
3.4 Biological Resources

INTRODUCTION

This section outlines the biological resources setting of the proposed project area in Canby, California. The vegetation and wildlife of the regional and local project area are described. The regulatory setting, which includes state, federal, and local laws, regulations, and plans, is also discussed in the context of their applicability to the biological resources affected by the proposed project. The information presented in this section is derived from environmental documents and records, literature, field surveys, and personal interviews with regional experts. The DOE has initiated consultation with the US Fish and Wildlife Service (USFWS). A Biological Assessment for the project has been prepared and submitted to the USFWS.

Approximately two thirds of the project runs through the town of Canby, through fallow agricultural fields in town, and along roadways. Local wildlife is limited to squirrels, birds, and other small animals commonly found in developed and disturbed areas. The other third of the project is located in the floodplain of the Pit River in flooded pastureland and wetland habitats. Due to man-made irrigation systems and weir manipulation on the Pit River the wetland area is atypical, with wet and dry seasons reversed (the wetland is wet in September despite limited rainfall and dry in February despite rainfall). Heavy cattle grazing in the wetland has further altered the natural state of the vegetation, limiting the size and diversity of plant growth. This area contains biological resources that are described and discussed in this section.

VEGETATION

Regional Vegetation and Wildlife Habitat

The proposed project is located within the Modoc Plateau geographic subdivision. The subdivision is part of the Great Basin province in northeastern California, east of the Cascade Mountain Range. This area can be typified as being a high desert and is subject to extreme climatic conditions. Most of the habitat in the Modoc Plateau is juniper savannah, sagebrush steppe or wetland, which is also consistent with the area in and around Canby, California. The elevation at the project site ranges from 4,310 feet to 4,290 feet in a northwest to southeast direction.

Vegetation at Site

Two thirds of the project area extends through fallow agricultural fields and city streets and exhibits characteristics of a high disturbance regime. The remaining third of the project area extends through the floodplain of the Pit River, which is essentially all riverine (river banks) and palustrine (inland marshes and swamps) wetland habitat. This wetland habitat has been heavily grazed by cattle, which has altered the natural height and minimized the diversity of the vegetation.

There are two major plant communities found within the project area. The first plant community is sagebrush steppe (also known as Great Basin scrub, or Big Sagebrush series), which has been converted to agricultural use. The second habitat is freshwater wetland habitat. A wetland delineation was performed by Stuart Consulting to determine the amount of jurisdictional wetlands in the project area (Appendix E). The wetland habitat has several associated microhabitats. The vegetation at this wetland site can be described as either emergent perennial wetland species or aquatic wetland species.

Special-Status Plant Species at Canby Project Site

The California Department of Fish and Game (CDFG) Natural Diversity Database (CNDDDB) lists 41 vascular plant species that are of special concern for Modoc County. These species were considered to be special-status species if they were classified as one or more of the following:

- Listed, or proposed for listing, as Threatened, Endangered, or Species of Concern (formerly listed as Candidate List 1 or 2) under the Endangered Species Act by the U.S. Fish and Wildlife Service (CDFG 1996a and 1996b)
- Listed, or proposed for listing, as Rare, Threatened, or Endangered under the California Endangered Species Act (CDFG 1996b)
- Listed as "Sensitive" or "Special Interest" by the USFS (Sanger 1996, pers. com., Williams 1996, pers. com.)
- Listed as "Survey and Manage", Category 2, in the Northwest Forest Plan (USFS 1996)
- Listed as Category 1, 2, 3, or 4 of the CNPS Inventory of Rare and Endangered Vascular Plants of California (Skinner and Pavlik 1994)
- Identified in pertinent resource management plans, such as the Northwest Forest management Plan or National Forest resource plans.

Table 3.4-1 lists the sensitive species that may potentially exist on the site based on geographic subdivision, habitat present, edaphic (soil related) conditions, and site elevation (between 3,500 and 5,000 feet). These conditions collectively provide potential habitat for the listed species; the listed species may or may not exist on the site. The ecology of each of the observed or potential species listed in Table 3.4-1 is described in the Botanical Survey results (Appendix F).

The current agricultural regime has diminished potential for most of the species to occur within the project site to unlikely or very unlikely. Of the list of special status vascular plants known to occur in California one species, the eel-grass pondweed (*Potamogeton zosteriformis*), would have the potential to occur at the Canby project site. This species has been collected on the Pit River drainage within the project area. This species was not found during the fall botanical survey, although it may potentially be detected during the spring.

Special-Status Non-vascular Plants

Of the list of special status non-vascular plants known to occur in California, none have the potential to occur at the Canby project site. This evaluation was determined based on plant communities within the project area, habitat observed at the project site, and site elevation. This information was gathered using the California Native Plant Society's Inventory of Rare and Endangered Plants of California (Special Publication 1, Sixth Edition, published August 2001).

Table 3.4-1: Special-Status Plant Species Known to Occur or with the Potential to Occur in the Project Area

Species	Federal ¹	State ²	CNPS ³	Presence at Project Site
Hillside arnica (<i>Arnica fulgens</i>)	-	-	2	Very unlikely
Falcate saltbrush (<i>atriplex gardneri var. falcata</i>)	-	-	2	Very unlikely
Long-Haired star-tulip (<i>Calochortus langebarbatus var. langebarbatus</i>)	-	-	1B	Very unlikely
Boggs Lake Hedge-hyssop (<i>Gratiola heterosepala</i>)	-	E	1B	Very unlikely
Lilliput lupine (<i>Lupinus uncialis</i>)	-	-	2	Very unlikely
Janish's beardtongue (<i>Penstemon janishiae</i>)	-	-	2	Unlikely
Modoc County knotweed (<i>Polygonum polygaloides ssp. Esotericum</i>)	-	-	1B	Unlikely
Eel-Grass pondweed (<i>Potamogeton zosteriformis</i>)	-	-	2	Potentially present
Howell's thelypodium (<i>Thelypodium howellii ssp. howellii</i>)	-	-	1B	Very unlikely

¹ Federal:

² State: E-Listed as endangered under the California Endangered Species Act

³ CNPS: 1B-plants rare, threatened or endangered in California and elsewhere; 2-rare, threatened or endangered in California but not elsewhere.

SOURCE: CNDDB Quad Search 2002, USFWS Modoc County List

Wildlife Habitat of Site

For the two thirds of the project that runs through the town of Canby there is little to no potential habitat for wildlife species other than birds, squirrels and other rodents commonly found in mostly disturbed areas with buildings and roadways. Birds and small mammals may use the fallow agricultural fields for foraging. The other third of the project is located in the floodplain of the Pit River in flooded pastureland and wetland habitats. The wetland area has been heavily grazed by cattle, which has altered the height and minimized the diversity of vegetation. A few willow trees, greatly impacted by beaver (*Castor canadensis*), were located along the margin of the wetland.

A habitat assessment for sensitive species was conducted in August 2002 (Galea 2002). Suitable breeding habitat was found within the assessment area for some ground nesting species, such as the greater sandhill crane and white faced ibis, although the high number of grazing cows and lack of high vegetation may make nesting more difficult. The lack of trees, brush or other tall vegetation reduces the potential for tree-nesting avian species in proximity to the project. Potential foraging habitat is available for many of the sensitive species on the list, especially avian predators. Potential habitat for many of the sensitive fish species is available in the Pit River.

WILDLIFE

Special-Status Wildlife Species at Site

There are a few special status wildlife species that either occur within or have the potential to occur within the Canby project site areas. The assessment area is defined as the route from the geothermal well to the Pit River, the immediate area of discharge, the immediate area downstream from the point of discharge, and any potential breeding habitat for sensitive species within several miles of the project. A ten-mile radius was considered to encompass the range of any northern spotted owl territory and known bald eagle nest sites that might support birds that forage along the Pit River near the project site. For purposes of this analysis, animal taxa are considered to be “special-status” if they fit one or more of the categories listed above in the vegetation section. These special status wildlife species are identified in Table 3.4-2.

A summary of special status animals’ use of the Canby area is presented in Table 3.4-2. Environmental conditions in the study area and project proximity to known foraging or breeding sites create potential for listed species to occur. Listed species may or may not occur within the project area for the duration of the project. Three species of those listed under Table 3.4-2 are known to occur within the study area: the greater sandhill crane (*Grus canadensis tabida*), the bald eagle (*Haliaeetus leucocephalus*), and the golden eagle (*Aquila chrysaetos*).

Greater Sandhill Crane. The greater sandhill crane (*Grus canadensis tabida*) is listed in California as threatened. In California, greater sandhill cranes historically nested in the northeastern part of the state. Wintering grounds have been in the Central Valley wetlands, of which only about 5% remain in existence. Today far fewer greater sandhill cranes nest in Lassen, Modoc, Plumas, Shasta, Sierra, and Siskiyou Counties. Wintering areas are more restricted due to loss of habitat in the Central Valley wetlands. The population currently appears to be stable.

Greater sandhill cranes breed in large wetlands and feed in different habitat types such as meadows, irrigated pastures, grain fields, bogs, fens, marshes, and nearby fields. Cranes like to flock together at night (called roosting) for safety in an open expanse of shallow water. Cranes are omnivorous; they eat a variety of grains and seeds as well as aquatic invertebrates, insects, small reptiles, amphibians, eggs, and rodents.

The greater sandhill crane is known to nest and forage in the assessment area around the project. Although no nest sites are recorded within 0.5 miles of the project area, known nesting sites occur approximately 0.5 miles down river.

Bald Eagle. The bald eagle (*Haliaeetus leucocephalus*) prefers to nest close (within one mile) to large, fish-rich waters such as lakes and rivers. They typically utilize large conifers to build nests in, which can be stand alone or in the midst of a dense timber stand. During the winter, migrant bald eagles also utilize the Warm Springs Valley, increasing the overall population of bald eagles in the area. Summer populations for the western Warm Springs Valley is approximately ten bald eagles (five pairs) while winter populations vary from ten to fifteen eagles.

Table 3.4-2: Special Status Wildlife Species With the Potential to Occur Within the Region of the Project Area and Use of the Proposed Project Study Area

Species	Federal ¹	State ²	Breeding Habitat in Project Area	Foraging Habitat in Project Area
Birds				
Greater Sandhill Crane (<i>Grus canadensis tabida</i>)	-	CT	Yes	Yes
Northern spotted owl (<i>Strix occidentalis caurina</i>)	FT	CSC	No	No
Bald eagle (<i>Haliaeetus luecocephalus</i>)	FT	CE/CFP	No	Yes
Golden eagle (<i>Aquila chrysaetos</i>)	-	CSC/CFP	No	Yes
Swainson's hawk (<i>Buteo swainsoni</i>)	-	CT	No	Potential
White-faced ibis (<i>Plegadis chihi</i>)	-	CSC	Potential*	Potential*
Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>)	FC	CE	No	No
Bank Swallow (<i>Riparia riparia</i>)	-	CT	No	Potential
Willow flycatcher (<i>Empidonax traillii</i>)	-	CE	Very limited or no potential	No
Reptiles				
Northwestern pond turtle (<i>Clemmys marmorata marmorata</i>)	FSC	CSC	Potential	Potential
Fish				
Modoc sucker (<i>Catostomus microps</i>)	E	E	No	Potential
Lost River sucker (<i>Deltistes luxatus</i>)	E	E	No	Potential
Shortnose sucker (<i>Chasmistes brevirostris</i>)	E	E	No	Potential
Cowhead Lake tui chub (<i>Gila bicolor vaccaceps</i>)	C	CSC	Potential	Potential
Pit Roach (<i>Lavina symmetricus mitrulus</i>)	-	CSC	Potential	Potential
Amphibians				
Oregon spotted frog (<i>Rana pretiosa</i>)	-	None	Very limited or no potential	Very limited

3: AFFECTED ENVIRONMENT

¹Federal Status

FE	Federally endangered
FT	Federally threatened
FC	Federal candidate for listing
FSC	Federal species of concern
FPE	Federally proposed for endangered listing
FPT	Federally proposed for threatened listing

²State Status

CE	California endangered
CT	California threatened
CCE	California candidate for endangered listing
CSC	California species of concern (CDFG)
CFP	California fully protected

*White faced ibis have been observed in the vicinity of Clover Swale Creek, 5 miles from Canby, and thus have the potential to occur within or closer to the site.

SOURCE: National Diversity Database (NDDDB) Quad Search, 2002, USFWS Modoc County list

The home range of a bald eagle pair can be as large as 13.7 miles; however, most eagles forage within 0.3-0.6 miles of the nest site (Garrett et al. 1993). Most bald eagle nest sites are located in suitable habitat in proximity to preferred foraging areas. During the breeding season, bald eagles forage mostly on fish. Based upon a Pacific Gas & Electric study (PG&E TES 1993), Sacramento suckers comprise a major component of the diet of nesting bald eagles on the Pit River; however, this study was conducted much farther downstream where the birds nested along the Pit River. Bald eagles are also known to forage on Pike minnow, large mouth bass, green [catfish](#) [sunfish](#), and trout (Ratcliff, personal communication 2002a). These eagles also forage at numerous lakes and reservoirs located in the area, many of which are stocked with trout by the CDFG. For example, Ballard Reservoir is located 2.5 miles southwest of Canby, and the larger Duncan and "F" reservoirs are located approximately 5.5 miles northwest and 8 miles due north, respectively. Both are stocked with trout yearly for human fishing. These reservoirs may serve as some source of food for the bald eagles but are most likely not their primary food source.

The intermediate/warm waters of the Pit River are thought to be the primary food source for local bald eagles. During the winter and early spring (November–March), bald eagles can shift food sources (Ratcliff, personal communication 2002b). Great numbers of migratory waterfowl use the area in the fall and winter, and eagles prey on weak and crippled (due to sport hunting) waterfowl. Winter and spring flooding of pastures causes Belding's ground squirrels (*Citellus beldingi*) and voles to leave their burrows, where they are exposed to predation by raptors (D. Laye, personal communication 2002). During this time hunters shoot thousands of ground squirrels as a means of depredation control and the carcasses become eagle prey. For four weeks during the spring bald eagles' primary food source becomes these ground squirrels. Other minor food sources include wintering mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocapra americana*) that concentrate in the valley during winter, and become "road kill" that the eagles forage on.

There are four to five known bald eagle nest sites within approximately 5 miles of the project area (Romberger, personal communication 2002a). The closest two nest sites are about 1 mile and 2 miles southeast between the Pit River and Ballard Reservoir. The closest nest was discovered in 1991, although eagles were seen in the vicinity for several previous years. That nest has been active every year since and has been very successful with only three of twelve failed nesting years. In successful years it has hatched 2-3 young. Hatching of two to three young is rare with bald eagles in Modoc County, and this territory

has produced two young twice. The nest monitoring is not comprehensive enough to give an accurate fledged count. Underlying areas have not been checked for dead young, but some young have disappeared or been found below the nest, so total young hatched would not reflect eaglets fledged.

The next closest eagle nesting territory is near the Canby Bridge about 2 miles southeast of the project site. It was discovered in 2000 although eagles were seen in the vicinity for several previous years. It has been active since 2000 with two nests 1.5 miles apart. The first was built and not used in 2000. The second nest may have existed before its discovery in 2001. One young was fledged in this nest that year. In 2002 there were no fledglings (Romberger, personal communication 2002b).

These four eagles obtain a sizeable portion of their food from fish downstream of the project's discharge point. The other 2-3 nests are around 5 miles away and would utilize the Pit River for food, but would also take fish from some of the reservoirs in closer proximity to their nest sites than the river. Since these eagles could be influenced by other factors, nest success was not reviewed. Eagles have been spotted foraging up and down the Pit River along this stretch east of Canby and it is possible that the other nests up to 5 miles away might also utilize this section of the river for some portion of their food (Ratcliff, personal communication 2002b).

Golden Eagle. The golden eagle (*Aquila chrysaetos*) is a California species of special concern and a fully protected species within the state (refer to Table 3.3-2). Golden eagles are relatively common throughout the more open, hilly, or mountainous habitats of California, and remain within their territories year-round. Golden eagles require open country for foraging; therefore, they do not forage in dense, wooded stands. They prefer to nest in large conifers within dense stands or on cliffs. Golden eagles are relatively common in the Canby area, and likely forage occasionally in the project area due to the open terrain and potential availability of food, such as waterfowl and ground squirrels.

Modoc Sucker. The Modoc sucker is listed as endangered by the USFWS and by the State of California. The historic range of the Modoc sucker included small streams tributary to the Pit River in Modoc and Lassen Counties, California. Modoc sucker is one of a handful of species that are only found in the Pit River and Ash Creek watersheds (PRWA 2002). The species is endemic to the small tributary streams of the Upper Pit River, larger sections of Rush Creek, including drainage ditches, and Ash Creek (Moyle and Marchiochi 1975).

Spawning sites of Modoc suckers have been identified only in pools of tributaries to Johnson Creek and Washington Creek approximately 7 miles from the project area. Spawning season of the Modoc sucker is from mid-April to the last week of May or first week of June. Stream channelization through the meadow systems in the 1980s eroded natural barriers and had allowed for the movement of Sacramento suckers (*Catostomus occidentalis*) into areas formerly occupied by Modoc suckers. Hybridization between the two species had eliminated Modoc suckers from all streams except Washington and Hulbert Creeks in the Turner Creek drainage and Johnson Creek in the Rush Creek drainage (CDFG, MNF, USFWS 1983).

In general, sites where Modoc suckers have been found are characterized by low flows (intermittent in some); largely shallow pools; muddy bottoms; partial shade trees, shrubs, boulders, or undercut banks; abundant cover from riparian vegetation and undercut banks; and moderately clear water. The Modoc sucker prefers portions of small streams dominated by large, shallow, muddy-bottomed pools, partially shaded by overhanging trees. Spawning occurs over coarse fine gravel in the lower end of pools with abundant cover.

Modoc suckers are omnivorous with a diet consisting mostly of benthic invertebrates, algae, and detritus (Moyle and Marciochi 1975). These prey items are low on the food chain. Modoc suckers are probably bioaccumulating low levels of mercury from their prey but these levels are most likely well below standards and have no significant effect on the fish.

Recent surveys by USFWS staff found no morphological Modoc suckers in the main stem of the Pit River downstream of the project areas, even though the project area is in historical habitat and suitable habitat exists. There may be some individuals not detected by the surveys suggesting that Modoc Sucker do exist in low abundance in the project area (Reid pers. comm. 2002a). Currently the closest known Modoc sucker occupied area in the project vicinity is the Turner Creek drainage which begins about 7 miles downstream from the Pit River discharge point and up from its confluence with the Pit River, where the project effects would be unlikely to extend (Reid pers. Comm. 2002b).

Other Species. There are several species of birds, reptiles, and fish on the list that have potential breeding or foraging habitat in the area. Based on wildlife surveys of the project area, most of these species were not found to occur in the area of the project's effects, or the project would not impact their breeding or foraging habitat. Additional information about each species status and distribution, habitat requirements, and occurrence within the project area is listed in Appendix G. The one amphibian listed in Table 3.4-2 has very little or no potential to occur in the study area.

Swainson's Hawk. The Swainson's hawk (*Buteo swainsoni*) is state-listed as threatened. This hawk prefers grasslands, agricultural areas, and desert-like habitats. The hawk is commonly seen perched on a fence post in a prairie or open range. The Swainson's hawk preys primarily on insects and rodents. Limited potential habitat, in the form of foraging habitat, exists within the assessment area.

White Faced Ibis. The white faced ibis (*Plegadis chihi*) is listed as a California species of concern. The species is found mostly in freshwater areas, on marshes, swamps, ponds, and rivers. The species has been known to nest in the vicinity of Clover Swale Creek, 5 miles east of the project area. The white faced ibis has potential foraging habitat in the study area because of existing wetlands. Potential ibis breeding habitat in the form of heavily vegetated wetland areas is adjacent to, but not in, the direct impact area of the project (e.g. the pipeline route). Potential ibis foraging habitat exists in the wetlands area associated with the pastures although this is of lower quality because of the intensive grazing in that area.

Bank Swallow. The bank swallow (*Riparia riparia*) is listed as a California threatened species. No bank swallows were observed at the project area. Steep banks used for nesting by bank swallows are not present in the project area, which composed of very flat, wet pasture.

Northwestern Pond Turtle. The northwestern pond turtle (*Clemmys marmorata marmorata*) is listed as a federal species of concern and a California species of concern. Pond turtles prefer slow-moving water but can also utilize banks of large rivers and streams. Pond turtles are not known to occur in the assessment area.

Modoc Sucker. ~~The Modoc sucker is listed as endangered by the USFWS and by the State of California. The species is endemic to the small tributary streams of the Upper Pit River. The species is currently restricted to several tributary streams of the Pit River, including Turner and Ash Creeks, tributaries located 20 miles downstream of the proposed discharge (See Figure 3.4 1). In general, sites where Modoc suckers have been found are characterized by low flows (intermittent in some); largely shallow pools; muddy bottoms; partial shade trees, shrubs, boulders, or undercut banks; abundant cover from riparian vegetation and undercut banks; and moderately clear water. The Modoc sucker prefers portions of small streams~~

dominated by large, shallow, muddy-bottomed pools, partially shaded by overhanging trees. Spawning occurs over coarse fine gravel in the lower end of pools with abundant cover. They feed on filamentous algae.

This species is not known to occur within the project area or immediately downstream in the Pit River, based upon surveys conducted by the USFWS specifically for this project (Reid, personal communication 2002). The closest known portion of the Pit River occupied by the Modoc sucker is 20 miles downstream.

Lost River Sucker. The Lost River sucker (*Deltistes luxatus*) is listed as endangered by the USFWS and by the State of California. The Lost River sucker is primarily a lake resident that spawns in rivers, streams, or springs associated with lake habitats. These suckers are omnivorous bottom feeders that have a diet that includes detritus, zooplankton, algae, and aquatic insects. The Lost River sucker is not known to occupy the study portion of the Pit River. This species was not found during sampling at the discharge site by the USFWS.

Shortnose Sucker. The shortnose sucker (*Chasmistes brevirostris*) is listed as endangered by the USFWS and by the State of California. Shortnose sucker is essentially found in the same lakes and rivers as the Lost River sucker. The shortnose sucker is not known to occupy the study portion of the Pit River. The species was not found during sampling at the discharge site by the USFWS.

Cowhead Lake Tui Chub. The Cowhead Lake tui chub (*Gila bicolor vaccaceps*) is a candidate species for federal listing, but has no specific status for the State of California. Tui chubs occur in a wide variety of habitats, most commonly in the weedy shallows of lakes and quiet waters in sluggish rivers. This species is not known to occupy the study portion of the Pit River and was not found during sampling at the discharge site by the USFWS.

Pit Roach. The pit roach (*Lavina symmetricus mitrulus*) is a species of concern in California. This species was once common and widely distributed in the upper Pit River drainage. Currently, its populations are few and scattered, occurring in either small, isolated streams or in some of the regulated sections of the Pit River. This species is not known to occupy the study portion of the Pit River. This species was not found during sampling at the discharge site by the USFWS. Pike minnow were located, which suggests that the roach would not occur in the study area due to the presence of this predator. The California roach, which is not a listed species, was found during sampling at the discharge site by the USFWS on September 6, 2002.

Mercury Levels and Bioaccumulation in Wildlife at Project Site

Bioaccumulation. Bioaccumulation is defined as the uptake and retention of a constituent by a living organism as a result of direct contact, inhalation, eating contaminated food, or drinking water contaminated with the constituents. Often, bioaccumulative constituents like mercury are retained in an organism's body tissues for extended periods of time. If a predator eats contaminated prey, then its tissues will become contaminated with the chemical constituents in the prey's tissues. Predator-prey relationships exist in hierarchies. Each predator-prey relationship is divided up into levels. For example, bacteria are primary producers and would uptake constituents from water. Protozoan (microscopic organisms) would consume the bacteria and are considered a higher level in the food chain. Small fish and insects might consume these protozoa and would comprise a higher level, and so on. As predators eat prey, these constituents move through the food web and become more concentrated in animals' tissue at higher levels in the food chain (Zillioux et al. 1993). Certain species, that are high on the food chain, are especially susceptible to metal accumulation and their adverse effects due to bioaccumulation.

The bald eagle is an example of a species that can be indirectly affected by mercury levels in water through bioaccumulation in their prey (fish).

Mercury can form many stable complexes with organic (carbon-containing) compounds. Microorganisms indigenous to soils, sediments, fresh water, and salt water, can convert inorganic mercury to form organic mercury in a process known as methylation. Methyl mercury is a toxic, organic compound that is fairly soluble in water. Almost all of the mercury found in animal tissues is in the form of methyl mercury. Methylation may occur in water, sediments or soil.

Current Mercury Levels in the Pit River. Current mercury levels in the Pit River were recently analyzed (Frontier 2002 Appendix I). The geothermal effluent from Kelley Hot Springs, located approximately 2 miles east of the proposed project discharge point, has a mercury concentration of 15 ng/L (Appendix I). Kelley Hot Springs also discharges geothermal fluid into the Pit River. The total mercury concentration in the Pit River above Kelley Hot Springs is ~~1.33~~ 1.96 ng/L. The total mercury concentration below the springs is ~~1.96~~ 1.33 ng/L. The river water at the proposed discharge point, located approximately 2 miles downstream from the Kelley Hot Springs discharge point, currently has a mercury concentration of 1.72 ng/L. There appears to be no statistically significant difference in mercury level through this section of the Pit River.

Current Fish Bioaccumulation. ~~In the summer of 2002, the USFWS sampled mercury levels in pike minnow tissue at the proposed discharge point on the Pit River (USFWS 2002a). The baseline fish tissue analysis averaged 0.409 ng/g methyl mercury (Frontier 2002). The sampled fish are at the third level in the food chain. According to the EPA Mercury Study Report to Congress (1997), approximately 80% of a bald eagle's fish diet is from this food chain level.~~

In the summer of 2002, the USFWS sampled mercury levels in pike minnow and Sacramento sucker tissue at the proposed discharge point on the Pit River (USFWS 2002a). The baseline fish tissue analysis averaged about 0.409 ng/g methyl mercury in pike minnow and 0.195 ng/g of methyl mercury in Sacramento sucker (Frontier 2002). Pike minnow are the largest and most piscivorous (fish-eating) fish in the Pit River. Pike minnow have the highest mercury concentrations and exhibit the greatest mercury bioaccumulation hazard because of their size, age and status as the top predator in the system (USFWS 2001). Bald eagle diet is comprised of roughly 60% Sacramento suckers, which have lower concentrations of methyl mercury in their tissue (Hunt et al. 1992). Using methyl mercury concentrations for pike minnow gives a worst-case scenario of methyl mercury consumption. Other fish species consumed by bald eagles (namely Sacramento sucker) have a lesser concentration of methyl mercury in their tissue.

Current Bald Eagle Mercury Consumption. Mercury bioaccumulation is particularly problematic for species high up on the food chain. In the Canby area, bald eagles could be adversely impacted by the bioaccumulation of mercury. A typical male bald eagle weighs approximately 4 kg while the larger females typically weigh between 4.5-6 kg. Bald eagles consume on approximately 12% of their body weight per day (Stalmaster and Gessaman 1984). With an existing 0.409 ng/g methyl mercury in the fish tissue, a 4 kg eagle eating 0.48 kg (approximately 1 pound) of contaminated fish a day would consume 196 ng of methyl mercury per day. This translates into an actual intake of 49 ng methyl mercury per kg body weight per day under current conditions.

$$480 \text{ g fish} \times \frac{0.409 \text{ ng methyl mercury}}{\text{g fish}} = 196 \text{ ng methyl mercury} \quad \text{THEN} \quad \frac{196 \text{ ng methyl mercury}}{4 \text{ kg eagle}} = \frac{49 \text{ ng (methyl mercury)}}{\text{kg (eagle)}}$$

REGULATORY FRAMEWORK

Federal

Federal law requires that all Federal departments and agencies shall use their authority to conserve endangered and threatened species as defined in the Federal Endangered Species Act (FESA). The Act defines as “endangered” any species that is in danger of extinction throughout all or a significant portion of its range, and as “threatened” any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Two other special-status categories are recognized under FESA: (1) proposed for listing as threatened or endangered and (2) species of concern. “Proposed” endangered and threatened species are those species for which a proposed regulation has been published in the Federal Register, but not a final rule. “Species of Concern” is the current designation of species formerly identified as “candidate” for listing in the Federal Register.

Section 9 of FESA prohibits the “taking” of listed species. Under Section 7 of FESA, Federal agencies are directed to consult with the USFWS to ensure that no agency actions would jeopardize the continued existence of any listed species or result in the destruction of critical habitat. Although FESA requires formal consultation only for those species currently listed as threatened or endangered, the USFWS recommends that adverse impacts on species proposed for listing and species of concern also be considered because they may become listed during the design and construction phases of a project. The DOE is currently consulting with the USFWS under Section 7 of FESA to ensure regulations are appropriately addressed. A Biological Assessment for the project has been submitted to the USFWS.

The Bald Eagle Protection Act. The Act provides federal protection to the bald eagle, and through amendments, to the golden eagle. The act prohibits the direct or indirect take of an eagle, eagle part or product, and nest.

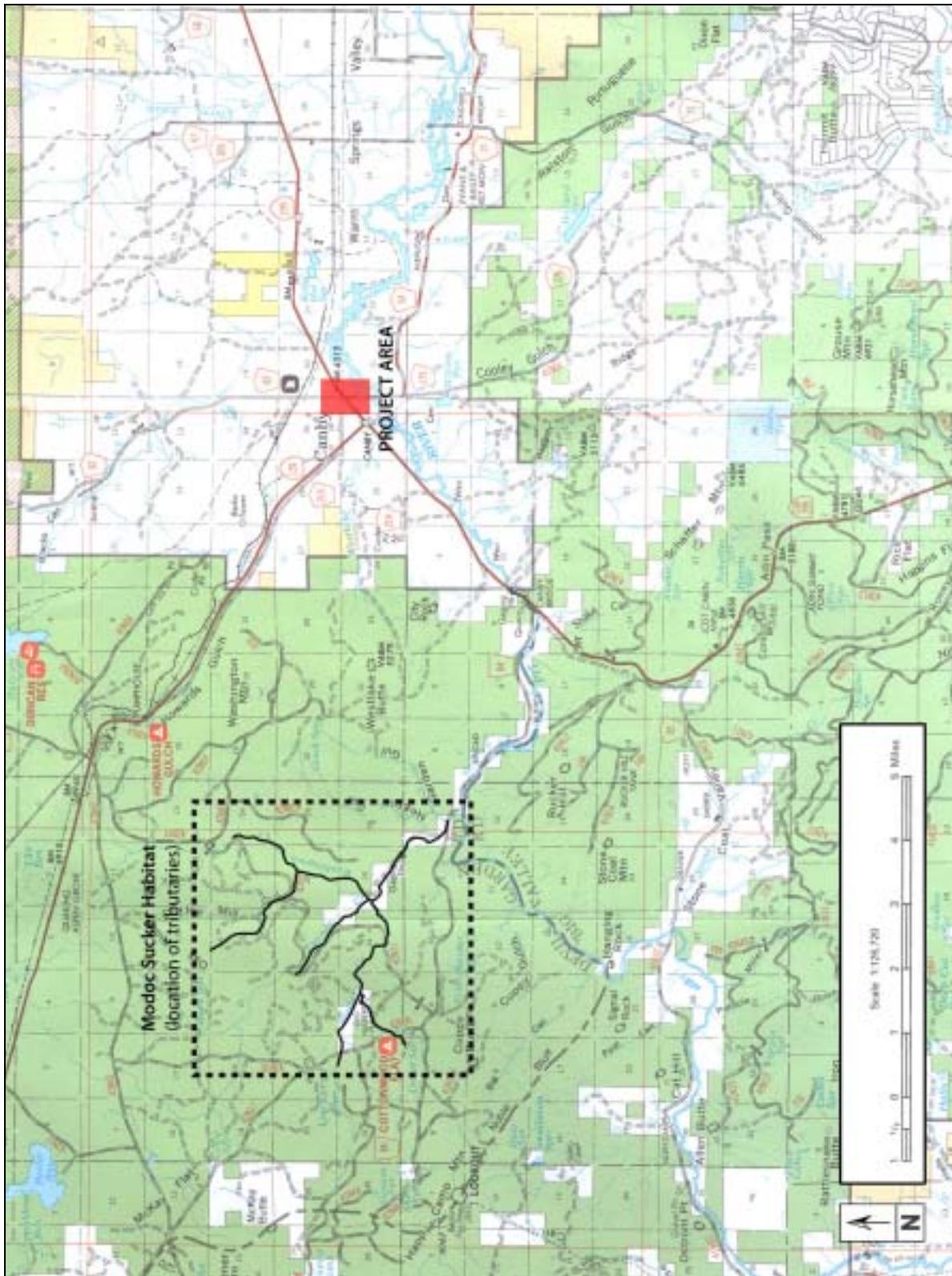
Migratory Bird Treaty Act. The Migratory Bird Treaty Act prohibits the killing of any migratory bird without a permit. With a few exceptions, most birds are considered migratory under the Act. The Act protects migratory birds and their nests.

State

The California Endangered Species Act (CESA) provides protection for endangered and threatened wildlife species as well. For proposed projects that may or would have an adverse effect on state-listed species, a formal consultation process must be initiated with the CDFG.

In addition to requiring consultation regarding potential adverse impacts to endangered and threatened wildlife, the CDFG currently maintains a list of “Species of Special Concern”. These animal species are not listed as endangered or threatened by the State of California at present, but there is a concern that, if current trends continue, they may require official listing in the future. By identifying Species of Special Concern, the CDFG draws attention to the need for protective measures that would prevent the need to designate them as endangered or threatened in the future.

Figure 3.4-1: Modoc Sucker Habitat



SOURCE: 50 CFR Part 17 USFWS and MHA 1985, 2002

California Natural Diversity Data Base. In order to inventory special status species in California, the CDFG has established the California Natural Diversity Data Base (CNDDDB), a program that lists the state's natural vegetation communities and "special plants." CNDDDB special plants include state and Federally listed, proposed, and candidate species and taxa that the CDFG considers to be rare, very restricted in distribution, declining, or closely associated with a habitat that is declining at an alarming rate in California. Species that are identified as sensitive by other government agencies (e.g., the BLM and USFS) are also considered to be CNDDDB special plants.

California Native Plant Society. The California Native Plant Society (CNPS) publishes and regularly updates the *Inventory of Rare and Endangered Vascular Plants of California*, (Skinner and Pavlik 1994) which has become a standard reference on California's rare and endangered plants. The CDFG recognizes that Lists 1A, 1B, and 2 of the *Inventory* contain plants that, in a majority of cases, would qualify for listing, and the CDFG will request their inclusion in environmental documents as necessary. Species classified as lists 3 or 4 are plants that are considered to be of lower sensitivity and do not fall under Federal or state regulatory authority.

Species Recovery Plans

Bald Eagle. A recovery plan for the bald eagle was published in 1986 (USFWS 1986). The primary goal of the recovery plan is to provide secure habitat for bald eagles within the seven-state Pacific recovery area, and to increase population levels in specific geographic areas to the extent that the species can be delisted. The seven states that comprise the Pacific recovery area include Idaho, Nevada, California, Oregon, Washington, Montana, and Wyoming.

Providing secure habitat for bald eagles involves identifying breeding and non-breeding habitat, arranging for long-term protection of bald eagle habitat, and managing habitat to ensure that its components are maintained and enhanced. Methods to secure bald eagle habitat that are outlined in the bald eagle recovery plan include: the need to assess the suitability of habitat not presently used by bald eagles, the incorporation of eagle habitat guidelines in agency land-use plans, the design and implementation of plans which secure individual nest sites, roosts, and foraging areas, and the need to maintain forested habitat that is presently used by eagles.

Modoc sucker. A revised action plan for the recovery of the Modoc sucker was published in 1983 (USFWS and CDFG, 1983). The purpose of the plan is to provide direction and assign responsibilities for the recovery of the Modoc sucker on the Modoc National Forest and adjacent private lands within its historic range.

The recovery efforts involve securing habitat and establishing viable Modoc sucker populations throughout the Turner-Hulbert-Washington creeks drainage, the Rush-Johnson Creeks drainage, and other streams during 1985-1990. The recovery plan includes actions necessary to secure viable populations and a timetable for completing these objectives. Methods include evaluating current populations in each drainage, preparing land adjustment plans, evaluating and constructing barriers in creek systems, and surveying for suitable habitat, and monitor population trends and habitat improvement effectiveness.

