools and other slack water areas (e.g., eddies), at tributary confluences, and potentially along channel margins, where it could have a short-term negative impact on wetland habitat due to temporary burial (USBR 2010). However, the wetland habitat impacts would be localized, and because the transient sediment

deposits would be highly erodible during subsequent flow events, the impacts would also be short-term (i.e., likely one year or less except during dry years).

Given that the impacts related to dam-released sediment are likely to be temporary (less than a year) and given that there would not be a substantial modification of federally protected wetlands, there would be a less than significant impact on wetland habitat downstream of the Lower Klamath Project dams.

Significance
No significant impact in the short term and long term

Potential Impact 3.5-4 Effects on riparian habitat downstream of the Lower Klamath Project dams due to short-term and long-term erosion or sediment deposition.
Commenters in the Proposed Project public scoping process expressed concerns regarding erosion and sediment deposition immediately downstream of Iron Gate Dam. Downstream of the Lower Klamath Project dams, river flow rates would not increase substantially above median historical rates. Therefore, rates of bank erosion are not expected to increase significantly (see Potential Impact 3.11-6).

With respect to short-term sediment deposition downstream of the Lower Klamath Project dams, dam-released sediment and sediment resupply would likely extend from Iron Gate Dam to approximately Cottonwood Creek (RM 185.1) (USBR 2012), where reach-averaged deposition of gravel and sediment is projected to be up to one foot between Iron Gate Dam and Bogus Creek (RM 192.68) and up to 0.8 feet between Bogus Creek and Willow Creek (RM 187.8) (see Potential Impact 3.11-5). If rain and snowmelt levels are high during drawdown, relatively less sedimentation would occur in downstream reaches, as there would be higher flows in the system to flush out sediments (Stillwater Sciences 2008). In the short term, reach-averaged sedimentation levels of up to one foot are not expected to substantially negatively impact riparian vegetation downstream of Iron Gate Dam, as vegetation growing within or along the river channel margins is generally adapted to this scale of perturbation due to seasonal and inter-annual sedimentation dynamics typical of river systems. Willow and cottonwood species grow rapidly and can bend, break and re-sprout following sediment deposition (Braatne et al. 1996; Shafroth et al. 2002). Similarly, branches and stems broken off and redeposited with sediment can sprout and grow vigorously on newly deposited alluvium, giving these species a relative advantage over non-sprouting upland or non-native species (Braatne et al. 1996, Rood et al. 2003). Thus, there would be a less than significant effect on riparian vegetation downstream of Iron Gate Dam due to short-term sediment deposition caused by dam removal.

Moreover, sedimentation has the potential to create new surfaces for riparian plants to colonize depending on the sequence of water years following dam removal; under certain scenarios (e.g., wet water year followed by dry water years whereby a lot of sediment is moved and vegetation has time to colonize), this may result in beneficial effects on riparian habitat especially in areas where there is currently less sediment deposit due to upstream sediment trapping in reservoirs (i.e., from Iron Gate to Cottonwood Creek) (Shafroth et al. 2002). Under such scenarios the riparian vegetation would be able to quickly re-establish through colonization. This colonization occurs following disturbance (i.e., deposition-related to removal of the dam) during peak flows that creates substrate for seedlings, followed by declining spring and summer flows that

occur during the seed dispersal period. Under this natural process, it is anticipated that new riparian vegetation would become established within three to five years (Riparian Habitat Joint Venture 2009).

In the long term, no permanent loss of riparian habitat due to erosion or sediment deposition is anticipated to occur in any river reach downstream of the Lower Klamath Project dams, and new surfaces for colonization would be created. This would be a beneficial effect.

Significance
No significant impact in the short term

Beneficial in the long term

Potential Impact 3.5-5 Short-term and long-term impacts on native vegetation due to increased invasive plant species establishment.
Under the Proposed Project, there would be potential for invasive plant species in the vicinity to quickly colonize exposed reservoir sediments and other disturbed soil areas and out-compete native plants. In addition, there could be an increase in the transport of invasive plant seeds to downstream areas following removal of the dams, particularly those plants that disperse by water such as Himalayan blackberry and reed canary grass (Nilsson et al. 2010; Merritt and Wohl 2002, 2006; Merritt et al. 2010). Without surveys to document and control invasive plant species they would displace native plants, including special-status species, and degrade habitats, including wetland and riparian vegetation; therefore, this would be a significant short-term impact.

As part of the Proposed Project, invasive plant species would be controlled according to the Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*). Actions would include invasive plant surveys initiated prior to dam removal year 1, and invasive monitoring and control over a five-year period with metrics to evaluate success of minimizing invasive exotic vegetation and invasive plant control as necessary. Control methods would include manual weed pulling, mowing or cutting, tilling and disking, grazing, solarization, and the potential use of herbicides. Herbicides would be applied as last resort and only herbicides that have been approved by the BLM, CDFW, RWQCB, USFWS and NMFS would be used. Quarterly inspections would also occur from years 5 to 10 post-dam removal (Table 2.7-1). Additionally, the Reservoir Area Management Plan includes active planting of native species, which will also assist in preventing the establishment of invasive species in disturbed areas. As a result of these actions, potential short- and long-term impacts on native vegetation would be reduced to less than significant.

Significance
No significant impact in the short term and long term

3.5.5.2 Culturally Significant Species

Potential Impact 3.5-6 Short- and long-term impacts on culturally significant species in riparian and wetland habitats.
Many of the species identified by the Native American Tribes in the Klamath River region as culturally significant occur in riparian and wetland habitats. Project activities including construction as well as reservoir drawdown would result in population-level impacts to culturally significant plant species or substantial degradation or removal of wetland and riparian habitat; therefore, there would be a significant short-term and long-term impact on culturally significant species.

The Proposed Project includes several actions to survey for wetlands and encourage rapid revegetation with native riparian species in the reservoir footprints as defined in the Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*) that would ensure no net loss of wetland or riparian habitat acreage and functions. The revegetation mixes will be developed based on updated inventories of existing wetland and riparian vegetation around the reservoir perimeters; therefore, culturally significant species will be documented and incorporated as part of the revegetation effort. In addition, Mitigation Measure TER-1 (see Potential Impact 3.5-1) includes wetland buffers to prevent intrusion in wetland habitats, deter heavy machinery from traversing the wetland, prevent runoff pollution from directly entering the wetland, and avoid substantial degradation in these areas. These measures would ensure that impacts on culturally significant species would be less than significant.

Significance
No significant impact with mitigation in the short term

No significant impact in the long term

3.5.5.3 Special-status Species and Rare Natural Communities

Potential Impact 3.5-7 Short-term impacts on special-status plants and rare natural communities from construction-related activities.
Construction activities including road, bridge, hatchery modifications, and culvert improvements (Section 3.22.2.3 *Road Conditions*) could result in direct mortality or damage to special-status plant species or indirect damage by degrading special-status plant habitat (e.g., introducing invasive plant species) or rare natural communities. Special-status plant species with the potential to occur in the Primary Area of Analysis for terrestrial resources are provided in Table 3.5-4 and rare natural communities with the potential to occur in the Primary Area of Analysis for terrestrial resources are provided in Appendix H. Construction activities would require heavy machinery to move through construction areas, staging areas, and haul roads where these species could occur. Contact with construction vehicles could result in direct mortality or damage to these species or their habitat. Special-status plants and rare natural communities may be present in the areas where construction activities may be performed; without surveys to document these species and habitats and measures to adequately protect them, they would be removed and/or habitat would be degraded; therefore, this would be a significant short-term impact.

As part of the Proposed Project, comprehensive floristic surveys would be conducted for special status-plants within the construction Limits of Work where ground-disturbing

activities would occur plus an established buffer (i.e., a 100-meter buffer around disposal sites and a 10-meter buffer along access and haul roads) following the CDFW guidelines (CDFG 2009; Appendix B: *Definite Plan – Appendix J*) and the vegetation maps would be updated to reflect existing conditions including any rare natural communities that may present. The Proposed Project includes avoidance and minimization measures as well as provisions for the establishment of wetland and riparian areas and other sensitive vegetation communities within the project area to result in no net loss of habitat acreage (CDFG 2009; Appendix B: *Definite Plan – Appendix J*); therefore, impacts to rare natural communities would be less than significant.

If any special-status plants are documented, the Proposed Project design would be modified if possible to avoid them. Where avoidance is not feasible, a combination of relocation, propagation, and establishment of new populations in designated conservation areas would be implemented, as determined in coordination with the resource agencies and invasive plant species would be controlled by implementing measures such as routine washing of construction vehicles and equipment (Appendix B: *Definite Plan – Appendix J*). There may be significant impacts on special-status plants where avoidance is infeasible and if replanting does not succeed in re-establishment of new populations at a 1:1 ratio such that there is no net loss of individuals. If implemented as part of the Final Restoration Plan, Recommended Terrestrial Measure 1 would reduce impacts to less than significant. KRRC proposes that KRRC and the appropriate state or local agency would work together to develop recommended terms and conditions that should be adopted by FERC as conditions of approval for the Lower Klamath Project. This is consistent with FERC's preference for licensees to be 'good citizens' of the communities in which projects are located and thus to comply, where possible, with state and local requirements. Overseeing development and implementation of terms and conditions relating to protection of terrestrial special-status plants and/or rare natural communities does not fall within the scope of the State Water Board's water quality certification authority. While the State Water Board anticipates that implementation of the entire Final Restoration Plan, including the aforementioned additional details and any modifications developed through the FERC process that provide the same or better level of protection for special-status plants, would reduce impacts to less than significant. However, because the State Water Board cannot ensure implementation of the terrestrial aspects of the Final Restoration Plan , it is analyzing the impact in this Draft EIR as significant and unavoidable.

Recommended Terrestrial Measure 1 – Establish Mitigation Ratios for Special-Status Plants.
The Final Restoration Plan shall include a minimum 1:1 mitigation ratio and a Plant Mitigation and Monitoring Plan shall be developed for any special-status species that would be impacted by the Proposed Project. These features of Recommended Terrestrial Measure 1 would be implemented such that any impact to special-status plants would be less than significant.

Significance
No significant impact on rare natural communities in the short term

Significant and unavoidable impacts on special-status plants in the short term

Potential Impact 3.5-8 Short- and long-term impacts on special-status plants from reservoir removal.
Wetland habitat at reservoir margins supports potential habitat for several species of special-status plants (Table 3.5-4). There is potential for special-status plants to occur at the Lower Klamath Project reservoirs, and therefore there would be loss of habitat for these individual plants once the reservoirs are removed. Without surveys to document these species and measures to adequately protect them, they would be removed and/or habitat would be degraded; therefore, this would be a significant short-term impact.

As discussed above, implementation of the Proposed Project may result in a net increase in the areal extent of riparian and wetland habitat within the Primary Area of Analysis, largely as part of natural recruitment along newly-exposed mainstem river channel riparian corridors within the former reservoir footprints, but also as a result of active restoration management as described in the Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*). The Reservoir Area Management Plan also includes focused surveys (i.e., the species listed in Table 3.5-1, Preliminary List of Special Status Plants with Potential to Occur in or near the Limits of Work) for special-status plants in areas such as reservoir shorelines where changes in hydrology and geomorphology will occur due to the Proposed Project and includes provisions for the establishment of special-status plants, if any are documented within these areas.

There would be significant impacts on special-status plants if those plants are not captured during the targeted surveys and also where avoidance of documented and undocumented special-status plants is infeasible and replanting does not succeed in re-establishment of new populations. If implemented, Recommended Terrestrial Measure 2 and Recommended Terrestrial Measure 1 would reduce impacts to less than significant. KRRC proposes that KRRC and the appropriate state or local agency would work together to develop recommended terms and conditions that should be adopted by FERC as conditions of approval for the Lower Klamath Project. This is consistent with FERC's preference for licensees to be 'good citizens' of the communities in which projects are located and thus to comply, where possible, with state and local requirements. Overseeing development and implementation of terms and conditions relating to protection of terrestrial special-status plants does not fall within the scope of the State Water Board's water quality certification authority. The State Water Board anticipates that implementation of the entire Final Restoration Plan, including the aforementioned additional details and any modifications developed through the FERC process that provide the same or better level of protection for special-status plants, would reduce impacts to less than significant. However, because the State Water Board cannot ensure implementation of the terrestrial aspects of the Final Restoration Plan, it is analyzing the impact in this Draft EIR as significant and unavoidable.

Recommended Terrestrial Measure 2 – Update Scoping Lists for Special-Status Plants.
The Final Restoration Plan shall include an updated list of special-status plants with the potential to occur in wetland and riparian habitats.

Significance
Significant and unavoidable in the short term and long term

Potential Impact 3.5-9 Short-term impacts on special-status terrestrial invertebrates from construction-related activities.
The special-status invertebrates identified as having the potential to occur in the terrestrial Primary Area of Analysis include USDA Forest Service and BLM sensitive species, which receive protection on USDA Forest Service and BLM lands, respectively. No construction-related impacts on USDA Forest Service or BLM special-status invertebrates are anticipated on USDA Forest Service or BLM lands. Most of the land within the Limits of Work, where direct construction-related impacts would have the potential to occur, is private and includes reservoir-type habitat, which does not currently provide necessary habitat components required for upland terrestrial invertebrate species. There are no USDA Forest Service land within the Limits of Work, and there is only a very small amount (<3 percent) of BLM lands (Figure 2.1-1).

The Oregon shoulderband, Trinity shoulderband, Siskiyou shoulderband, and Tehama chaparral are terrestrial snails associated with exposed rock or rock talus habitat. This habitat is not present on BLM lands that overlap the Limits of Work (Appendix G). Rock talus habitat is present just downstream of Copco No. 2 Dam and may support habitat for these species. This habitat is present in numerous locations throughout the Primary Area of Analysis for terrestrial resources (Appendix G) and any short-term construction-related activities in this specific area would not be expected to impact any federal species of special concern on a population level, if present.

The Western bumblebee is associated with shrub, chaparral, and open grassy areas, and there is a relatively small amount of this habitat within the Limits of Work, as the majority of these habitats include existing reservoirs and shoreline habitat. If present, the species would likely fly to adjacent habitat as annual and perennial grasslands are common in habitats surrounding the Limits of Work. As a result, no population-level impacts are anticipated.

As no population-level impacts are anticipated on special-status invertebrates, there would be no significant impacts on special-status terrestrial invertebrates due to short-term construction-related activities under the Proposed Project.

Significance
No significant impact

Potential Impact 3.5-10 Short-term impacts on special-status amphibian, reptiles, and mammals from construction activities.
Construction activities including, but not limited to, structure demolition; hatchery modifications (Section 2.7.6 *Hatchery Operations*); road, bridge, and culvert improvements (Section 3.22.2.3 *Road Conditions*); and, use of heavy equipment to transport sediment during reservoir drawdown or to grade floodplain areas to support wetland and restoration of natural habitats (Appendix B: *Definite Plan – Appendix H*), could result in direct mortality or harm to special-status amphibian, reptile, and mammal species or associated habitat with the potential to occur in the Primary Area of Analysis for terrestrial resources (see Table 3.5-5 for the list of species). Construction activities that may affect habitat, result in direct contact to individuals, or result in indirect impacts on individuals, include demolition of structures, digging holes or trenches where wildlife may be trapped, and movement of heavy machinery through construction areas, staging areas, and along haul roads where these species could occur.

Terrestrial resources avoidance and minimization measures included in the Proposed Project, such as installing construction fencing around the work area, would be an effective means to reduce the potential for medium and large mammals to enter the work area and become entrapped; however, the presence of fencing has the potential to keep animals in the work area if they have managed to cross into the work area and/or to become trapped in the fencing. Effects of construction-related noise and vibration are not anticipated to affect amphibians and reptiles, and for mammals dispersing through the Primary Area of Analysis, it is expected that they would move to adjacent suitable habitat. Construction-related noise and vibration impacts on roosting bats are discussed in Potential Impact 3.5-14.

To date, KRRC has conducted the following surveys for the Proposed Project:

- A field reconnaissance survey in July 2017 to gather information on habitat and identify access for subsequent wildlife surveys (spring and summer 2018), focusing on locations within the Limits of Work where special-status species were documented by PacifiCorp in 2001–2003.
- General Wildlife Surveys in May and June 2018, involving documentation of baseline information on the presence of special-status species and their habitats, which included documenting any wildlife signs such as dens or burrows.

The aforementioned short-term construction-related activities would result in a significant impact on special-status amphibians, reptiles, and mammals, if present during construction. The Proposed Project includes multiple components to avoid and minimize construction-related impacts on wildlife species including, but not limited to, the components listed below (additional details are provided in Appendix B: *Definite Plan Appendix J – Terrestrial Resource Measures*). Proposed Project avoidance and minimization measures include the following:

- Developing a Construction Monitoring Plan in coordination with resource agencies
- Providing a biological monitor to ensure compliance with protective measures during clearing and construction activities within designated areas;
- Training employees about special-status species and action to be taken upon sighting of special-status species during construction;
- Fencing construction areas and implementing measures to reduce wildlife entrapment in excavated holes or trenches;
- Monitoring coffer dams following closure and prior to the start of construction activities for the presence of western pond turtles, and if present, capture and relocate;
- Requiring crews maintain a 20-miles per hour speed limit on all unpaved roads to reduce wildlife being harmed via impact with vehicles;
- Requiring proper disposal of trash and food into closed containers generated during construction, and trash to be removed once a week from the site;
- Preventing presence of pets, feeding of wildlife, or use of firearms;
- Maintaining equipment, if necessary, in designated staging areas; and
- Reporting to CDFW and USFWS the observation of any dead, injured, or entrapped state or federally listed species.

While the Proposed Project avoidance and minimization measures would reduce the potential for short-term construction-related impacts on wildlife species within the Primary Area of Analysis, several of the aforementioned components need more specificity to ensure that short-term construction activities would not result in significant impacts on special-status species amphibians and reptiles or substantially interfere with movement and/or migration of these species, or that any remaining potentially significant impacts are mitigated to the extent feasible. Implementation of the mitigation measures below, developed in consultation with CDFW, would reduce potential short-term construction-related impacts on special-status amphibian and reptiles to less than significant.

Further, several of the aforementioned components unrelated to amphibians or reptiles also need more specificity to ensure that short-term construction activities would not result in significant impacts on special-status species or substantially interfere with movement and/or migration of wildlife species, or that any remaining potentially significant impacts are mitigated to the extent feasible. KRRC proposes that KRRC and the appropriate state or local agency would work together to develop recommended terms and conditions that should be adopted by FERC as conditions of approval for the Lower Klamath Project. This is consistent with FERC's preference for licensees to be 'good citizens' of the communities in which projects are located and thus to comply, where possible, with state and local requirements.

It would be appropriate for the recommended terms and conditions relating to protection of terrestrial wildlife species other than amphibians and reptiles to include the Recommended Terrestrial Measures below, which have been developed in consultation with CDFW and USFWS. The Recommended Terrestrial Measures include additional components beyond those listed as part of the Proposed Project and would be necessary to reduce potential short-term construction-related impacts on special-status to less than significant, as specifically discussed in each measure (see Table 3.5-6 and the measures themselves). The Recommended Terrestrial Measures are consistent with widely accepted professional best management practices for environmental protection which would reduce potential harm to special-status species.

Overseeing development and implementation of terms and conditions relating to protection of terrestrial wildlife species does not fall within the scope of the State Water Board's water quality certification authority unless the species has a particular nexus with water – for example, it is a wetland or riparian species or primarily eats fish. In this case, there are mitigation measures pertaining to amphibian and reptiles that the State Water Board can ensure through the water quality certification. Therefore, these mitigation measures (TER-2 and TER-3) are considered as part of the impact analysis and determination of significance.

While the KRRC has initiated a process[113] to reach enforceable good citizen agreements with USFWS and CDFW that will be finalized and implemented, at this time the terms and conditions relating to protection of terrestrial wildlife species without a nexus to water are not finalized and the State Water Board cannot require their implementation.

[113] KRRC submitted the *Klamath River Renewal Project California Environmental Quality Act (CEQA) and California and Oregon 401 Water Quality Certifications Technical Support Document* (AECOM et al. 2017a) to USFWS and CDFW in September 2017 and requested feedback by November 10, 2017.

Accordingly, while the State Water Board anticipates that implementation of the final terms and conditions, including the Recommended Terrestrial Measures, and any modifications developed through the FERC process that provide the same or better level of protection for special-status wildlife, would reduce impacts to less than significant, because the State Water Board cannot ensure implementation of the Recommended Terrestrial Measures, it does not consider the Recommended Terrestrial Measures in this analysis and is analyzing the associated impacts to mammals in this Draft EIR as significant and unavoidable.

Mitigation Measure TER-2 – Amphibian and Reptile Management.
As described in the Draft Clean Water Act Section 401 Water Quality Certification for California Condition 15 *Amphibian and Reptile Management*, no later than three months following issuance of a FERC license surrender order, KRRC shall submit an Amphibian and Reptile Rescue and Relocation Plan (Amphibian and Reptile Plan) to the State Water Board Deputy Director for review and approval prior to drawdown, in-water work, and work in riparian areas. The Amphibian and Reptile Plan shall identify protection measures that when implemented by KRRC will avoid direct mortality or harm to special-status amphibian and reptile species with the potential to occur in the Primary Area of Analysis for terrestrial resources. The Amphibian and Reptile Plan shall also specify survey protocols, locations, and frequency; rescue and relocation techniques; and reporting requirements. Species covered in the Amphibian and Reptile Plan shall include amphibians and reptiles found within the terrestrial Primary Area of Analysis that are listed under the federal ESA or the CESA or are designated as Species of Special Concern by CDFW. These species may include, but are not limited to: southern torrent salamander, Scott Bar salamander, Siskiyou Mountains salamander, Pacific tailed frog, foothill yellow-legged frog, northern red-legged frog, and western pond turtle. These features of TER-2 will be implemented such that there is no significant impact on special-status amphibians and reptiles.

Mitigation Measure TER-3 – Western Pond Turtle Pre-construction Surveys.
As described in the Draft Clean Water Act Section 401 Water Quality Certification for California Condition 15 *Amphibian and Reptile Management,* KRRC shall protect western pond turtle, which has been designated by CDFW as a Species of Special Concern and is present within the Primary Area of Analysis.

KRRC shall conduct western pond turtle pre-construction surveys and reporting, as described below. An on-site biologist approved by the applicable agencies to specifically conduct western pond turtle pre-construction surveys shall be familiar with the ecology of western pond turtle. This on-site biologist shall conduct pre-construction surveys immediately prior to the start of any in-water work each day that in-water work will occur. Any adult western pond turtles that are found during surveys shall be relocated to a safe location, by an agency-approved biologist, outside of the work area and away from indirect impacts. An appropriate relocation site shall be designated prior to the start of construction. Pre-construction surveys shall be consistent with the Amphibian and Reptile Management Plan (TER-2). (This measure is specific to construction activities, such as cofferdams, and is not intended to be implemented during reservoir drawdown.)

A report shall be submitted to applicable agencies within 30 days of completing the Proposed Project. The report shall include the following information regarding all species handled and relocated; location, date, time and duration of the handling; enumeration and identification of species handled; identification of species life stage;

identification of capture personnel; the release location and time; stream, transport, and receiving water temperatures; and location, date, and time of release. These features of TER-3 will be implemented such that there is no significant impact on western pond turtles.

Table 3.5-6. Summary of Proposed Project Components and Recommended Terrestrial Measures.

Proposed Project Avoidance and Minimization Measure Component	Recommended Terrestrial Measure
Biological monitoring and the development of a detailed Construction Monitoring Plan[114] in coordination with the resource agencies	**Recommended Terrestrial Measure 3** further requires agency approval of on-site biologists and identifies monitoring and reporting requirements to incorporate in the Construction Monitoring Plan.
Mandatory biological resource awareness training for all construction personnel	**Recommended Terrestrial Measure 4** requires additional items, including consideration of exotic and noxious species and appropriate decontamination measures as part of the training, identifies the reoccurrence interval of the training, and stipulates that the training shall be interpreted for non-English speaking workers.
Requirements for construction personnel including disposing of trash, maintain construction related-traffic in construction boundaries, no feeding of wildlife, no pets, no firearms, maintaining equipment in staging areas, reporting on state-listed or federally-listed species	**Recommended Terrestrial Measure 5** includes the additional requirements that (1) all food-related trash items would be disposed of in closed wildlife-proof containers to reduce the potential for special-status wildlife to enter the Limits of Work, and; (2) equipment would be power washed prior to arriving at the site to reduce potential for non-native species to enter the Limits of Work and compete with special-status species or spread to nearby habitats.
Requirements for wildlife exclusion and entrapment	**Recommended Terrestrial Measure 6** in addition to providing a requirement for wildlife exclusion and entrapment, this provides an additional requirement for fencing to be checked daily during active construction to ensure that it remains intact.
Surveys to identify special-status amphibian and reptile habitat and quantity affected, mammal sign, including den sites or burrows, will be noted.	**Recommended Terrestrial Measure 7** includes special-status species identified in Table 3.5-5 to be included for habitat assessments, and if present, for inclusion in pre-construction surveys. **Recommended Terrestrial Measure 7** also requires that an on-site biologist preform daily pre-construction wildlife surveys prior to initiating construction activities.
Identifying wolves during general wildlife surveys	**Recommended Terrestrial Measure 8** includes further means to monitor the CDFW gray wolf activity map, and if wolf activity identified on the map overlaps with the Lower Klamath Project, or if a wolf is observed during any Proposed Project survey or monitoring effort, CDFW would be consulted to further evaluate site-specific measures depending on the time of year and information about the individuals in the area.

[114] No specific details were provided in the Construction Monitoring Plan other than the plan would be developed in coordination with resource agencies (Appendix B: *Appendix J – Terrestrial Resource Measures*).

Recommended Terrestrial Measure 3 – On-site Biologist/Construction Monitoring Plan.
The Construction Monitoring Plan, as referenced in KRRC's Definite Plan (Appendix B: *Appendix J – Terrestrial Resource Measures*) shall be developed prior to implementing construction (ground disturbing activities) and include where and when monitoring would occur, requirements and roles of an on-site biologist, resource monitored, and reporting requirements. The Construction Monitoring plan details would include the information below.

An on-site biologist (often referred to as a biological monitor or construction monitor) shall be present during construction-related activities to reduce the potential for impacts on special-status wildlife species and nesting birds that are protected by CDFW and USFWS. The role of the on-site biologist shall include, but is not limited to, identifying wildlife species within or adjacent to the work area that may be affected; clearing each work area daily (including individual areas such as each staging area, structure demolition area, bridge upgrade location) of wildlife species prior to the initiation of an activity (as discussed in Recommended Terrestrial Measure 7); observing changes in wildlife behavior; identifying species if they enter the work area and relocating them to a designated location identified prior to Proposed Project activities; developing site- and species-specific minimization measures to prevent impacts on special-status species or sensitive habitats and advising crew of these minimization measures which could include stopping work until the wildlife was no longer in the work area or implementing buffers; communicating daily at tailboards with the construction crew about special-status wildlife activity in the area; and coordinating with agencies for guidance, as needed. The on-site biologist has stop-work authority for any activity in order to avoid unauthorized take of a special-status species.

The on-site biologist shall be knowledgeable and experienced in the biology, natural history, collecting, and handling of species that may be encountered. CDFW and USFWS must approve the on-site biologist's qualifications prior to start of construction; such approval shall occur within a timely fashion.

During any construction-related (i.e., staging, facility removal, restoration) activity, the on-site biologist shall be present at locations where the activity is occurring. A minimum of one on-site biologist shall be present at each earth-moving or structure demolition location (e.g., dam location, staging area, bridge upgrade). It would be reasonable to assume, depending on the level of proposed activity, one biologist can monitor areas that are immediately adjacent to each other. This measure is specific to construction activities and is not intended to be implemented during reservoir drawdown.

The on-site biologist shall prepare daily written observation and inspection records that summarize observed special-status species and minimization measures employed. These records shall be submitted at least monthly to CDFW, USFWS, and the State Water Board. The on-site biologist shall submit all observations of state species of special concern and candidate, threatened, or endangered species under the state or federal Endangered Species Act (ESA), to the California Natural Diversity Database within 60 calendar days of the observation, and copies of the submitted forms shall be included with the monthly report.

If a species of special concern, candidate, threatened, or endangered species is harmed by the Proposed Project, or found dead within the Limits of Work, initial notification to the respective resource agencies shall include information regarding the location, species, and number of animals taken or injured with 24 hours of discovery. Following initial notification, a written report shall be provided to the respective resource agencies within two calendar days and shall include any additional measures to implement for the duration of the Proposed Project to avoid additional injury to species of special concern, candidate, threatened, or endangered species. The report format shall be developed in coordination with CDFW and shall include the date and time of the finding or incident, the location of the animal or carcass, a photograph (if possible), an explanation as to cause of harm, and any other pertinent information. If the incident was a result of the Proposed Project, the report will include a recommendation that would be implemented in order to avoid additional injury to special-status species of special concern, candidate, proposed, threatened, or endangered species.

Recommended Terrestrial Measure 4 – Biological Resources Education and Awareness Training.
A mandatory biological resource education and awareness training shall be provided by a biologist approved by the resource agencies (USFWS and CDFW) for all on-site Proposed Project personnel and their associated supervisor. All persons shall receive the training prior to performing any ground-disturbing (including vegetation clearing and grading) work. This training shall inform Proposed Project personnel about special-status species that could occur on site. The training shall, at a minimum, consist of: (1) a brief introduction to the special-status species and identifying characteristics, including a short discussion of the biology, life history, habitat requirements, status, and legal protection; (2) measures being taken for the protection of these species and their habitats; and (3) actions to be taken if a special-status species is found within the area during construction activities. Species identification cards shall be issued to shift supervisors; these cards shall have photos, descriptions, and actions to be taken upon sighting of special-status species during construction. The training shall also include information on exotic and noxious species and appropriate decontamination measures. This training shall be repeated at least once annually and shall be provided to any new Proposed Personnel before beginning work activities, and if a change in special-status species occurs that requires further consideration. The KRRC shall provide interpretation for non-English speaking workers. Training Proposed Project personnel on special-status species will increase the potential of documenting special-status species in the construction area and allow for the on-site biologist to implement measures (e.g., rescue and relocate, implement buffers) to reduce impacts on the species to less than significant. Upon completion of the training, all employees shall sign an acknowledgment form stating that they attended the training and understand all protection measures. Tracking of training activities shall be reported monthly to applicable agencies.

Recommended Terrestrial Measure 5 – Requirements for Construction Personnel.
Establishing requirements for construction personnel will reduce the potential impacts on special-status terrestrial resources to less than significant by ensuring construction activities are occurring within designated boundaries and reducing the potential for wildlife to enter the work area or be affected by equipment. These requirements are described below.

- The KRRC shall clearly delineate the Limits of Work and prohibit any construction-related traffic outside of these boundaries.
- KRRC shall require construction crews to maintain a 20 mile per hour speed limit on all unpaved roads to reduce the chance of wildlife being struck.
- KRRC shall require that no deliberate feeding of wildlife shall be allowed and all food-related trash items shall be disposed of in closed wildlife-proof containers (e.g., bear-proof trash cans) and removed at least once a week.
- If vehicle or equipment maintenance is necessary, it shall be performed in the designated staging areas with adequate spill containment.
- Any worker who inadvertently injures or kills a federally or state-listed species, bald eagle, or golden eagle, or finds one dead, injured, or entrapped shall be required to immediately report the incident to the construction supervisor and on-site biologist. The on-site biologist shall notify the resource agencies within 24 hours of the incident.
- All equipment shall be power-washed prior to arriving to and leaving the site to minimize the spread of non-native wildlife and exotic and noxious plants species to reduce the chance of impacts on special-status species and their habitats.
- Tracking of these requirements shall be reported monthly to applicable agencies.

Recommended Terrestrial Measure 6 – Wildlife Exclusion and Entrapment. Construction areas, including staging areas and access routes, shall be fenced with high-visibility fencing to demarcate work areas to reduce the potential for terrestrial species to enter the work area and be harmed by construction equipment. An on-site biologist (see Recommended Terrestrial Measure 3) shall confirm the location of the fenced area prior to habitat clearing, and the fencing shall be maintained throughout the construction period and checked daily when active construction is occurring to ensure that it remains secure and intact and that no wildlife are trapped by the fencing. Additional exclusion fencing or other appropriate measures shall be implemented in consultation with the resource agencies if necessary to prevent use of construction areas by special-status species during construction. Installing visible construction fencing does not apply to the reservoir areas during drawdown or areas being restored with planting of vegetation, but rather staging and active construction areas.

To prevent entrapment of wildlife at construction sites, all excavated, steep-walled holes or trenches in excess of two feet deep shall be inspected by a biologist or construction personnel approved by the resource agencies at the start and end of each working day. If no animals are present during the evening inspection, plywood or similar materials shall be used to immediately cover the trench, or one or more escape ramps shall be set in the trench at no greater than 1,000-foot intervals and constructed of earth fill or wooden planks. Trenches and pipes shall be inspected for entrapped wildlife each morning prior to onset of activity. Before such holes or trenches are filled, they shall be thoroughly inspected for entrapped animals. Any animals so discovered shall be allowed to escape voluntarily, without harassment, before activities resume, or removed from the trench or hole by the biologist and the animals shall be allowed to escape unimpeded.

Tracking of wildlife exclusion and entrapment activities shall be reported monthly to applicable agencies. Should wildlife be found entrapped, the on-site biologist shall

identify if modifying construction or monitoring activities would reduce potential for future impacts and implement as feasible to prevent mortality of special-status species.

Recommended Terrestrial Measure 7 – General Special-status Wildlife Surveys and Pre-construction Surveys.
A general special-status wildlife survey shall be conducted within 24 months of initial habitat modification associated with construction activities (e.g., grubbing, structure modification) within the Limits of Work to assess the presence of any special-status species and potential for habitat to be present that could support special-status species identified in Table 3.5-5. Surveys shall be conducted by a qualified biologist; such approval shall occur in a timely fashion. If suitable habitat is present, and there is potential for special-status species to be present, a biologist shall further assess if these special-status species are present in the Limits of Work by conducting general visual observation surveys or protocol-level surveys. Surveys for nesting birds are discussed in Recommended Terrestrial Measure 9, willow flycatcher in Recommended Terrestrial Measure 10, bald and golden eagle in Recommended Terrestrial Measure 11, bats in Recommended Terrestrial Measure 12; surveys to be consistent with the Amphibian and Reptile Management Plan discussed in Mitigation Measure TER-2.

Pre-construction surveys shall be conducted daily by the on-site biologist (as identified in Recommended Terrestrial Measure 3) at each location where construction is occurring prior to initiation of construction. If special-status species are present (excluding state or federally listed as threatened, endangered, or candidate species), they shall be captured and relocated out of harm's way to a suitable area designated prior to initiating the Proposed Project activities that have the potential to affect the species, in a way that is consistent with recommended measures for bats (Recommended Terrestrial Measure 12) and Mitigation Measures for western pond turtle pre-construction surveys (TER-4) and the Amphibian and Reptile Management Plan (TER-2). General special-status wildlife surveys and pre-construction surveys shall be reported monthly to applicable agencies.

Recommended Terrestrial Measure 8 – Gray Wolf.
Every six months, the location of gray wolves shall be assessed using the CDFW gray wolf activity map (CDFW 2018a). If the Lower Klamath Project overlaps with known wolf activity as identified in the CDFW wolf activity map or if a wolf is documented during any Proposed Project surveys or monitoring, CDFW shall be contacted to further determine if activities pose any potential impacts on gray wolves, particularly with respect to potential modification or disruption of key pup-rearing areas such as dens and rendezvous sites. Depending on the time of year and information about the pack or individuals in the area, CDFW may identify additional measures including denning surveys, reduced driving speeds, limited operating periods, disturbance buffers, reduced speed and signage on haul roads, modification of haul roads to avoid key areas, and monitoring. Tracking of gray wolf activities shall be reported every six months to applicable agencies.

Significance
No significant impact with mitigation for amphibians and reptiles

Significant and unavoidable for mammals

Potential Impact 3.5-11 Short-term impacts on nesting birds from construction-related noise and habitat alterations.
In the short term, construction activities including, but not limited to, structure demolition, hatchery modifications (Section 2.7.6 *Hatchery Operations*), road and bridge upgrades (as discussed in Appendix B: *Definite Plan – Appendix K*), and culvert improvements (Section 3.22.2.3 *Road Conditions*) could result in disturbance to or mortality of nesting birds.

Impacts on bald and golden eagles are discussed in Potential Impact 3.5-13 and on northern spotted owl in Potential Impact 3.5-15. Potential impacts on native birds during the breeding season, including several special-status species, many of which are referenced in Table 3.5-5, could occur under the Proposed Project including species such as peregrine falcon and non-special-status species such as swallows (northern rough-winged, tree, violet-green) (eBird 2018). Potential impacts could result from nest abandonment due to construction noise above ambient conditions, as well as habitat removal resulting from construction activities or physical harm. Examples of construction activities that could result in noise disturbance include dam demolition and loud blasting activities, use of helicopters or planes during restoration activities, noise disturbance during removal of transmission lines, and use of general construction equipment (e.g., cranes, dozers, front loaders). Dam removal activities would be initiated in March, which is relatively early in the bird nesting season (February 1 through August 31) (Appendix B: *Definite Plan – Appendix H*). Examples of construction activities that could result in harm to an active nest include removing vegetation, clearing of access and haul roads, removing existing structures, and creating staging and disposal sites. Without surveys to document nesting special-status birds and buffers to prevent noise and habitat removal impacts, special-status nesting bird species, if present, would be displaced resulting in a failed nest or mortality to young, and this would be a significant short-term impact.

The Proposed Project includes multiple components to avoid and minimize short-term construction-related impacts on bird species (Appendix B: *Definite Plan – Appendix J*) which include, but are not limited to, the components below (additional details are provided in Appendix B: *Definite Plan Appendix J – Terrestrial Resource Measures*).

- The following surveys were recently conducted for the Proposed Project.
    - As part of the General Wildlife Surveys, KRRC conducted special-status bird species surveys in May and June 2018 within the Limits of Work and within 0.25 miles of dams and structures to be removed, disposal sites, and haul and access roads. KRRC noted species seen or heard.
    - As part of the Nest Surveys, KRRC conducted nest surveys in May 2018 and focused on special-status species that may return to the same nest location (e.g., osprey, peregrine falcon, greater sandhill crane). Surveys for osprey were conducted at suitable nesting locations within 0.75 mile of the Limits of Work, peregrine falcon nests were surveyed at cliff locations within one mile of the Limits of Work, and greater sandhill crane nesting habitat was surveyed at J.C. Boyle Reservoir. Heron colonies were also surveyed along reservoir and river shorelines within 0.25 mile of the Limits of Work, KRRC noted all species seen or heard, and active nests were documented.

- Future measures include the following:
    - Implementing pre-construction bird nesting surveys two weeks prior to construction within 300 feet of the Limits of Work and removing non-active nests (i.e., those without eggs) outside of the non-bird nesting season to discourage future nesting.
    - Surveying for osprey at nest sites identified in 2018 for occupancy in the year construction activities are planned to commence, and consulting with agencies on nests within 0.75 mile of the Limits of Work to block or remove nest to prevent future nesting.
    - Surveying for heron colonies and peregrine falcon and greater sandhill cranes in the spring of the year prior to drawdown, and if an active nest documented, a spatial buffer may be established in coordination with resource agencies.
    - Removing nesting habitat for osprey and nests of other raptors (other than eagles) prior to the bird nesting season[115].
    - Removing vegetation outside of the bird nesting season (February through July)[115].

While the Proposed Project avoidance and minimization measures would reduce the potential for short-term construction-related impacts on nesting birds within the Primary Area of Analysis, several of the aforementioned components need more specificity to ensure that short-term construction activities would not result in significant impacts on special-status species or substantially interfere with movement and/or migration of wildlife species, or that any remaining potentially significant impacts are mitigated to the extent feasible. KRRC proposes that KRRC and the appropriate state or local agency would work together to develop recommended terms and conditions that should be adopted by FERC as conditions of approval for the Lower Klamath Project. This is consistent with FERC's preference for licensees to be 'good citizens' of the communities in which projects are located and thus to comply, where possible, with state and local requirements.

It would be appropriate for the recommended terms and conditions relating to protection of nesting birds to include Recommended Terrestrial Measure 9 below, which was developed in consultation with CDFW and USFWS. This recommended terrestrial measure includes additional components beyond those listed as part of the Proposed Project, including, but not limited to, the following:

- extending the bird nesting season through August 31st (i.e., February 1 through August 31[116,117]);
- implementing pre-construction nesting bird surveys within one week of the construction activity, and include surveys for raptors within 500 feet of the construction activity; and

[115] Removing suitable nesting habitat (e.g., platforms, vegetation) outside of the bird nesting season would reduce the potential for birds to nest in the area and be subject to construction-related disturbance (noise, habitat removal) during the breeding season.
[116] Bird nesting season identified by A. Henderson, CDFW, Environmental Scientist, pers. comm October 2017. Timing may be modified by CDFW based on nesting information collected in the Area of Analysis.
[117] The nesting season identified in the Proposed Project included two date ranges—February through July and January 1 through August 20.

- consulting with CDFW and USFWS for buffer distances associated with (a) special-status species and (b) raptors not included in Table 3.5-5, or if a modified buffer is proposed.

Although removing individual active nests of non-special-status bird or CDFW special-status species would not rise to the level of population-level impacts, loss of a state- or federally- threatened active nest may affect populations levels and thus impacts on one individual or a nest may result in a significant impact.

Overseeing development and implementation of recommended term and conditions relating to nesting birds does not fall within the scope of the State Water Board's water quality certification authority. While the KRRC has initiated a process[118] to reach enforceable good citizen agreements with USFWS and CDFW that will be finalized and implemented, at this time the recommended term and conditions are not finalized, and the State Water Board cannot require their implementation. Accordingly, while the State Water Board anticipates that implementation of the recommended term and conditions, including the Recommended Terrestrial Measures and any modifications developed through the FERC process that provide the same or better level of protection for special-status wildlife, would reduce impacts to less than significant, because the State Water Board cannot ensure implementation of the Recommended Terrestrial Measures, it is analyzing the associated impacts in this Draft EIR as significant and unavoidable.

Recommended Terrestrial Measure 9 – Nesting Birds.

- Removal or trimming of any trees or other vegetation for construction shall be conducted outside of the nesting season (February 1 through August 31[119]). This shall include removal or trimming of trees along access roads and haul routes and within disposal sites. When this activity cannot occur (e.g., unanticipated activity, unanticipated delays, or vegetation re-grew during the growing season), a nesting bird survey (as described below) shall be conducted prior to vegetation removal. Where clearing, cutting, grubbing, or structural removal/modification cannot occur outside the nesting season (e.g., not feasible with construction schedule, unanticipated activity), a nesting bird survey (as described below) shall be conducted prior to habitat removal.
- Nesting bird surveys shall be conducted by a qualified avian biologist approved by CDFW and USFWS. The avian biologist shall survey the nesting habitat (vegetation, buildings) to be removed in the construction area and suitable habitat buffering the construction area—within 500 feet for raptors (other than eagles) and within 300 feet for non-special status non-raptors (e.g., song birds) Surveys should be conducted within one week[120] prior to habitat removal to determine if any native birds are nesting in those areas and have the potential to be affected by habitat removal. Surveys may be repeated beyond that described above (i.e., one week prior to habitat disturbance) to ensure that no nests have become active within vegetation or structures to be removed. If an old nest has been

[118] KRRC submitted the CEQA support document to agencies in September 2017 and requested feedback by November 10, 2017.
[119] Bird nesting season identified by A. Henderson, CDFW, Environmental Scientist, pers. comm October 2017. Timing may be modified by CDFW based on nesting information collected in the Area of Analysis.
[120] Surveys distance and timing identified by CDFW on 29 September 2017.

documented, it shall be removed during the non-nesting season to discourage future use of the nest.

- If potential greater sandhill crane nesting habitat is present within 500 feet of Proposed Project activities, any potential nesting habitat within the 500-foot radius shall also be surveyed for the presence of active greater sandhill crane nests.
- For all raptors (other than eagles), inactive nests shall be considered for removal before the nesting seasons begin, to the greatest extent practicable. (This includes osprey nests within 0.75 mile of construction areas.) For those nests where access is difficult, traffic cones or other deterrents shall be placed in the nest platform to prevent nesting in the year of construction. All deterrents shall be removed as soon as possible after construction activity is ceased within the disturbance buffer (Table 3.5-7 below) for that species.
- The on-site or avian biologist approved by CDFW and USFWS shall be on site prior to and during the bird nesting season to reduce the potential for nesting as much as possible.
- If an active nest is observed for a non-special-status species that is not a raptor, then the on-site biologist may identify an appropriate buffer, considering ambient conditions and response of bird to existing conditions. If this nest is in a location where the Proposed Project would destroy the nest, the KRRC shall attempt to reschedule activities until the young fledge. If the KRRC has considered rescheduling activities and implemented the minimization measures described above (repeated surveys, on-site monitors, removal old non-active nests outside of the breeding season), CDFW shall be contacted to discuss further measures.
- If an active raptor or special-status bird nest is observed, a restriction buffer shall be established. This shall include consideration of noise effects and line-of-sight considerations. (Bald and golden eagle species-specific recommended measures are discussed below in Potential Impact 3.5-13 and Recommended Terrestrial Measure 11)
    - Table 3.5-7 lists the restriction buffer distances and timing for many common raptor species with potential to occur within or near construction areas, as provided by USFWS (Strassburger 2011). All restriction buffers for raptors shall follow the spatial buffers as identified in Table 3.5-7, and consultation with agencies shall occur prior to implementing the activity if: (a) construction activity is within the buffer distance, or (b) the species is not identified in Table 3.5-7.
    - Buffers for passerines not state or federally listed as candidate, threatened, or endangered shall be established by a qualified avian biologist approved by CDFW and USFWS.
    - No vegetation removal or construction activities shall occur within the disturbance buffer until the young have fledged, as determined by the qualified biologist. Monitoring in these cases shall include determining and reporting to CDFW and USFWS the ultimate fate of the nest.
- If an active special-status bird nest is observed where the Proposed Project would destroy the nest, this could be a significant effect and KRRC shall obtain approval by applicable agencies.
- Tracking of nesting birds shall be reported once a month to applicable agencies.

Table 3.5-7. Noise Disturbance Buffers and Seasonal Timing Restrictions for Nesting Raptors.

Species	Noise Disturbance Buffer (miles [feet])	Seasonal Timing Restriction
Bald eagle	1.00 mi (5,280 ft)	Jan 1–Aug 31
Golden eagle	1.00 mi (5,280 ft)	Jan 1–Aug 31
Northern goshawk	0.75 mi (3,960 ft)	March 1–Aug 15
Northern harrier	0.75 mi (3,960 ft)	April 1–Aug 15
Cooper's hawk	0.75 mi (3,960 ft)	March 15–Aug 31
Ferruginous hawk	1.00 mi (5,280 ft)	March 1–Aug 1
Red-tailed hawk	0.75 mi (3,960 ft)	March 15–Aug 15
Sharp-shinned hawk	0.75 mi (3,960 ft)	March 15–Aug 31
Swainson's hawk	0.75 mi (3,960 ft)	March 1–Aug 31
Turkey vulture	0.75 mi (3,960 ft)	May 1–Aug 15
Peregrine falcon	1.00 mi (5,280 ft)	Feb 1–Aug 31
Prairie falcon	0.75 mi (3,960 ft)	April 1–Aug 31
Merlin	0.75 mi (3,960 ft)	April 1–Aug 31
American kestrel	0.05 mi (300 feet)	April 1–Aug 15
Osprey	0.75 mi (3,960 ft)	April 1–Aug 31
Burrowing owl	0.25–0.75 mi (1,320–3,960 ft)	March 1–Aug 31
Flammulated owl	0.75 mi (3,960 ft)	April 1–Sept 30
Great horned owl	0.75 mi (3,960 ft)	Dec 1–Sept 30
Long-eared owl	0.75 mi (3,960 ft)	Feb 1–Aug 15
Northern saw-whet owl	0.75 mi (3,960 ft)	March 1–Aug 31
Short-eared owl	0.75 mi (3,960 ft)	March 1–Aug 1
Northern pygmy-owl	0.75 mi (3,960 ft)	April 1–Aug 1
Western screech-owl	0.75 mi (3,960 ft)	March 1–Aug 15
Barn owl	0.062–0.25 mi (330–1,320 ft)	Feb 1–Sept 15

Source: USFWS (Strassburger 2011)

Significance

Significant and unavoidable

Potential Impact 3.5-12 Effects on willow flycatcher from short-term construction-related noise and short-term and long-term habitat alterations.

In the short term, construction activities including, but not limited to, structure demolition, hatchery modifications (Section 2.7.6 *Hatchery Operations*), road and bridge upgrades (Appendix B: *Definite Plan – Appendix K*), and culvert improvements (Section 3.22.2.3 *Road Conditions*) could result in noise disturbance and habitat removal that may result in significant impacts on willow flycatcher. Significant impacts may result from direct mortality or physical harm to individuals; degradation of habitat or a change in habitat conditions that would result in physiological impairment or that may affect the ability to perform essential behaviors such as migration, feeding, or reproducing; or abandonment of active bird nests. As a result, habitat removal or disturbance during the bird nesting

season has the potential to remove a nest directly and/or result in nest failure, which would be a significant impact. The Proposed Project does not include a significant amount of tree removal, but rather it is anticipated that habitat removal could occur if branches or small trees would need to be removed in order to upgrade bridges and roads. As a result, it is not anticipated that the quantity or quality of the habitat would be degraded, but rather the potential for direct or incidental harm from noise or removal of a nest in a branch, if present. There are few locations where modeled willow flycatcher habitat (discussed below) overlaps the Limits of Work. If activities occur in this area, the Proposed Project may cause nest abandonment due to construction noise or direct harm due to physical removal of vegetation, similarly to the impacts described in Potential Impact 3.5-10 for nesting birds. The Proposed Project includes construction activities at Copco Road Bridge over Jenny Creek, which is located in an area of known willow flycatcher use.

Willow flycatcher habitat has been modeled in areas along the Hydroelectric Reach and Middle Klamath River and reservoirs, and most of the habitat is predicted to occur along riverine habitat rather than reservoir habitats (Stermer et al. 2002). Under existing conditions, habitat modeling along the Klamath River between the California-Oregon state line and Cottonwood Creek (approximately 9 RM downstream of Iron Gate Dam) indicates that approximately 10 percent of habitat is suitable for the willow flycatcher (assuming a 0.1-mile buffer). Along reservoir shorelines, modeled suitable willow flycatcher habitat represents only 0.2 percent of existing conditions habitat; the few relatively small patches are located at the upstream-most end of Iron Gate Reservoir at Fall Creek and at Copco No. 1 Reservoir near the confluences of East Fork Beaver Creek and Deer Creek. This modeled willow flycatcher habitat did not identify suitable habitat at the confluence of Jenny Creek and Iron Gate Reservoir, even though willow flycatcher use has been documented at these locations. Under the Proposed Project, the distribution of suitable habitat along the newly formed Klamath River banks in the Hydroelectric Reach is expected to be similar to the relative amount of habitat that is currently present upstream and downstream of the reservoirs, and thus overall the amount of flycatcher habitat would be expected to increase.

Following drawdown and restoration of the reservoir area, the modeled existing riparian habitat located along Fall Creek, East Fork Beaver Creek, and Deer Creek would be expected to continue invertebrate production and thus serve as a resource for willow flycatcher foraging. Further, the riparian habitats supported along these creeks would expand toward the newly formed banks of the Klamath River. While the new riparian habitats are establishing, the existing habitat would continue to be present throughout the Hydroelectric Reach upstream of Copco No. 1 Reservoir and at the confluence of Fall Creek. As a result, the long-term effect of the Proposed Project on willow flycatcher habitat would be beneficial.

The Proposed Project includes components to avoid and minimize impacts including conducting a habitat evaluation to identify suitable habitat, and if it is determined that there would be impacts on the potential willow flycatcher habitat from Project implementation in areas where presence is uncertain or cannot be assumed, the KRRC will conduct protocol surveys for willow flycatcher in the spring of the year prior to drawdown, in coordination with resource agencies (Appendix B: *Definite Plan – Appendix J*). Also, when harvesting willow pole cuttings to support restoration activities, KRRC proposes to avoid areas where there is known habitat for willow flycatcher (Appendix B: *Definite Plan – Appendix H*).

While the Proposed Project avoidance and minimization measures would reduce the potential for short-term construction-related impacts on willow flycatcher within the Primary Area of Analysis, the aforementioned components need more specificity to ensure that short-term construction activities would not result in significant impacts on this special-status species or substantially interfere with movement and/or migration of wildlife species, or that any remaining potentially significant impacts are mitigated to the extent feasible. Implementation of the recommended measure below, developed in consultation with CDFW, would reduce potential short-term construction-related impacts on willow flycatcher to less than significant. KRRC also proposes that KRRC and the appropriate state or local agency would work together to develop recommended terms and conditions that should be adopted by FERC as conditions of approval for the Lower Klamath Project. This is consistent with FERC's preference for licensees to be 'good citizens' of the communities in which projects are located and thus to comply, where possible, with state and local requirements.

It would be appropriate for the recommended terms and conditions relating to protection of willow flycatcher to include the Recommended Terrestrial Measure 10 below, which has been developed in consultation with CDFW. The Recommended Terrestrial Measure 10 includes components beyond those listed as part of the Proposed Project and would be necessary to reduce potential short-term construction related impacts on willow flycatcher to less than significant (see Recommended Terrestrial Measure 10). These components include conducting construction activities outside of the bird nesting season, protocol-level surveys in suitable habitat that have the potential to be affect to collect information on the number of flycatchers that may be affected by activities, establishing a no-construction buffer, and removing only the amount of vegetation necessary to implement the action and not affect the overall habitat quality of the patch. The recommended terrestrial measure is consistent with widely accepted professional best management practices for environmental protection which would reduce potential harm to the species; therefore, result in less than significant impacts due to the Proposed Project.

Overseeing development and implementation of recommended term and conditions relating to the willow flycatcher does not fall within the scope of the State Water Board's water quality certification authority. While the KRRC has initiated a process[121] to reach enforceable good citizen agreements with CDFW that will be finalized and implemented, at this time the recommended term and conditions are not finalized, and the State Water Board cannot require their implementation. Accordingly, while the State Water Board anticipates that implementation of the recommended term and conditions, including the Recommended Terrestrial Measures and any modifications developed through the FERC process that provide the same or better level of protection for willow flycatcher, would reduce impacts to less than significant, because the State Water Board cannot ensure implementation of the Recommended Terrestrial Measures, it is analyzing the associated impacts in this Draft EIR as significant and unavoidable.

[121] KRRC submitted the CEQA support document to agencies in September 2017 and requested feedback by November 10, 2017.

Recommended Terrestrial Measure 10 – Willow Flycatcher.

- As proposed by the KRRC, the KRRC shall conduct an assessment to identify potential suitable habitat for willow flycatcher in habitat that has the potential to be affected by the Proposed Project. The assessment would occur in the spring of the year prior to drawdown or before.
- Construction activities within suitable habitat or known willow flycatcher locations (e.g., Jenny Creek Bridge replacement activities) shall occur outside of the bird nesting season and habitat disturbance shall be minimized as much as possible. The on-site biologist (Recommended Terrestrial Measure 3) shall monitor to ensure that habitat removal includes only the amount necessary to implement the action and would not affect the overall habitat quality of the patch.
- If construction activities or habitat removal occurs in potentially suitable habitat during the bird nesting season, protocol-level surveys will be conducted prior to the construction activity or habitat removal, and if the willow flycatcher is documented within an area that has the potential to be affected, coordination with CDFW shall occur to identify an appropriate buffer to be implemented. Any impact resulting from the Proposed Project that would result in the mortality or physical harm or impairment of an individual willow flycatcher would be a significant impact. If activities would need to occur within the buffer, the KRRC shall implement any measures CDFW deems necessary. Report on the status of any willow flycatcher surveys once a month when surveys are conducted to applicable agencies.

Significance
Significant and unavoidable in the short term

Beneficial in the long term due to expansion of riparian habitat in the former location of Copco No. 1 and Iron Gate reservoirs

Potential Impact 3.5-13 Short-term impacts on bald and golden eagles from construction-related noise and nesting habitat alterations.
Short-term construction-related activities including, but not limited to, structure demolition, hatchery modifications (Section 2.7.6 *Hatchery Operations*), road and bridge upgrades (Appendix B: *Definite Plan – Appendix K*), and culvert improvements (Section 3.22.2.3 *Road Conditions*) could result in noise disturbance and habitat removal impacts on bald and golden eagles. Bald and golden eagles are protected by the Bald and Golden Eagle Protection Act that prohibits anyone without a permit to take alive or dead any part of a bald or golden eagle or their nest. Impacts on bald and golden eagles are similar to those described in Potential Impact 3.5-10 for nesting birds. 2018 eagle surveys documented two inactive bald eagle nests—one within 0.5 miles of Copco Reservoir and one located between 0.5–2 miles of Iron Gate Reservoir (S. Leonard, AECOM, Senior Water Resources Engineer, pers. comm, October 2018). Two active golden eagle nests were found within two miles of Copco No. 1 Reservoir and three inactive nests were documented within 2 miles of Iron Gate Reservoir (S. Leonard, AECOM, Senior Water Resources Engineer, pers. comm, October 2018). In May 2018, a golden eagle was observed at Copco No. 1 Reservoir perched on a slope on the northern shoreline, a pair was observed near a northern cove, and one was observed bathing in the shallow water (CDM Smith 2018c).

Bald eagle nesting trees are known to exist within or near proposed Lower Klamath Project construction areas. A bald eagle nest, active from 1986 to 1997, was located

approximately two miles from Iron Gate Dam; a nest active from 1993 to 1997 was documented within 0.5 mile of Iron Gate Dam; and an active nest in 2002 was documented within two miles of Iron Gate Dam (Willy 2017, as cited in *Appendix B: Definite Plan*). As bald eagle nests have been previously documented nearby, and as bald eagles may use the same nests in multiple years, there is a potential for bald eagles to nest in these same sites (or locations in similar habitats) and be disturbed by Proposed Project noise. Noise disturbance may cause nest abandonment while physical removal of vegetation may result in direct harm. Construction activities that could result in noise and disturbance impacts on bald and golden eagles include dam demolition, clearing of access and haul roads, creating and using staging and disposal sites, and restoration activities. Project impacts on nesting eagles could occur if individuals are nesting (January 1 through August 31) while construction activities occur—powerhouse and dam removal activities would begin November 1 of the year prior to drawdown and continue through September of the drawdown year (Table 2.8-1). Without surveys to document nesting bald or golden eagles and buffers to prevent noise and habitat removal impacts, bald and golden eagles if present, would be displaced resulting in a failed nest or mortality to young, and this would be a significant short-term impact. (Potential impacts from the loss of reservoir habitat are addressed in Potential Impact 3.5-14 and potential impacts from the reduction in hatchery output are addressed in Potential Impact 3.5-25).

The Proposed Project includes components to avoid and minimize construction-related impacts on bald and golden eagles (Appendix B: *Definite Plan – Appendix J*) which include, but are not limited to, the components listed below.

- The following surveys were conducted for the Proposed Project.
    - Initial ground-based nest search survey in late January/early February 2018 and a second ground-based and aerial survey was conducted in June 2018 covering an area approximately two miles from construction and demolition sites and 0.5 mile from other areas within the Limits of Work including reservoir boundaries where significant demolition and construction activities would not be occurring. The 2018 results are detailed above. (Survey methods were based on established protocols including Jackman and Jenkins 2004 and Pagel et al. 2010).
- Future measures include the following:
    - Conducting an additional survey during the early nesting season of the year prior to drawdown to determine updated activity and to observe eagle activity patterns, to establish a baseline of normal behavior prior to construction.
    - Developing an Eagle Avoidance and Minimization Plan in coordination with the USFWS that identifies procedures and protocols for avoiding and minimizing impacts.
    - When possible, scheduling activities including clearing, cutting, and grubbing outside of the eagle nesting season (January 1 through August 31).
    - Applying a 0.5-mile restriction buffer if a nest is within two miles of the Limits of Work in coordination with resource agencies to ensure nests that are not disturbed. If an eagle nest is within the 0.5-mile buffer, then construction activities would be halted until coordination with resource agencies determine that construction can resume. The KRRC noted that if there are topographic or vegetative features that would block the eagle's line of site to the activity, the buffer could be reduced to 0.25 mile. A further narrowing of the buffer or

identification of specific activities that could be determined in coordination with the biological monitors and the USFWS, as long as the activities would not jeopardize nesting success.

While the Proposed Project avoidance and minimization measures would reduce the potential for short-term construction-related impacts on bald and golden eagles within the Primary Area of Analysis, the aforementioned components need more specificity to ensure that short-term construction activities would not result in significant impacts on bald an golden eagles or substantially interfere with their movement and/or migration, or that any remaining potentially significant impacts are mitigated to the extent feasible. Implementation of the recommended bald and golden eagle mitigation measure below, developed in consultation with CDFW and USFWS, would reduce potential short-term construction-related impacts on bald and golden eagles to less than significant. KRRC proposes that KRRC and the appropriate state or local agency would work together to develop recommended terms and conditions that should be adopted by FERC as conditions of approval for the Lower Klamath Project. This is consistent with FERC's preference for licensees to be 'good citizens' of the communities in which projects are located and thus to comply, where possible, with state and local requirements.

It would be appropriate for the recommended terms and conditions relating to protection of bald and golden eagles to include Recommended Terrestrial Measure 11 below, which has been developed in consultation with CDFW and USFWS. This recommended terrestrial measure includes the following additional components beyond those listed as part of the Proposed Project:

- During the implementation of the 2018 eagle surveys, a two-mile survey area was established surrounding construction and demolition areas and a 0.5-mile survey area surrounding other areas such as reservoirs. Appendix J of the Definite Plan identifies aerial seeding within the reservoir footprint, and as a result the survey area shall reflect the modified noise disturbance areas around the reservoirs by expanding the surveys buffer around the reservoirs from 0.5 mile to one mile. (A minimum of a one-mile survey area is based on the one-mile buffer distance that would be applied if an active nest was present.)
- Consultation with resource agencies shall include both USFWS and CDFW, as the eagles are protected by the federal Bald and Golden Eagle Protection Act and the bald eagle is listed as a state endangered species.
- Nests shall be monitored within buffer zones.

Overseeing development and implementation of recommended term and conditions relating to bald and golden eagles does not fall within the scope of the State Water Board's water quality certification authority. While the KRRC has initiated a process[122] to reach enforceable good citizen agreements with USFWS and CDFW that will be finalized and implemented, at this time the recommended term and conditions are not finalized, and the State Water Board cannot require their implementation. Accordingly, while the State Water Board anticipates that implementation of the recommended term and conditions, including the Recommended Terrestrial Measures and any modifications developed through the FERC process that provide the same or better level of protection for special-status wildlife, would reduce impacts to less than significant, because the

[122] KRRC submitted the CEQA support document to agencies in September 2017 and requested feedback by November 10, 2017.

State Water Board cannot ensure implementation of the Recommended Terrestrial Measures, it is analyzing the associated impacts in this Draft EIR as significant and unavoidable.

Recommended Terrestrial Measure 11 – Bald and Golden Eagle.

- KRRC shall develop an Eagle Avoidance and Management Plan in coordination with USFWS and CDFW.
- A two-year survey for eagle use patterns shall be conducted prior to construction activities.
    - The first-year survey shall determine bird use patterns at any facilities to be removed or modified during the time of year most likely to detect bird usage (this was completed by KRRC in 2017).
    - The second-year survey shall include focused surveys (see below).
    - Surveys shall be conducted by a qualified avian biologist, approved by resource agencies (CDFW and USFWS).
- A focused survey (two site visits) shall be conducted in a single nesting season within two years prior to drawdown to document the presence of nests. These focused surveys shall identify eagle nests within one miles of disturbance areas within the Limits of Work, including but not limited to demolition areas where there may be any loud noise disturbance (e.g., helicopter or plane). The early nesting season survey shall occur at a time when eagles are most likely found at the nest sites, and the second survey shall occur later in the season and prior to the fledglings leaving the nest to confirm nesting activity. All observations shall be reported to CDFW using the California Bald Eagle Nesting Territory Survey Form (CDFW 2017d).
- Within two weeks prior to commencing construction or ground-disturbing activities, KRRC shall conduct at least one pre-construction survey within the survey area defined above.
- Wherever possible, clearing, cutting, and grubbing activities shall be conducted outside of the eagle nesting season (January 1 through August 31[123]).
- If active eagle nests are documented during the surveys, a one-mile[124] restriction buffer shall be established around the nest to ensure that nests are not disturbed. This buffer may be reduced in coordination with USFWS and CDFW, while taking into consideration components such as proposed activity, distance to activity, terrain, and line of site. For example, in coordination with agencies, if a nest is not within line-of-site, meaning that trees or topographic features physically block the eagle's view of construction activities, the buffer could be reduced to 0.25 miles. Further reduction of buffers or allowance of limited activity inside of buffers could occur in coordination with on-site biologist, CDFW, and the USFWS, while being consistent with the Eagle Avoidance and Minimization Plan, if it is determined that the activities shall not jeopardize nesting success.
- Nests within a one-mile buffer shall be monitored by an USFWS- and CDFW-approved biologist when there is a potential for noise disturbance, in order to

[123] Eagle breeding season of January 1 through August 31 identified by A. Henderson, CDFW, Environmental Scientist, pers. comm, November 2017

[124] Eagle nest restriction buffer of 1.0 mile identified by A. Henderson, CDFW, Environmental Scientist, pers. comm, November 2017

assess whether eagle activity patterns are normal, as compared with that observed during baseline surveys described above.

- If activities are anticipated to result in take under the Bald and Golden Eagle Protection Act, it would be considered a significant impact and KRRC will coordinate appropriate measures, including procurement of any necessary take permits, with USFWS and CDFW. Report on the status of bald and golden eagle surveys within one month of the survey to applicable agencies.

Significance
Significant and unavoidable in the short term

Potential Impact 3.5-14 Short- and long-term impacts on bats from construction noise and loss of roosting habitat.
In the short term, construction activities including, but not limited to, structure demolition, hatchery modifications (Section 2.7.6 *Hatchery Operations*), road and bridge upgrades (Appendix B: *Definite Plan – Appendix K*), and culvert improvements (Section 3.22.2.3 *Road Conditions*) could disturb bat roosts through construction noise, physical vibration, and direct removal of roosting habitat.

Structures in the Lower Klamath Project are providing habitat for small day roosts and large maternity colonies. Recent structure assessments and surveys in 2017 and 2018 identified roosts in 22 structures with the largest of colonies (between a few hundred and a few thousand individuals) observed thus far at the Copco No. 1 Dam - C12 Gatehouse, Copco No. 1 Diversion Tunnel, Vacant House #21601 (light yellow house), and Iron Gate Diversion Tunnel (Appendix B: *Definite Plan – Appendix J*; KRRC 2018a, and KRRC 2018b). (see Table 3.5-8).

Table 3.5-8. Evidence of Bat Use at Structures Based on June 2017 Reconnaissance and Available Information from 2018 surveys (Appendix B: *Definite Plan – Appendix J;* KRRC 2018a,b)

Building Name	Evidence of Bat Use
All bridges scheduled for removal or modification	No roosting bats
Copco No. 1 and No. 2 Dams and Facilities	
Schoolhouse	No
House 19038 (next to schoolhouse)	Yes – abundant guano in crawl space.
Vacant House 1 (tan)	Yes – small numbers of bats present under wood panels outside.
Vacant House 2 (blue)	Yes – small numbers of bats present under wood panels outside.
Vacant House 3 (yellow)	Yes – small numbers of bats present under wood panels outside.
Vacant House 3 (yellow)	Yes – large colony in garage behind wood window framing, whole structure is being heavily used.
Vacant House 4 (peach)	Yes – maternity colony between flashing & fascia board all around roof edge; pups present.
Cookhouse	Yes – bats present in awning over side door outside, no sign inside.
Bunkhouse	Yes – guano on bed. Night roosting suspected from

Building Name	Evidence of Bat Use
	staining around outside lighting.
Copco No. 1 Dam - C12 Gatehouse	Yes – abundant guano/staining on the inside and outside of the building; dead bat (Myotis spp.) found outside on windowsill. Documented a large maternity roost of >2,000 Myotis spp. inside structure.
Copco No. 1 Powerhouse	Yes – several dozen bats clustered on wall above Transformer 3781; abundant staining/guano on basement level. Follow-up surveys documented small numbers of roosting bats.
Copco No. 1 Diversion Tunnel (also referenced as Tunnel outside of Copco No. 1 Powerhouse)	Yes – several hundred bats observed during emergence
Copco No. 2 Diversion Dam	No
Vacant House #21601 (light yellow house)	Yes – ~200 bats roosting in attic.
Shed (next to power station)	None found in main portion of shed. Back area of building was inaccessible.
Vacant House (light blue)	Yes – dead bat found in bathroom sink. No guano/staining inside. Attic vents are closed. No points of entry found.
Tin Pumphouse (across from light blue house)	No
Tin Pumphouse at entrance to Copco Village	Yes – small amount of guano outside. Multiple points of entry. Inside inaccessible.
Copco No. 2 Powerhouse	Yes – many dead bats on ground level (on floor, in storage room, control room) and dead pups at bottom of stairs on lower level. More sign/activity found at ground level. Follow-up surveys documented small numbers of roosting bats.
Control Room at Copco No. 2 Powerhouse	Not inspected during reconnaissance survey.
Shop next to power station at Copco No. 2	Not inspected during reconnaissance survey.
Occupied House next to Vacant House 4	Not inspected during reconnaissance survey.
Equipment shed (in front of bunkhouse/cookhouse)	Not inspected during reconnaissance survey.
Waste storage/wood shop by gas pumps (near houses/bunkhouse/cookhouse)	Not inspected during reconnaissance survey.
Iron Gate Dam and Facilities	
Gatehouse for low-level outlet (upstream side of dam)	Yes – night roosting evidence outside. No sign found inside.
Iron Gate Diversion Tunnel (also referenced as Tunnel near Iron Gate Powerhouse)	Yes – several hundred bats observed during emergence.
Iron Gate Powerhouse Intake	Yes - from ground level, bats heard through grating below. Entry via open grate on outside. Two dead bats. Observed abundant guano on plastic sheeting on floor inside.
Iron Gate Emergency Spill Equipment Shed	No

Building Name	Evidence of Bat Use
Iron Gate Hydro Resources Office/Powerhouse	Yes – heavily used night roost by light fixture under stairwell (abundant staining on concrete wall). Sign of significant roost inside concrete shaft (heavy staining/guano). Confined space entry to bottom level of powerhouse, did not inspect.
Bathroom/Storage building near powerhouse	No
Spawning building	Yes – small amount of guano. Potential night roosting outside.
2 storage trailers (parked next to each other)	No
Barn/Garage at Iron Gate Village	Yes – bats present in rafters/ceiling; abundant amount of guano.
Residence 1 (occupied) blue/gray	No–inspected outside only; inside/attic not accessed.
Residence 2 (occupied) tan w/green roof	Yes – 15 bats present behind clock on back porch. Attic access likely through loose screen over vent. Outside inspection only; inside/attic not accessed.

Short-term impacts may occur from disturbing a maternity and/or hibernacula colony, including those possibly used by special-status bat species. Structure modifications or significant noise or vibrational disturbance occurring during the bat maternity season have the greatest potential to affect special-status bats. Maternity colonies may have high numbers of non-volant young (unable to fly) that may be directly or indirectly harmed or killed, resulting in impacts on individuals or a colony. A hibernaculum is a roost that bats use to overwinter, which provides suitable microclimates and allows bats to hibernate by slowing their metabolic rate to survive through low temperatures and low abundance of food. Disturbing a hibernacula roost may interrupt the metabolic rate and cause bats to use limited energy reserves. Impacting a maternity or hibernacula roost has the potential to result in direct impact on individuals and/or colonies and thus result in a significant short-term impact. Working outside of sensitive life history periods (i.e., maternity, hibernacula) and excluding bats from structures prior to construction or during times when bats would be less affected, would reduce the impact on bats.

Although impacting a maternity or hibernacula roost would be considered a significant impact, removal of night roosts used by a few individuals would not represent a significant impact on bats, as (1) structures would not be removed during the night when bats are present and thus no direct impact would occur, and (2) there are homes and other structures within a 15-mile radius (H.T. Harvey and Associates 2004) of the Limits of Work that may provide suitable night roosting habitat.

In the long term, removing maternity or hibernacula roosts has the potential to result in population-level impacts, as it is not known if the bats will relocate or if there is suitable habitat in the adjacent area to support these roosts. Removal of large maternity or hibernacula roosts would result in a significant long-term impact.

Without surveying to document roosting bats, conducting construction within limited operating periods that are least likely to overlap with sensitive bat life histories, and creation of successful replacement roost habitats, impacts on bat in the short term and long term would be significant, as described above.

The Proposed Project includes components to avoid and minimize both short- and long-term construction-related impacts and loss of habitat on roosting bats including, but not limited to, the components below (additional details are provided in Appendix B: *Definite Plan – Appendix* J.

- The following surveys were recently conducted or in progress for the Proposed Project.
    - A site reconnaissance daytime visual inspection (most sites surveyed in July 2017 and May 2018) and emergence surveys and acoustic monitoring surveys in June 2018. Hibernacula surveys conducted in February and March 2018 (Copco No. 1 and Copco No. 2 structures only due to limited access). Surveys to assess migration in spring occurred in April/May and in fall occurred in September/October 2018.
- Future measures include the following:
    - KRRC is also assessing nearby trees scheduled for removal.
    - Removing facilities that support maternity colonies outside of the bat roosting season (March 2–October 31) and removing facilities that support hibernacula roosts when it is determined to be unoccupied.
    - Excluding bats outside of the bat roosting period when feasible and conducting exclusion consistent with a Bat Exclusion Plan that would be provided to CDFW prior to implementing the exclusion method.
    - If a structure is to be removed and contains bats, the KRRC proposes coordinating with agencies to remove habitat at a time when it would have the least impact on bats.
    - For replacement bat habitat, the KRRC proposes giving preference to on-site and in-kind opportunities and retaining existing structures supporting roosts, to the extent practical. For facilities that cannot be retained, the KRRC will construct free-standing bat roosts prior to the removal of the existing facility; the replacement habitat will be informed by features at the structure that currently supports the bat roost(s). The KRRC proposes to develop success criteria in coordination with agencies and bat specialists, as appropriate.

While the Proposed Project avoidance and minimization measures would reduce the potential for short-term construction-related impacts on bats within the Primary Area of Analysis, the aforementioned components need more specificity to ensure that short-term construction activities would not result in significant impacts on special-status species or substantially interfere with movement and/or migration of wildlife species, or that any remaining potentially significant impacts are mitigated to the extent feasible. The recommended terrestrial measure below, developed in consultation with CDFW, include additional components beyond those listed as part of the Proposed Project and would be necessary to reduce potential short-term construction-related impacts on special-status to less than significant, as specifically discussed in the recommended terrestrial measure below. KRRC proposes that KRRC and the appropriate state or local agency would work together to develop recommended terms and conditions that should be adopted by FERC as conditions of approval for the Lower Klamath Project. This is consistent with FERC's preference for licensees to be 'good citizens' of the communities in which projects are located and thus to comply, where possible, with state and local requirements.

It would be appropriate for the recommended terms and conditions relating to protection of bats to include Recommended Terrestrial Measure 12 below, which was developed in consultation with CDFW. This recommended terrestrial measure includes the following additional components: (1) the proposed two-year surveys shall be conducted within five years prior to drawdown; (2) an additional assessment of all structures should be reassessed to detect any changes in use and update baseline data to be as contemporary as possible when used as a comparison for monitoring the success of replacement habitat; (3) additional specificity associated with the timing and required weather conditions during exclusion or habitat removal when bats are present to prevent impacts on individuals; (4) definition of a CDFW-proposed breeding season that is less restrictive than the KRRC-proposed season allowing for additional flexibility; (5) definition of a CDFW-proposed hibernating season that is more restrictive than proposed; (6) definition of protection measures in the event that a few bats are documented during construction at locations where surveys did not previously document use—bats may be captured and released by a CDFW-approved bat biologist; (7) additional options for artificial bat roosts (e.g., bridge enhancement); and (8) specificity regarding monitoring success criteria for replacement roost structures.

Overseeing development and implementation of recommended term and conditions relating to bats does not fall within the scope of the State Water Board's water quality certification authority. While the KRRC has initiated a process[125] to reach enforceable good citizen agreements with CDFW that will be finalized and implemented, at this time the recommended term and conditions are not finalized, and the State Water Board cannot require their implementation. Accordingly, while the State Water Board anticipates that implementation of the recommended term and conditions, including the Recommended Terrestrial Measures and any modifications developed through the FERC process that provide the same or better level of protection for special-status bats, would reduce impacts to less than significant, because the State Water Board cannot ensure implementation of the Recommended Terrestrial Measures, it is analyzing the associated impacts in this Draft EIR as significant and unavoidable.

Recommended Terrestrial Measure 12 – Roosting Bats and Habitat.

- Surveys described below shall be conducted within five years prior to drawdown, and within one year prior to drawdown all structures shall be reassessed to detect any change to the roost (maternity and hibernacula).
- A qualified bat biologist shall conduct two years of bat surveys at the facilities to be removed or modified to determine bat use (species use, roost type [maternity, day, night, hibernacula]) using visual observation/emergence surveys to assess size of roost and using acoustic detectors to identify species (or species group if identification to species is not feasible) present at the roost. Surveys shall be conducted during the time of year most likely to detect bat use during the maternity and hibernacula season.
- If surveys indicate that a structure is utilized as a bat maternity roost, then removal or modification of the facility shall occur outside of the bat maternity season

[125] KRRC submitted the CEQA support document to agencies in September 2017 and requested feedback by November 10, 2017.

(March 1–September 15)[126]. If the facility is used as a winter hibernacula, then removal or modification of the facility shall occur outside of the hibernacula season (October 15–February 28)[127] or when it is determined to be unoccupied. These timeframes may be adjusted based on site-specific conditions, data collected on-site or in the region, and proposed activities, as determined by the qualified bat biologist and in consultation with CDFW.

- No direct or indirect disturbance (exclusion or demolition as discussed below) shall occur during the peak of the maternity season (April 15–August 31)[128].
- Consistent with the KRRC's proposed measure, humane bat exclusion methods to seal facility entry sites (e.g., blocking by netting or installing sonic bat deterrence equipment) may occur to prevent bat use in a structure during the demolition. A Bat Exclusion Plan to identify proposed exclusion methods shall be developed by the qualified bat biologist and approved by CDFW prior to initiation. Exclusion measures shall be put in place when bats are active and weather is fair outside between September 1 and October 15[129]. During this allowable period, these activities may occur when evening temperatures are greater than 45ºF and no more than 0.5 inch of rainfall is predicted within the following 24 hours. The sites shall be monitored to determine whether the exclusion was successful. Humane bat exclusion methods shall be conducted by, or under the supervision of, a qualified bat biologist with experience in conducting humane exclusions that holds a CDFW Scientific Collecting Permit for bat capture.
- If demolition occurs at a time when a structure is occupied by a maternity colony or hibernating colony and exclusion was deemed infeasible, a plan shall be developed (this could be part of the Bat Exclusion Plan) in coordination with a qualified bat biologist and approved by CDFW to carefully remove the occupied bat habitat at a time when it would have the least impact on bats present and in a manner that avoids bat injury and mortality. Demolition shall occur when bats are active and weather is fair outside between September 1 and October 15[129]. During this period, activities to remove the occupied habitat may occur when evening temperatures are greater than 45°F and no more than 0.5 inch of rainfall is predicted within the following 24 hours. During demolition activities, a qualified bat biologist shall be present on site.
- If an on-site biologist (Recommended Terrestrial Measure 3) conducts a daily pre-construction survey (Recommended Terrestrial Measure 7) of a structure previously assessed as not providing habitat for bats and finds a few bats (and confirmed neither a hibernacula or maternity colony), a qualified bat biologist with experience handling bats and approved by CDFW may capture and release the bat(s) at dusk during suitable weather (i.e., not raining, temperatures greater than 45°F).
- To reduce short-term and long-term impacts on bats from the permanent loss of maternity or hibernating roosting habitat, creation and/or enhancement of artificial

[126] Bat maternity season identified by K. Hubbard, CDFW Environmental Scientist, pers. comm., November 2017.
[127] Bat hibernating season identified by K. Hubbard, CDFW Environmental Scientist, pers. comm., November 2017.
[128] Peak maternity season identified by K. Hubbard, CDFW Environmental Scientist, pers. comm., November 2017.
[129] Humane exclusion period identified by K. Hubbard, CDFW Environmental Scientist, pers. comm., November 2017.

roosting habitat shall occur prior to the structures being removed. New artificial bat roosting habitat shall be designed to support equivalent roost (maternity, hibernacula) habitat, numbers, and species excluded from the demolished roosts, with the goal of meeting the success criteria defined below.

- The total number of artificial bat roosts shall depend on the total number of facilities removed with maternity and hibernacula bat roosts. The size and design of artificial bat roosts shall be informed by the features of the removed structure and the type and size of roost; critical design elements shall include access, ventilation, and thermal conditions.
- Artificial bat roosts may include, but are not limited, to enhancing bridges to support roosting habitat and constructing free-standing artificial bat roosts on- or off-site in consultation with bat specialists and the resource agencies. Preference shall be given to on-site and in-kind solutions; however, if artificial free-standing bat roosts are unlikely to remain into the foreseeable future (e.g., due to land ownership changing following completion of the Proposed Project), the placement of artificial bat roosts in off-site locations on publicly owned land (e.g., Horseshoe Ranch Wildlife Area) may be considered in coordination with agencies (CDFW).
- Experienced contractors shall perform the installation of bat roosts. The artificial bat roosts shall meet the applicable specifications of Bats in American Bridges (Keeley and Tuttle 1999) and California Bat Mitigation Techniques, Solutions, and Effectiveness (H.T. Harvey and Associates 2004).
- Post-construction monitoring of the mitigated enhanced or replacement bat roosts shall occur multiple times of the year and depend on the type of roost being created. At a minimum, roost surveys shall occur seasonally (four times per year). Monitoring surveys may include, but are not limited to, emergence surveys, acoustic monitoring, and guano observation.
- Monitoring shall occur for at least five years or until the mitigation can be considered successful. At Year 3, artificial bat roosts meeting the success criteria (described below) may be eliminated from the monitoring. Criteria shall be considered successful through concurrence with CDFW or their designated representatives.
  - The mitigated enhanced and/or replacement bat roosts will be considered successful if the following occurs: (1) the mitigation roost provides the function(s) of the demolished roost (i.e., maternity, hibernacula) and (2) the roost is occupied by a similar composition of species and number of bats that were present in the demolished roost (H.T. Harvey and Associates 2004). If this standard is not met, KRRC shall coordinate with CDFW, as appropriate, to ascertain the potential need for further measures (e.g., modifications to the mitigation roost(s), additional monitoring).

- Report on the status of bat surveys, exclusion activities, and success criteria monitoring within one month of the survey to applicable agencies.

Significance

Significant and unavoidable for short-term construction-related impacts

Significant and unavoidable for long-term habitat removal

Potential Impact 3.5-15 Impacts on northern spotted owl and critical habitat from construction-related noise and habitat alterations.
Northern spotted owls can be disturbed by noise, visual, or physical disturbances. The noisiest construction activities are blasting and helicopters (it is uncertain if aerial seeding would be done by plane or helicopter). Blasting has a disturbance distance of approximately one mile and helicopter use has a disturbance distance approximately of 0.5 mile, whereas other activities (e.g., chainsaw use, heavy equipment) have disturbance distances of approximately 0.25 mile (Table 3.5-9); disturbance distances were developed in coordination with the Arcata USFWS office using an estimation of auditory and visual disturbance effects (USFWS 2006) as a basis.

Helicopters can also cause a downdraft that can affect owls and nests. Without an assessment to identify if suitable habitat or owl nests are present or establish no-activity buffers surrounding a known nest location, the Proposed Project would result in direct harm on northern spotted owl, which would be a significant impact.

Table 3.5-9. Disturbance Distances[1] for the Northern Spotted Owl During the Breeding Period.

Source of Noise	Disturbance Distance
Blasting	1 mile
Hauling on open roads	0.25 mile
Heavy equipment	0.25 mile
Rock crushing	0.25 mile
Helicopter—Type I[2]	0.5 mile
Aircraft—Fixed Wing	0.25 mile

[1] Noise distances were developed in coordination with the Arcata USFWS office using an estimation of auditory and visual disturbance effects (USFWS 2006) as a basis.
[2] Type I helicopters seat at least 16 people and have a minimum capacity of 2,300 kg (5,000 lbs). Both a CH 47 (Chinook) and UH 60 (Blackhawk) are Type I helicopters.

The Proposed Project includes an assessment to evaluate suitable habitat and known activity centers, and if suitable habitat is present, to conduct protocol-level surveys, and if owls are present, implement seasonal restriction (March 1–September 30), prevent aircraft flights within or at an elevation lower than 0.5 miles of suitable nesting and roosting habitat during the entire breeding season, unless protocol-level surveys identify no activity centers or it is determined in coordination with the USFWS that there would be no effect on the activity center, and not remove components of owl habitat during the removal of transmission or installation or removal of fencing activities. An assessment conducted by the KRRC determined that there are no existing northern spotted owl activity centers are located within the noise disturbance distance of the construction activities (Table 3.5-9) (Appendix B: *Definitive Plan – Appendix J*).

The closest spotted owl activity center to the Proposed Project is located approximately 1.7 miles southeast of Copco No. 1 Reservoir, which is outside of the blasting disturbance distance from dam removal activities. As the northern spotted owl typically nests from February through September and construction activity would begin prior to the start of the nesting season (Table 2.7-1, Section 2.7 *Proposed Project*), this noise and human presence would likely discourage northern spotted owls from initiating

nesting near construction areas. Based on the Northern Spotted Owl Relative Habitat Suitability model output, there is no nesting or roosting habitat within 1 mile of the reservoirs and based on habitat and previously recorded nesting locations, protocol-level surveys were not recommended (R. Carey, USFWS, Supervisory Fish and Wildlife Biologist, pers. comm, July 2018). Any potential impacts are more likely to occur from disturbance during aerial seeding of reservoir areas than to occur as a result of structure (e.g., dam and powerhouse) removal activities.

Helicopters may be used during restoration activities. As critical habitat (discussed below) is present approximately 0.6 mile from Copco No. 1 Reservoir, the Proposed Project avoidance and minimization measure to prevent aircraft flights within or at an elevation lower than 0.5 miles of suitable nesting and roosting habitat during the entire breeding season, unless protocol-level surveys identify no activity centers or it is determined in coordination with the USFWS that there would be no effect on the activity center would ensure that any potential short-term construction-related impacts on northern spotted owl would be less than significant.

No impacts on critical habitat were identified. Northern spotted owl critical habitat is present approximately 0.6 mile southeast of Copco No. 1 Reservoir. Within a 3-mile buffer of Copco No. 1 and Copco No. 2 reservoirs, the critical habitat only makes up approximately 4 percent (2,400 acres) of the upland habitat in this area. USFWS critical habitat designation (USFWS 2012) includes the following Primary Constituent Elements, physical and biological features essential for the conservation of the species—forest stands in early, mid-, or late seral stages, as well as nesting and roosting, foraging, and dispersal habitat as described below (USFWS 2012). However, as no components of critical habitat would be removed or modified, no long-term impacts were assessed and no further analysis was conducted. (Removal of individual or small number of trees or other vegetation to support activities such as widening existing roads are not expected to rise to the level of habitat modification.)

Implementation of the Proposed Project avoidance and minimization measures, as discussed above, would result in a less than significant impact on the northern spotted owl.

Significance
No significant impact

Potential Impact 3.5-16 Effects on special-status amphibians and reptiles in riverine habitats from short-term high suspended sediment concentrations (SSCs) and flows and long-term changes in water quality.
The Proposed Project would result in the release of sediment from behind the dams, causing increased SSCs within the mainstem Klamath River downstream of the dams. The sediment behind the dams is more than 80 percent fine sediment (organics, silts, and clays), which are expected to remain suspended in the Klamath River flow as it moves downstream and out into the Pacific Ocean (see Section 2.7.3 *Reservoir Sediment Deposits and Erosion During Drawdown*). Modeling results indicate elevated SSCs (>1,000 mg/L) in early January of dam removal year 2 when Iron Gate and J.C. Boyle reservoirs begin drawdown and Copco No. 1 Reservoir enters the second phase of drawdown. Depending on the water year type (dry, median, wet), SSCs would peak in February between 7,100 mg/L and 13,600 mg/L, decrease but remain elevated (>1,000 mg/L) between March and June, remain greater than or equal to 100 mg/L in

June and July, and remain greater than or equal to 30 mg/L until December or July of the following year. In a wet-year scenario, a second pulse of SSC greater than 100 mg/L would occur the following November and December (see Section 3.2 Water Quality—Figures 3.2-12 and 3.2-13) (see additional detail in Section 3.2.5.2 *Suspended Sediments*). SSCs in excess of 1,000 mg/L would occur downstream of Iron Gate Dam on a timescale of weeks to months (see Table 3.2-2), as compared with similarly high SSCs (or total suspended solids [TSS]) that can occur in the Middle and Lower Klamath River during winter storm events on a timescale of days to weeks under existing conditions (see Appendix C, Section C.2.2). River flows would be expected to remain below the 10-year flood event of 11,000 cubic feet per second (cfs). Potential impacts as a result of these flows are discussed below.

SSCs are expected to be higher in locations closer to the point of origin of the sediment (i.e., Hydroelectric Reach and Middle Klamath River immediately downstream of Iron Gate Dam) and to decline in a downstream direction due to dilution from tributaries (Stillwater Sciences 2008, USBR 2012). Model results also indicate that dilution in the Middle and Lower Klamath River would decrease SSCs to 60–70 percent of their initial value downstream of Seiad Valley (RM 129.4) and to 40 percent of their initial value downstream of Orleans (~RM 58.9) (Section 3.2.5.2 *Suspended Sediments*).

Elevated SSCs have the potential to adversely affect or cause mortality of sensitive life stages of amphibians and reptiles occurring in the Hydroelectric Reach and the Middle and Lower Klamath River. According to Stillwater Sciences (2009), high SSCs from dam removal could result in a worst-case scenario of 100 percent mortality of all amphibian eggs deposited in the Lower Klamath River. However, the scope of this assessment did not include a detailed species-specific analysis of the timing of the increased SSCs and the life history attributes and habitat use of the potentially affected amphibians and reptiles.

Increased SSCs from dam removal have the potential to decrease food availability by affecting the growth and survival of food sources such as algae, diatoms, and macroinvertebrate populations. This indirect impact of increased SSCs would likely have some effect on all reptile and amphibian species using the Klamath River downstream of the dams. However, this indirect impact is not considered a substantial adverse effect due to the short duration and timing of the impact and the life history attributes of affected species, particularly the seasonality of their habitat use. The potential impacts of high SSCs on specific special-status amphibian and reptile species are discussed below.

Foothill Yellow-Legged Frog

Foothill yellow-legged frog, proposed as threatened under CESA, are known to occur in the lower reaches of the Klamath River, while only historical occurrences are known closer to the Proposed Project. Foothill yellow-legged frogs and egg masses have been observed in mid-June on the Lower Klamath River approximately 13 RM upstream of the estuary (M. Wikaira Yurok Tribe to Parker Thaler, pers. comm., January 2018). The species has also been documented on the Klamath River approximately 20 RM upstream of the estuary by Green Diamond in 1994 (CDFW 2017a) adjacent to Green Diamond lands. Historical occurrences in 1970 documented the frog closer to the Proposed Project approximately 50 RM downstream from Iron Gate Dam, and farther downstream in 1976 (CDFW 2017a). Targeted surveys by PacifiCorp in 2003 did not document the species in mainstem and tributary locations identified as the most likely to

support foothill yellow-legged frogs, including Bogus Creek, approximately 0.2 RM downstream of Iron Gate Dam and Cottonwood Creek, approximately eight miles downstream of Iron Gate Dam (PacifiCorp 2004a). Borisenko and Hayes (1999) hypothesized that the absence of foothill yellow-legged frogs was due to poor water quality released from Iron Gate Reservoir and fluctuating water levels.

The absence of foothill yellow-legged frogs during PacifiCorp 2003 surveys supports the hypothesis that they are no longer present downstream of Iron Gate Dam. However, PacifiCorp (2004a) indicates that historical records of foothill yellow-legged frogs occurred in Jenny Creek (a tributary to Iron Gate Reservoir) and Cottonwood and Little Bogus creeks, located downstream of Iron Gate Dam. Although it is not known how common the species was before the construction of the Lower Klamath Project, the foothill yellow-legged frog may be affected by loss of river habitat, predation by the non-native bullfrog and other aquatic predators, and desiccation or scour of egg masses resulting from flow alterations (PacifiCorp 2004a). Limiting factors downstream of Iron Gate dam may be more associated with flow patterns than with water temperatures, as water temperature conditions may be sufficiently suitable to support the frog. Foothill yellow-legged frog breeding is typically triggered by warming water temperatures between 50 and 53.6ºF. Daily average water temperatures in the Klamath River downstream of Iron Gate Dam (~RM 192), near Seiad Valley (RM 132.7), and at Orleans (RM 58.9) indicate that generally by mid-May water temperatures are 50–53.6ºF, which would be suitably warm to trigger breeding (Figures C-3 and C-4, Appendix C). According to Lannoo (2005), the foothill yellow-legged frog typically breeds between late April and June. In California, egg masses have been found between April 22 and July 6, with an average of May 3 (Lannoo 2005). In the Trinity River, a major tributary to the Lower Klamath River, Ashton et al. (1998) found that foothill yellow-legged frogs lay eggs throughout a three month period of April to June. Eggs generally hatch within 5–37 days (AmphibiaWeb 2018).

Elevated flows and release of suspended sediments on the foothill yellow-legged aquatic stages were evaluated downstream of Iron Gate Dam. As discussed in additional detail in Section 3.2.5.2 *Suspended Sediments*, SSCs would peak in February and remain elevated between March and June downstream of Iron Gate Dam. Dilution in the Middle and Lower Klamath River would decrease SSCs to 40 percent downstream of Orleans (~RM 58.9) (Section 3.2.5.2 *Suspended Sediments*). The early period (late April) of the foothill yellow-legged frog egg laying season overlaps with elevated SCCs between March and June (see Table 3.2-2).

High SSCs could have a short-term significant impact on the foothill yellow-legged frog egg masses and tadpoles, if present. Silt has often been observed on the outer surfaces of egg masses, which may make the eggs less conspicuous and thereby possibly reducing predation by visual predators (Lannoo 2005). However, a study to evaluate the growth and survival of western toad tadpoles from initial pulses of 130 and 260 mg/L of suspended sediment documented slower growth rates and reduced survival to metamorphosis as a result of tadpoles consuming the sediment (Wood and Johnson 2009). Therefore, suspended sediment may result in mortality or harm to state-candidate-threatened foothill yellow-legged frogs through reduced survival and growth of egg masses and tadpoles, which would be a significant impact.

Although river flows during reservoir drawdown may result in short-term impacts on foothill yellow-legged frogs due to scour of egg masses or displacement of tadpoles (if

these lifestages are present), drawdown flows would be expected to remain below the 10-year flood event[130] and so would not be a change from existing conditions. If high flows occur early in the foothill yellow-legged frog breeding season, it is possible that adults may avoid direct impacts of high flow and associated SSCs by delaying breeding (Gonsolin 2010, GANDA 2008).

Although survey data are limited for characterizing the distribution of foothill yellow-legged frog in the Klamath River, recent occurrences have been documented in the Lower Klamath River and tributaries, and presumably individuals have the potential to be present in the Middle Klamath River. Due to the listing status of the foothill yellow-legged frog (state Candidate Threatened), take of a single individual (including egg masses as described above) would result in a significant impact and would require approval by applicable agencies. Mitigation typically employed to reduce impacts was considered for this Proposed Project; however, the action of rescuing and relocating eggs is infeasible due to the low likelihood of locating eggs during high levels of turbidity. In the long term, it is anticipated that improved water quality (i.e., elimination of blue-green algae blooms and their associated toxins) and elimination of existing peeking flows as a result of the Proposed Project may enhance habitat for the species and reducing potential for scouring of egg masses.

Juvenile and adult foothill yellow-legged frogs are semi-terrestrial. Foothill yellow-legged frogs breed in rivers and spend a significant amount of time in adjacent riparian and wetland habitats, and in tributaries to mainstem rivers. As such, juveniles and adults would have the ability to avoid the short-term impacts of high SSCs by moving up-slope or up tributary channels during the reservoir drawdown period. Thus, high juvenile and adult mortality is not expected from high SSCs in the Hydroelectric Reach or the Middle or Lower Klamath River.

Pacific Tailed Frog and Southern Torrent Salamander

Both the Pacific tailed frog and southern torrent salamander live in high-gradient headwater stream habitat and have been documented in tributaries to the Lower Klamath River. These species would not be expected to occur in the Lower Klamath River itself. High flows and sediment released from behind the dams would be transported downstream within the Lower Klamath River mainstem, whereas tributaries would not experience elevated SSCs. Therefore, short-term SSCs in the Middle and Lower Klamath River are not expected to affect the Pacific tailed frog or southern torrent salamander.

Northern Red-Legged Frog

The northern red-legged frog breeds in still or low-velocity ponds, pools, side-channels, and wetlands in the coastal areas of the Lower Klamath Basin, generally within 12 miles of the river mouth. Northern red-legged frogs lay their eggs on aquatic or submersed herbaceous emergent vegetation. As their egg-laying habitat requires still water or very low flow, their breeding sites are typically more up-slope and disconnected from the Lower and Middle Klamath River. These breeding sites would only be connected with the Klamath River during extreme high-flow events, in which case egg masses would likely experience high rates of mortality. Adult northern red-legged frogs are mostly terrestrial and spend substantial time foraging in upland habitats. Thus, short-term high

[130] A 10-year flood event results in flows of 11,000 cfs.

flows and high SSCs in the Middle and Lower Klamath River are not expected to result in substantial negative effects on eggs, tadpoles, or adult northern red-legged frogs.

Western Pond Turtle
Western pond turtles in the Middle and Lower Klamath River and Hydroelectric Reach use the mainstem channel as well as side-channels, backwaters, and adjacent wetland and riparian habitat. They often move to off-channel habitats, such as oxbows, or uplands during high flow events.

Although the western pond turtle is considered an aquatic species, they are known to spend a considerable portion of their lives in upland habitats. They may travel across terrestrial habitats as much as 0.6 mile from aquatic habitat and radio-tracking studies have recorded individuals occurring on land for up to seven months out of each year (Bury and Germano 2008). Some animals may be active year-round, while others may enter terrestrial overwintering sites in October or November and reemerge in March or April (Bury and Germano 2008). Turtles from river and stream habitats often leave the watercourse in late fall and move up to 1,500 feet into upland habitats to overwinter (Bury and Germano 2008).

The increased flows and SSCs during reservoir drawdown could result in impacts on the western pond turtle if conditions cause turtles to move away from underwater refugia and thus become more vulnerable to predators, or if conditions diminish foraging opportunities. Increased SSCs following dam removal for 2 to 4 months depending on the water year type) would have a short-term but unsubstantial effect on this species' foraging and habitat use because of their ability to forage in, and escape to, adjacent upland habitat if needed. In addition, as discussed in Appendix C, Section C.2.2, elevated SSCs are natural during winter and spring in the Middle and Lower Klamath River and western pond turtles are adapted to these conditions. Other important habitat features, such as availability of basking sites, are not anticipated to be impacted by the short-term increase in flows and SSCs. Both adults and hatchlings that emerged the spring of dam removal year 2 (year of drawdown) may be present during these flows and affected by increased sediments. As western pond turtle eggs are laid in upland habitats, neither flows or SSCs would affect this life stage.

Significance
No significant impact for amphibians (Pacific tailed frog, southern torrent salamander, northern red-legged frog) and reptile (western pond turtle) populations due to short-term increases in SSCs or flows

Significant and unavoidable impact for individual foothill yellow-legged frog egg masses, if present, due to short-term increases in SSCs

Beneficial for all amphibian and reptiles due to long-term improved water quality

Potential Impact 3.5-17 Effects on benthic macroinvertebrates short-term dewatering and sedimentation and long-term alterations to habitat.
Impacts to benthic macroinvertebrates (BMIs) are anticipated on populations present in the reservoir footprint as a result of reservoir drawdown and drying of the habitat, and downstream of iron Gate Dam as a result of sediment transport and deposition. During reservoir drawdown, it is anticipated that the removal of reservoirs would result in

mortality to invertebrates through desiccation, except in locations where tributaries continue to provide streamflow.

Dam removal would result in sedimentation downstream of the reservoirs in the Hydroelectric Reach and the Middle Klamath River, from Iron Gate Dam to approximately Cottonwood Creek (see also Potential Impact 3.11-5). In the short term, the Proposed Project could alter bedload sediment transport and deposition and affect BMIs (Reid and Anderson 2000, Orr et al. 2008). As a result, impacts on BMI would be most substantial between Iron Gate Dam and Willow Creek (about 4.5 river miles downstream of Iron Gate Dam), but extend to Cottonwood Creek (approximately eight RMs downstream of Iron Gate Dam) (see also Potential Impact 3.11-5). Impacts are expected to include physiological stress, reduced growth, and potentially mortality.

While a large proportion of the BMI population in the Hydroelectric Reach and in the Middle Klamath River downstream of Iron Gate Dam would be affected in the short term, BMI populations would be expected to recover quickly due to the many sources for recolonization (i.e., tributaries) and their rapid dispersion through drift or aerial movement of adults. In a summary of multiple dam removal studies, Foley et al. (2017) report that following dam removal, BMI abundance tends to increase downstream of a dam and species assemblages transition to resemble sites upstream of the former dam. Furthermore, some BMI species can double their population size in days to weeks, such that they quickly recover once the initial sediment pulse has passed. Full recovery of BMI communities is typically observed within a year following disturbance (Tsui and McCart 1981, Anderson et al. 1998). Tullos et al. (2014) found that BMI communities downstream of the Brownsville (Calapooia River, Oregon) and Savage Rapids (Rogue River, Oregon) dams resembled upstream control sites within a year after dam removal.

In the long term, the Proposed Project would restore connectivity among the Lower Klamath Basin, the Hydroelectric Reach and its tributaries, and the Upper Klamath Basin, and would rehabilitate and increase availability of riverine habitat within the Hydroelectric Reach. Increased habitat availability and improved habitat quality would be beneficial to BMI populations.

Additional information regarding sedimentation impacts and BMI analysis is provided in Section 3.3.4.10 *Benthic Macroinvertebrates* and Section 3.3.5.8 *Aquatic Resource Impacts*.

Significance
No significant impact in the short term

Beneficial in the long term

Potential Impact 3.5-18 Short-term impacts on amphibian and reptile in riverine habitats from sedimentation.
Dam removal would result in sedimentation downstream of the reservoirs in the Hydroelectric Reach and the Middle Klamath River, from Iron Gate Dam to approximately Cottonwood Creek, located approximately eight RM downstream of Iron Gate Dam (see also Potential Impact 3.11-5). These sediment inputs are expected to result in sand and finer bedload sediment transport and deposition in river reaches downstream of the reservoirs, which could fill riffle substrate in some areas, reducing localized habitat for the larval phases of amphibian species (e.g., Pacific giant

salamander). Western pond turtle adults may move upland during the sediment release, and since their eggs are laid on land, this life stage would not be affected.

As discussed above in Potential Impact 3.5-16 (potential impacts due to short-term elevated SSCs), targeted foothill yellow-legged frog surveys by PacifiCorp in 2003 did not document the species in mainstem and tributary locations identified at as the most likely to support the foothill yellow-legged frog, including Bogus Creek located approximately 0.2 RM downstream of Iron Gate Dam and Cottonwood Creek located approximately eight miles downstream of Iron Gate Dam (PacifiCorp 2004a), and as a result no impacts are anticipated. If suspended sediment settles further downstream, and/or foothill yellow-legged frogs are present, the presence of settled fine silt in slow moving portions of the river reaches would not likely affect the adhesion of egg masses based on foothill yellow-legged frogs loosen algae and sediment that could enhance the ability of egg masses to adhere to the substrate (Rombough and Hayes 2005).

In the short term, these transient sediment deposits would be highly erodible during subsequent high flow events, leading to a short residence time (i.e., likely one year or less except during dry years) (see also Potential Impact 3.11-5). As a result, the impacts would be less than significant in the short term.

Significance
No significant impact in the short term

Potential Impact 3.5-19 Impacts on native amphibians from loss of reservoir habitat.
The loss of reservoir habitat will reduce lake and pond-type habitat that supports the non-native American bullfrog (PacifiCorp 2004a), which are known to prey upon and out-compete native amphibians (CDFW 2018b). The American bullfrog range includes Northern California (California Herps 2018a) and the species has been documented in the Primary Area of Analysis. PacifiCorp (2004a) noted that the bullfrogs were widely distributed and included reservoir habitats such as Iron Gate Reservoir, but also noted that breeding habitat was present in shallow and backwater habitats in low gradient reaches, located between the Copco No 1. Reservoir and the Oregon-California state line (PacifiCorp 2004a). Although removing reservoir habitat would reduce pond and lake-type habitat for the American bullfrog, suitable bullfrog habitat would remain on the Klamath River, and would including restored backwater and wetland habitat. Therefore, native amphibians would continue to experience similar predation effects as observed where species ranges overlap with the American bullfrog, as a result, there is no significant impact as a result of the Proposed Project.

Significance
No significant impact

Potential Impact 3.5-20 Short- and long-term impacts on western pond turtle and amphibians from reduced BMI populations.
Dam removal would result in sedimentation downstream of the reservoirs in the Hydroelectric Reach and the Middle Klamath River, from Iron Gate Dam to approximately Cottonwood Creek, located approximately eight RM downstream of Iron Gate Dam (see also Potential Impact 3.11-5). The period of greatest initial impact would occur during the months following drawdown where BMI production would likely decrease in the reach from Iron Gate Dam to approximately Cottonwood Creek, located

approximately miles downstream of Iron Gate Dam. As discussed in Potential Impact 3.5-17, BMI populations would be expected to recover quickly because of the many sources for recolonization, their rapid dispersion through drift or aerial movement of adults, and ability to double their population size in days to weeks, and as a result, long-term impacts on foraging turtles from a short-term reduction in BMI sources would be less than significant. Further, western pond turtle do not exclusively rely upon BMIs in their diets. Turtles also forage on aquatic plants, frogs, crayfish, frogs, and fish. As a result of western pond turtle's diverse diet, and the presence of BMI sources in tributaries to the Hydroelectric Reach and Middle Klamath River, short-term impacts on foraging turtles from reduced BMI populations would be less than significant.

Special-status amphibians were considered for impacts from reduced BMI populations; however, no short-term or long-term impacts were identified. Foothill yellow-legged frogs were not documented during PacifiCorp (2004a) surveys in reaches downstream to Cottonwood Creek and are not anticipated to be present and affected by reduced BMI populations. Pacific tailed frog and southern torrent salamander habitat is not present in this reach, as they use high-gradient headwater stream habitat.

Significance
No significant impact

Potential Impact 3.5-21 Short- and long-term impacts on birds and bats from loss of aquatic reservoir and shoreline vegetative habitat.
Following dam removal, reservoir aquatic habitat would transition to wet or upland habitat depending on future hydrologic and physical (topographic) conditions. Following drawdown of the reservoirs, existing upland vegetation is expected to remain unchanged and contribute to successional processes on newly exposed areas. Surrounding the reservoirs, upland tree-dominant vegetation types include Montane Hardwood, Montane Hardwood-Conifer, and Juniper (Section 3.5.2.1 *Vegetation Communities*; Appendix G). Trees dominant in these vegetation types are native trees and drought tolerant; although some of the trees immediately adjacent to the reservoir may currently be benefiting from an elevated water table, lowering groundwater following reservoir drawdown it is not expected to result in a large die-off. In contrast, tree-dominated wet habitats surrounding the reservoir (i.e., Montane Riparian and Palustrine Forested Wetland [Section 3.5.2.1 *Vegetation Communities*; Appendix G]) may transition to upland and existing trees including Oregon ash and bigleaf maple may be impacted; they may turn to snags for perching, form cavities for nesting birds and bats, or ultimately fall to the ground to provide habitat for small mammals and insects which birds and bats may forage. The Proposed Project includes several actions to encourage rapid revegetation with native riparian species including trees as defined in the Reservoir Area Management Plan (Appendix B: *Definite Plan – Appendix H*) which will ultimately provide for tall structure habitat adjacent to the water course to support nesting birds and bats, and provide cover for other wildlife species. (Additional information available above under Potential Impact 3.5-2).

Water birds that currently use the reservoirs seasonally during migration and/or for overwintering would be affected by the loss of this aquatic habitat for nesting, foraging, loafing (resting on the water), and roosting. The loss of aquatic reservoir habitat would also reduce foraging opportunities for fish-eating birds including bald eagle, osprey, merganser, cormorant, egret, and heron (including the great blue heron rookery documented at Copco No. 1 Reservoir (PacifiCorp 2004b). Historically, two bald eagle

nests were documented near Copco No. 1 Reservoir: one within 0.5 mile in 2002, and a second within two miles, which was monitored between 1993 and 1997 (*Appendix B: Definite Plan – Appendix J*). Bald eagles are opportunistic foragers and hunt mainly for fish and waterfowl (Peterson 1986, Zeiner et al. 1990b); however, they will also feed on small mammals and other small vertebrates and carrion (Buehler 2000). During and following reservoir drawdown, eagles would likely consume a variety of live and dead mammals and birds present year-round; there may be also be an enhanced opportunity for eagles to consume stranded or dead fish as a result of the Proposed Project. Bald eagles would use riverine habitat, along with other fish-eating species, or other aquatic habitat outside the Proposed Project for foraging. The initial drawdown of the reservoirs may strand invertebrates or fish and provide short-term foraging opportunities for a variety of birds. In addition, there may be an increase in foraging opportunities for these species presented by the return of salmon to the riverine system that replaces the reservoirs.

Changes in food availability for birds such as dabbling ducks that consume aquatic vegetation and invertebrates would occur. For example, these species would use the river or other aquatic habitat outside the Proposed Project for foraging once the reservoirs are gone. Similarly, foraging over aquatic habitat by swifts and bats that feed on flying insects would be reduced; however, as discussed in Potential Impact 3.5-17, once BMI populations reestablish after drawdown, swifts and bats would be able to feed over riverine habitat. Although golden eagles will eat fish, they primarily feed on small to medium-sized mammals (e.g., rabbits, squirrels), and therefore, are unlikely to be substantially affected by the change in aquatic habitat.

It is anticipated that birds (e.g., ducks, eagles, swifts) and bats would continue to use the river for foraging, or would use other aquatic habitat outside of the terrestrial resource Primary Area of Analysis; therefore, impacts in both the short- and long-term would be less than significant.

Significance
No significant impact

Potential Impact 3.5-22 Short-term and long-term impacts on western pond turtle from loss of aquatic habitat.
In the short term, reservoir drawdown would affect shoreline habitat currently used by western pond turtle. The potential impacts on western pond turtle may occur from turtles being entrapped during sediment redistribution, change in temperature on overwintering turtles in reservoir sediment from drawdown, and entrapment in cracks and increased predation during migration over the reservoir footprints following drawdown. As Copco No. 2 Reservoir has not been documented to support western pond turtles and limited habitat is available (e.g., lack of basking areas); the analysis below focuses on Copco No. 1 and Iron Gate reservoirs.

The KRRC proposes to draw down reservoirs between January and March at a maximum drawdown rate of five feet per day (Table 2.7-1, Appendix B: *Definite Plan – Appendix H*). Exposing reservoir sediment to ambient air conditions during and following drawdown will change the temperature of the sediment (more solar exposure and colder nights and possible wind shear). Turtles overwintering in the sediment would then be subject to these changing temperature stresses. There is a potential for erosion and shallow slides to occur at locations currently along the reservoir rims and existing water

surface elevations. At Copco No. 1 Reservoir in particular, diatomite (fine-grained sedimentary rock formed from consolidated diatomaceous earth) terrace deposits surround much of the shoreline and extend below the surface waters. These deposits would exhibit low shear strength and would likely be unstable, potentially resulting in shallow slides that could entrap juvenile and adult turtles. Following drawdown, juvenile and adult western pond turtles may be affected including those that may be overwintering in the sediment or are present in the reservoir; turtles overwintering or present on land would not be affected by the sediment redistribution. The KRRC identified the locations of overwintering aquatic habitat (i.e., reservoir levels two meters deep) based on bathymetry data (AECOM et al. 2017), and in considering proximity to suitable basking and nesting habitation locations identified by PacifiCorp (2004a), the locations where there is the highest potential for redistribution of sediment to affect turtles at Copco No. 1 Reservoir are the northern arm of the reservoir near Beaver Creek and at Iron Gate Reservoir in the southeast cove, north cove at Camp Creek, and at the confluence of Jenny Creek and Fall Creek (Figures 3.5-7 and 3.5-8).

These locations are also consistent with the locations where the majority of turtles were documented during the 2018 wildlife survey—most observations at Copco No. 1 Reservoir were northern Beaver Creek and Raymond Gulch coves and most observations at Iron Gate Reservoir were along the northern half of the reservoir (Mirror Cove and near Camp Creek and Jenny Creek) (CDM Smith 2018c).

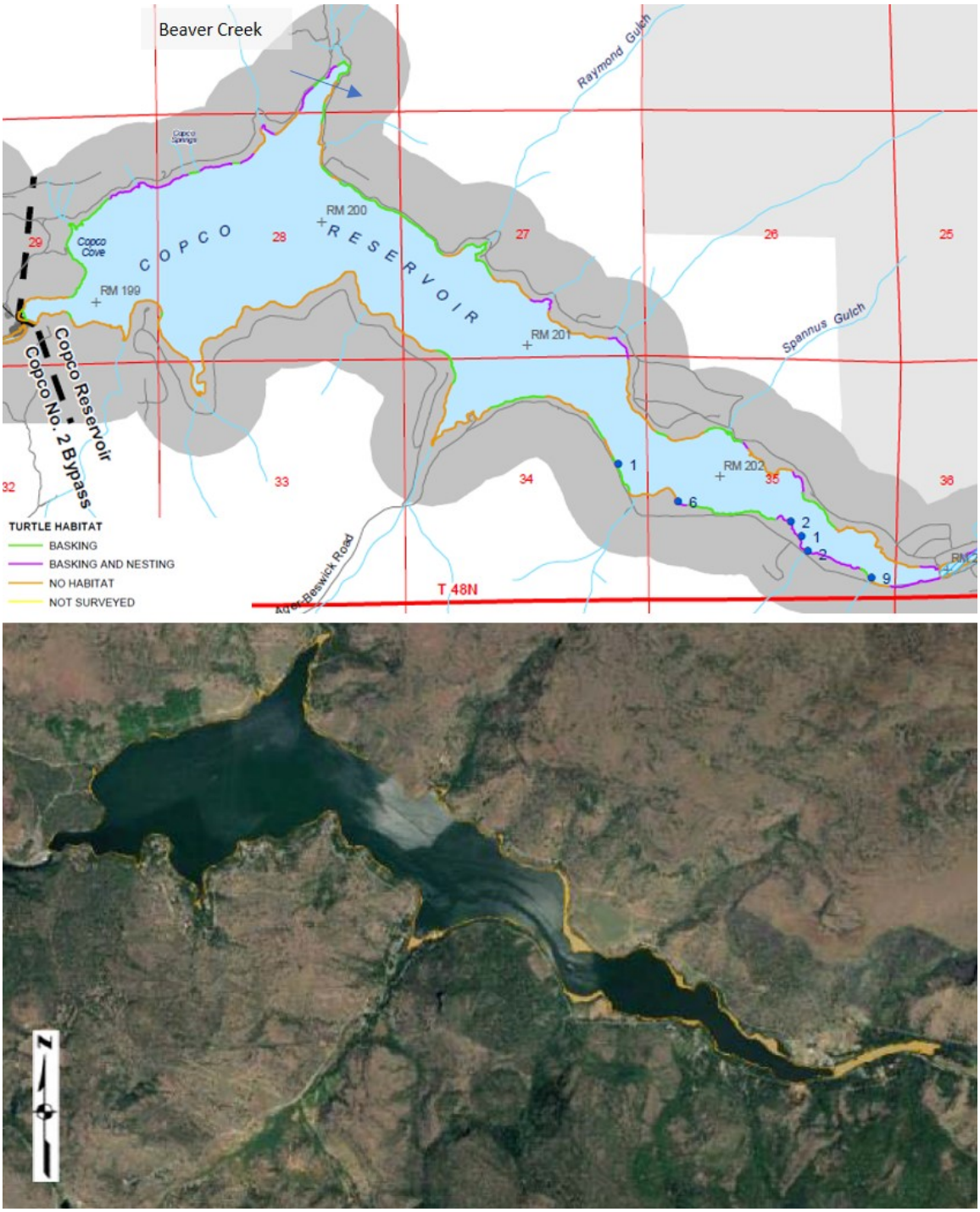

Figure 3.5-7. Western pond turtle suitable basking and nesting habitat in green and purple (top) and potential aquatic overwintering habitats in water depths of less than two meters in yellow (bottom) at Copco No. 1 Reservoir (PacifiCorp 2004a, AECOM et al. 2017).

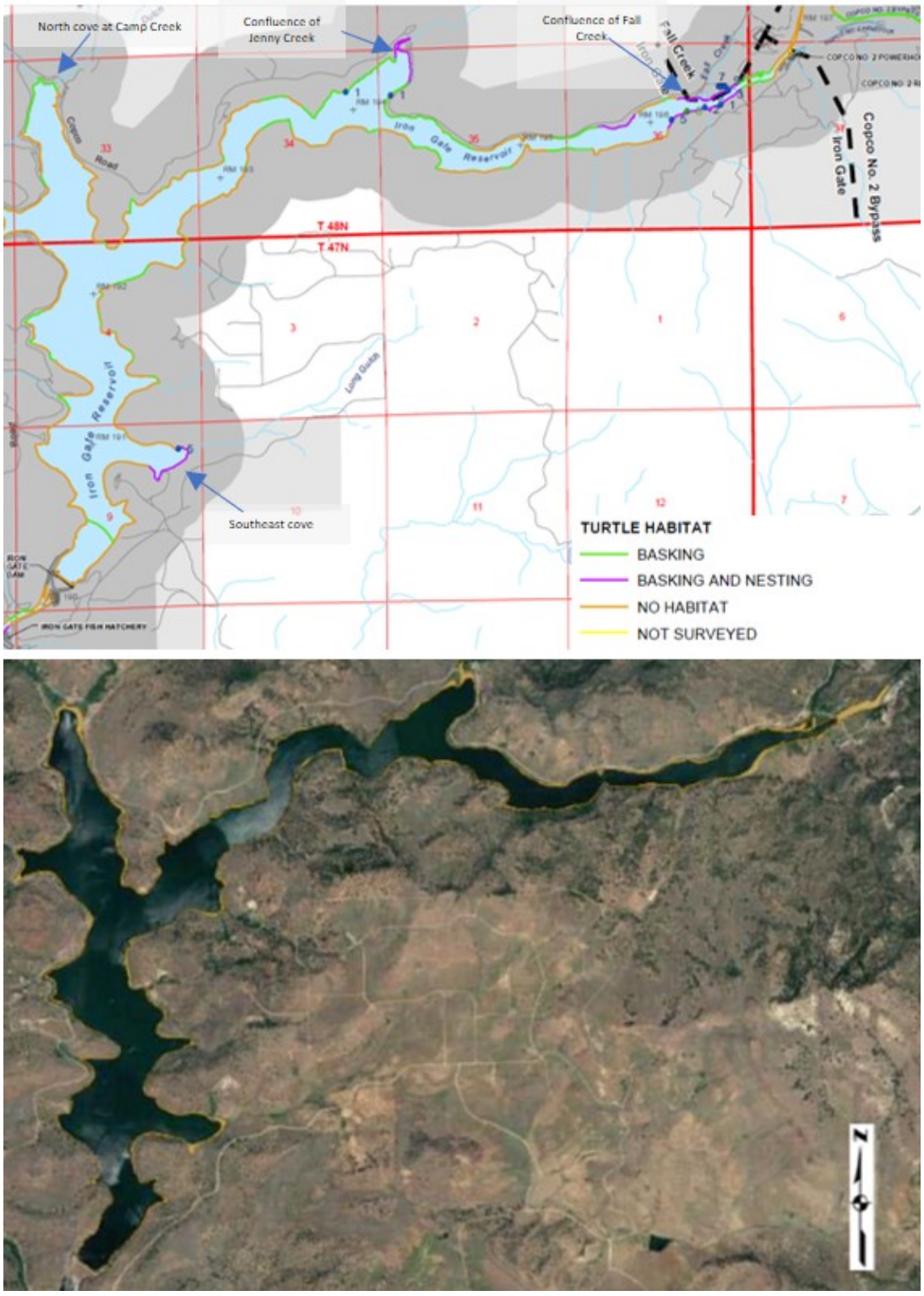

Figure 3.5-8. Western pond turtle suitable basking and nesting habitat in green and purple (top) and potential aquatic overwintering habitats in water depths of less than two meters in yellow (bottom) at Iron Gate Reservoir (PacifiCorp 2004a, AECOM et al. 2017).

There is also the potential for western pond turtles to be entrapped in cracks in the sediment deposits remaining in the reservoir footprints following drawdown (see also Potential Impact 3.11-5). The sediment underneath the reservoir is approximately 80 percent water by volume, and after the reservoir is drawn down, the sediment is expected to dry, decrease in thickness, and form cracks. The sediment drying process may result in turtles becoming trapped in the cracks and subject to predation.

Additionally, migrating hatchlings that emerge in spring could travel distances over barren soil to the river and may become entrapped in cracks formed by the mud and subject to increased predation from avian predators. Draining the reservoirs may also leave western pond turtles vulnerable to predation from a limited cover and forage (lack of vegetation and invertebrates along the shoreline) and subject to thermal stress. In one study, emerged hatchlings moved in short (<150 feet) increments, from one stop-over site to another until reaching aquatic habitat, and hatchlings tend to bury themselves under vegetation or debris and remain inactive for up to 21 days (Rosenberg and Swift 2010). With drying sediment and inability to hide under vegetation or debris, this may increase the potential of predation and thermal stress on hatchlings migrating during the spring of the drawdown year.

The western pond turtle population in the Klamath River has been estimated to be approximately 5 to 15 turtles per river mile (Bury 1995, as noted in PacifiCorp 2004). At this estimated density, turtles in Copco No. 1 Reservoir would number between 24 and 43 and in Iron Gate would be between 31 and 56. (The length of the reservoirs was calculated using the middle line of the reservoirs [i.e., Copco No. 1 Reservoir at 4.8 miles and Iron Gate Reservoir at 6.2 miles]). Available information regarding western pond turtle sightings is from 2002 and 2018 (PacifiCorp 2004a; K. Stenberg, Principal, CDM Smith, pers. comm., July 2018). Surveys conducted in Copco No. 1 Reservoir in 2002 documented 12 turtles while surveys in 2018 documented 31 to 36, which are similar to the anticipated density estimate. Surveys conducted in Iron Gate Reservoir in 2002 documented 8 turtles, while surveys in 2018 documented 17, which is lower than the anticipated density estimates. However, the goal of these surveys was not to document all individual turtles in the reservoirs, but rather note individuals basking; surveys were not inclusive of turtles underneath the water nor on land. As a result, the number of turtles documented using the reservoirs are likely an underestimate of the reservoir population.

It is not possible to predict how many hatchlings, juveniles, or adults would be affected in the short term by the potential effects described above. As discussed above, the survey results may not account for all turtles in the reservoir, as some may be underneath the water or on land. Also, an estimate of hatchlings is not possible as the age of the turtles is not known (females reach sexual maturity when they are about 8 to 10 years old]) and not all females lay eggs each year, while some may lay two clutches (California Herps 2018b). In addition, some turtles may be overwintering on land during the drawdown and not affected by sediment redistribution, and juveniles, adults, and hatchlings may not migrate over the dewatered reservoir, but rather may go around within more vegetated habitats or disperse into nearby tributaries.

Although exact numbers of take are not possible to identify, the impact on the reservoir population may be significant. Implementation of Mitigation Measure TER-4 (western pond turtle rescue after reservoir drawdown operations), developed in coordination with CDFW, would reduce these potential short-term impacts to less than significant.

Please note that in addition to requiring Mitigation Measure TER-4, the State Water Board has authority to review and approve any final plan developed to protect western pond turtle through its water quality certification under Clean Water Act Section 401. The State Water Board has issued a draft water quality certification[131] which sets forth monitoring and adaptive management requirements for an Amphibian and Reptile Management Plan as Condition 15.

In the long term, riverine habitat would continue to support the life history functions of western pond turtle. Although western pond turtles are documented throughout the Proposed Project reservoirs and along several reaches of the terrestrial resources Primary Area of Analysis, precise population data are not available. Thus, it is not possible to quantitatively assess population-level effects as a result of the Proposed Project. However, it is possible to assess the long-term potential for change in the amount of suitable habitat for supporting western pond turtle populations.

Based on the turtle nesting habitat suitability mapping conducted in 2002 for Copco No. 2 Bypass, Copco No. 1 Reservoir, and Iron Gate Reservoir, of the 40 miles of existing river and reservoir shoreline, only approximately 5.4 miles (13 percent) possess suitable nesting and basking habitat. An additional 13 miles (33 percent) have suitable basking habitat structure (i.e., logs, large rocks, or patches of persistent emergent vegetation), but do not possess high-quality potential nesting habitat because of steep slopes, developed shorelines, or shorelines with dense understory vegetation (PacifiCorp 2004a).

Under the Proposed Project, approximately 90 percent of the existing aquatic surface area would be removed. Aquatic habitat at the reservoirs would be converted to riverine, riparian, and upland habitat, depending on future hydrologic and physical (topographic) conditions. The existing surface area of the three California reservoirs is approximately 1,950 acres (Copco No. 1 Reservoir [1,000 acres], Iron Gate Reservoir [944 acres] [FERC 2007], Copco No. 2 Reservoir [6 acres]). Based on historical maps and aerial photos, PacifiCorp (2004a) estimated that approximately 227 acres of aquatic riverine habitat occurred historically (119 acres at Copco No. 1 Reservoir and 108 acres at Iron Gate Reservoir; Copco No. 2 Reservoir was not mapped). Although the overall surface area of aquatic habitat would decrease substantially (i.e., to approximately 195 acres) under the Proposed Project, the impact on western pond turtle would be more directly related to a change in the amount of shoreline habitat.

It is uncertain whether the number of western pond turtles currently present in the Hydroelectric Reach would allow for additional population growth or exceed the carrying capacity of habitat that becomes available along the restored riverbanks in the Hydroelectric Reach. Providing riverine habitat may support a higher density of turtles than that currently observed in the reservoirs. However, if the number of western pond turtles does exceed the carrying capacity of the available habitat along the restored riverbanks, it is uncertain whether they would then disperse into available habitat upstream or downstream along the Klamath River and/or upstream into tributaries that would then be present following the removal of the reservoirs. It is estimated that there are currently 18.4 miles of suitable nesting and basking habitat (PacifiCorp 2004a)

[131] The State Water Board's draft water quality certification is available online at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/docs/lower_klamath_ferc14803/lkp_dwqc.pdf (Accessed December 19, 2018).

surrounding Copco and Iron Gate reservoirs. Following the removal of the reservoirs, approximately 17.7 miles of mainstem and tributary reaches would be re-exposed in the reservoir footprints (see Reservoir Area Management Plan [Appendix B: *Definite Plan – Appendix H*]). Shoreline habitat would then be present on either side of the newly exposed mainstem channel and tributaries (i.e., approximately 17.7 miles), or providing approximately 35 miles of shoreline habitat. Following drawdown, it is anticipated that river flow through the area previously occupied by the Copco No. 1 Reservoir would meander and provide wetland/riparian habitat for turtles, while the river channel in Iron Gate Reservoir would be narrower, with historical channels associated with Jenny Creek and the Camp, Scotch, Dutch creek systems establishing riparian communities (AECOM et al. 2017). Although it is uncertain how much of the newly created mainstem and tributary shoreline habitat would be suitable for western pond turtle, the proposed habitat restoration in these areas would also create and enhance habitat for western pond turtle. The proposed habitat restoration is designed to slow water velocities along the riverbanks and thus has the potential to create backwater and basking habitat used by turtles. Proposed habitat restoration components include manually creating connectivity to tributaries, incorporating floodplain habitat features (e.g., wetlands, swales, side channels), creating shoreline complexity to slow water velocities, and placing large wood habitat features (see Reservoir Area Management Plan [Appendix B: *Definite Plan – Appendix H*]).

For context, the Lower Klamath Project reservoirs represent a small amount of the available open water/shoreline habitat in the Klamath Basin. While quantified information about suitable shoreline habitat in the upper basin is not available, the existing surface area of the Lower Klamath Project reservoirs is approximately 1,950 acres, which is relatively small when compared with the large open water areas and wetland complexes of Upper Klamath Lake (approximately 77,000 acres), Tule Lake (approximately 13,000 acres), or Lower Klamath Lake (approximately 22,000 acres of which approximately 2,200 acres are permanently flooded). Thus, population-level adverse effects to turtles would not be anticipated in the Klamath Basin due to the loss of aquatic reservoir habitat under the Proposed Project.

As a result of the restored Klamath River shoreline within the Hydroelectric Reach, including specific habitat restoration elements that would benefit western pond turtles (e.g., wetlands, swales, side channels) and a relatively small overall change in reservoir habitat throughout the Klamath Basin, there would be a less than significant long-term impact of the Proposed Project on western pond turtles.

Mitigation Measure TER-4 Western Pond Turtle Rescue After Reservoir Drawdown Operations.

Prior to implementing reservoir drawdown, KRRC shall develop a Western Pond Turtle Rescue and Relocation Plan in coordination with applicable agencies to identify a means of relocating as many turtles as feasible along the reservoir shoreline, assuming conditions are safe for all personnel. It is understood that not all turtles will be found, and not all turtles seen will be able to be captured and relocated. The goal of the plan shall be to apply a good-faith effort to reduce the number of turtles that are subject to mortality such that there will not be a significant impact on Western Pond turtles. The plan shall identify the following components:

- survey timing to cover multiple life stages (adults, overwintering adults, emerging hatchlings) present between initial reservoir drawdown and emergence;

- survey periodicity, focusing observations during periods of highest likelihood of observing these life stages—surveys may be considered complete after an identified number of surveys (e.g., three) does not detect turtles;
- survey locations that focus on suitable nesting habitat and locations where high numbers of turtles were documented during the general wildlife surveys (e.g., Copco Reservoir near Beaver Creek Raymond Gulch coves and at Iron Gate Reservoir in the southeast cove, north cove near Camp Creek, and at the confluence of Jenny Creek and Fall Creek);
- relocation areas in suitable habitat (that provide cover and food resources), which may include lower reaches of tributaries to the Klamath River;
- survey methodology—as nests and young are difficult to locate, an approach of using a trained dog to identify nests should be considered; and
- reporting of survey results within 60 days of the completion of surveys to applicable agencies and the State Water Resources Control Board.

Significance
No significant impact in the short term with mitigation

No significant impact in the long term with mitigation

Potential Impact 3.5-23 Long-term effects on deer from alterations to winter range habitat.
At Copco No. 1 and Iron Gate reservoirs, there are approximately 1,400 acres of inundated land that would become upland habitat (PacifiCorp 2004a). Under the Proposed Project, removing Iron Gate and Copco No. 1 reservoirs would not impact migratory wildlife corridors for deer nor impact deer wintering areas as identified in the Siskiyou County General Plan (Siskiyou County 1980, n.d.); rather the Proposed Project would increase the number of available acres of habitat within critical deer winter range in the long term, benefiting deer by expanding winter range habitat (Hamilton 2011).

Significance
Beneficial in the long term

Potential Impact 3.5-24 Effects on terrestrial species from herbicide use during reservoir restoration activities.
As part of the Proposed Project, the KRRC proposes initiating invasive plant control prior to dam removal year 1, continuing through the plant establishment period (post-dam removal year 1) until post-dam removal year 5 or until the vegetation restoration criteria have been met. The focus areas include newly exposed areas of the reservoir footprints and upland areas. Chemical herbicides would be used as a last resort when all other methods (e.g., manual weed pulling, mowing or cutting, tilling and disking, grazing, solarization) prove to be ineffective (Appendix B: *Appendix H – Reservoir Area Management Plan*).

The KRRC proposes to only use herbicides that have been approved for use by the BLM, CDFW, RWQCB, USFWS, and NMFS and herbicides would be applied by hand either by brushing (stumps and cut stems), wicking and/or spraying by a certified applicator and in accordance with all applicable laws and regulations. Because the herbicide application would be targeted to populations of invasive plants and applied in a

very select manner, there would be no significant short-term impacts to special-status plants. There would likely be long-term beneficial effects to rare natural communities, wetlands and riparian vegetation as habitat conditions would be improved by reducing competition from invasive species.

Although the Reservoir Area Restoration Plan (Appendix B: *Definite Plan – Appendix H*) does not identify the types of herbicides that would be used, the KRRC has evaluated several herbicides, and is recommending glyphosate as the primary herbicide to control most of the invasive plant species (S. Leonard, AECOM as KRRC Technical Representative, pers. comm., September 2018). Glyphosate may be formulated with surfactants to increase their efficacy, and in some cases, toxicity data have indicated that surfactants added to glyphosate are more toxic than glyphosate itself. For example, a Syracuse Environmental Research Associates (SERA 2002) study to evaluate effects of surfactants on the toxicity of glyphosate, noted a major qualitative difference between the effect of glyphosate and glyphosate formulations with a polyethoxylated tallow amine surfactant (used in Roundup) on aquatic and terrestrial organisms. However, a study conducted by the USDA-FS found no evidence that a nonylphenol ethoxylate-based surfactant lead to any level of concern for terrestrial wildlife (Bakke 2003, as cited in CINWECC 2004). Effects of the commonly used glyphosate and glyphosate-based herbicides with surfactant additives are analyzed below.

- Studies and assessments of glyphosate show that ecological risks for focused, short-term eradication efforts are small (Monheit 2003).
- While highly toxic to plants, glyphosate is non-toxic to animals (Williams et al. 2000, as cited in Monheit 2003).
- Glyphosate is poorly absorbed by the digestive track and is excreted essentially unmetabolized (Cornell University EXTOXNET database, Williams et al. 2000, both as cited in Monheit 2003).
- There is no evidence indicating that glyphosate is an immunotoxicant, neurotoxicant, or endocrine disruptor (SERA 2002, as cited in Monheit 2003).
- At typical application rates, none of the acute scenarios studied presented unacceptable risks to wildlife, including predatory birds consuming small mammals (Bautista 2007).

Raptors and terrestrial mammals prey mostly on small mammals and fish[132], and it is plausible that there is a potential risk to the prey species from direct or indirect application of herbicides. However, potential short-term and long-term impacts to raptors would be less than significant because KRRC proposes to (a) only apply herbicides approved by applicable agencies, (b) only apply when it is the most effective control method, (c) only apply by hand and by a certified applicator and in accordance with all applicable laws and regulations, and (d) would not target plants that provide habitat for raptor prey.

Special-status invertebrates were considered, and these invertebrates include pollinators such as the western bumblebee, which is a USDA Forest Service special-status species. There are no USDA Forest Service lands within the Limits of Work where herbicides may be applied, and thus no nexus to evaluate a USDA Forest Service species.

[132] Northern spotted owls prey primarily on small mammals (e.g., mice, voles), golden eagles primarily prey on birds, reptiles, and insects, and bald eagles and osprey primarily prey on fish.

However, potential impacts on pollinators would be less than significant because KRRC proposes to (a) only apply herbicides approved by applicable agencies, (b) only apply when it is the most effective control method, and (c) only apply by hand and by a certified applicator and in accordance with all applicable laws and regulations. As a result, no population-level impacts are anticipated.

Significance

No significant impacts in the short term on special-status plants and wildlife

Beneficial in the long term for rare natural communities, wetlands, and riparian vegetation

Potential Impact 3.5-25 Effects on wildlife from increased habitat for salmonids and changes in hatchery production.

Special-status wildlife such as bald eagle, Barrow's goldeneye, common loon, and western pond turtle may forage on out-migrating natural and hatchery-produced salmonids and/or on returning adult carcasses. The Proposed Project includes continued operation of Iron Gate Hatchery (IGH) and reopening of Fall Creek Hatchery (FCH)[133] for eight years following dam removal.

As discussed in Section 2.7.6 *Hatchery Operations* and Section 3.3.5.6 *Fish Hatcheries*, the total production goals for steelhead and fall-run Chinook salmon at Iron Gate Hatchery would be reduced from the current goal[134], and goals for coho yearling production would remain the same for eight years following dam removal. No data are available to accurately estimate the number of naturally produced smolts in the watershed in comparison with hatchery production, but based on adult returns (Section 3.3.2 [Aquatic Resources] Environmental Setting), hatchery-origin out-migrating fall-run Chinook salmon yearlings and smolts currently comprise approximately 35 percent of all fall-run Chinook salmon smolts outmigrating in the mainstem Klamath River. Under the Proposed Project (Potential Impact 3.3-7) hatchery production of fall-run Chinook salmon would be reduced by around 43 relative to current production (2005 through 2018) for eight years following dam removal. There would be no reduction in smolt outmigration relative to current levels for coho salmon for eight years following dam removal, and no reduction in steelhead (since no steelhead have been released since 2012).

For the first eight years following dam removal, the effect of hatchery production on terrestrial resources would be similar to current conditions. Once hatchery production is ceased (i.e., post-dam removal year 8), the hatchery fish would continue in the system for the next few years (see Section 3.3.5.6 *Fish Hatcheries*). However, in the year of dam removal (i.e., Year 2), both hatchery and natural-origin adults for all species would have access to new habitat for spawning, and thus production from Chinook salmon in new habitat would occur in Year 3 and coho and steelhead in Year 4.

[133] Fall Creek Hatchery ceased fish production in 2003.

[134] Goals at Iron Gate Hatchery for fall-run Chinook salmon yearlings would be reduced by approximately 87 percent, goals for fall-run Chinook salmon smolts reduced by approximately 33 percent, goals for steelhead would be reduced by 100 percent (no steelhead have been released since 2012 steelhead production is not a part of the Proposed Project)

Overall, the Proposed Project would open access to additional habitat for fish spawning, production, and migration and would increase prey and overall nutrient distribution for wildlife (see Section 3.3.5.9 *Aquatic Resource Impacts*). It is anticipated that juvenile fish production would increase as early as dam removal Year 3, and an increase in adult returns as soon as dam removal Year 4 (when the first progeny of adults using newly accessible habitat would return). Special-status bald eagle, Barrow's goldeneye, common loon, and western pond turtle forage on a variety of prey, including fish, and increasing juvenile and adult fish in the Klamath River system would result in an overall beneficial effect on these special-status wildlife.

Significance
Beneficial

Potential Impact 3.5-26 Impacts on special-status wildlife from Bogus Creek flow diversions.
Under the Proposed Project, up to 8.75 cfs of water would be diverted from Bogus Creek to operate Iron Gate Hatchery for eight years (through post-dam-removal Year 7), as described in Section 2.7.6 *Hatchery Operations*. Seasonal diversions would range from zero cfs during the summer (June through September), to 6.5 cfs during fall (October and November), 8.75 cfs during winter (December), 3.75 cfs during the late winter (January through March), and 8.25 cfs during spring (April through May). The precise diversion location is not proposed at this time, but it is anticipated to be within Bogus Creek less than 1,000 feet upstream from the confluence with the Klamath River. This would result in a maximum 1,000-foot bypass reach in lower Bogus Creek, which would experience lower fall, winter, and spring flows than occur under existing conditions.

Flow diversions have the potential to affect aquatic amphibians and reptiles, if present. Based on PacifiCorp surveys in 2002 and 2003 throughout the lower 492 feet and lower 0.5 mile of Bogus Creek, respectively, no special-status amphibians or reptiles were documented. Results specifically noted that no special-status foothill yellow-legged frogs or Pacific tailed frogs were present. Non-special-status species including common garter snake and fence lizards were observed during these surveys.

The proposed lack of diversions during June through September, and the proposal to operate the hatchery diversion to maintain a minimum of 50 percent of the instream flow in the creek at the point of diversion, means that flow-related adverse impacts on special-status wildlife in the Bogus Creek bypass reach, if they are present, are unlikely to occur. The KRRC also proposes to coordinate with NMFS and CDFW to assess conditions in Bogus Creek and to minimize the potential effects of Bogus Creek diversions on Coho salmon and their critical habitat (Section 2.7.6 *Hatchery Operations*). If sufficient water is maintained in the channel to support anadromous fish passage, then habitat would also be suitable for any special-status wildlife that are present.

However, based on the potential for low flows (less than 4.5 cfs) in the Bogus Creek bypass reach during some years, and the uncertain commitment under the Proposed Project to ensure flows to protect anadromous salmon volitional migration, there could be significant flow-related impacts to any special-status wildlife that are present. Mitigation Measure AQR-3 is included in this EIR (Section 3.3.5 *Potential Impact 3.3-23*) to ensure that the minimum flow requirement for anadromous fish species is released, and this would also provide assurance of suitable habitat for special-status amphibians

and reptiles in the Bogus Creek bypass reach, if they are present. Implementation of Mitigation Measure AQR-3 would reduce potential impacts to less than significant.

Significance
No significant impact with mitigation

Potential Impact 3.5-27 Impacts on special-status wildlife from Fall Creek flow diversions.
Under the Proposed Project, up to 9.24 cfs of water would be diverted from Fall Creek to operate Fall Creek Hatchery for eight years (through post-dam-removal Year 7), as described in Section 2.7.6 *Hatchery Operations*. Seasonal diversions would range from 0.58 cfs during June, to 8.48 cfs during October, 9.24 cfs during November, and less than 2 cfs during the spring (February through May) (Section 2.7.6 *Hatchery Operations*). In addition, the City of Yreka maintains a water right to divert up to 15 cfs from Fall Creek for municipal purposes (City of Yreka 2012).

The City of Yreka is required to bypass a minimum flow of 15 cfs or the natural flow of Fall Creek, whenever the natural flow is less than 15 cfs. The Fall Creek Hatchery diversion and return flow points would occur between the City of Yreka water supply intake and the City's compliance point for the Fall Creek minimum flow, which is at the Fall Creek USGS gage (USGS 11512000). Between the Fall Creek Hatchery diversion and return flow points, the flow remaining in Fall Creek after the diversions for the City of Yreka and the Fall Creek Hatchery would usually be greater than 15.0 cfs, but it could occasionally be slightly less than 15.0 cfs in late summer to early fall (i.e., mid-July to mid-September) when Fall Creek flows reach a minimum (Figure 2.7-13). However, the flow downstream of the hatchery return flow would be generally similar to the flow under existing conditions and a substantial reduction in instream flows is not anticipated due to operation of Fall Creek Hatchery.

Surveys conducted at Fall Creek by PacifiCorp (2004a) documented northern sagebrush lizard (BLM sensitive) at Lower Fall Creek Falls and western pond turtle in a ponded wetland area that was created by a beaver pond near Iron Gate Reservoir. Non-special-status species documented include Pacific chorus frog, Pacific giant salamander larvae above and below Fall Creek diversion dam, western fence lizard, terrestrial garter snake, and common kingsnake. Mammals observed included bobcat and deer. As the Proposed Project would maintain approximately 15 cfs or greater flows in Fall Creek, there would be no impact to special-status wildlife compared to existing conditions.

Significance
No significant impact

Potential Impact 3.5-28 Impacts on sensitive habitats and special-status terrestrial wildlife and plant species from construction activities on Parcel B lands.
The Secondary Area of Analysis was used to evaluate potential impacts on sensitive habitats and special-status species on Parcel B lands. As discussed in Section 2.7-10 *Land Disposition and Transfer*, as part of the Proposed Project, Parcel B lands would be transferred to the states (i.e., California, Oregon), as applicable, or to a designated third-party transferee, following dam removal. The outcome of the future Parcel B land transfer is speculative with regard to land use; while the lands would be managed for the public interest, this could include open space, active wetland and riverine restoration, river-based recreation, grazing, and potentially others.

It is likely that there would be at least some construction for recreation facilities, active restoration, fencing, trail-building, or other land management activities. To the extent there are construction activities, these could involve the same types of potential short-term impacts to sensitive habitats and to special-status terrestrial wildlife and plant species as described in Section 3.5.5.1 *Vegetation Communities*, 3.5.5.2 *Culturally Significant Species*, and Section 3.5.5.3 *Special-status Species and Rare Natural Communities*. Future land use activities that involve active wetland and riverine restoration would be likely to result in long-term benefits to sensitive habitats and special-status terrestrial wildlife and plant species within the Secondary Area of Analysis. The special-status species that have the potential to occur within the Secondary Area of Analysis would be a subset of the species evaluated for the Primary Area of Analysis (Table 3.5-4 and 3.5-5), since the Secondary Area of Analysis is proximal to a portion of the Primary Area of Analysis. In the long term, if managed grazing activities were to occur beyond the level occurring under existing conditions, this could result in reduced habitat diversity and erosion-related significant impacts on special-status species, vegetation communities, and wetlands within the Secondary Area of Analysis.

To the extent there are construction activities under future land uses, it would be appropriate to implement the terms and conditions recommended to FERC relating to protection of sensitive habitats and special-status species and to include measures that provide the same or better level of protection for sensitive habitats and special-status terrestrial wildlife and plant species as the measures specified in Mitigation Measures WQ-1 and TER-1 through TER-4, and Recommended Terrestrial Measures 1 through 13, as modified for construction involved in the particular future land use activity or activities that result from the transfer of Parcel B lands. These measures represent protection under a broad range of large and small construction projects, both in-water and in the dry, and are likely to cover the range of construction activities that would support the various public land uses anticipated under the KHSA. If implemented as part of construction activities under future land uses, these measures would reduce impacts to less than significant. However, because the State Water Board cannot ensure implementation of these future measures, it is analyzing the impact in this Draft EIR as significant and unavoidable.

Significance
Significant and unavoidable

3.5.5.4 Wildlife Corridors and Habitat Connectivity

Potential Impact 3.5-29 Long-term effects on wildlife from alteration of wildlife movement corridors.
Removal of the Lower Klamath Project reservoirs, penstocks, and restoration of the pre-dam river channel would eliminate areas of wide, deep water crossings that currently represent a hindrance to large and small mammal movements from one side of the river to the other or upland migration for reptiles. Following removal of the reservoirs, relatively narrow and shallow water crossing points would be available for both large and small terrestrial species to move across the river. This would provide long-term benefits to wildlife in the terrestrial resources Primary Area of Analysis by increasing the amount of habitat available to these species, making them less vulnerable to disease, malnutrition, and other environmental stressors as compared with existing conditions.

To facilitate the restoration of reservoir habitat and growth of planted vegetation, permanent cattle exclusion fencing would be installed around the reservoir restoration areas (Appendix B: *Definite Plan - Appendix H*) prior to drawdown or shortly after the pioneer seeding. (It is unknown at this time if this fencing would remain following the transfer of Parcel B lands.) Cattle are currently allowed to free-range graze on the hillsides adjacent to the Lower Klamath Project reservoirs, and the purpose of proposed cattle exclusion fencing would be to prevent cattle from grazing on newly restored vegetation once the reservoirs are drawn down. The fencing would be wildlife-friendly and as such would allow for deer, turtles, and small mammals to move under or over the fencing, while preventing cattle from moving beyond the fencing. As wildlife would be able to safely move under or over the cattle exclusion fencing, there would be no long-term impact due to alteration of wildlife movement corridors.

Significance
Beneficial in the long term due to overall increased wildlife movement opportunities

No significant impact with respect to the use of wildlife-friendly fencing

Potential Impact 3.5-30 Long-term effect on terrestrial wildlife from an increase in the distribution of salmon-derived nutrients upstream of Iron Gate, Copco No. 1 and Copco No. 2 dams.
The Proposed Project would result in changes to the amount and distribution of habitat types and consequently to the species that depend on them, as described in Potential Impact 3.5-25. Removal of the Lower Klamath Project would enable salmon and other fish species to migrate to reaches upstream of Iron Gate Dam, providing nutrient-rich food for terrestrial species, including bald eagles, osprey, and many other species of birds and mammals. These consumers would subsequently deposit these marine-derived nutrients into terrestrial habitats, increasing productivity of riparian vegetation and benefiting the terrestrial ecosystem as a whole (Hilderbrand et al. 2004, Merz and Moyle 2006, Moore et al. 2011). This would be a beneficial effect.

Significance
Beneficial

3.5.6 References

AECOM, CDM Smith, and McBain Associates. 2017. Potential impacts on western pond turtle. Prepared by AECOM, Oakland, California; CDM Smith, Sacramento, California; and McBain Associates, Arcata, California for Klamath River Renewal Corporation, Oregon Department of Fish and Wildlife, California Department of Fish and Wildlife, and U.S. Fish and Wildlife.

AmphibiaWeb. 2017. *Hyalinobatrachium fleischmanni*, Fleischmann's glass frog. Website. http://amphibiaweb.org [Accessed October 2017]. Prepared by University of California, Berkeley.

AmphibiaWeb. 2018. *Rana boylii*, foothill yellow-legged frog. Website. https://amphibiaweb.org/cgi/amphib_query?where-genus=Rana&where-species=boylii [Accessed August 2018]. Prepared by University of California, Berkeley.

Anderson, P. G., C. G. J. Fraikin and T. J. Chandler. 1998. Impacts and recovery in a coldwater stream following a natural gas pipeline crossing. Proceedings of the International Pipeline Conference. Volume 2: 1013-1020. Calgary, AB, Canada. American Society of Mechanical Engineers.

APLIC (Avian Power Line Interaction Committee). 1994. Mitigating bird collisions with power lines: the state of the art in 1996. Edison Electric Institute/Raptor Research Foundation. Washington, D.C.

APLIC. 1996. Suggested practices for raptor protection on power lines: the state of the art in 1996. Edison Electric Institute/Raptor Research Foundation. Washington, D.C.

Arora, D. 1986. Mushrooms demystified a comprehensive guide to the fleshy fungi. Second edition. Ten Speed Press, Berkeley, California.

Ashton, D. T., A. J. Lind, and K. E. Schlick. 1998. Foothill yellow-legged frog (*Rana boylii*) natural history. USDA Forest Service, Pacific Southwest Research Station, Arcata, California.

Bakke, D. 2003. USDA Forest Service. Human and Ecological Risk Assessment of Nonylphenol Polyethoxylate-based (NPE) Surfactants in Forest Service Herbicide Applications. Internal Report, Pacific Southwest Region (Region 5).

Barbour, M. G., T. Keeler-Wolf, and A. A. Schoenherr, editors. 2007. Terrestrial vegetation of California. University of California Press, Berkeley, California.

Borisenko, A., and M.P. Hayes. 1999. Status of the foothill yellow-legged frog (Rana boylii) in Oregon. Final report prepared for The Nature Conservancy under contract to the U.S. Fish and Wildlife Service.

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti, and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

Bautista, S. L. 2007. A summary of acute risk and four common herbicides to birds and mammals. Pages 77–82 *in* T.B. Harrington and S.H. Reichard, editors. Meeting the challenge: invasive plants in Pacific Northwest ecosystems. USDA Forest Service, Pacific Northwest Research Station, Portland, Oregon.

BLM (Bureau of Land Management). 2002. Weed populations observed by BLM. GIS dataset.

Braatne J. H., S. B. Rood, and P. E. Heilman. 1996. Life history, ecology, and conservation of riparian cottonwoods in North America. Pages 423–458 *in* R. F. Stettler, H. D. Bradswhaw Jr, P. E. Heilman, and T. M. Hinckley, editors. Biology of Populus and Its Implications for Management and Conservation. National Research Council Research Press, Ottawa, Canada.

Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*), version 2.0. *In* A. F. Poole and F. B. Gill, editors. The Birds of North America. Cornell Lab of Ornithology, Ithaca, New York. https://doi.org/10.2173/bna.506

Bury, R. B., and D. J. Germano. 2008. *Actinemys marmorata* (Baird and Girard 1852) western pond turtle, Pacific pond turtle. Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs.

California Herps. 2018a. American bullfrog - *Lithobates catesbeianus*. Website. http://www.californiaherps.com/frogs/pages/l.catesbeianus.html [Accessed November 2018].

California Herps. 2018b. Northwestern pond turtle - *Actinemys marmorata*. Website. http://www.californiaherps.com/turtles/pages/a.marmorata.html [Accessed August 2018].

CDFG (California Department of Fish and Game). 1997. California wildlife habitat relationships system: western mastiff bat (*Eumops perotis*). CDFG, California Interagency Wildlife Task Group.

CDFG. 2006. California wildlife: conservation challenges: California's Wildlife Action Plan. Chapter 11: North Coast-Klamath Region. Prepared by the U.C. Davis Wildlife Health Center for the California Department of Fish and Game. Available at: http://www.dfg.ca.gov/wildlife/wap/report.html.CDFW. 2013. Black-backed woodpecker status evaluation. Prepared by CDFW, Sacramento, California

CDFG. 2009. Protocols for surveying and evaluating impacts to special-status native plant populations and natural communities. California Natural Resources Agency, Sacramento, California. Available at: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf.

CDFW (California Department of Fish and Wildlife). 2014a. BIOS layer Mule Deer Range, Region 1. Website. https://map.dfg.ca.gov/bios/ [Accessed July 2018]. Prepared by CDFW, Sacramento, California.

CDFW. 2014b. Hatchery and Genetic Management Plan for Iron Gate Hatchery Coho Salmon. Prepared by CDFW, Redding, California and PacifiCorp, Portland, Oregon for National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Arcata, California.

CDFW. 2017a. California Natural Diversity Database. RareFind5. Electronic database. Natural Heritage Division, California Department of Fish and Game, Sacramento, California. Available at: https://map.dfg.ca.gov/rarefind/view/RareFind.aspx.

CDFW. 2017b. Special vascular plants, bryophytes, and lichens list. Quarterly publication. Prepared by CDFW, Sacramento, California.

CDFW. 2017c. California Natural Diversity Database (CNDBB) Commercial, spotted owl observations. Online database. Prepared by CDFW, Sacramento, California.

CDFW. 2017d. Bald eagle breeding survey instructions and California bald eagle nesting territory survey form.

CDFW. 2018a. Gray wolf. Website. https://www.wildlife.ca.gov/conservation/mammals/gray-wolf [Accessed November 2018]. Prepared by CDFW, Sacramento, California.

CDFW. 2018b. California's invaders: American bullfrog. Website. https://www.wildlife.ca.gov/Conservation/Invasives/Species/Bullfrog [Accessed November 2018]. Prepared by CDFW, Sacramento, California.

CDM Smith. 2018a. June 2018 vegetation communities summary report. Prepared by CDM Smith, Sacramento, California.

CDM Smith. 2018b. July 2018 special status plant survey summary report. Prepared by CDM Smith, Sacramento, California.

CDM Smith. 2018c. May 2018 special status wildlife survey summary report. Prepared by CDM Smith, Sacramento, California.

CDM Smith. 2018d. June 2018 special status wildlife survey summary report. Prepared by CDM Smith, Sacramento, California.

CNPS (California Native Plant Society). 2018. A Manual of California Vegetation, Online Edition. http://www.cnps.org/cnps/vegetation/ Accessed on March 2018. California Native Plant Society, Sacramento, CA.

CNPS. 2017. Inventory of rare and endangered plants (online edition, v8-03 0.39). Rare Plant Program. California Native Plant Society, Sacramento, California. Available at: http://www.rareplants.cnps.org/.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. FWS/OBS-79/31. U.S. Fish and Wildlife Service, Washington, D.C.

eBird . 2018a. eBird home page. Website. https://ebird.org/home. Prepared by The Cornell Lab of Ornithology, Ithaca, New York. [Accessed 8 June 2018].

eBird. 2018b. eBird range map. Website. https://ebird.org/map [Accessed June 2018]. Prepared by The Cornell Lab of Ornithology, Ithaca, New York.

Dixon, R. B. 1907. The Shasta. Bulletin of the American Museum of Natural History 17: 381–498.

EDAW (Eckbo, Dean, Austin and Williams). 2000. Digitized map from C. 1900 railroad/property maps.

EDAW. 2004. Weed populations observed by EDAW. GIS dataset.

FERC (Federal Energy Regulatory Commission). 2007. Final Environmental Impact Statement for Hydropower License, Klamath Hydroelectric Project, FERC Project No. 2082-027, FERC/EIS-0201F. Washington, DC, Federal Energy Regulatory Commission, Office of Energy Projects, Division of Hydropower Licensing.

Foley, M. M., J. R. Bellmore, J. E. O'Connor, J. J. Duda, A. E. East, G. E. Grant, C. W. Anderson, J. A. Bountry, M. J. Collins, P. J. Connolly, L. S. Craig, J. E. Evans, S. L. Greene, F. J. Magilligan, C. S. Magirl, J. J. Major, G. R. Pess, T. J. Randle, P. B. Shafroth, C. E. Togersen, D. Tullos, and A. C. Wilcox. 2017. Dam removal: listening in, Water Resources Research 53: 5,229–5,246.

GANDA (Garcia and Associates). 2008. Identifying microclimatic and water flow triggers associated with breeding activities of a foothill yellow-legged frog (*Rana boylii*) population on the North Fork Feather Friver, California. Prepared by GANDA, San Francisco, California for California Energy Commission, Public Interest Research Group, Sacramento, California.

Gonsolin Jr., T. E. 2010. Ecology of foothill yellow-legged frogs in Upper Coyote Creek, Santa Clara County, CA. Master's thesis. San Jose State University, California.

Green Diamond Resource Company. 2018. Green Diamond Forest Habitat Conservation Plan.

Green Diamond Resource Company. 2006. Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances. Prepared for National Marine Fisheries Service and U.S. Fish and Wildlife Service.

Hamilton, J. 2011. U.S. Fish and Wildlife Service (USFWS). Written communication with Jennifer Jones (via Chris Park), CDM. January 7, 2011.

Hayes, M. P., C. A. Wheeler, A. J. Lind, G. A. Green, D. C. Macfarlane, technical coordinators. 201 6. Foothill yellow-legged frog conservation assessment in California. Gen. Tech. Rep. PSW-GTR-248. USDA Forest Service, Pacific Southwest Research Station, Albany, California.

Hilderbrand, G. V., S. D. Farley, C. C. Schwartz, and C. T. Robbins. 2004. Importance of salmon to wildlife: Implications for integrated management. Ursus 15: 1–9.

Hillman, L. 2016. Karuk Tribe scoping comments on the California Water Resources Control Board's Notice of Preparation of an Environmental Impact Report for the Klamath Hydroelectric Project Relicensing. Prepared by Karuk Tribe, Happy Camp, California for State Water Resources Control Board, Sacramento, California.

Hillman, L. 2017. Karuk Tribe scoping comments on the EIR related to the Clean Water Act Section 401 permitting of a surrender application, FERC Project 14803. Prepared by Karuk Tribe, Happy Camp, California for State Water Resources Control Board, Sacramento, California.

H. T. Harvey and Associates. 2004. California Bat Mitigation Techniques, Solutions, and Effectiveness. Prepared for California Department of Transportation Office of Biological Studies and Technical Assistance, Sacramento, California and Gene R. Trapp, Ph.D., Coordinator Professor Emeritus California State University Sacramento Foundation.

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. California Department of Fish and Game, Nongame-Heritage Program, Sacramento, California.

Humboldt County. 2017. Humboldt County General Plan for the Areas Outside the Coastal Zone.

Jackman, R. E., and J. M. Jenkins. 2004. Protocol for evaluating bald eagle habitat and populations in California. Prepared by Garcia and Associates, San Anselmo, California; and Pacific Gas and Electric Company, San Ramon, California for U.S. Fish and Wildlife Service, Sacramento, California.

Jepson Herbarium. 2017. The Jepson Online Interchange for California Floristics. Website. http://ucjeps.berkeley.edu/interchange/ [Accessed October 2017]. Prepared by Jepson Herbarium, University of California, Berkeley.

Keeley, B. W., and M. D. Tuttle. 1999. Bats in American bridges. Bat Conservation International, Inc., Austin, Texas.

Klamath County. 2010. Comprehensive Plan for Klamath County. Klamath County Community Development - Planning Division. Available at: https://www.klamathcounty.org/721/Comprehensive-Plan

KRRC (Klamath River Renewal Corporation). 2018a. May 2018 bat and eagle survey summary.

KRRC. 2018b. June 2018 bat survey summary.

KRRT (Klamath River Technical Team). 2011. Ocean abundance projections and prospective harvest levels for Klamath River fall Chinook, 2011 season.

KRRT. 2013. Ocean abundance projections and prospective harvest levels for Klamath River fall Chinook, 2013 season.

KRRT. 2015. Ocean abundance projections and prospective harvest levels for Klamath River fall Chinook, 2015 season.

Lannoo, M., editor. 2005. Amphibian declines. University of California Press, Berkeley, California.

Larson, R. 2011. U.S. Fish and Wildlife Service. Written communication with Jennifer Jones (via Chris Park), CDM. March 14, 2011.

Larson, R., and B. J. Brush. 2010. Upper Klamath Basin wetlands: an assessment. U.S. Fish and Wildlife Service, Klamath Falls, Oregon.

Mahony, T. M., and J. D. Stuart. 2000. Old-growth forest associations in the northern range of coastal redwood. Madrono 47: 53–60.

Mayer, K. E., and W. F. Laudenslayer, Jr. 1988. A guide to wildlife habitats of California. State of California Resources Agency, Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/biogeodata/cwhr/wildlife_habitats.asp.

Merritt, D. M., and E. E. Wohl. 2002. Processes governing hydrochory along rivers: hydraulics, hydrology, and dispersal phenology. Ecological Applications 12: 1,071–1,087.

Merritt, D., and E. Wohl. 2006. Plant dispersal along rivers fragmented by dams. River Research and Applications 22: 1–26.

Merritt, D., C. Nilsson, and R. Jansson. 2010. Consequences of propagule dispersal and river fragmentation for riparian plant community diversity and turnover. Ecological Monographs 80: 609–626.

Merz, J. E., and P. B. Moyle. 2006. Salmon, wildlife, and wine: marine-derived nutrients in human-dominated ecosystems of Central California. Ecological Applications 16: 999–1,009.

Mintier & Associates, Jones & Stokes Associates, S. Lowens, and Del Norte County Community Development Department. 2003. Del Norte County General Plan.

Monheit, S. 2003. Glyphosate-based aquatic herbicides, an overview of risk. Noxious Times 4: 5–9.

Moore, J. W., S. A. Hayes, W. Duffy, S. Gallagher, C. J. Michel, D. Wright, and B. Jonsson. 2011. Nutrient fluxes and the recent collapse of coastal California salmon populations. Canadian Journal of Fisheries and Aquatic Sciences 68: 1,161–1,170.

Nilsson, C., R. L. Brown, R. Jansson, and D. M. Merritt. 2010. The role of hydrochory in structuring riparian and wetland vegetation. Biological Reviews 85: 837–858.

NMFS (National Marine Fisheries Service). 2017. Species List - Intersection of USGS Topographic Quadrangles with NOAA Fisheries ESA Listed Species, Critical Habitat, Essential Fish Habitat, and MMPA Species Data. Data downloaded from http://www.westcoast.fisheries.noaa.gov/maps_data/california_species_list_tools.html. Prepared by NMFS, West Coast Region.

O'Rourke, T. P. 2016. Yurok Tribe scoping comments on the Klamath Hydroelectric Project EIR. Prepared for State Water Resources Control Board, Sacramento, California.

O'Rourke, T. P. 2017. Yurok Tribe's scoping comments on the Environmental Impact Report for the Klamath Hydroelectric Project License Surrender. Prepared for State Water Resources Control Board, Sacramento, California.

Orr C. H., S. J. Kroiss, K. L. Rogers, and E. H. Stanley. 2008. Downstream benthic responses to small dam removal in a coldwater stream. River Research and Applications 24: 804–822.

PacifiCorp. 2004a. Terrestrial resources. Klamath Hydroelectric Project (FERC Project No. 2082). Final Technical Report. Prepared by PacifiCorp, Portland, Oregon.

PacifiCorp. 2004b. Botanical and wildlife resources. Klamath Hydroelectric Project (FERC Project No. 2082). 2004 Terrestrial Resources Technical Report. Prepared by PacifiCorp, Portland, Oregon.

PacifiCorp. 2005. Vegetation cover mapping and sensitive plant locations for Klamath River Renewal Corporation. Geodatabase file. Prepared by PacifiCorp, Portland, Oregon.

PacifiCorp. 2012. PacifiCorp Klamath Hydroelectric Project Interim Operations Habitat Conservation Plan for Coho Salmon. Prepared by PacifiCorp, Portland, Oregon.

Pagel, J. E., D. M. Whittington, and G. T. Allen. 2010. Interim golden eagle inventory and monitoring protocols; and other recommendations. Prepared by U.S. Fish and Wildlife Service, Carlsbad, California and Arlington, Virginia.

Peterson, A. 1986. Habitat suitability index models: Bald eagle (breeding season). U.S. Fish Wildlife Service Biological Report 82(10.126).

Pierson, E. D., and W. E. Rainey. 1998. Distribution, habitat associations, status, and survey methodologies for three molossid bat species (*Eumops perotis*, *Nyctinomops femorosaccus*, *Nyctinomops macrotis*) and the vespertilionid (*Euderma maculatum*). Final Report. Prepared for California Department of Fish and Game, Wildlife Management Division, Sacramento, California.

Riparian Habitat Joint Venture. 2009. California riparian habitat restoration handbook, Second Edition. July. Available at: https://water.ca.gov/LegacyFiles/urbanstreams/docs/ca_riparian_handbook.pdf

Ratliff, R. D. 1985. Meadows in the Sierra Nevada of California: state of knowledge. General Technical Report, PSW-84. USDA Forest Service, Berkeley, California.

Reid, S. M., and P. G. Anderson. 2000. Effects of sediment released during open-cut pipeline water crossings. Hydrobiologia 79: 271–276.

Rombough, C. R., and M. P Hayes. 2005. Novel aspects of oviposition site preparation by foothill yellow-legged frogs (*Rana boylii*). Northwestern Naturalist 86: 157–160.

Rood, S. B., R. A. R. Kalischuk, M. L. Polzin, J. H. Braatne. 2003. Branch propagation, not cladoptosis, permits dispersive, clonal reproduction of riparian cottonwoods. Forest Ecology and Management 186: 227–242.

Rosenberg, D. K., and R. Swift. 2010. Post-emergence behavior of hatchling western pond turtles. Oregon Wildlife Institute, Corvallis, Oregon.

SERA (Syracuse Environmental Research Associates). 2002. Neurotoxicity, immunotoxicity, and endocrine disruption with specific commentary on glyphosate, triclopyr and hexazinone. Final Report, TR 01-43-08-04a. Prepared for USDA Forest Service.

Shafroth, P. B, J. M. Friedman, G. T. Auble, M. L. Scott, and J. H. Braatne. 2002. Potential responses of riparian vegetation to dam removal. BioScience 52: 703–712.

Shuford, W. D., and I. C. Timossi. 1989. Plant communities of Marin County. California Native Plant Society, Sacramento.

Silver, S. 1978. Shasta. *In* W. C. Sturtevant, editor. Handbook of North American Indians Volume 8. Smithsonian Institution, Washington, D.C.

Siskiyou County. n.d. Scott Valley Watershed Planning Area: deer wintering. Prepared by Siskiyou County, Yreka, California. https://www.co.siskiyou.ca.us/sites/default/files/docs/SVAP_DeerWintering.pdf

Siskiyou County. 1973. Conservation Element of the Siskiyou County General Plan. Siskiyou County Planning Department. Available at: https://www.co.siskiyou.ca.us/content/planning-division-siskiyou-county-general-plan

Siskiyou County. 1980. Siskiyou County General Plan Land Use and Circulation Element. Available at: https://www.co.siskiyou.ca.us/content/planning-division-siskiyou-county-general-plan

Strassburger, M. 2011. Regional Migratory Bird Chief, U.S. Fish and Wildlife Service. Written communication with Jennifer Jones (via Chris Park), CDM. July 5, 2011.

State Water Board. 2018. Draft Water Quality Certification for Klamath River Renewal Corporation Lower Klamath Project. https://www.waterboards.ca.gov/waterrights/water_issues/programs/water_quality_cert/lower_klamath_ferc14803.shtml. [Accessed June 8, 2018].

Stermer, C. J, T. S., Burton, and R. Callas. 2002. Modeling willow flycatcher habitat using landsat thematic mapper imagery in Siskiyou and Shasta County, California. Prepared by California Department of Fish and Game.

Stillwater Sciences. 2008. Technical Report – Klamath River Dam Removal Study: Sediment Transport DREAM-1 Simulation. Prepared for the Coastal Conservancy. October.

Stillwater Sciences. 2009. Technical Report – Effects of Sediment Release Following Dam Removal on the Aquatic Biota of the Klamath River. Prepared for the Coastal Conservancy. January.

Van Wagtendonk, J. W., N. G. Sugihara, S.L. Stephens, A. E. Thode, K. E. Shaffer and J. A. Fites-Kaufman. 2018. Fire in California's ecosystems. University of California Press, Berkeley, California.

Tsui, P. T. P., and P. J. McCart. 1981. Effects of streamcrossing by a pipeline on the benthic macroinvertebrate communities of a small mountain stream. Hydrobiologia 79: 271–276.

Tullos, D. D., D. S. Finn, and C. Walter. 2014. Geomorphic and ecological disturbance and recovery from two small dams and their removal. PLoS One 9: e108091, doi:10.1371/journal.pone.0108091.

USACE (U.S. Army Corps of Engineers). 1987. Corps of Engineers wetlands delineation manual. Technical Report Y-87-1. USACE, Environmental Laboratory, Waterways Experiment Station, Vicksburg, Mississippi.

USACE. 2008. Regional supplement to the Corps of Engineers wetland delineation manual: arid west region. Version 2.0. Final Report ERDC/EL TR-08-28. Wetlands Regulatory Assistance Program, USACE, Engineer Research and Development Center, Environmental Laboratory, Vicksburg, Mississippi.

USACE. 2010. Regional supplement to the Corps of Engineers wetland delineation manual: western mountains, valleys and coast region. Version 2. Final Report ERDC/EL TR-10-3. Wetlands Regulatory Assistance Program, USACE, Engineer Research and Development Center, Environmental Laboratory, Vicksburg, Mississippi.

USBR (U.S. Bureau of Reclamation). 2010. Klamath River Sediment Sampling Program, Phase I – Geologic Investigations. September.

USBR. 2011. Reservoir Area Management Plan for the Secretary's Determination on Klamath River Dam Removal and Basin Restoration, Technical Report No. SRH-2011-19. Prepared for Mid-Pacific Region, Bureau of Reclamation, Technical Service Center, Denver, CO.

USBR. 2012. Hydrology, Hydraulics and Sediment Transport Studies for the Secretary's Determination on Klamath River Dam Removal and Basin Restoration, Technical Report No. SRH-2011-02. Prepared for Mid-Pacific Region, Bureau of Reclamation, Technical Service Center, Denver, Colorado.

United States Department of Agriculture Forest Service (USDA Forest Service). 2012. Region 5 U.S. Forest Service sensitive vascular plant, bryophyte & lichen species. Evaluation & Documentation Form for *Sulcaria badia*.

USDA Forest Service. 2017a. Classification and Assessment with Landsat of Visible Ecological Groupings Zone 1: North Interior, North Coast East, North Coast West, and North Coast Mid-vegetation maps, using the Regional Dominant classification. Website. https://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192 [Accessed June 2017].

USDA Forest Service. 2017b. Appendix C. Six Rivers Sensitive Plant and Fungi Species 2013. Revised June 2017.

USDA Forest Service and BLM. 2017. Interagency Special Status/Sensitive Species Program (ISSSSP). Website. https://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-fungi.shtml [Accessed September 20, 2017].

USFWS (U.S. Fish and Wildlife Service). 2006. Transmittal of guidance: estimating the effects of auditory and visual disturbance to northern spotted owls and marbled

murrelets in Northwestern California. Prepared by USFWS, Arcata Fish and Wildlife Office, Arcata, California.

USFWS. 2008. Informal consultation on four vegetation management projects within the Willamette Planning Province, which may affect northern spotted owls and spotted owl critical habitat (FWS reference: 13420-2007-I-0038). Letter of concurrence. Prepared by USFWS, Oregon Fish and Wildlife Office, Portland, Oregon.

USFWS. 2010. Invasive Plant Treatment Project on the Fremont-Winema National Forests in Klamath and Lake counties, Oregon. Prepared by USFWS, Klamath Falls Fish and Wildlife Service, Oregon for Fremont-Winema National Forests, Lakeview Oregon.

USFWS. 2012. Endangered and threatened wildlife and plants; designation of revised critical habitat for the northern spotted owl, final rule. Prepared by USFWS, Oregon Fish and Wildlife Office, Portland, Oregon.

USFWS. 2017a. National wetlands inventory. Website. https://www.fws.gov/wetlands/Data/State-Downloads.html [Accessed October 2017]. Prepared by USFWS, Ecological Services.

USFWS. 2017b. Klamath EIR Scoping, CA only. IPaC trust resource report. Prepared by USFWS, Sacramento, California.

Williams, G.M., R. Kroes R, and I.C. Munro. 2000. Safety Evaluation and Risk Assessment of the Herbicide Roundup and Its Active Ingredient, Glyphosate, for Humans. Regulatory Toxicology and Pharmacology 31, 117-165.

Yurok Tribe Environmental Program. 2009. Klamath River Estuary Wetlands Restoration Prioritization Plan, Version 1.0. October.

Zeiner, D. C., W. F. Laudenslayer Jr., K. E. Mayer, and M. White, editors. 1990b. California's wildlife. Volume II. Birds. California Statewide Habitat Relationships System. California Department of Fish and Game.