

# Chapter 13

## Wildlife Resources

### 13.1 Affected Environment

This section describes the affected environment related to wildlife resources, including special-status species, for the dam and reservoir modifications proposed under the SLWRI. For a more in-depth description, see the *Wildlife Resources Technical Report*.

Shasta Dam and Shasta Lake are located on the upper Sacramento River in Northern California. Shasta Dam is located approximately 9 miles northwest of Redding, and the dam and entire reservoir are located in Shasta County. Elevations in the Shasta Lake vicinity portion of the primary study area range between approximately 1,070 and 1,200 feet, and the terrain is moderate to steep.

The wildlife resources setting for the Shasta Lake and vicinity portion of the primary study area consists of the impoundment area (five arms and the main body of Shasta Lake) and the relocation areas (Figure 13-1). The Shasta Lake and vicinity portion of the primary study area is composed of Shasta Dam and Shasta Lake and the lower reaches of the tributaries draining into Shasta Lake. In the initial phase of the SLWRI, 13 streams and rivers were selected to represent the diverse characteristics of the rivers and streams that flow into Shasta Lake.

Reclamation established project boundaries for focused surveys in the area that would be subject to inundation under various enlargement scenarios. The lower boundary corresponds to the current full-pool elevation defined by Reclamation (1,070-foot mean sea level (msl) contour line). The upper boundary was established using the 1,090-foot msl contour line around the entire lake. This area is hereafter referred to as the “impoundment area” (Figure 13-1).

To examine the physical and biological resources along riverine reaches that would be subject to inundation if Shasta Dam were enlarged, reaches of 11 streams and rivers that are tributary to Shasta Lake were also incorporated into the Shasta Lake and vicinity portion of the primary study area. These streams were selected by Reclamation in conjunction with USFS as an initial sampling of streams representative of riverine and riparian habitats.

Areas subject to physical disturbance as an indirect result of the proposed project (i.e., areas proposed as relocation sites for roadways, bridges, utilities,

and campgrounds that would be inundated subsequent to the enlargement of Shasta Dam as well as proposed dike locations) were incorporated into the Shasta Lake and vicinity portion of the primary study area. These locations are hereafter referred to as “relocation areas” (Figure 13-1).

For the purposes of this investigation, approximate acreages for habitat types are reported by arm of the lake. For a relocation area that falls between two arms, the area is included with the arm that has the most acreage of the vegetation type or water of the United States.

Descriptions of biological resources were derived primarily from the following sources:

- *Shasta Lake Water Resources Investigation Mission Statement Milestone Report* (Reclamation 2003)
- *Shasta Lake Water Resources Investigation Initial Alternatives Information Report* (Reclamation 2004)
- Chapter 3, “Biological Environment,” in the *Draft Shasta Lake Water Resources Investigation Plan Formulation Report* (Reclamation 2007)
- USFWS Endangered Species Database (USFWS 2007a)
- The California Natural Diversity Database (CNDDDB) (2011)

Several attachments to the *Wildlife Resources Technical Report* provide detailed lists and descriptions of special-status wildlife species present in the primary and extended study areas:

- Attachment 1, “Special-Status Wildlife Species Potentially Occurring in the Shasta Lake and Vicinity Portion of the Primary Study Area”
- Attachment 2, “Species Accounts for Special-Status Wildlife in the Shasta Lake and Vicinity Portion of the Primary Study Area”
- Attachment 3, “Breeding Bird Survey Results – 2007”
- Attachment 4, “Species Accounts for Special-Status Wildlife in the Primary Study Area Downstream from Shasta Dam”
- Attachment 5, “State and Federal Lists of Special-Status Wildlife Species in the Vicinity of the Primary Study Area”
- Attachment 6, “Special-Status Wildlife Species with Potential to Occur in the Primary and Extended Study Areas by Area”
- Attachment 7, “List of All Sensitive Wildlife Species in the Extended Study Area Reported to the CNDDDB”

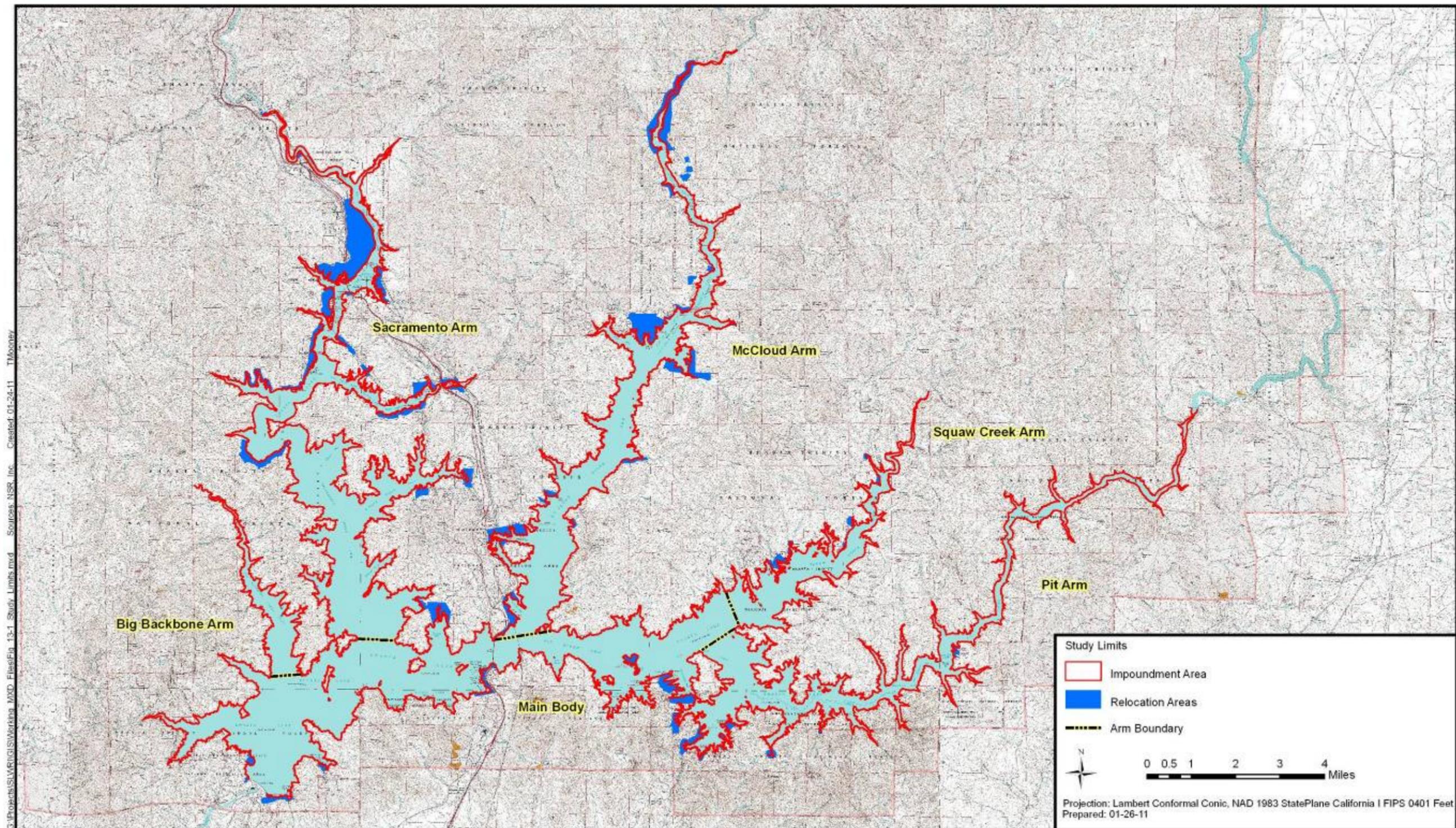


Figure 13-1. Study Limits

*This page left blank intentionally.*

### 13.1.1 Wildlife

#### ***Shasta Lake and Vicinity***

Wildlife resources described in this chapter result from the wealth and diversity of climatic and vegetative associations in and adjacent to the Shasta Lake and vicinity portion of the primary study area. Influences from the Coast Ranges, the southern Cascade Range, the northern Sierra Nevada, the Great Basin, and the Central Valley provide for a unique mix of biota. Much of this region, especially in the Central Valley, has been modified by past and present land uses.

Prior to Euro-American settlement, the area was dominated by riparian vegetation in the annual floodplains, with stands of valley oak (*Quercus lobata*) and interior live oak (*Q. wislizenii*) on higher ground. Herbaceous wetland bottoms and upland native grassland communities were common in this vegetation mosaic. The extensive oak forests and riparian/wetland habitats hosted a diverse and abundant wildlife community. Cattle grazing, deforestation of the oak woodlands, water development, flood protection, and expansion of agriculture onto the floodplains in the early to mid-1800s substantially altered the historical floodplain and channel vegetation.

Rural development, fire suppression, recreation, and wildfires have affected the population and distribution of wildlife in this area. Fire suppression, which has generally increased understory vegetation, has had mixed effects on wildlife. Bear, deer, and birds that prefer near-ground vegetation for food and cover have generally benefited, whereas birds requiring aerial foraging habitat, such as the golden eagle (*Aquila chrysaetos*), American peregrine falcon (*Falco peregrinus anatum*), and great horned owl (*Bubo virginianus*), have declined. Species that have adapted or thrived in the altered human environment include coyotes (*Canis latrans*), raccoons (*Procyon lotor*), and various other late-successional species. The quality of potential bat habitat, found primarily in the limestone formations to the north and east of Shasta Lake, has suffered from increased use by recreational rock climbers and spelunkers. Wildlife may also be affected by fragmented travel corridors in certain portions of the area that prevent species from moving between remaining suitable habitats.

**Wildlife Habitats** The Shasta Lake and vicinity portion of the primary study area is characterized by a variety of habitats typical of transitional mixed woodland and low-elevation forest. These habitats were mapped and classified using the *Guide to Wildlife Habitats of California* (Mayer and Laudenslayer 1988). Habitats present in the Shasta Lake and vicinity portion of the primary study area are summarized in Table 13-1 and Table 13-2. The locations of each type are depicted in Figures 13-2a through 13-2f. The wildlife species typical of each of these communities are described below.

**Table 13-1. Summary of Wildlife Habitats in the Impoundment Area**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Annual grassland	0.44	0.00	3.10	0.70	0.00	0.00
Barren	1.05	0.00	0.55	0.00	0.00	0.00
Blue oak – foothill pine	10.36	0.00	0.00	0.00	4.29	1.94
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	6.81
Closed-cone pine – cypress	32.68	0.00	12.95	20.79	44.72	373.48
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Lacustrine**	10,196.88	1,014.12	7,225.14	5,032.68	2,081.60	4,372.80
Mixed chaparral	29.19	13.64	161.04	15.06	10.35	59.50
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood – conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Riverine	0.00	0.88	5.24	15.43	1.41	0.00
Urban	21.95	00.00	1.95	7.96	0.00	1.92
<b>Total</b>	<b>10,655.99</b>	<b>1,105.79</b>	<b>7,945.75</b>	<b>5,475.62</b>	<b>2,324.52</b>	<b>4,888.56</b>

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping.

Notes:

\* Acreage values are approximate.

\*\* Lacustrine values are included for the entire surface area of Shasta Lake. The extent of activity occurring within Shasta Lake has yet to be determined.

**Table 13-2. Summary of Wildlife Habitats in the Relocation Areas**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Annual grassland	5.05	0.00	29.02	10.65	1.29	1.25
Barren	0.00	0.00	0.00	0.82	0.00	0.00
Blue oak–foothill pine	3.61	0.00	0.00	0.00	0.00	13.74
Blue oak woodland	0.00	0.00	0.00	3.89	0.00	2.28
Closed-cone pine–cypress	0.11	0.00	56.90	8.95	1.94	33.72
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Mixed chaparral	25.68	0.00	120.00	46.36	4.44	134.82
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood–conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Riverine	0.00	0.00	0.39	3.75	0.00	0.00
Urban	21.05	0.00	230.58	0.48	0.00	2.49
<b>Total</b>	<b>408.74</b>	<b>0.00</b>	<b>1,312.51</b>	<b>1,023.04</b>	<b>99.53</b>	<b>280.48</b>

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping.

Note:\*

Acreage values are approximate.

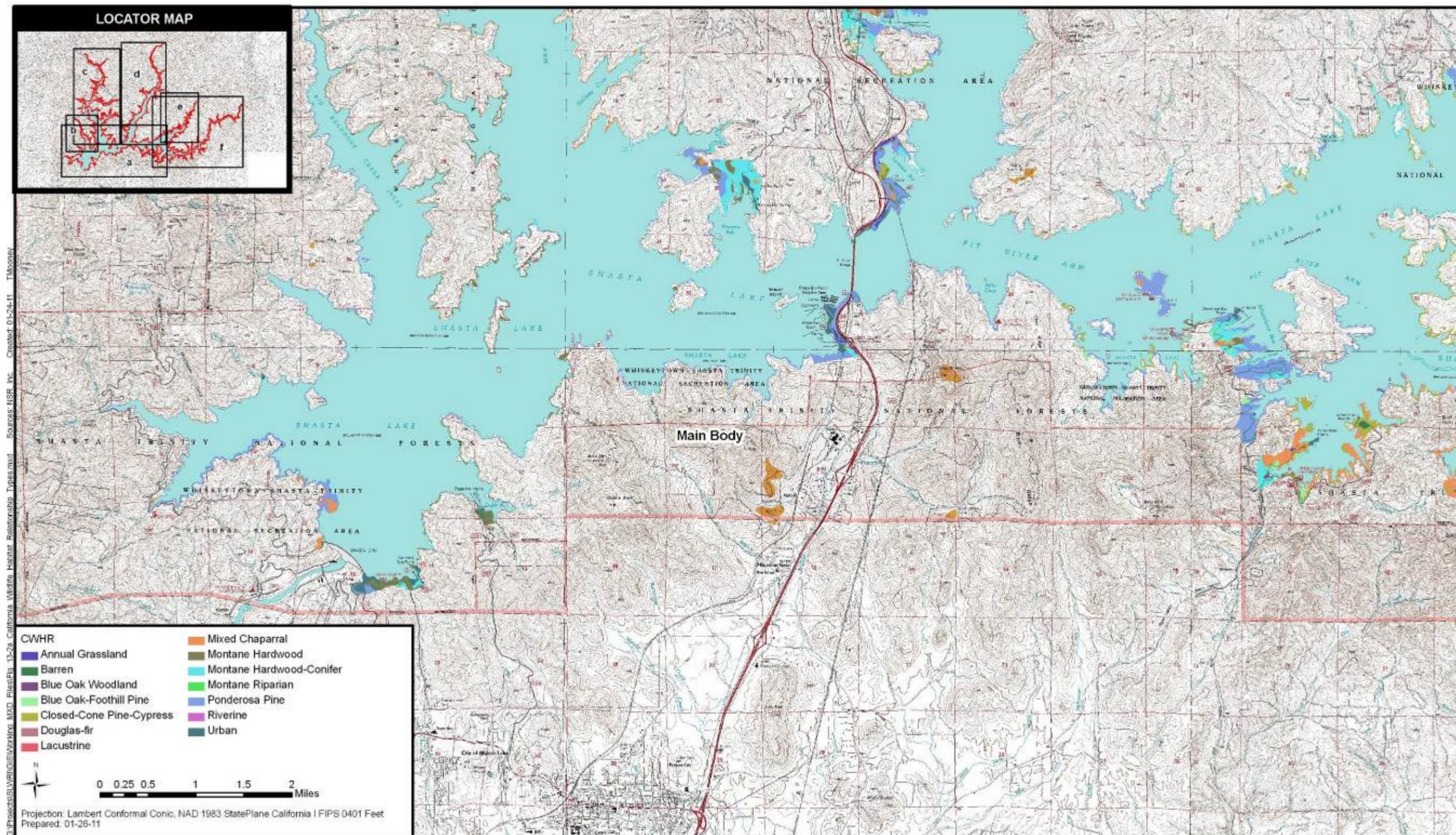


Figure 13-2a. California Wildlife Habitat Relationship Types

*This page left blank intentionally.*

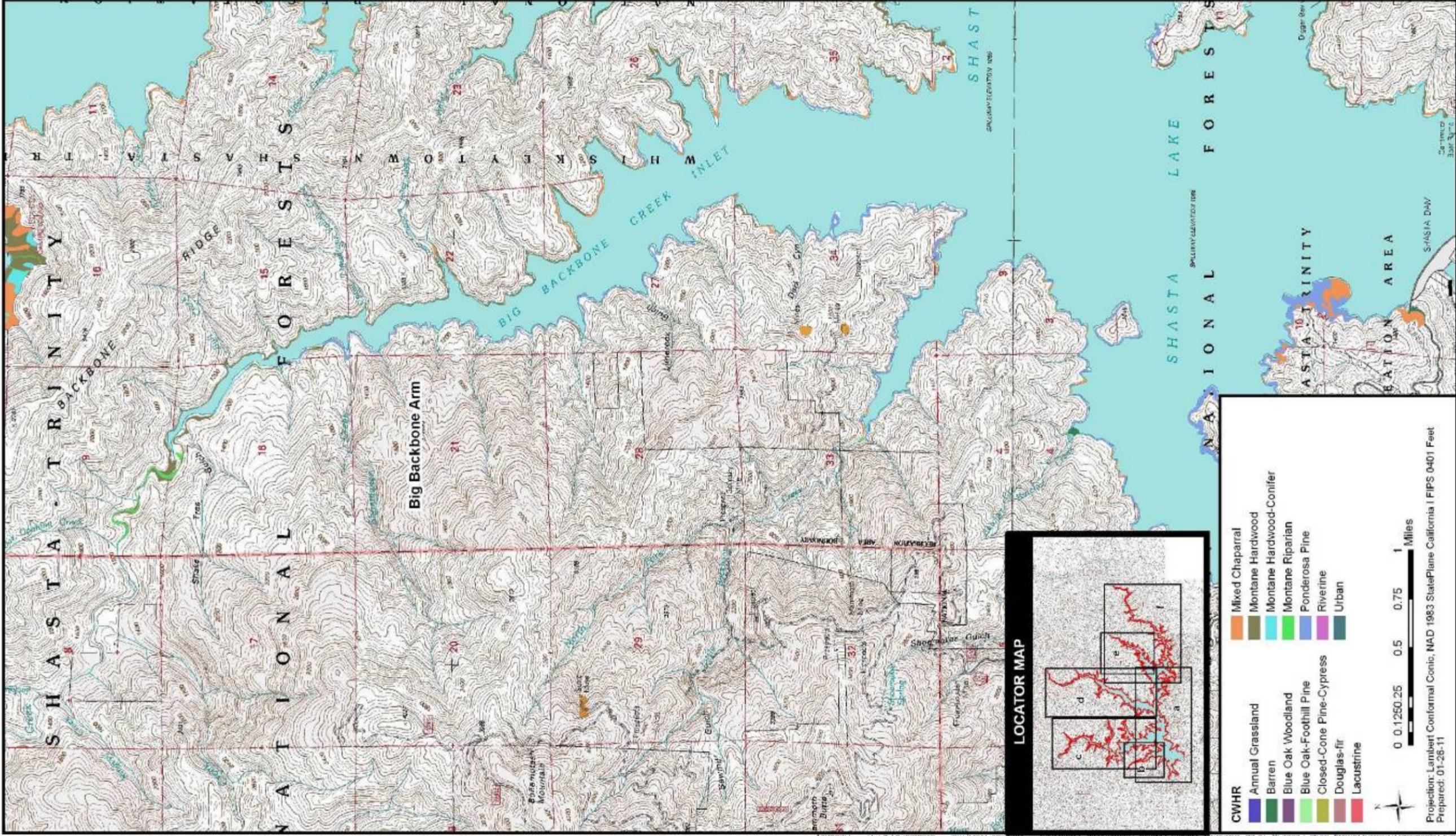


Figure 13-2b. California Wildlife Habitat Relationship Types

*This page left blank intentionally.*

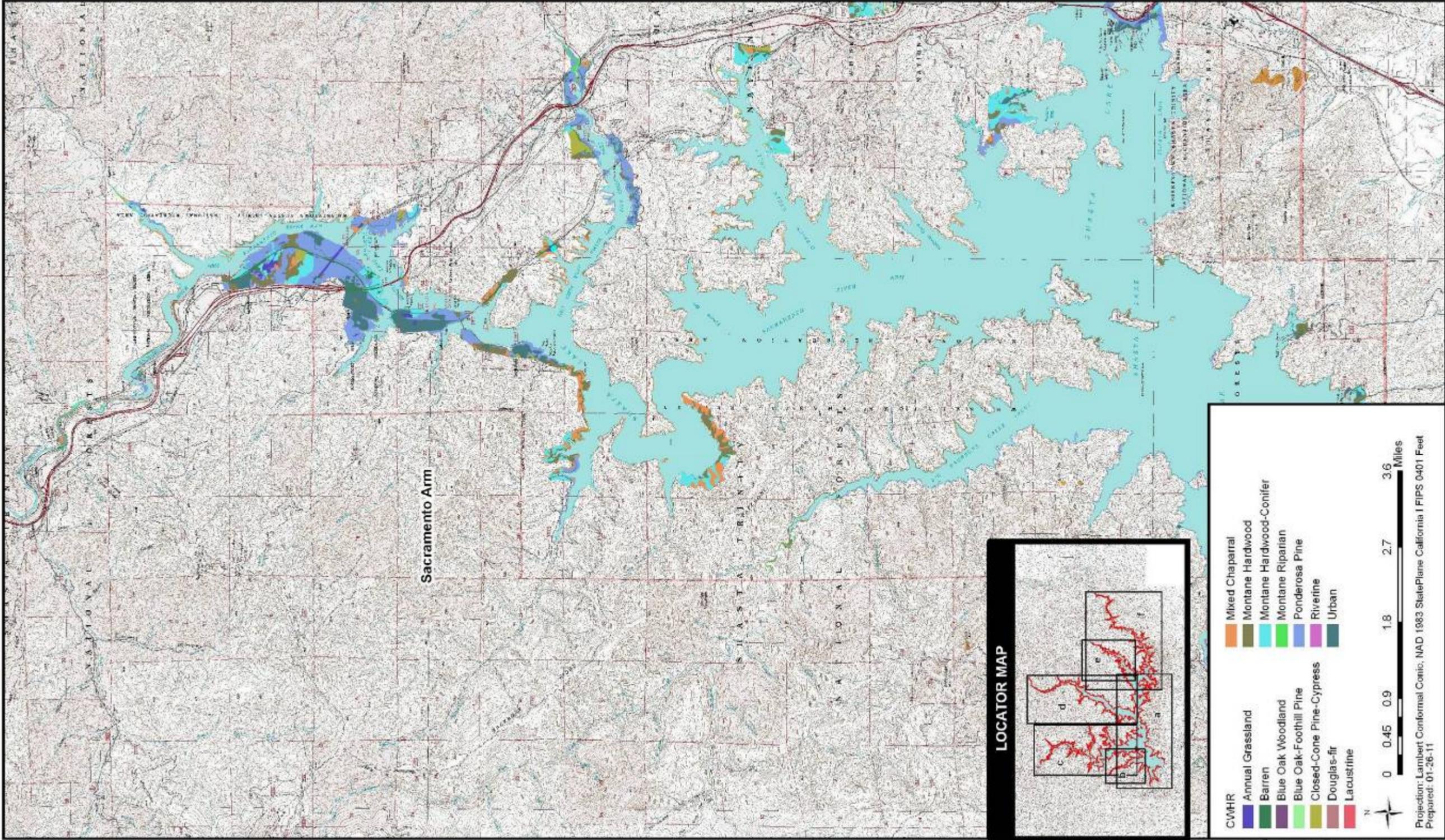


Figure 13-2c. California Wildlife Habitat Relationship Types

*This page left blank intentionally.*

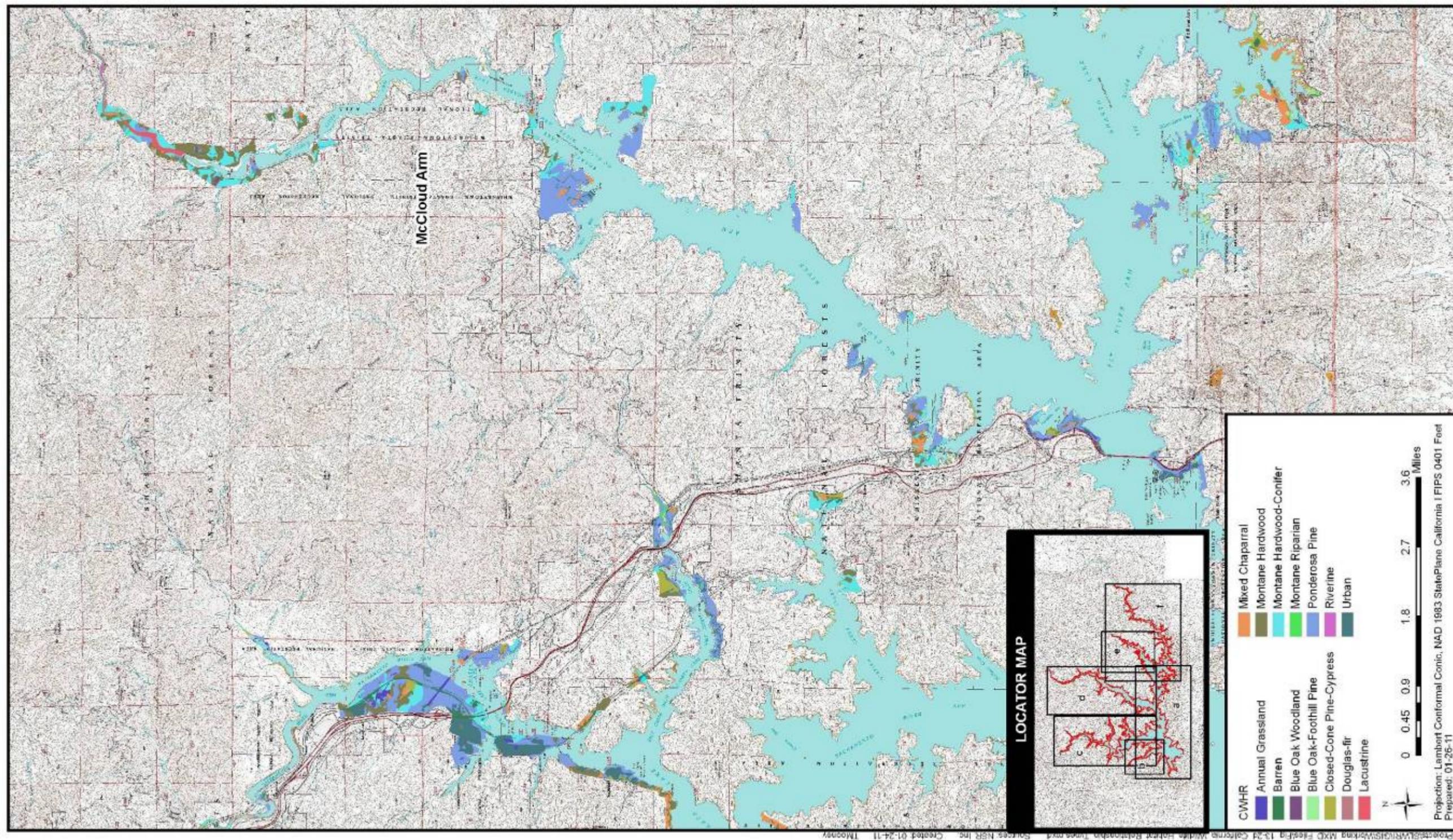


Figure 13-2d. California Wildlife Habitat Relationship Types

*This page left blank intentionally.*

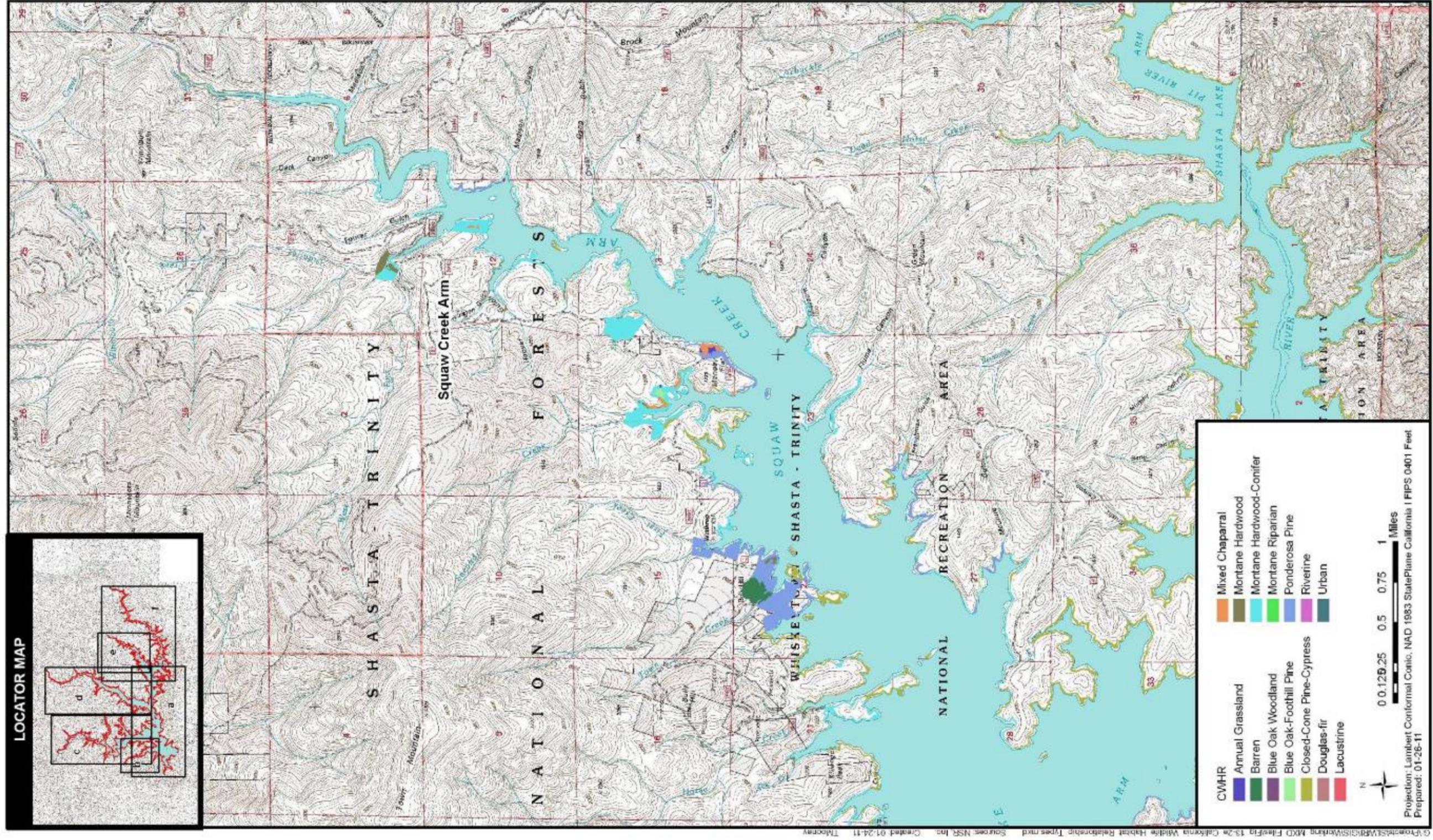


Figure 13-2e. California Wildlife Habitat Relationship Types

*This page left blank intentionally.*

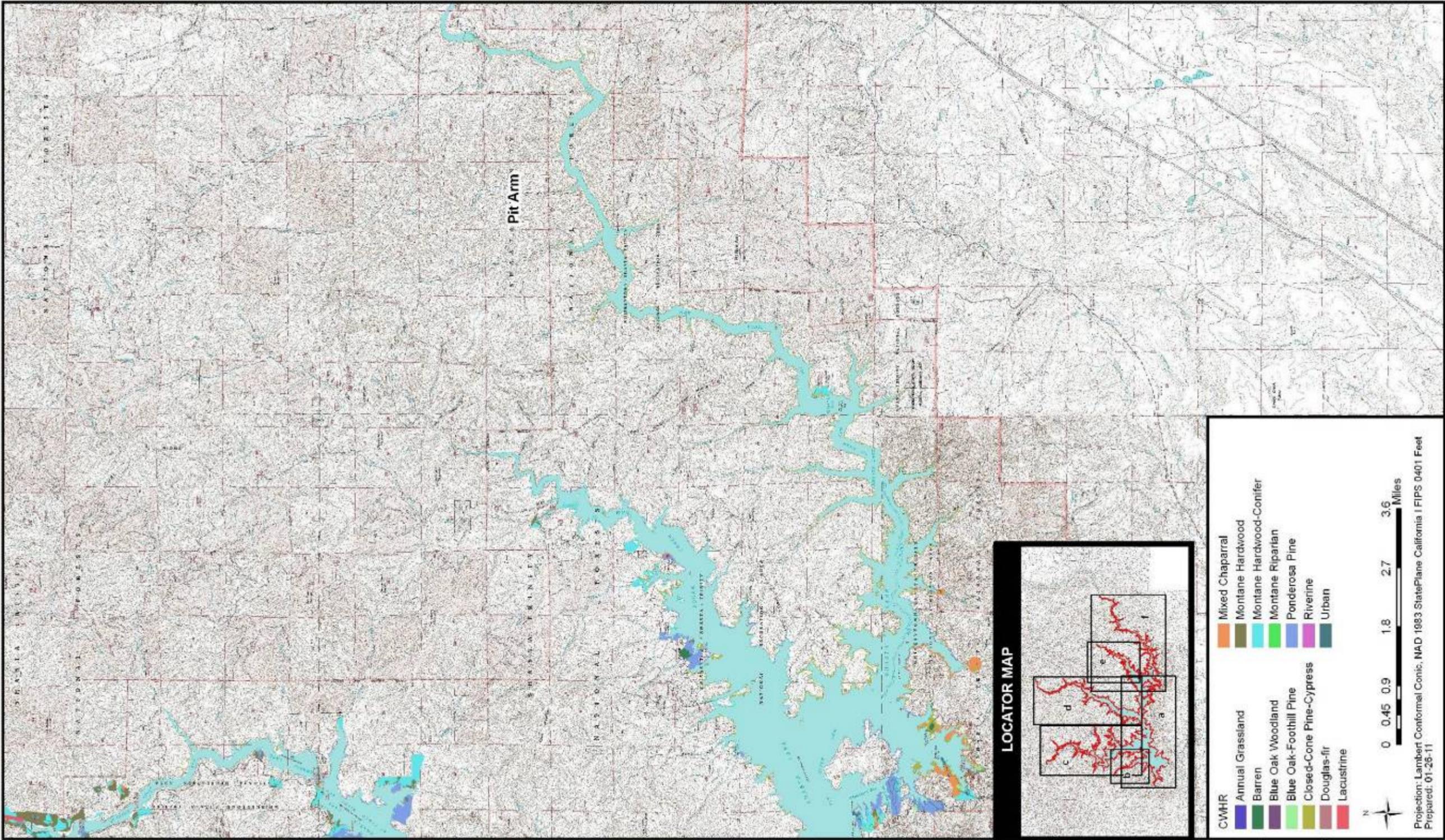


Figure 13-2f. California Wildlife Habitat Relationship Types

*This page left blank intentionally.*

**Annual Grassland** Annual grassland is uncommon in the Shasta Lake and vicinity portion of the primary study area and occurs as small inclusions in other more prevalent plant series types or in areas subjected to previous disturbance. Dominant species include wild oat (*Avena fatua*), cheatgrass (*Bromus tectorum*), ripgut (*B. diandrus*), yellow star-thistle (*Centaurea solstitialis*), squirreltail (*Elymus elymoides*), and European hairgrass (*Aira caryophylla*). Grassland bird species such as the mourning dove (*Zenaida macroura*), savannah sparrow (*Passerculus sandwichensis*), and white-crowned sparrow (*Zonotrichia leucophrys*), as well as rodents such as the California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), and deer mouse (*Peromyscus maniculatus*), may forage on the seed crop this community provides. These species, in turn, attract predators such as the gopher snake (*Pituophis melanoleucus*), American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis*), and coyote. Reptile species expected to inhabit this area include the western fence lizard (*Sceloporus occidentalis*), western skink (*Eumeces skiltonianus*), western rattlesnake (*Crotalus viridis*), and yellow-bellied racer (*Coluber constrictor*).

**Barren** Barren habitat consists mainly of nonvegetated human-made features scattered throughout the Shasta Lake and vicinity portion of the primary study area, including boat ramps, parking lots, and roads. Other barren habitats include a large gravel plain feature at the confluence of Butcher Creek and Shasta Lake (Main Body) and a sealed riprap feature adjacent to Interstate 5 near the upper Sacramento Arm and Shasta Lake confluence. Vegetation is usually not present, although sparse opportunistic grasses/forbs or weedy species may be present. Barren habitat has limited value for wildlife; however, many species in adjacent habitats may use these areas occasionally as opportunities arise, such as for feeding. Also, open nesting species such as killdeer (*Charadrius vociferus*) may use some barren surfaces for nesting.

**Blue Oak Woodland** Blue oak woodlands occur mainly as small inclusions within other more prevalent habitats; however, moderate-sized stands also occur. This habitat occurs at scattered locations along the Main Body, McCloud Arm, and Pit Arm. Blue oak woodland is characterized by a moderate overstory of blue oak (*Quercus douglasii*) with a dense herbaceous understory. Oak woodlands produce acorns used as forage by a variety of species, including acorn woodpeckers (*Melanerpes formicivorus*), western scrub-jays (*Aphelocoma californica*), turkey (*Meleagris gallopavo*), western gray squirrels (*Sciurus griseus*), and black-tailed deer (*Odocoileus hemionus columbianus*). Snags and live trees containing cavities provide nesting habitat for species such as the western bluebird (*Salia mexicana*), tree swallow (*Tachycineta bicolor*), American kestrel, and northern flicker (*Colaptes auratus*), as well as roost sites for bats and denning sites for mammals such as the raccoon, Virginia opossum (*Didelphis virginiana*), and gray fox (*Urocyon cinereoargenteus*). Raptors, including the red-tailed hawk and great horned owl, also nest in these woodlands. Amphibian and reptile species found here include the Pacific chorus frog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), western fence lizard,

southern alligator lizard (*Elgaria multicarinata*), western terrestrial garter snake (*Thamnophis elegans*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake.

**Blue Oak – Foothill Pine** Blue oak–foothill pine habitat also occurs mainly as small inclusions within other more prevalent habitats in the Shasta Lake and vicinity portion of the primary study area; however, moderate-sized stands also occur. This habitat is found in the Main Body, Squaw Creek Arm, and Pit Arm. Species composition is similar to the blue oak woodland habitat; however, gray pine and a shrub component are more common. Dominant overstory species include blue oak, California black oak (*Quercus kelloggii*), valley oak (*Quercus lobata*), interior live oak (*Quercus wislizenii*), and gray pine (*Pinus sabiniana*). Common shrubs observed in this habitat include white leaf manzanita (*Arctostaphylos viscida*), buck brush (*Ceanothus cuneatus*), poison oak (*Toxicodendron diversilobum*), coffee berry (*Rhamnus californica*), snowdrop bush (*Styrax officinalis*), wild mock orange (*Philadelphus lewisii*), deer brush (*Ceanothus integerrimus*), and California buckeye (*Aesculus californica*). Common grasses and forbs observed in this vegetation habitat include pussy ears (*Calochortus tolmiei*), Pacific hounds tongue (*Cynoglossum grande*), slender wild oat, and soaproot (*Chlorogalum pomeridianum*). Lianas of Dutchman’s pipe (*Aristolochia californica*) and chaparral clematis (*Clematis lasiantha*) shroud shrubs and often grow into the tree canopy.

The blue oak–foothill pine community provides breeding habitat for a large variety of wildlife species, although no species is completely dependent on it for breeding, feeding, or cover. Many of the species found in blue oak habitat are also found here. Acorns and gray pine seeds are an important resource for many of the species using this habitat, such as the acorn woodpecker, western scrub-jay, and western gray squirrel. The newly emerged leaves of oaks in the spring support an abundance of insects that attract migrating and nesting warblers, vireos, flycatchers, and other insectivorous birds. In addition, the shrubs provide habitat for birds such as the spotted towhee (*Pipilo maculatus*), California towhee (*Pipilo crissalis*), wrentit (*Chamaea fasciata*), and blue-gray gnatcatcher (*Polioptila caerulea*). Characteristic reptiles and amphibians include western toads (*Bufo boreas*), a wide variety of snakes (common garter snakes, California whipsnakes (*Masticophis lateralis*), gopher snakes, and western rattlesnakes), western skinks, southern alligator lizards, and western fence lizards.

**Closed-Cone Pine – Cypress** Closed-cone pine–cypress consists of open to dense knobcone pine (*Pinus contorta*) stands. This habitat is scattered throughout all portions of the Shasta Lake and vicinity portion of the primary study area and often occurs in disturbed areas, including areas of historic mining activities and past or recent wildfires. Dominant species include knobcone pine, with occasional canyon live oak (*Quercus chrysolepis*), California black oak, ponderosa pine, and gray pine. The shrub layer is moderate to dense and is dominated by white leaf manzanita and poison oak. The ground layer varies and is dominated by various grasses and forbs.

Numerous game and nongame species make use of this habitat for feeding and cover. Steller's jays (*Cyanocitta stelleri*) and western scrub-jays, downy woodpeckers (*Picoides pubescens*), and western gray squirrels extract seeds from partially opened cones. The great horned owl and red-tailed hawk are among the few species known to use this habitat for breeding.

**Douglas-Fir** As a habitat type, Douglas-fir is uncommon in the Shasta Lake and vicinity portion of the primary study area. This habitat type occurs in the upper portion of the McCloud Arm. Douglas-fir is characterized by moderate to dense conifer stands dominated by Douglas-fir (*Pseudotsuga menziesii*), with occasional ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), incense cedar (*Calocedrus decurrens*), canyon live oak, and California black oak. Associated understory species vary and include Pacific dogwood (*Cornus nuttallii*), mock orange (*Philadelphus lewisii*), poison oak, snowdrop bush, and white leaf manzanita. The ground layer ranges from open to moderate and is dominated by various grasses and forbs. The multilayered vegetation in the Douglas-fir community supports a variety of wildlife species. A significant feature of the community is the presence of cavity-bearing trees. Mature, fire-damaged, and wind-damaged forests typically contain snags (dead trees that are still standing), which are a valuable resource for birds and mammals that prefer nest and den sites in cavities, such as the flammulated owl (*Otus flammeolus*) and northern pygmy owl (*Glaucidium gnoma*). Snags also support wood-boring insects that provide food for bark-gleaning insectivorous birds such as the brown creeper (*Certhia americana*). Other birds foraging and/or breeding in this habitat include the sharp-shinned hawk (*Accipiter striatus*), American peregrine falcon, mountain quail, western wood-pewee (*Contopus sordidulus*), and western tanager (*Piranga ludoviciana*). Mammals found in this habitat include the long-eared myotis (*Myotis evotis*), western red bat (*Lasiurus blossevillii*), northern flying squirrel (*Glaucomys sabrinus*), and bobcat (*Lynx rufus*).

**Lacustrine** Lacustrine habitat consists of the area regularly inundated by Shasta Lake (i.e., areas up to and below the 1,070-foot elevation). Most of this area is barren of vegetation and is characterized as exposed soil and/or rock. Portions of the lacustrine habitat do support vegetation during draw-down periods, including woody riparian species such as black willow, button willow, Fremont cottonwood, and various grasses and forbs.

**Mixed Chaparral** Mixed chaparral is a common habitat type and is scattered throughout all portions of the Shasta Lake and vicinity portion of the primary study area. This habitat often occurs on exposed slopes and/or in disturbed areas, including historic mining activities and past or recent wildfires. Mixed chaparral is typically characterized by dense shrub stands dominated by white leaf manzanita, buck brush, toyon (*Heteromeles arbutifolia*), California buckeye, Brewer's oak (*Quercus garryana* var. *breweri*), California bay (*Umbellularia californica*), interior live oak, Lemmon's ceanothus (*Ceanothus lemmonii*), birch-leaf mountain mahogany (*Cercocarpus betuloides*), holly-leaf redberry

(*Rhamnus ilicifolia*), yerba santa (*Eriodictyon californicum*), and poison oak. Few herbaceous plants occur in this habitat. Mixed chaparral provides habitat for a wide variety of wildlife species. It provides seeds, fruit, and protection from predators and harsh weather. In addition, it provides singing, roosting, and nesting sites for many species of birds, including the California quail (*Callipepla californica*), wrentit, and Bewick's wren (*Thryomanes bewickii*). Mammals common in this habitat include the black-tailed hare (*Lepus californicus*), gray fox, coyote, and deer mouse. Reptiles that make use of this habitat include the western fence lizard and southern alligator lizard.

**Montane Hardwood** Montane hardwood is a common tree habitat type and is scattered throughout all portions of the Shasta Lake and vicinity portion of the primary study area. The montane hardwood stands are typically characterized by moderate to dense stands of California black oak, canyon live oak, and occasional interior live oak. The understory is variable, although often sparse in the evergreen (live oak) stands because of a typically dense overstory canopy. Mast crops provided by montane hardwood forests are an important food resource for many species, including the acorn woodpecker, Steller's jay, mountain quail (*Oreortyx pictus*), western gray squirrel, and black-tailed deer. In addition, cavities in mature trees provide nesting and denning habitat for species such as the northern flicker, western screech owl (*Otus kennicottii*), American kestrel, and Virginia opossum. In moist areas, many amphibians and reptiles are found in the detrital layer, including ensatina (*Ensatina eschscholtzii*) and western skink.

**Montane Hardwood – Conifer** Montane hardwood–conifer is a common tree habitat type and is scattered throughout all portions of the Shasta Lake and vicinity portion of the primary study area. Montane hardwood–conifer is a complex forest type generally characterized by a complex of hardwood and conifer tree species. Stand composition varies, depending on numerous physical and geographic factors, and can include California black oak, canyon live oak, interior live oak, Oregon white oak (*Quercus garryana*), gray pine, ponderosa pine, Douglas-fir, sugar pine, and knobcone pine. Understory species are generally moderate to dense and include white leaf manzanita, buck brush, California buckeye, western redbud (*Cercis occidentalis*), California bay, poison oak, birch-leaf mountain mahogany, Brewer's oak, and snowdrop bush. The ground layer varies and is dominated by various grasses and forbs, including pussy ears, soaproot, Pacific hound's tongue, and slender wild oat.

The variability of the canopy cover and understory vegetation makes montane hardwood–conifer habitat suitable for numerous species of wildlife. Hollow trees and logs provide denning sites for mammals such as the coyote and gray fox, and cavities in mature trees are used by cavity-dwelling species such as the acorn woodpecker, violet-green swallow (*Tachycineta thalassina*), northern flicker, great horned owl, raccoon, and California myotis (*Myotis californicus*). In addition, raptors, such as the red-tailed hawk, construct nests in the upper canopy of mature trees. Moreover, mast crops and conifer seeds are an

important food source for many birds and mammals, including the Steller's jay, acorn woodpecker, California quail, black-tailed deer, and western gray squirrel. In moist areas, many amphibians and reptiles, including ensatina and western fence lizards, inhabit the detrital layer. Snakes, including the western rattlesnake and sharp-tailed snake (*Contia tenuis*), also are found in this habitat.

**Montane Riparian** Montane riparian is the dominant riparian habitat type and is scattered throughout all portions of the Shasta Lake and vicinity portion of the primary study area. Montane riparian habitat occurs as thin stringers and large patches along most stream corridors and is characterized as a sparse overstory of white alder (*Alnus rhombifolia*), Fremont cottonwood (*Populus fremontii*), or big leaf maple (*Acer macrophyllum*), along with a fairly dense mid-story and herbaceous layer. The mid-story is dominated by red osier dogwood (*Cornus sericea*), arroyo willow (*Salix lasiolepis*), narrow-leafed willow (*S. exigua*), red willow (*S. laevigata*), spicebush (*Calycanthus occidentalis*), mock orange, button willow (*Cephalanthus occidentalis*), American dogwood (*Cornus sericea*), California ash (*Fraxinus dipetala*), and mugwort (*Artemisia douglasiana*). Brambles of Himalayan blackberry (*Rubus discolor*) and California blackberry (*R. ursinus*) often engulf broader, low-gradient riparian areas. Lianas including California grape and greenbriar (*Smilax californica*) grow into the canopy.

Riparian habitats are among the most important wildlife habitats because of their high floristic and structural diversity, high biomass (and therefore high food abundance), and high water availability. In addition to providing breeding, foraging, and roosting habitat for a diverse array of animals, riparian habitats also provide movement corridors for some species, connecting a variety of habitats throughout the region.

The leaf litter, fallen tree branches, and logs associated with the riparian community in the study area provide cover for the western toad and Pacific chorus frog. The western fence lizard, western skink, and southern alligator lizard are also expected to occur here. Common species nesting and foraging primarily in the riparian tree canopy include the bushtit (*Psaltriparus minimus*), white-breasted nuthatch (*Sitta carolinensis*), and Nuttall's woodpecker (*Picoides nuttallii*). Other resident species, such as the spotted towhee and song sparrow (*Melospiza melodia*), nest and forage on or very close to the ground, usually in dense vegetation. A variety of mammals also inhabit riparian communities, including the deer mouse, raccoon, and Virginia opossum.

**Ponderosa Pine** Ponderosa pine is the most common conifer habitat type in the Shasta Lake and vicinity portion of the primary study area and is scattered throughout all portions of the area. This habitat is characterized by open to dense conifer stands dominated by ponderosa pine. Associated species include occasional Douglas-fir, sugar pine, incense cedar, canyon live oak, and California black oak. Associated understory species vary and include redbud, buck brush, mock orange, poison oak, snowdrop bush, and white leaf

manzanita. The ground layer ranges from open to moderate and is dominated by various grasses and forbs.

Ponderosa pine needles, cones, buds, pollen, twigs, seeds, and associated fungi and insects provide food for many species of birds and mammals, including the mountain quail, western gray squirrel, black-tailed deer, Allen's chipmunk (*Tamias senex*), and black bear (*Ursus americanus*). Mature trees provide nesting habitat for raptors such as the bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), sharp-shinned hawk, and red-tailed hawk, and snags and hollow logs provide shelter for species such as the Virginia opossum and western spotted skunk (*Spilogale gracilis*).

**Riverine** Riverine habitat includes the free-flowing portions of the larger Shasta Lake tributaries in the Shasta Lake and vicinity portion of the primary study area. The riverine habitat is highly variable and ranges from moderate, low-gradient to steep, well-confined stream reaches. Most riverine habitat is dominated by run-and-riffle habitats, with bedrock, boulder, cobble, gravel, and sand substrates. The vegetation in the active stream channel is sparse, with occasional clumps of torrent sedge (*Carex nudata*) and Indian rhubarb (*Darmera peltata*).

Riverine areas provide habitat for numerous fish, including rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), smallmouth bass (*Micropterus dolomieu*), and riffle sculpin (*Cottus gulosus*). Aquatic wildlife species include the foothill yellow-legged frog (*Rana boylei*), aquatic garter snake (*Thamnophis atratus*), and the aquatic phase of the rough-skinned newt (*Taricha granulosa granulosa*). Birds present include the American dipper (*Cinclus mexicanus*), common merganser (*Mergus merganser*), and belted kingfisher (*Ceryle alcyon*). Many mammals in the surrounding upland habitats use the riverine areas, including raccoon, gray fox, and black-tailed deer.

**Urban** Urban habitat consists of various human-made features scattered throughout the Shasta Lake and vicinity portion of the primary study area, including resorts and a portion of the visitor center complex at Shasta Dam. These features are typically a combination of buildings, pavement areas with manicured landscaping, and lawns. The wildlife species most often associated with urban areas are those that are most tolerant of periodic human disturbances, including several introduced species, such as European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), and house mouse (*Mus musculus*). Native species that are able to use these habitats include the western fence lizard, American robin (*Turdus migratorius*), Brewer's blackbird (*Euphagus cyanocephalus*), northern mockingbird (*Mimus polyglottos*), mourning dove, house finch (*Carpodacus mexicanus*), California ground squirrel, black-tailed hare, and striped skunk (*Mephitis mephitis*). In addition, bats that forage in nearby habitats may make use of small cavities around the eaves of structures.

***Upper Sacramento River (Shasta Dam to Red Bluff)***

Important wildlife habitat is found throughout the upper Sacramento River portion of the primary study area, and large contiguous blocks that contain multiple habitat types have the potential to support the highest wildlife diversity and abundance. Overall, the quantity and variety of wildlife species now inhabiting the area have been reduced since agricultural and residential development permanently removed much of the native and natural habitat. Most affected have been wildlife species associated with riparian habitats, which have declined substantially and been highly altered by land use, water resources development, and land management practices. Wildlife species associated with grassland and oak woodland habitats have also been affected by habitat loss resulting from habitat conversions to residential, commercial, and agricultural uses; cattle grazing; and other compounding factors such as lack of oak regeneration, spread of Sudden Oak Death Syndrome, and competition from invasive species. The region also supports a variety of nonnative plant and animal species, some of which are detrimental to survival of native species.

**Habitats present in this portion of the primary study area are riparian woodland, riparian scrub, oak woodland, chaparral, annual grassland, agriculture, and urban. (See the Wildlife Resources Technical Report for a description of the plant and wildlife species typical of these habitats.)**

Riparian habitat has been designated by DFG as a sensitive habitat in California because of its limited abundance and high value to wildlife.

***Lower Sacramento River and Delta***

The roughly 300 miles of the Sacramento River can be subdivided into distinct reaches. The reaches in the lower Sacramento River and Delta portion of the extended study area are discussed separately below because of differences in morphology, riparian vegetation, and habitat functions.

**Sacramento River from Red Bluff Diversion Dam to the Delta** Most habitat types and many of the wildlife species found in the upper Sacramento River portion of the primary study area have the potential to occur in the Central Valley portion of the extended study area, with additional species occurring in upland and foothill areas. The segment of the extended study area between Red Bluff Diversion Dam (RBDD) and the Delta includes a diverse array of wildlife habitats – floodplains, basins, terraces, active and remnant channels, and oxbow sloughs. The variety and availability of habitats along the middle Sacramento River support a wide range of wildlife species: a variety of waterfowl, raptors, and migratory and resident avian species, plus a variety of mammals, amphibians, and reptiles that inhabit both aquatic and upland habitats.

**Sacramento-San Joaquin River Delta** Delta wetlands are considered to be among the most productive wildlife habitats in California. These wetlands consist of permanent saline, brackish, and freshwater marshes; seasonal freshwater wetlands; open water; tidal and nontidal marshes, and emergent wetlands; and agricultural cropland (CALFED 2000a). (See the *Wildlife*

*Resources Technical Report* for a discussion of the plant and wildlife species typical of Delta wetlands.)

**San Joaquin River Basin to the Delta** Most habitat types and many of the wildlife species described above for the Sacramento River corridor have the potential to occur in the Central Valley portion of the extended study area, with additional species occurring in upland and foothill areas. The current wildlife habitat value of this area is somewhat limited by the predominance of agricultural lands, which support a relatively low diversity of wildlife species. However, the orchards, row and field crops, and fallow fields can be used by a number of common species, and fallow fields and some crops (e.g., wheat and barley) can support a variety of small mammals and provide high-quality foraging habitat for many species of raptors. More importantly, remnant native vegetation patches are likely to support a high diversity of wildlife species.

#### ***CVP/SWP Service Areas***

The CVP and SWP service areas contain a large diversity of both lowland and upland habitats and species, although agricultural and urban growth has reduced the area and connectivity of important habitats that are critical to sustaining a wide variety of unique plants and animals (CALFED 2000a). The agricultural land and urban development that dominate the CVP and SWP service areas, respectively, can support many wildlife species, most of which are highly adapted to these disturbed environments.

### **13.1.2 Special-Status Species**

Special-status species addressed in this section include animals that are legally protected or are otherwise considered sensitive by Federal, State, or local resource conservation agencies and organizations. Specifically, these include species that are Federally listed and/or State-listed as rare, threatened, or endangered; those considered as candidates or proposed for listing as threatened or endangered; species identified by DFG as fully protected or species of special concern, species identified by USFS as sensitive, or endemic; species identified by the U.S. Bureau of Land Management (BLM) as sensitive; species designated by the Northwest Forest Plan as survey and manage; other animals protected by the California Fish and Game Code; and those designated as Multi-Species Conservation Strategy (MSCS) covered species by the CALFED Bay-Delta Program (CALFED).

#### ***Shasta Lake and Vicinity***

For the purposes of this evaluation, wildlife species of concern include species that are any of the following:

- Designated as threatened or endangered by the State or Federal government
- Proposed or petitioned for Federal listing as threatened or endangered

- State or Federal candidates for listing as threatened or endangered
- Identified by DFG as a species of special concern
- Considered sensitive or endemic by USFS
- Considered sensitive by BLM
- Considered survey and manage species by Northwest Forest Plan
- Designated as MSCS-covered species by CALFED

Special-status wildlife species with the potential to occur in the Shasta Lake and vicinity portion of the primary study area were determined using several database searches, review of USFWS and DFG special-status species lists for Shasta County, review of other appropriate literature, discussions with resource agency personnel, and professional experience in the area. All special-status wildlife species potentially occurring in the Shasta Lake and vicinity portion of the primary study area are discussed in Attachment 1 of the *Wildlife Resources Technical Report*, which provides a general comparison of habitat requirements for each species and the general habitats in the primary study area above Shasta Dam. For those special-status species for which generally suitable habitat was determined to be present, results from the various vegetation habitat mapping and wildlife surveys conducted in the area by North State Resources, Inc. (NSR) since 2002 were used to determine the likelihood of their presence in the primary study area above Shasta Dam (Table 13-3).

The survey and manage species include species listed in the most current survey and manage species list considered by the Northwest Forest Plan Survey and Manage Program. This list includes species from the current annual review for survey and manage species that was completed in compliance with the 2001 record of decision (ROD) for amendments to the survey and manage, protection buffer, and other mitigation measures standards and guidelines. Compliance with this ROD is conducted by completion of an annual species review and category assignment. The current survey and manage species list is from the December 2003 annual status review and includes species included in *Survey and Manage Standards and Guidelines and Category Assignment* of the 1994 ROD for the Northwest Forest Plan. For the purposes of this evaluation, survey and manage species of concern include taxa that are designated as Category A and C by the current category assignment. These categories include taxa that require what are known as predisturbance (i.e., preproject) surveys.

The CNDDDB was reviewed for records of special-status plant species in or near the Shasta Lake and vicinity portion of the primary study area. The CNDDDB is a database consisting of historical observations of special-status plant species, wildlife species, and natural communities. The CNDDDB is limited to reported

sightings and is not a comprehensive list of special-status species that could occur in a particular area.

**Table 13-3. Wildlife Species of Concern in the Shasta Lake and Vicinity Portion of the Primary Study Area**

Common Name	Scientific Name	Status	Potential for Occurrence
Shasta sideband	<i>Monadenia troglodytes troglodytes</i>	FP, USFS S, S&M, MSCS m	Endemic to Shasta County. Potentially occurring in mixed conifer and woodland habitats, especially near limestone. Species occurs in limestone on the McCloud Arm from Potter Creek north.
Wintu sideband	<i>Monadenia troglodytes wintu</i>	FP, USFS S, S&M	Endemic to Shasta County. Potentially occurring in mixed conifer and woodland habitats, especially near limestone. Known to occur between the Pit and Squaw Creek arms and at Mountain Gate.
Shasta chaparral	<i>Trilobopsis roperi</i>	FP, USFS S, S&M	Endemic to Shasta County. Potentially occurring in mixed conifer and conifer/woodland habitats. Known occurrences in the Shasta Lake and vicinity portion of the study area.
Shasta hesperian	<i>Vespericola shasta</i>	FP, USFS S, S&M	Endemic to Klamath Province. Potentially occurring in mixed conifer and conifer/woodland habitats (riparian and/or riverine habitats). Only known from the southeastern Klamath Mountains region. Known occurrences in the Shasta Lake and vicinity portion of the study area.
Shasta salamander	<i>Hydromantes shastae</i>	CT, USFS S, S&M, MSCS m, BLMS	Only known from the southeastern Klamath Mountains region. Potentially occurring in mixed conifer, woodland, and chaparral habitats, especially near limestone. Known occurrences in the Shasta Lake and vicinity portion of the study area.
Tailed frog	<i>Ascaphus truei</i>	CSC	Potentially occurring in stream habitats in the Shasta Lake and vicinity portion of the study area. Known occurrences in the McCloud Arm and the upper Sacramento Arm tributaries outside the study area boundaries (DFG 2003).
California red-legged frog	<i>Rana draytonii</i>	FT, CSC, MSCS m	Requires aquatic habitat for breeding; also uses a variety of other habitat types including riparian and upland areas. A habitat assessment has been prepared to determine habitat suitability in the vicinity of Shasta Lake. Species has not been recorded in Shasta County since 1926 (University of Michigan Museum of Zoology 2009).
Foothill yellow-legged frog	<i>Rana boylei</i>	CSC, USFS S, MSCS m, BLMS	Potentially occurring in stream habitats. Known occurrences scattered throughout the Shasta Lake and vicinity portion of the primary study area.
Northwestern pond turtle	<i>Actinemys marmorata marmorata</i>	CSC, USFS S, MSCS m	Potentially occurring in stream or other wetland habitats. Adjacent upland habitats are potential nesting areas. Known occurrences scattered throughout the Shasta Lake and vicinity portion of the primary study area.
Long-eared owl	<i>Asio otus</i>	CSC, MSCS m	Potentially occurring in coniferous forest habitats.
Northern goshawk	<i>Accipiter gentilis</i>	CSC, USFS S, BLMS	Potentially occurring in mixed conifer habitats. Known to occur in the upper McCloud Arm.
Cooper's hawk	<i>Accipiter cooperi</i>	MSCS m	Potentially occurring in mixed conifer and conifer/woodland habitats.
Great blue heron	<i>Ardea herodias</i>	MSCS m	Known to breed in nearshore wooded habitat in the Turntable Bay area of Shasta Lake.

**Table 13-3. Wildlife Species of Concern in the Shasta Lake and Vicinity Portion of the Primary Study Area (contd.)**

Common Name	Scientific Name	Status	Potential for Occurrence
Willow flycatcher	<i>Empidonax traillii</i>	CE, USFS S, MSCS r	Uncommon migrant in riparian habitat; unlikely to nest in the Shasta Lake and vicinity portion of the primary study area.
American peregrine falcon	<i>Falco peregrinus anatum</i>	FD, CD, CP, MSCS m	Potentially occurring in mixed conifer and conifer/woodland habitats. Nesting sites in the study area unlikely due to lack of suitable eyrie sites; however, potential eyrie sites occur adjacent to the Shasta Lake and vicinity portion of the primary study area. Known historical eyrie along the McCloud Arm, and "new" eyrie found at the Gooseneck (Sacramento Arm).
Bald eagle	<i>Haliaeetus leucocephalus</i>	FD, FB, CE, CP, USFS S, MSCS m, BLMS	Potentially occurring in riverine and lacustrine habitats. Common at Shasta Lake, and a substantial number of nests occur in the Shasta Lake and vicinity portion of the primary study area and vicinity. Shasta Lake has the highest density of breeding bald eagles in the continental United States.
Osprey	<i>Pandion haliaetus</i>	MSCS m	Potentially occurring in riverine and lacustrine habitats. Common at Shasta Lake, and many known nests occur in the Shasta Lake and vicinity portion of the primary study area and vicinity.
Northern spotted owl Critical Habitat	<i>Strix occidentalis caurina</i>	FT, MSCS m	Potentially occurring in coniferous forest habitats. The species has been recorded within 0.5 mile of the study area along the Squaw Creek Arm (DFG 2003). Critical habitat occurs in the upper portion of the Squaw Creek and Pit arms.
Vaux's swift	<i>Chaetura vauxi</i>	CSC	Potentially occurring in coniferous forest and conifer/woodland habitats. Known to occur in the Shasta Lake and vicinity portion of the study area.
Yellow warbler	<i>Dendroica petechia brewsteri</i>	CSC, MSCS r	Potentially occurring in riparian habitats. Known occurrences in and near the Shasta Lake and vicinity portion of the primary study area.
Yellow-breasted chat	<i>Icteria virens</i>	CSC, MSCS m	Potentially occurring in riparian habitats. Known occurrences in and near the Shasta Lake and vicinity portion of the primary study area.
Purple martin	<i>Progne subis</i>	CSC	Potentially occurring in conifer, woodland, and riparian habitats. Foraging habitat occurs throughout Shasta Lake and vicinity portion of the primary study area. Shasta Lake is one of the few known breeding sites in interior California.
Pallid bat	<i>Antrozous pallidus</i>	CSC, USFS S, BLMS	Potentially occurring in mixed conifer and conifer/woodland habitat throughout the study area.
Ringtail	<i>Bassariscus astutus</i>	CP, MSCS m	Potentially occurring in mixed conifer and conifer/woodland habitats. Known occurrences in and near the Shasta Lake and vicinity portion of the primary study area.
Spotted bat	<i>Euderma maculatum</i>	CSC, BLMS	Potentially occurring in mixed conifer and conifer/woodland habitat throughout the study area. Species has been recorded on Squaw Creek within approximately 6 miles of the Shasta Lake and vicinity portion of the primary study area (DFG 2003).

**Table 13-3. Wildlife Species of Concern in the Shasta Lake and Vicinity Portion of the Primary Study Area (contd.)**

Common Name	Scientific Name	Status	Potential for Occurrence
Western mastiff bat	<i>Eumops perotis</i>	CSC, MSCS m*, BLMS *californicus subspecies only	Potentially occurring in mixed conifer and conifer/woodland habitat throughout the Shasta Lake and vicinity portion of the primary study area.
Western red bat	<i>Lasiurus blossevillii</i>	USFS S	Potentially occurring in mixed conifer and conifer/woodland habitat throughout the Shasta Lake and vicinity portion of the primary study area.
American marten	<i>Martes americana</i>	USFS S	Mixed evergreen forests with abundant cavities for denning and nesting and open areas for foraging.
Pacific fisher	<i>Martes pennanti</i>	FC, CSC, USFS S, BLMS	Potentially occurring in mixed conifer and conifer/woodland habitats. Known occurrences in and near the Shasta Lake and vicinity portion of the primary study area.
Long-eared myotis	<i>Myotis evotis</i>	BLMS	Potentially occurring in a wide variety of forest habitats throughout the study area.
Yuma myotis	<i>Myotis yumanensis</i>	BLMS	Potentially occurring in a wide variety of forest habitats throughout the study area.
Townsend's big-eared bat	<i>Plecotus townsendii</i>	CSC, USFS S	Potentially occurring in mixed conifer and conifer/woodland habitat throughout the study area. The species was observed in the Shasta Lake and vicinity portion of the primary study area by NSR biologists in June 2008.

Source: DFG 2003

Key:

Status Definitions

BLMS = U.S. Bureau of Land Management sensitive

CD = State delisted

CE = State-listed as endangered

CP = California fully protected

CSC = California species of special concern

CT = California (State) listed as threatened

FB = Federal Bald and Golden Eagle Protection Act

FC = Federal candidate for listing

FD = Federally delisted

FP = Federally petitioned for listing

FT = Federally listed as threatened

MSCS = Multi-Species Conservation Strategy covered species

m = Maintain. Ensure that any adverse effects on the species that could be associated with implementation of CALFED Bay-Delta Program actions will be fully offset through implementation of actions beneficial to the species.

r = Contribute to recovery. Implement some of the actions deemed necessary to recover species' populations in the Multi-Species Conservation Strategy focus area.

S&M = Survey and manage species

USFS S = U.S. Forest Service sensitive

The life history of species known or potentially occurring in the Shasta Lake and vicinity portion of the primary study area are described in detail in Attachment 2 of the *Wildlife Resources Technical Report*. Figures 13-3a through 13-3f depict the known locations of special-status wildlife species in the primary study area above Shasta Dam located during various surveys conducted by NSR and recent USFS records. Figures 13-4a through 13-4f depict the known locations of special-status terrestrial mollusks.

**Summary of Wildlife Investigations** Because wildlife studies are ongoing, technical memoranda describing methods, results, and conclusions in detail will be provided in the Final Environmental Impact Statement (FEIS).

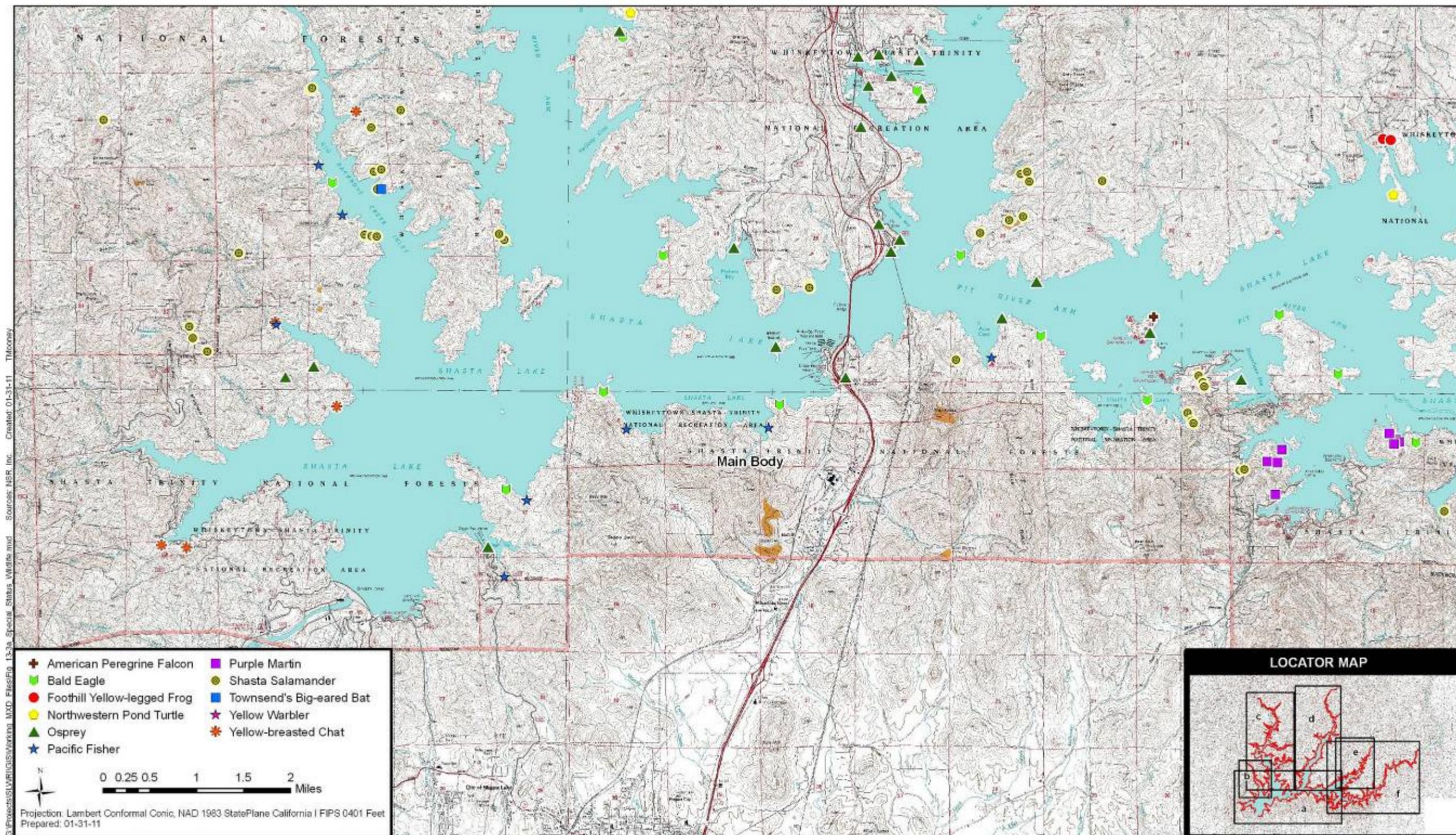


Figure 13-3a. Special-Status Wildlife Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

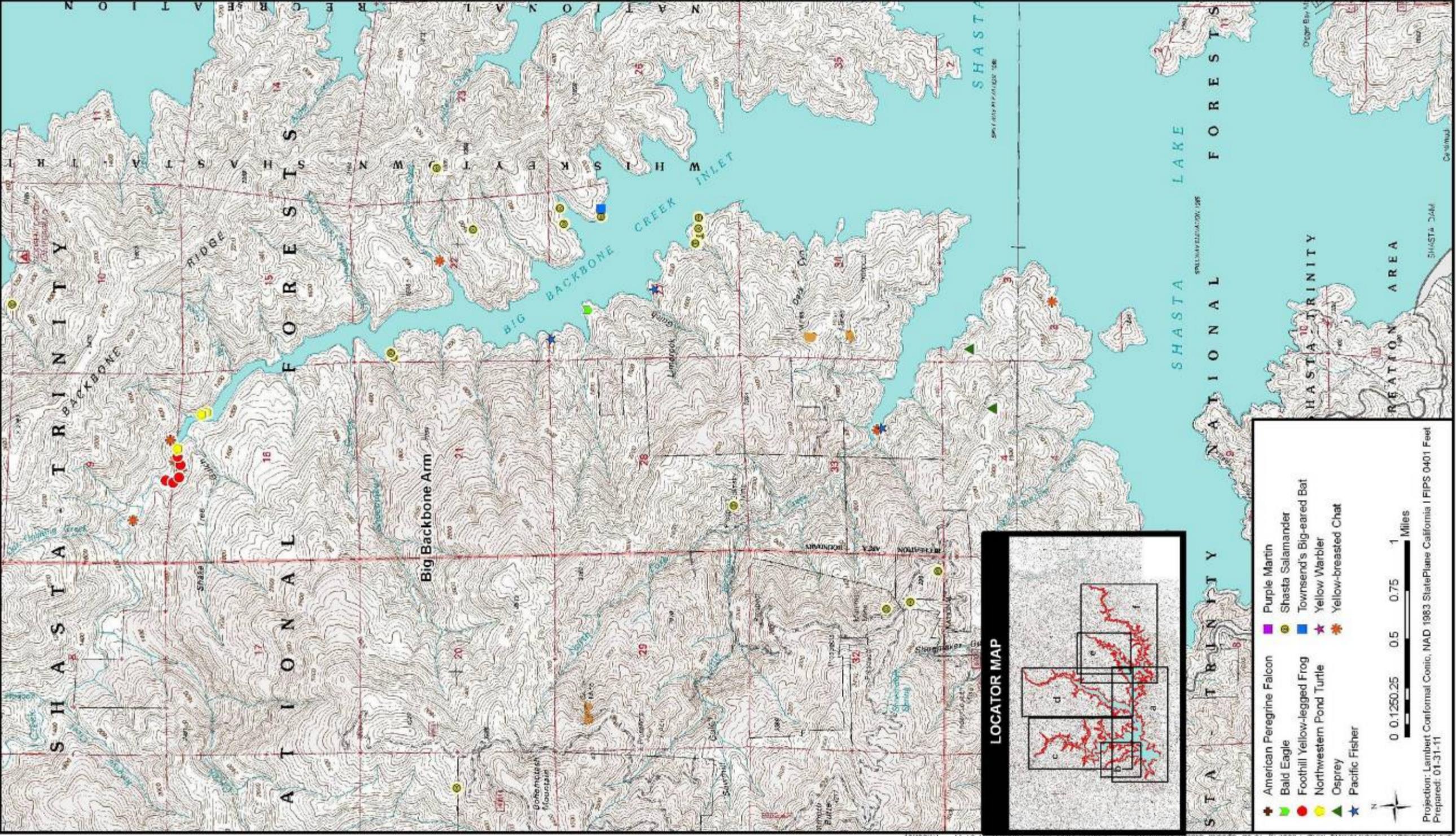


Figure 13-3b. Special-Status Wildlife Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

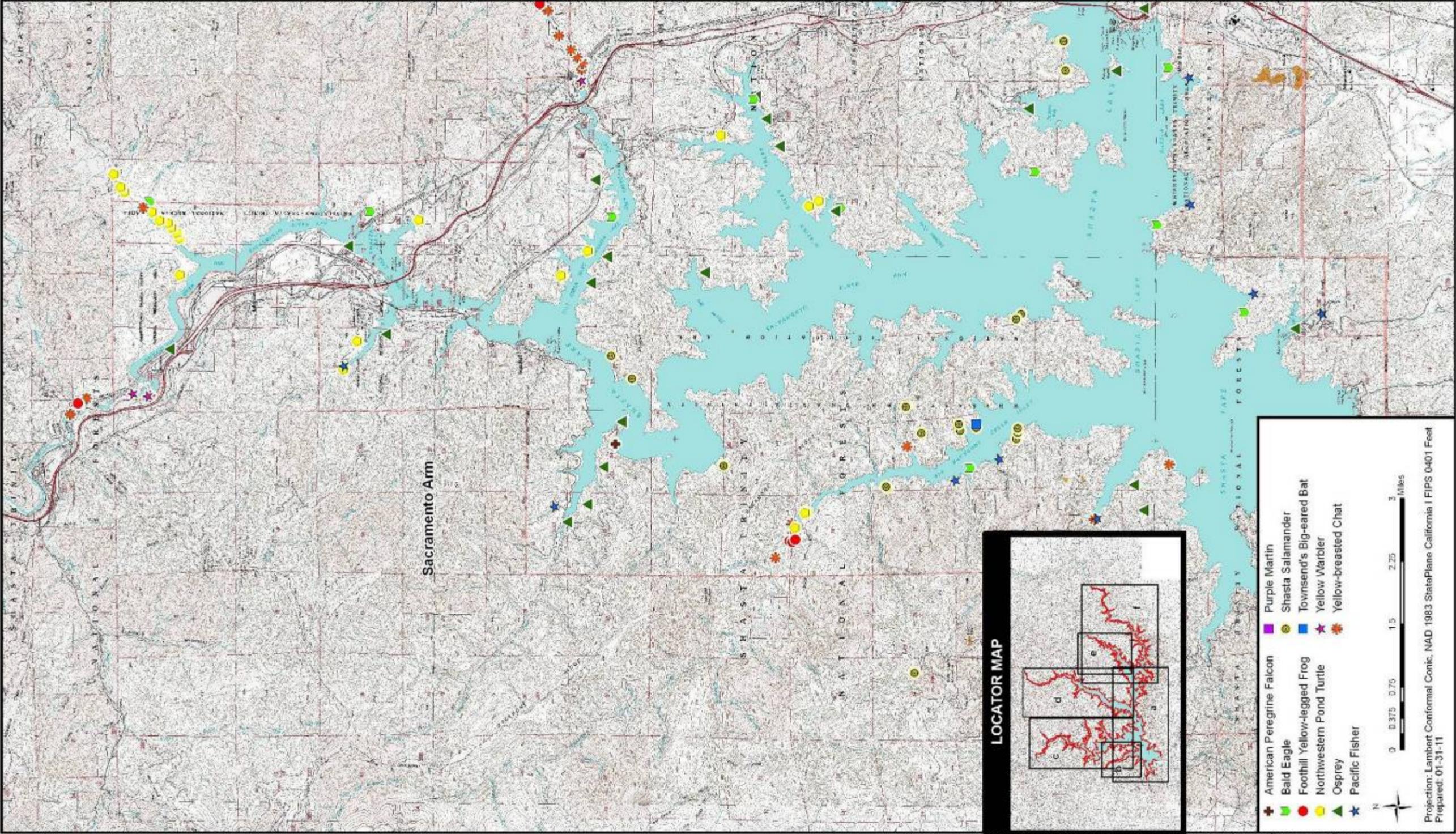


Figure 13-3c. Special-Status Wildlife Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

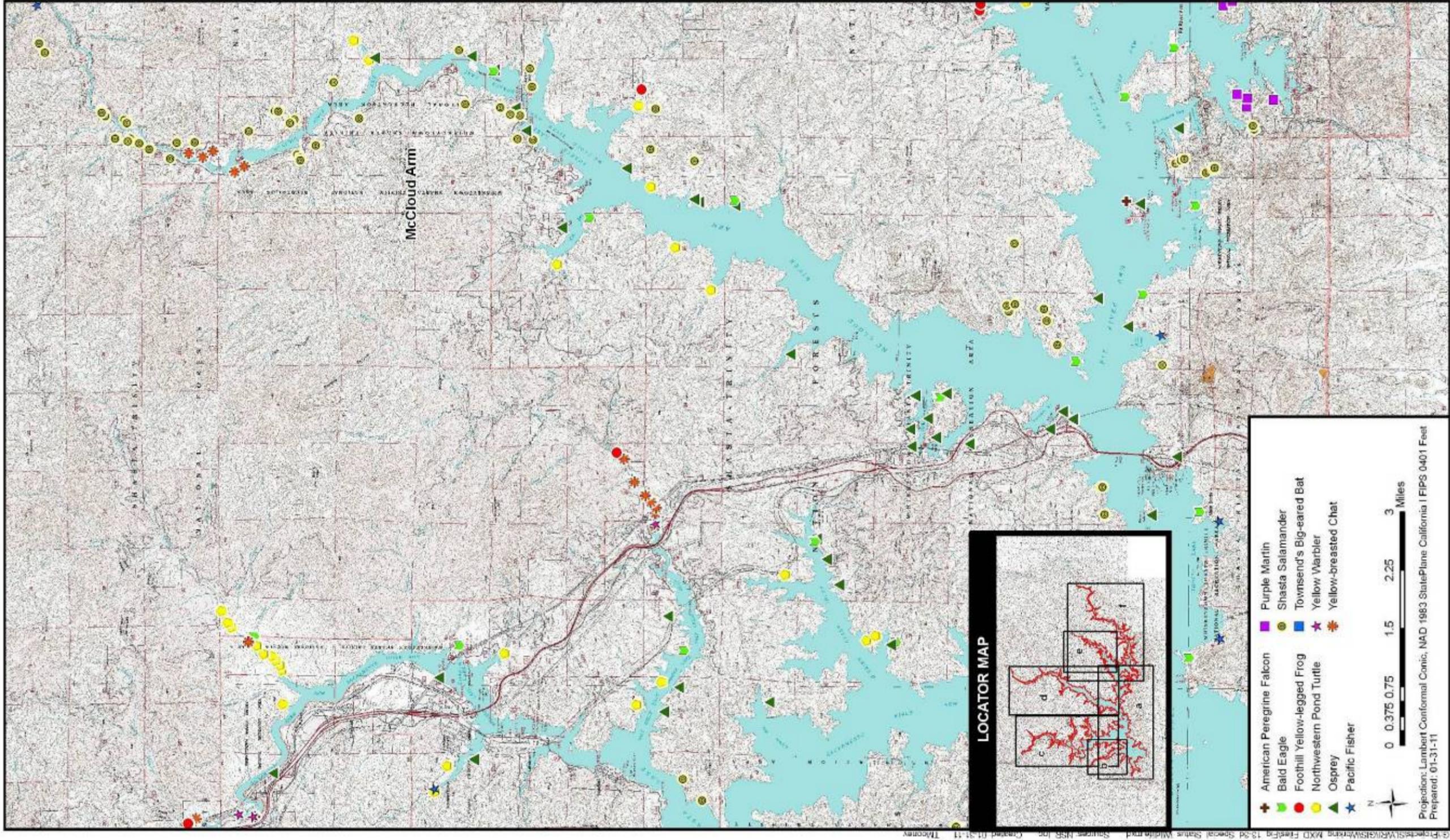


Figure 13-3d. Special-Status Wildlife Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

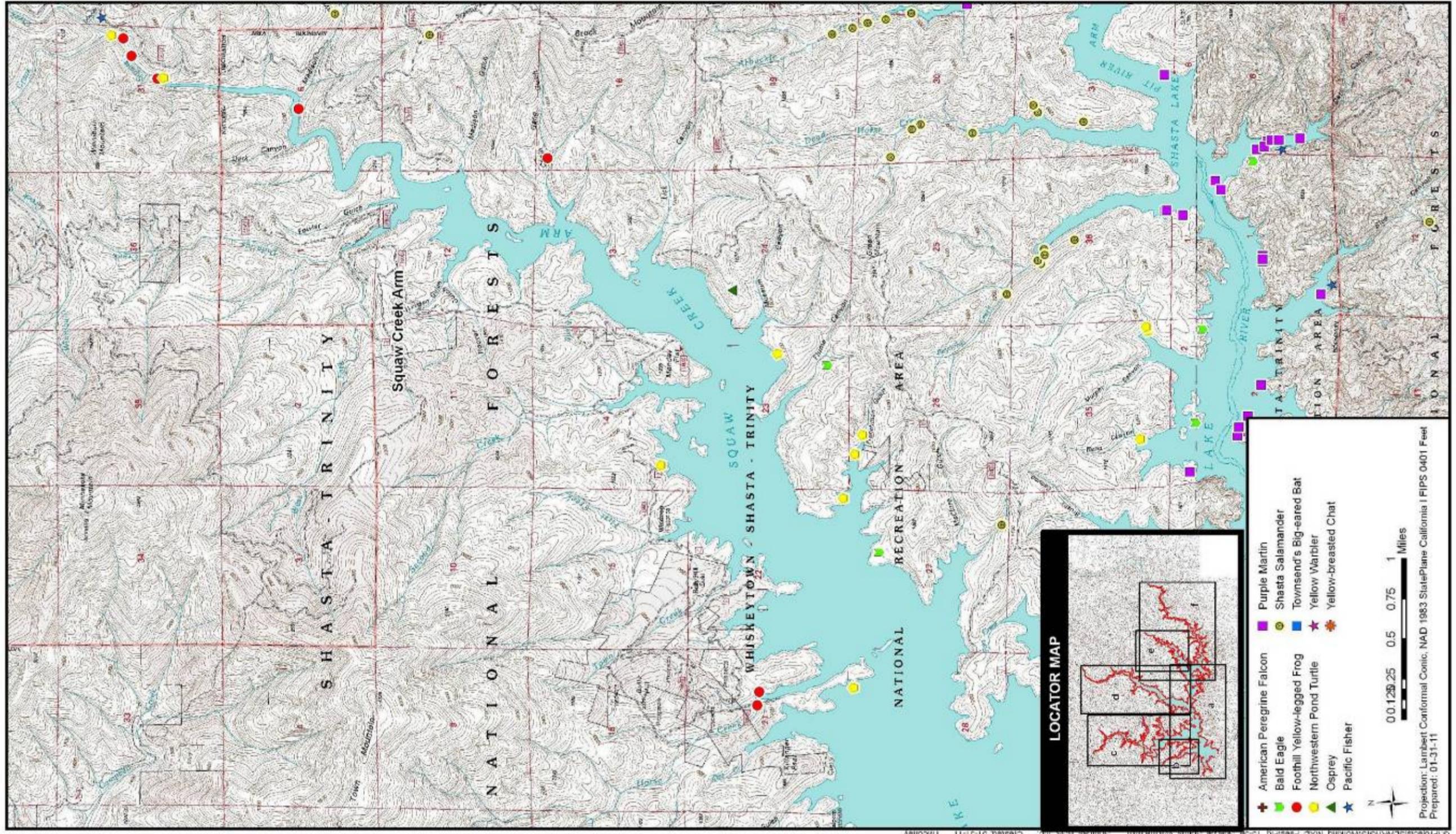


Figure 13-3e. Special-Status Wildlife Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

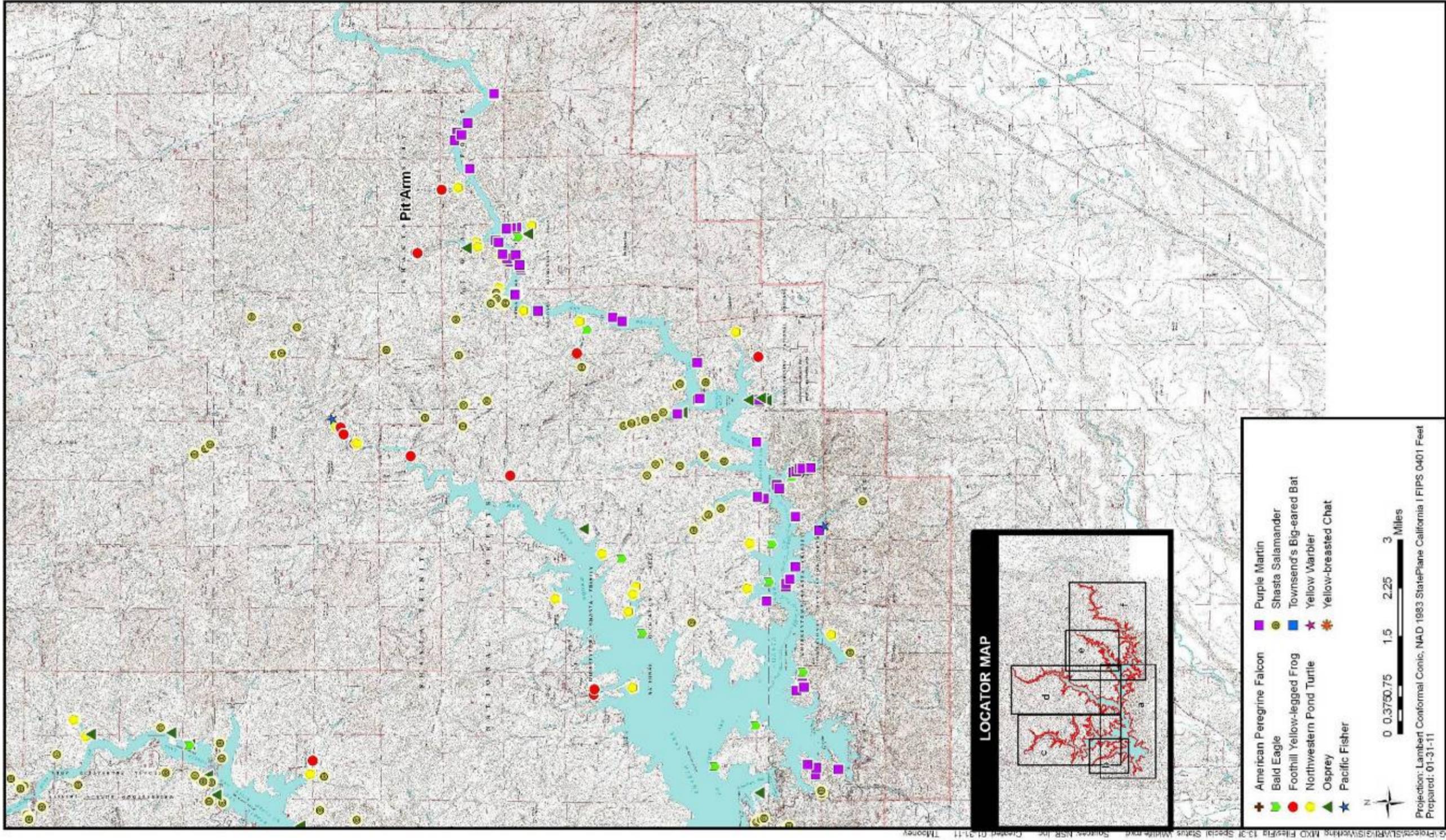


Figure 13-3f. Special-Status Wildlife Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

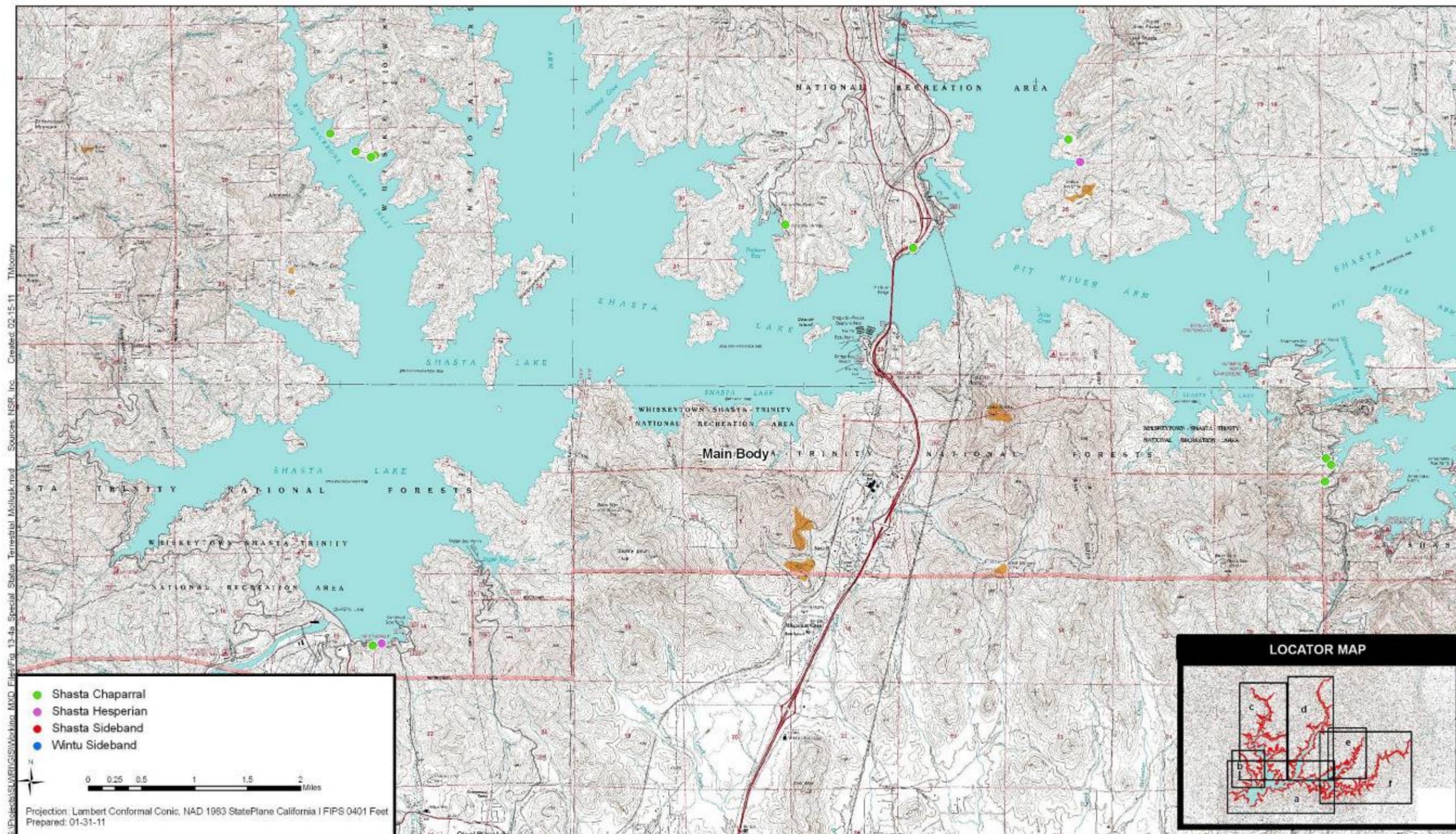


Figure 13-4a. Special-Status Terrestrial Mollusks Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

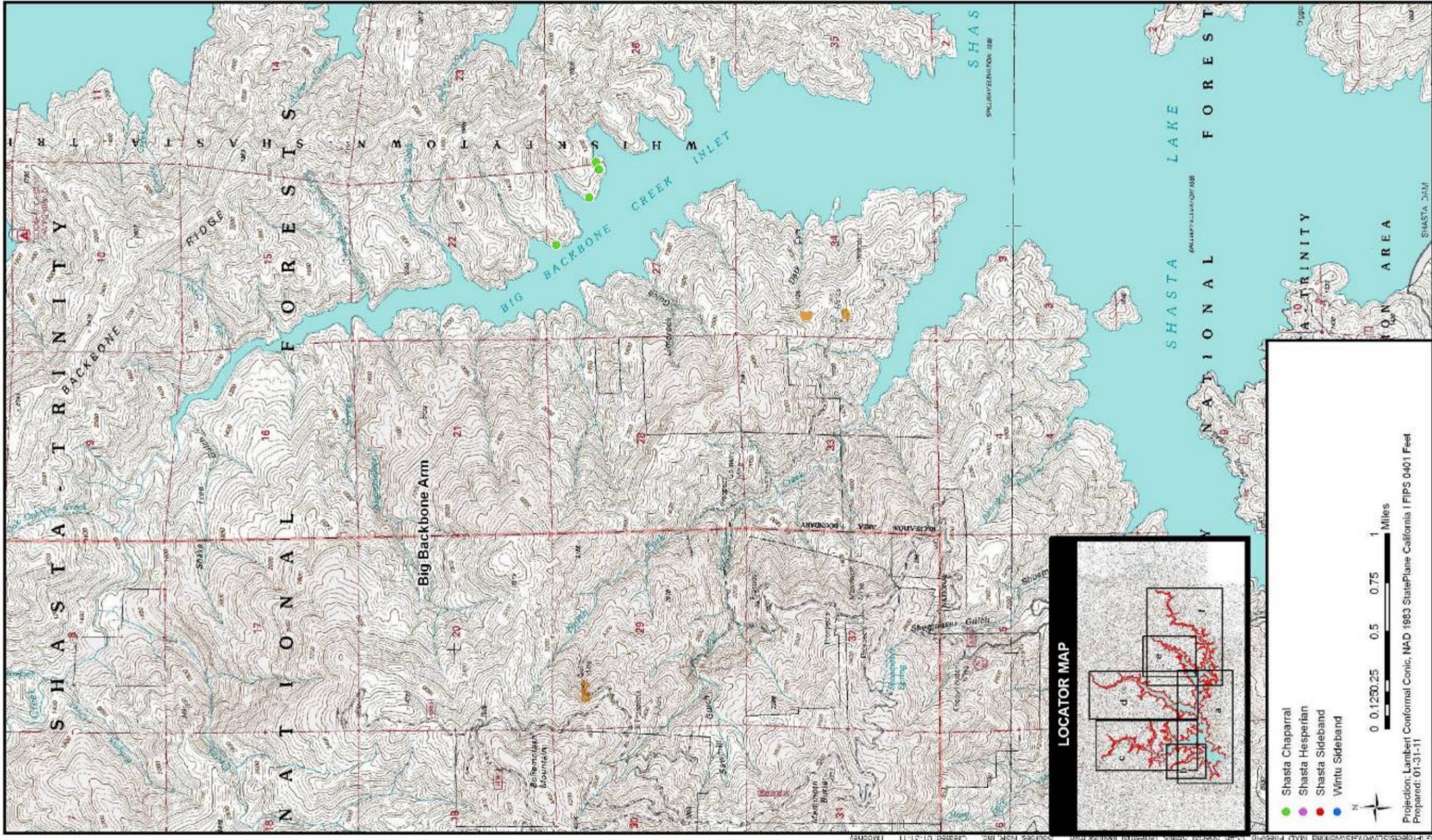


Figure 13-4b. Special-Status Terrestrial Mollusks Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

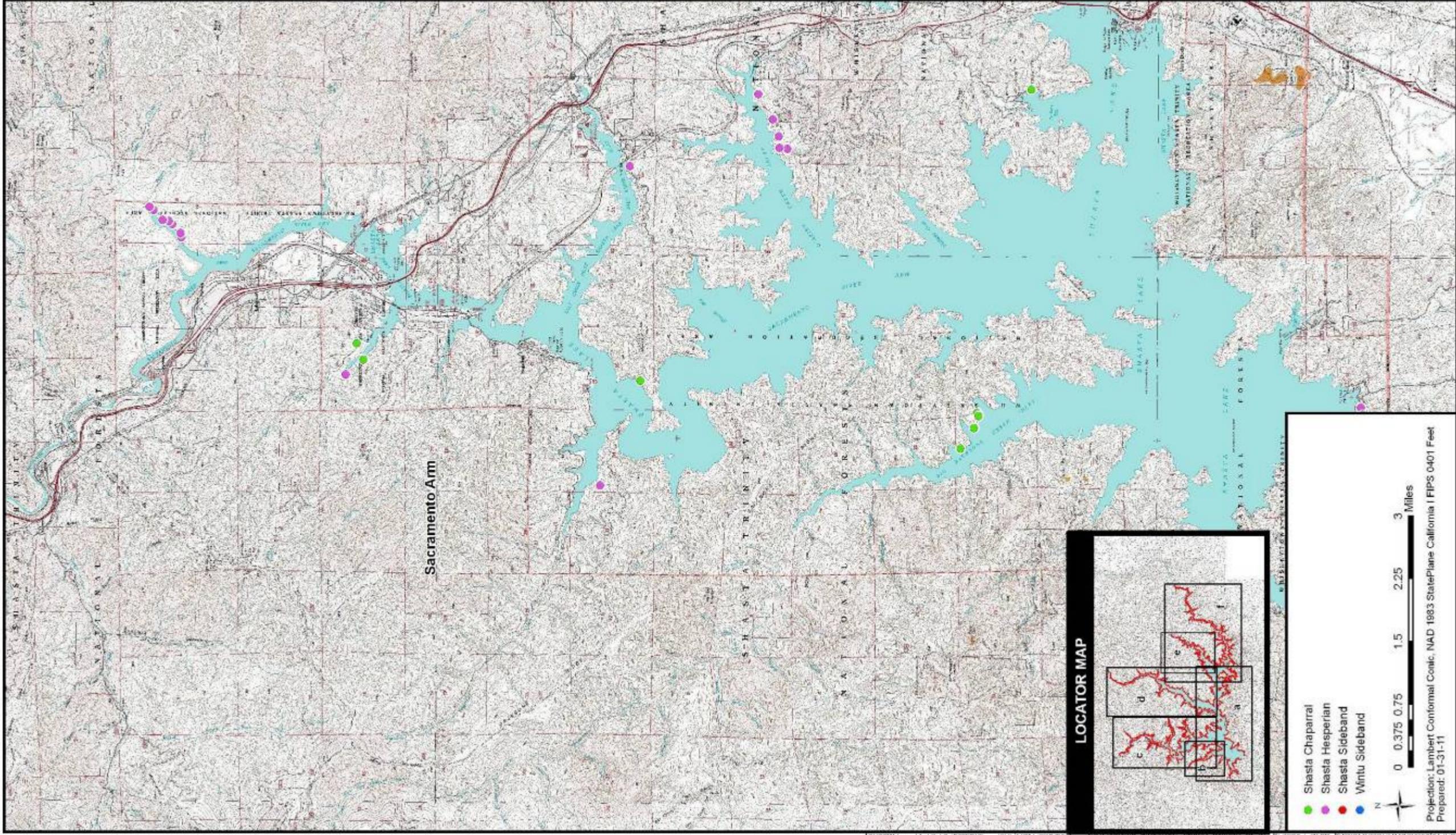


Figure 13-4c. Special-Status Terrestrial Mollusks Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

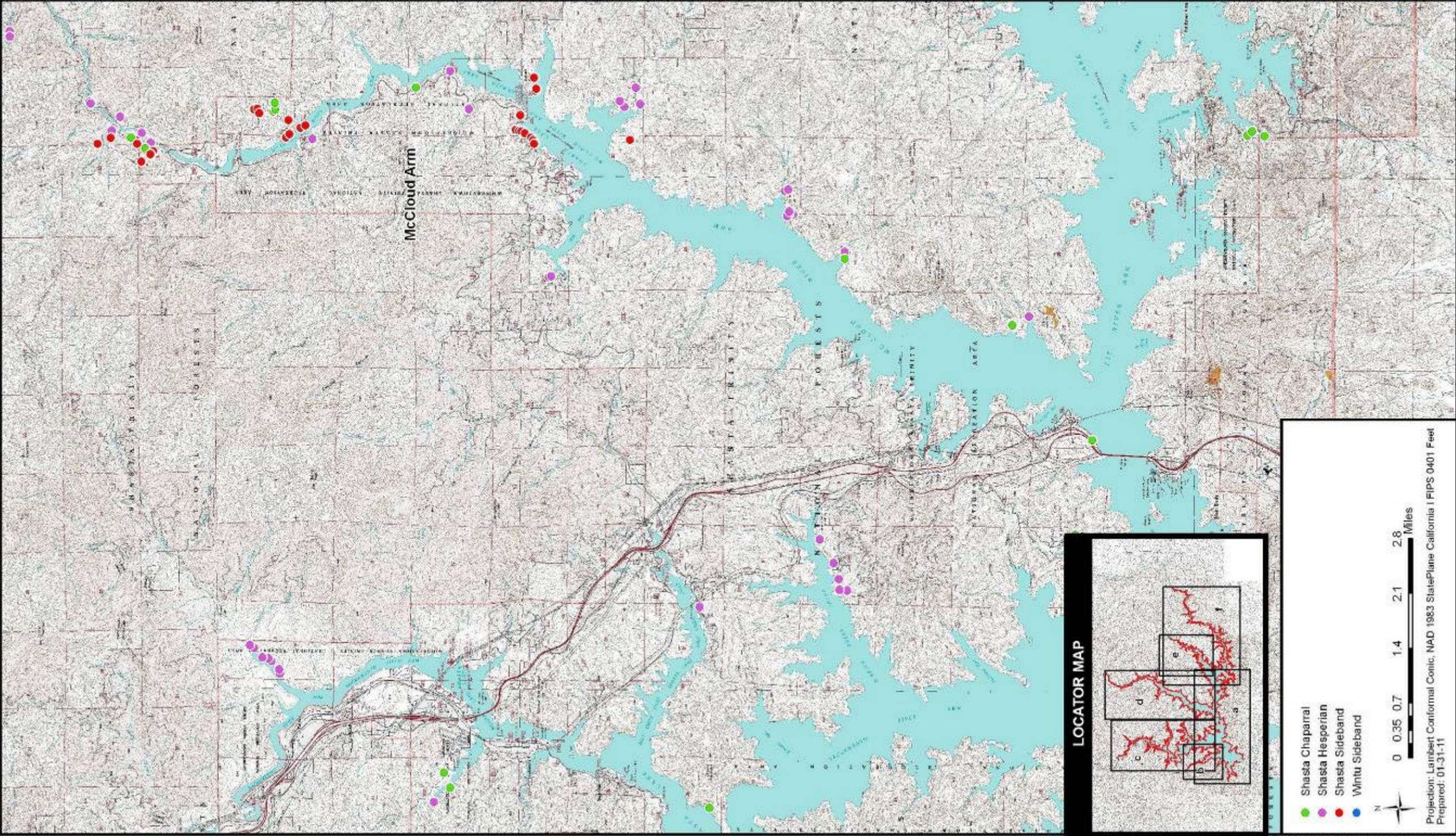


Figure 13-4d. Special-Status Terrestrial Mollusks Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

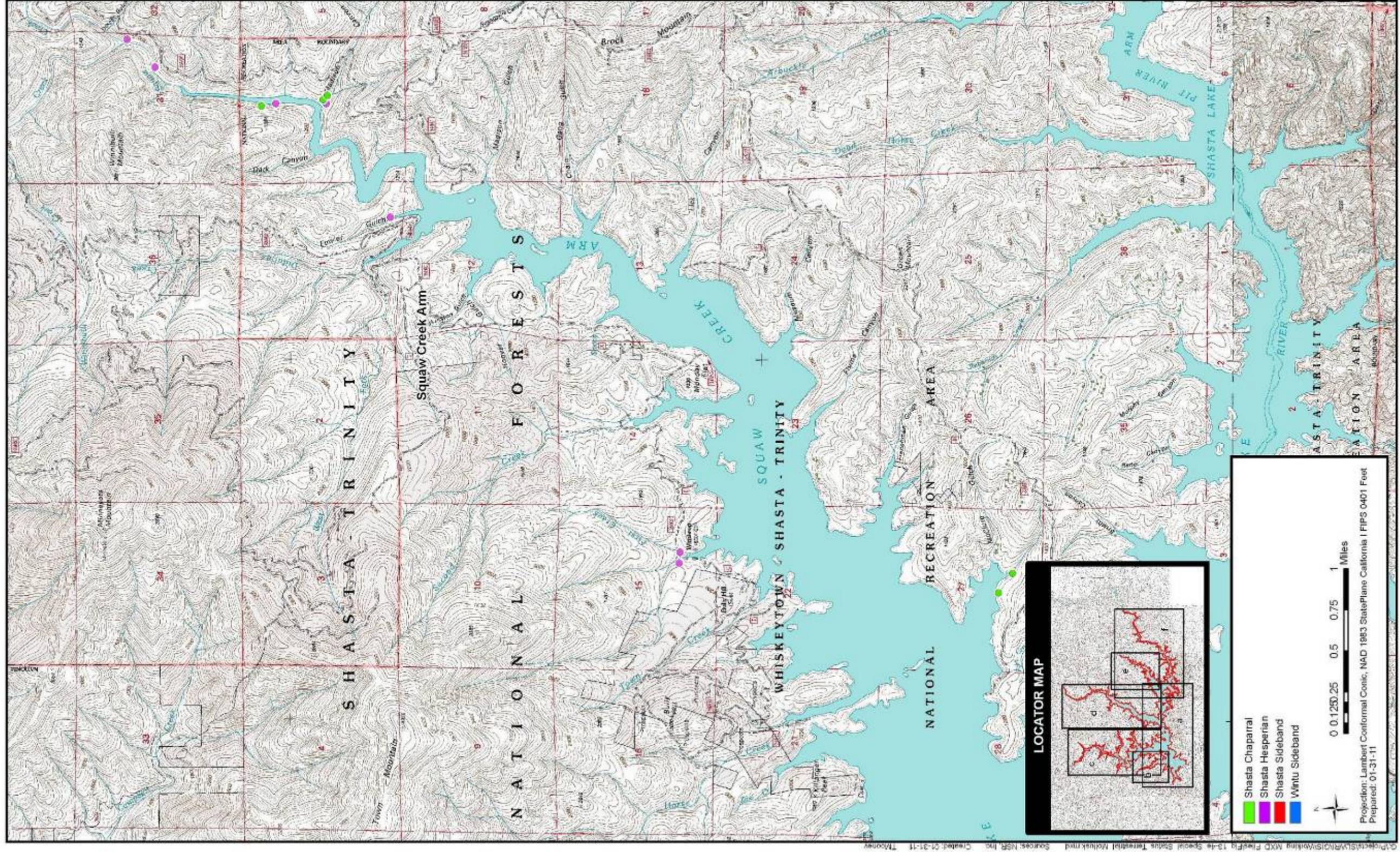


Figure 13-4e. Special-Status Terrestrial Mollusks Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

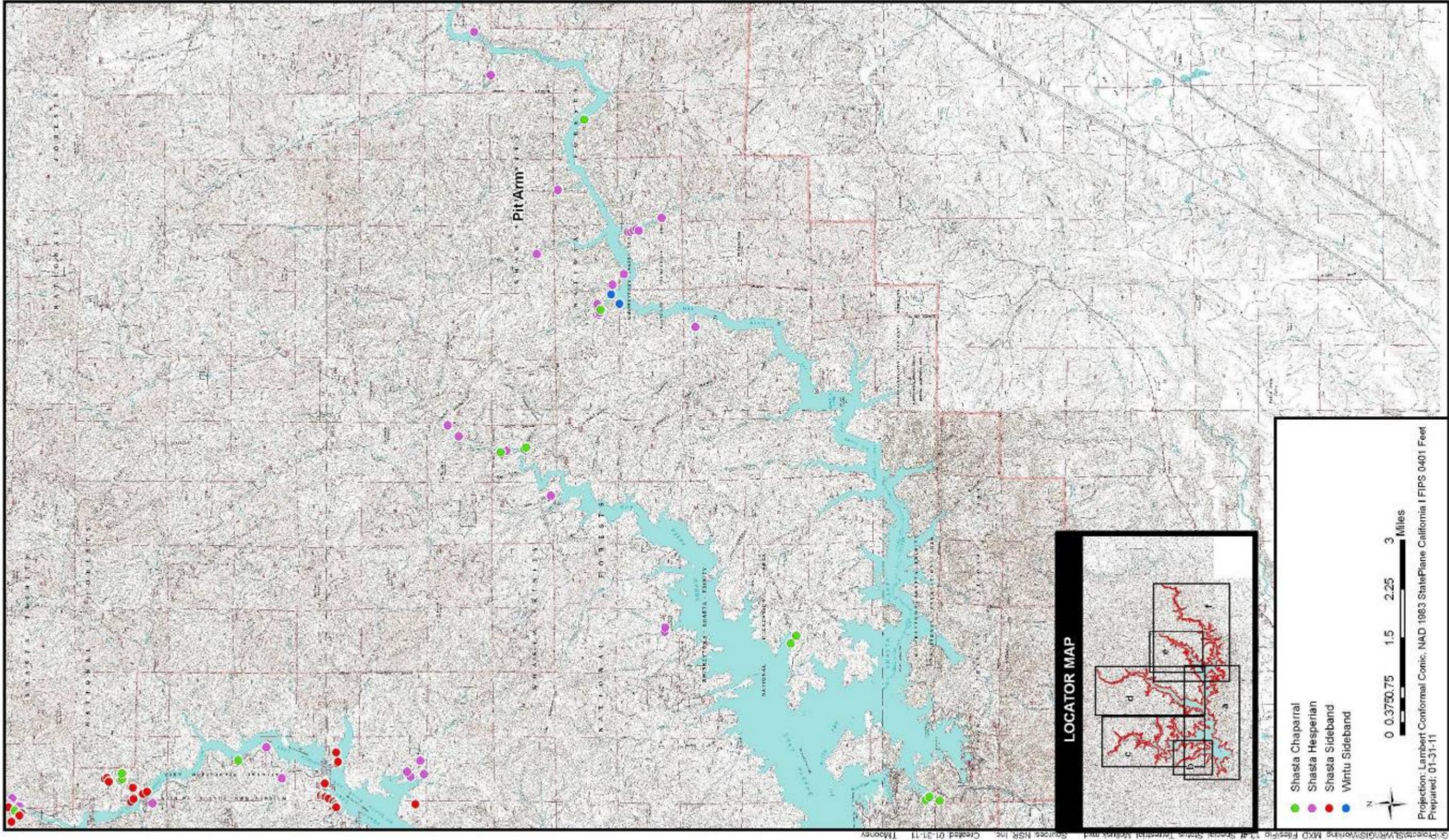


Figure 13-4f. Special-Status Terrestrial Mollusks Occurring in Shasta Lake and Vicinity

*This page left blank intentionally.*

**Terrestrial Mollusk Surveys (Survey and Manage)** Reclamation has conducted three survey efforts for survey and manage terrestrial mollusk species in the Shasta Lake and vicinity portion of the primary study area. These include protocol-level efforts during 2002 to 2003 and 2005 along selected portions of the Shasta Lake shoreline and current protocol-level efforts initiated in 2010 at the relocation areas. Additionally, many other terrestrial mollusk locations have been found incidentally during numerous other biological survey tasks throughout the Shasta Lake and vicinity portion of the primary study area. Four survey and manage terrestrial mollusk species have been found to date: Shasta sideband (*Monadenia troglodytes troglodytes*), Wintu sideband (*Monadenia troglodytes wintu*), Shasta chaparral (*Trilobopsis roperi*), and Shasta hesperian (*Vespericola shasta*). Collectively, 29, 2, 29, and 73 locations of Shasta sideband, Wintu sideband, Shasta chaparral, and Shasta hesperian, respectively, have been found (Figures 13-4a through 13-4f).

**Shasta Salamander Surveys** Reclamation has conducted three survey efforts for Shasta salamander in the Shasta Lake and vicinity portion of the primary study area. These include survey efforts during 2003 and 2006 to 2007 along selected portions of the Shasta Lake shoreline and current efforts initiated in 2010 at the relocation areas. Additionally, several other Shasta salamander locations have been found incidentally during other biological survey tasks throughout the Shasta Lake and vicinity portion of the primary study area. Shasta salamanders have been found at 39 locations. These findings and other known locations show that this species occurs in all arms of Shasta Lake in both limestone and nonlimestone habitats (Figures 13-3a through 13-3f).

**Bald Eagle/Osprey Surveys** Reclamation mapped all known bald eagle and osprey nests in the Shasta Lake and vicinity portion of the primary study area in 2007. Additional data including diameter of nest trees, nest tree height, nest height, proximity to the high-water mark, surrounding vegetation, and shoreline erosion rating were recorded for the bald eagle nests. Twenty-eight bald eagle nests were located and 54 osprey nests were located (Figures 13-3a through 13-3f). Reclamation is currently working with USFS to update this data set, because several bald eagle nesting pairs are no longer active and/or have moved to new locations.

**Neotropical Migrant Bird Surveys** Reclamation conducted a breeding bird survey in the Shasta Lake and vicinity portion of the primary study area in 2007. Additionally, focused surveys for purple martins and an analysis of purple martin habitat at Shasta Lake were conducted. These surveys provided information on use of the Shasta Lake and vicinity portion of the primary study area by breeding birds, including breeding neotropical migrant species. Sixty-seven bird species were detected during these surveys, including 38 neotropical migrant species.

These surveys also provided a basic understanding of the distribution and habitat use of purple martins in the Shasta Lake and vicinity portion of the

primary study area. Purple martin monitoring has continued through 2010 and provides additional distribution and habitat use information (Figures 13-3a through 13-3f). The Shasta Lake purple martin population has remained stable and has increased slightly over the monitoring period to date. The nesting purple martin population has totaled 18, 21, 24, and 28 pairs during 2007, 2008, 2009, and 2010, respectively. Most nest sites occur in flooded snags found in the reservoir; however, recent monitoring has shown a slight increase in use of upland nest sites.

**Forest Carnivore Surveys** Reclamation conducted surveys for sensitive forest carnivore species (forest carnivores) in the Shasta Lake and vicinity portion of the primary study area during 2003 to 2005. The specific sensitive forest carnivore species (i.e., “target species”) surveyed included the Sierra Nevada red fox (*Vulpes vulpes necator*), American marten (*Martes americana*), Pacific fisher (*Martes pennanti*), and wolverine (*Gulo gulo*). One target forest carnivore species, the Pacific fisher, was detected. Pacific fisher was detected at 13 locations scattered in all areas of the Shasta Lake and vicinity portion of the primary study area, except the McCloud Arm (Figures 13-3a through 13-3f). Additionally, the ringtail, a California fully protected species, was detected in all areas of the Shasta Lake and vicinity portion of the primary study area.

The Pacific fisher survey results provide additional information on habitat use and distribution of the species in Northern California. The survey findings represent the southeastern-most Pacific fisher occurrences in the Klamath and Sierra/Cascade regions. Additionally, these findings show Pacific fishers in areas generally (previously) not considered suitable habitat in California, including open second-growth conifer, hardwood–conifer, and hardwood habitats that have extensive chaparral components. Pacific fishers were also detected in areas that had been barren or semi-barren 50 to 60 years ago because of copper smelting and near commercial, rural residential, and industrial development areas.

**California Red-Legged Frog Assessment** Reclamation conducted a California red-legged frog habitat assessment in the Shasta Lake and vicinity portion of the primary study area in 2010. In consultation with USFWS, an assessment area was developed and field surveys of aquatic habitats were conducted in accordance with *Revised Guidance on Site Assessments and Field Surveys for the California Red-Legged Frog* (USFWS 2005a). The results suggest only one feature may represent potential California red-legged frog breeding habitat. A California red-legged frog habitat assessment report is currently being completed for USFWS review.

#### ***Upper Sacramento River (Shasta Dam to Red Bluff)***

A list of special-status wildlife species with the potential to occur in the primary study area from Shasta Dam to RBDD (Table 13-4) was compiled based on habitat suitability and known occurrences within the area covered in the Shasta Dam, Redding, Enterprise, Cottonwood, Ball’s Ferry, Bend, and Red Bluff East

U.S. Geological Survey 7.5-minute quadrangle maps (CNDDDB 2007; USFWS 2007a), as well as species considered sensitive by USFS. (See the *Wildlife Resources Technical Report* for a description of the life history of special-status wildlife species known or likely to occur in the area and figures depicting the recorded locations of special-status species.)

**Table 13-4. Special-Status Wildlife Species Known or with Potential to Occur in the Primary Study Area, Along the Sacramento River from Shasta Dam to Red Bluff Diversion Dam**

Common Name	Scientific Name	Status	Potential for Occurrence
<b>Invertebrates</b>			
Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	FE, MSCS	Unlikely to occur. No suitable habitat is present along the river corridor.
Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	FT, MSCS	Known to occur. Elderberry shrubs are present within the riparian woodland community along the Sacramento River.
Vernal pool tadpole shrimp	<i>Lepidurus packardii</i>	FE, MSCS	Unlikely to occur. No suitable habitat is present along the river corridor.
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	FT, MSCS	Unlikely to occur. No suitable habitat is present along the river corridor.
<b>Amphibians</b>			
California red-legged frog	<i>Rana aurora draytonii</i>	FT, CSC, MSCS	Unlikely to occur. No longer occurs on the floor of the Central Valley.
Foothill yellow-legged frog	<i>Rana boylei</i>	CSC, USFS S, MSCS	Unlikely to occur in the Sacramento River due to lack of suitable substrate and hydrology.
Western spadefoot toad	<i>Spea hammondi</i>	CSC, MSCS	Unlikely to occur. No suitable habitat is present along the Sacramento River corridor.
Western tailed frog	<i>Ascaphus truei</i>	CSC	Unlikely to occur in mainstem of Sacramento River where flows could be altered.
<b>Reptiles</b>			
Giant garter snake	<i>Thamnophis gigas</i>	FT, CT, MSCS	Unlikely to occur in the primary study area; however, known to occur in the extended study area.
Northwestern pond turtle	<i>Clemmys marmorata marmorata</i>	CSC, USFS S, MSCS	Known to occur. Suitable habitat is present in the primary study area.

**Table 13-4. Special-Status Wildlife Species Known or with Potential to Occur in the Primary Study Area, Along the Sacramento River from Shasta Dam to Red Bluff Diversion Dam (contd.)**

Common Name	Scientific Name	Status	Potential for Occurrence
<b>Birds</b>			
Aleutian Canada goose	<i>Branta canadensis leucopareia</i>	FD, MSCS	Unlikely to occur within banks of the Sacramento River where flows could be altered.
American peregrine falcon (nesting)	<i>Falco peregrinus anatum</i>	CE, CP, USFS S, MSCS	Unlikely to nest in this portion of the study area; however, may forage in areas of open water with large concentrations of waterbirds.
Bald eagle (nesting and wintering)	<i>Haliaeetus leucocephalus</i>	FD, CE, CP, MSCS	Known to occur along the Sacramento River within the primary study area.
Bank swallow	<i>Riparia riparia</i>	CT, MSCS	Known to occur along the Sacramento river in the primary and extended study areas.
Black-crowned night heron (rookery)	<i>Nycticorax nycticorax</i>	BLM S, MSCS	Could nest in trees adjacent to the Sacramento River.
California gull	<i>Larus californicus</i>	MSCS	Not within breeding range. Could occur in the study area during winter or migration.
Cooper's hawk (nesting)	<i>Accipiter cooperii</i>	MSCS	Could occur. Suitable nesting and foraging habitat is present in the study area.
Double-crested cormorant (rookery)	<i>Phalacrocorax auritus</i>	MSCS	Could nest in trees adjacent to the Sacramento River.
Golden eagle	<i>Aquila chrysaetos</i>	CP, BLM S, MSCS	No suitable nesting habitat along the Sacramento River. Unlikely to forage along the river corridor.
Great blue heron (rookery)	<i>Ardea herodias</i>	MSCS	Could nest in trees adjacent to the Sacramento River.
Great egret (rookery)	<i>Casmerodius albus</i>	MSCS	Could nest in trees adjacent to the Sacramento River.
Greater sandhill crane	<i>Grus canadensis tabida</i>	CT, CP, MSCS	Unlikely to breed in the study area. Unlikely to use the Sacramento River corridor during winter or migration.
Least bittern (nesting)	<i>Ixobrychus exilis</i>	CSC, MSCS	Could nest along the Sacramento River if suitable habitat is present.
Lesser sandhill crane (wintering)	<i>Grus canadensis canadensis</i>	CSC	Does not breed in California. Unlikely to use the Sacramento River corridor during winter or migration.
Little willow flycatcher (nesting)	<i>Empidonax traillii brewsteri</i>	CE, USFS S, MSCS	Unlikely to breed in the study area due to elevation, but may use riparian woodlands during migration.
Loggerhead shrike (nesting)	<i>Lanius ludovicianus</i>	CSC	Likely to nest and forage in woodlands and scrub habitats in the study area.
Long-billed curlew	<i>Numenius americanus</i>	MSCS	Does not breed in the study area. Unlikely to use the Sacramento River corridor during winter or migration.
Long-eared owl (nesting)	<i>Asio otus</i>	CSC, MSCS	Does not nest in lowland Central Valley areas. Unlikely to forage along the Sacramento River corridor where flows would be altered.

**Table 13-4. Special-Status Wildlife Species Known or with Potential to Occur in the Primary Study Area, Along the Sacramento River from Shasta Dam to Red Bluff Diversion Dam (contd.)**

Common Name	Scientific Name	Status	Potential for Occurrence
Mountain plover (wintering)	<i>Charadrius montanus</i>	CSC, BLM S, MSCS	Does not nest in California. Unlikely to winter along the Sacramento River where flows would be altered.
Northern goshawk (nesting)	<i>Accipiter gentilis</i>	CSC, USFS S	Unlikely to occur along the Sacramento River corridor due to lack of suitable habitat.
Northern harrier (nesting)	<i>Circus cyaneus</i>	CSC, MSCS	Likely to occur. Suitable nesting and foraging habitat is present in the study area.
Northern spotted owl (nesting)	<i>Strix occidentalis caurina</i>	FT, MSCS	Unlikely to occur along the Sacramento River corridor due to lack of suitable habitat.
Osprey (nesting)	<i>Pandion haliaetus</i>	MSCS	Known to nest along the Sacramento River within the primary study area.
Purple martin (nesting)	<i>Progne subis</i>	CSC	Could occur. Potentially suitable habitat is present along the Sacramento River corridor.
Short-eared owl (nesting)	<i>Asio flammeus</i>	CSC, MSCS	Could occur. Potentially suitable habitat is present within the primary study area.
Snowy egret (rookery)	<i>Egretta thula</i>	MSCS	Could nest in trees adjacent to the Sacramento River.
Swainson's hawk (nesting)	<i>Buteo swainsoni</i>	CT, MSCS	Could occur. Suitable nesting and foraging habitat is present in the study area.
Tricolored blackbird (nesting)	<i>Agelaius tricolor</i>	CSC, MSCS	Could occur. Potentially suitable habitat is present in the primary study area.
Western yellow-billed cuckoo (nesting)	<i>Coccyzus americanus occidentalis</i>	FC, CE, USFS S, MSCS	Likely to nest and forage in the primary study area.
Western burrowing owl (burrow sites)	<i>Athene cunicularia hypugea</i>	CSC, MSCS	Unlikely to occur along the Sacramento River corridor due to a lack of suitable nesting habitat.
White-tailed kite (nesting)	<i>Elanus leucurus</i>	CP, MSCS	Likely to occur. Suitable nesting and foraging habitat is present in the study area.
Yellow-breasted chat (nesting)	<i>Icteria virens</i>	CSC, MSCS	Likely to nest and forage in the primary study area
Yellow warbler (nesting)	<i>Dendroica petechia</i>	CSC, MSCS	Could nest and forage in the primary study area. Likely to use riparian woodlands during migration.
<b>Mammals</b>			
American badger	<i>Taxidea taxus</i>	CSC	Could occur along the Sacramento River corridor.
American marten	<i>Martes americana</i>	USFS S	Unlikely to occur. No suitable habitat along the Sacramento River corridor.
Pacific fisher	<i>Martes pennanti</i>	FC, USFS S	Unlikely to occur. No suitable habitat along the Sacramento River corridor.
Pallid bat	<i>Antrozous pallidus (roosting)</i>	CSC, USFS S	Could occur. Potentially suitable habitat is present in woodland in the primary study area.
Ringtail	<i>Bassariscus astutus</i>	CP, MSCS	Could occur. Potentially suitable habitat is present along the Sacramento River corridor.

**Table 13-4. Special-Status Wildlife Species Known or with Potential to Occur in the Primary Study Area, Along the Sacramento River from Shasta Dam to Red Bluff Diversion Dam (contd.)**

Common Name	Scientific Name	Status	Potential for Occurrence
Spotted bat	<i>Euderma maculatum</i>	CSC	Unlikely to roost along the Sacramento River corridor because suitable roost sites are lacking.
Townsend's big-eared bat	<i>Corynorhinus townsendii townsendii</i> (roosting)	CSC, USFS S	Unlikely to roost along the Sacramento River corridor because suitable roost sites are lacking.
Western mastiff bat	<i>Eumops perotis californicus</i> (roosting)	CSC, MSCS	Unlikely to roost along the Sacramento River corridor because suitable roost sites are lacking.
Western red bat	<i>Lasiurus blossevillii</i>	CSC, USFS S	Could occur. Potentially suitable habitat is present in woodland in the primary study area.

Sources: CNDDDB 2007; USFWS 2007a; USFS 2007; CALFED 2000b; Shuford and Gardali 2008

Key:

BLM S = U.S. Bureau of Land Management sensitive

CE = State-listed as endangered

CP = California fully protected

CSC = California species of special concern

CT = California Threatened

FC = Federal candidate for listing

FD = Federally delisted

FE = Federally listed as endangered

FT = Federally listed as threatened

MSCS = Multi-Species Conservation Strategy covered species

USFS S = USFS sensitive

**Lower Sacramento River and Delta**

Numerous special-status wildlife are associated with riparian, floodplain, and side channel wetland habitats along the Sacramento River and in the Delta, including those listed in Table 13-5. However, as stated above, the roughly 300 miles of the Sacramento River can be subdivided into distinct reaches. The reaches in the extended study area are discussed separately below because of differences in morphology, riparian vegetation, and habitat functions. The *Wildlife Resources Technical Report* contains a comprehensive list of all sensitive wildlife species in the extended study area that have been reported to the CNDDDB.

**Sacramento River from RBDD to the Delta** Many of the special-status wildlife species described above for the upper Sacramento River corridor have the potential to occur in the middle and lower reaches of the Sacramento River. Wildlife species listed under the Federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA) that have potential to occur in a portion of the extended study area from RBDD to the Delta include valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), giant garter snake (*Thamnophis gigas*), bald eagle (*Haliaeetus leucocephalus*), Swainson's hawk (*Buteo swainsoni*), western yellow-billed cuckoo (*Coccyzus americanus*)

*occidentalis*), willow flycatcher (*Empidonax traillii*), and bank swallow (*Riparia riparia*).

**Table 13-5. Sensitive Wildlife Species of Riparian and Perennial Wetland Communities Along the Sacramento River and in the Delta**

Species	Status <sup>1</sup>	Habitat Description
<b>Invertebrates</b>		
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	FT	Elderberries in riparian woodlands or savanna communities.
<b>Reptiles</b>		
Western pond turtle <i>Actinemys marmorata</i>	CSC	Ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches with abundant vegetation and either rocky or muddy bottoms, in woodland, forest, and grassland.
Giant garter snake <i>Thamnophis giga</i>	FT CT	Marshes, sloughs, drainage canals, and irrigation ditches, especially around rice fields, and occasionally in slow-moving creeks from sea level to 400 feet. Prefers locations with vegetation close to the water for basking.
<b>Birds</b>		
Tricolored blackbird <i>Agelaius tricolor</i>	CSC	<i>Foraging:</i> On ground in croplands, grassy fields, flooded land, and along edges of ponds. <i>Nesting:</i> Dense cattails, tules, or thickets near fresh water.
Swainson's hawk <i>Buteo swainsoni</i>	CT	<i>Foraging:</i> Open desert, grassland, or cropland containing scattered, large trees or small groves. <i>Nesting:</i> Open riparian habitat, in scattered trees or small groves in sparsely vegetated flatlands. Usually found near water in the Central Valley.
Northern harrier <i>Circus cyaneus</i>	CSC	<i>Nesting:</i> Tall grasses and forbs in emergent wetland, along rivers or lakes, grasslands, grain fields, or on sagebrush flats several miles from water.
Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	FC CE	<i>Nesting:</i> Extensive deciduous riparian thickets or forests with dense, low-level or understory foliage adjacent to slow-moving watercourses, backwaters, or seeps. Willow is almost always a dominant component of the vegetation. In the Sacramento Valley, also utilizes adjacent walnut orchards.
Yellow warbler <i>Dendroica petechia brewsteri</i>	CSC	<i>Nesting:</i> Low, open-canopy riparian deciduous woodlands with a heavy brush understory; sometimes in montane shrubbery in open conifer forests.
White-tailed kite <i>Elanus leucurus</i>	FP	<i>Foraging:</i> Undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. <i>Nesting:</i> Large groves of dense, broad-leafed deciduous trees close to foraging areas.
Greater sandhill crane <i>Grus canadensis tabida</i>	CT FP	<i>Foraging:</i> Open grasslands, grain fields, and open wetlands. <i>Roosting:</i> In flocks standing in moist fields or in shallow water. <i>Nesting:</i> Open habitats with shallow lakes and fresh emergent wetlands.
Bald eagle <i>Haliaeetus leucocephalus</i>	CE FP	<i>Foraging:</i> Large bodies of water or free-flowing rivers with abundant fish and adjacent snags or other perches. <i>Nesting:</i> Large, old-growth trees or snags in remote, mixed stands near water.

**Table 13-5. Sensitive Wildlife Species of Riparian and Perennial Wetland Communities Along the Sacramento River and in the Delta (contd.)**

<b>Species</b>	<b>Status<sup>1</sup></b>	<b>Species</b>
Yellow-breasted chat <i>Icteria virens</i>	CSC	<i>Foraging and nesting:</i> Riparian thickets of willow and other brushy thickets near streams or other watercourses.
California black rail <i>Laterallus jamaicensis coturniculus</i>	CT FP	<i>Foraging and nesting:</i> Tidal emergent wetlands dominated by pickleweed, in the high wetland zones near upper limit of tidal flooding, or in brackish marshes supporting bulrushes and pickleweed. In freshwater, usually found in bulrushes, cattails, and saltgrass adjacent to tidal sloughs.
Suisun song sparrow <i>Melospiza melodia maxillaries</i>	CSC	<i>Foraging:</i> The bare surface of tidally exposed mud among tules and along slough margins in brackish marshes. <i>Nesting:</i> Along edges of sloughs and bays supporting mixed stands of bulrush, cattail, and other emergent vegetation.
Bank swallow <i>Riparia riparia</i>	CT	<i>Foraging:</i> Open riparian areas, grassland, wetlands, water, and cropland. <i>Nesting:</i> Vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, and lakes.
Yellow-headed blackbird <i>Xanthocephalus xanthocephalus</i>	CSC	<i>Foraging:</i> Fresh emergent wetland and sometimes along shorelines and in nearby open fields, preferably on moist ground. <i>Nesting:</i> Dense emergent wetland of cattails and tules, often along border of lake or pond.
<b>Mammals</b>		
Pallid bat <i>Antrozous pallidus</i>	CSC	<i>Foraging:</i> Relatively open oak woodlands, over water near riparian and upland forests and woodlands, and orchards and vineyards. <i>Roosting:</i> Rocky outcrops, cliffs, and crevices.
Western mastiff bat <i>Eumops perotis</i>	CSC	<i>Foraging:</i> Over water in broad, open areas near riparian and upland forests and woodlands. <i>Roosting:</i> Crevices in vertical cliffs, usually granite or consolidated sandstone, and in broken terrain with exposed rock faces.
Western red bat <i>Lasiurus blossevillii</i>	CSC	<i>Foraging:</i> Over water edges in open areas near riparian and upland forests and woodlands; orchards. <i>Roosting:</i> Trees along edges or in habitat mosaics in a variety of habitats and orchards.
Townsend's big-eared bat <i>Plecotus townsendii</i>	CSC	<i>Foraging:</i> Water edges in open areas near riparian and upland forests and woodlands. <i>Roosting:</i> Caves, mines, tunnels, buildings, or other human-made structures in woodlands. Prefers mesic habitats.
Salt-marsh harvest mouse <i>Reithrodontomys raviventris</i>	FE CE FP	Salt marsh dominated by pickleweed and salt grass. Generally requires nonsubmerged, salt-tolerant vegetation for escape during high tides.

Sources: CNDDB 2011

Note:

<sup>1</sup> Status definitions:

- FC = federal candidate for listing
- FE = Federally listed as endangered
- FT = Federally listed as threatened
- CE = California listed as endangered
- CT = California listed as threatened
- FP = California fully protected
- CSC = California species of special concern

**Sacramento–San Joaquin River Delta** Many special-status species are known or are likely to occur in the Delta because of the presence of unique wetland habitats. Tidal marshes and emergent wetlands support several special-status wildlife species: California black rail (*Laterallus jamaicensis coturniculus*), California clapper rail (*Rallus longirostris obsoletus*), greater

sandhill crane (*Grus canadensis tabida*), salt marsh common yellowthroat (*Geothlypis trichas sinuosa*), salt marsh harvest mouse (*Reithrodontomys raviventris*), Suisun ornate shrew (*Sorex ornatus sinuosus*), Suisun song sparrow (*Melospiza melodia maxillaris*), and tricolored blackbird (*Agelaius tricolor*). The giant garter snake is known to inhabit sloughs, canals, and low-gradient streams and freshwater marshes in the Delta. Vernal pools and other freshwater seasonal wetlands support several special-status crustaceans, including vernal pool tadpole shrimp (*Lepidurus packardii*) and vernal pool fairy shrimp (*Branchinecta lynchi*). Although it is severely declining because of a dramatic shrinkage of suitable habitat, the valley elderberry longhorn beetle has been found in the Delta region on McCormack-Williamson and New Hope tracts (CNDDDB 2007).

**San Joaquin River Basin to the Delta** The current wildlife habitat value of this area is somewhat limited by the predominance of agricultural lands, which support a relatively low diversity of wildlife species. Remnant native vegetation patches are likely to support a high diversity of wildlife species. More than 100 special-status wildlife and plants occur in the San Joaquin River region. Most of the special-status wildlife species are associated with grasslands, freshwater emergent wetlands, lakes, and rivers that occur on the valley floor. Many of the species have been listed by Federal and State wildlife agencies because of habitat losses associated with agricultural development and water projects.

#### **CVP/SWP Service Areas**

The CVP and SWP service areas are dominated by agricultural land and urban development, which can support many wildlife species, most of which are highly adapted to these disturbed environments. The conflict between urban growth and conservation of native habitat has resulted in the listing of a number of wildlife species that were threatened with extinction. The region also supports a variety of exotic species, some of which are detrimental to survival of native species.

The California condor (*Gymnogyps californianus*), lightfooted clapper rail (*Rallus longirostris levipes*), California least tern (*Sternula antillarum brownie*), least Bell's vireo (*Vireo bellii pusillus*), Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*), southwestern willow flycatcher (*Empidonax traillii extimus*), California gnatcatcher (*Polioptila californica*), Mohave ground squirrel (*Spermophilus mohavensis*), and Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) are examples of species that have been listed as threatened or endangered under the ESA and that could occur within the CVP and SWP service areas.

### **13.1.3 Other Wildlife Resources**

#### **Shasta Lake and Vicinity**

**Critical Deer Range** Critical black-tailed deer winter range for the McCloud Flats and Cow Creek herds is located in the Shasta Lake and vicinity portion of

the primary study area in all five arms of the lake. Critical fawning range also is found along the south-facing slopes of Little Sugarloaf Creek (DFG 1998). Critical deer winter range can include movement corridors, staging areas where deer congregate, and habitats with high-quality winter forage or other elements that help deer to survive the winter. Winter ranges are at lower elevations and are fewer in number than summer ranges, and thus are more vulnerable to human impact. Deer from different summer ranges may use common winter ranges when breeding typically occurs, which contributes to genetic diversity (DFG 1998).

**USFWS Habitat Evaluation Procedure Analysis** Reclamation is working with USFWS to complete a Habitat Evaluation Procedure analysis to help quantify potential project impacts and meet Fish and Wildlife Coordination Act consultation requirements. To date, Habitat Evaluation Procedure studies and analyses have been completed for part of the Shasta Lake and vicinity portion of the primary study area. Additional planning and coordination are ongoing.

**Incidental Observations** Reclamation has maintained a database of special-status wildlife species incidentally observed during all biological surveys performed since 2002. The incidental species observations include the foothill yellow-legged frog, northwestern pond turtle (*Actinemys marmorata marmorata*), osprey (*Pandion haliaetus*), yellow-breasted chat (*Icteria virens*), and yellow warbler (*Dendroica petechia brewsteri*) (Figures 13-3a through 13-3f).

**Upper and Lower Sacramento River, Delta, and CVP/SWP Service Areas** For the upper and lower Sacramento River, Delta, and CVP/SWP service areas, no other wildlife resources were evaluated in addition to wildlife habitats, wildlife, and special-status wildlife as described previously in Sections 13.1.1 and 13.1.2.

## 13.2 Regulatory Framework

Biological resources in California are protected and/or regulated by a variety of Federal and State laws and policies. Key regulatory and conservation planning issues applicable to the project and alternatives under consideration are discussed below.

### 13.2.1 Federal

#### ***Federal Endangered Species Act***

Pursuant to the ESA, USFWS and NMFS have authority over projects that may result in “take” of a Federally listed species. In general, ESA Section 7 prohibits persons (including private parties) from “taking” listed endangered or threatened fish and wildlife species on private property, and from “taking” listed endangered or threatened plant species in areas under Federal jurisdiction or in

violation of State law (16 U.S. Code (USC) 1532, 50 Code of Federal Regulations (CFR) 17.3). Under the ESA, the definition of “take” is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” as part of an intentional or negligent act or omission. The term “harm” includes acts that result in death or injury to wildlife. Such acts may include significant habitat modification or degradation if it results in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Section 7(a) of the ESA, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed for listing or is listed as endangered or threatened. Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with USFWS or NMFS, depending on the species.

As defined in the ESA, critical habitat is a specific geographic area that is essential for the conservation of a threatened or endangered species and that may require special management and protection. It may include an area that is not currently occupied by the species but that will be needed for its recovery. Critical habitats are designated to ensure that actions authorized by Federal agencies will not destroy or adversely modify critical habitat, thereby protecting areas necessary for the conservation of the species.

#### ***Fish and Wildlife Coordination Act***

The Fish and Wildlife Coordination Act provides the basic authority for the involvement of USFWS in evaluating impacts on fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive consideration equal to that of other project features. It also requires Federal agencies that construct, license, or permit water resource development projects to first consult with USFWS (and NMFS in some instances) and State fish and wildlife agencies regarding the impacts of the proposed action on fish and wildlife resources and measures to mitigate these impacts.

#### ***Bald Eagle Protection Act***

The bald eagle and golden eagle are Federally protected under the Bald Eagle Protection Act (16 USC 668–668c). It is illegal to take, possess, sell, purchase, barter, offer to sell or purchase or barter, transport, export, or import a live or dead bald or golden eagle or any eagle part, nest, or egg unless authorized by the Secretary of the Interior. The Bald Eagle Protection Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb” (16 USC 668–668d). USFWS has defined “disturb” under the act as follows (72 Federal Register 31132–31140 (June 5, 2007)):

*Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.*

Active nest sites are also protected from disturbance during the breeding season, generally January through August.

USFWS has proposed new permit regulations to authorize the take of bald and golden eagles under the Bald Eagle Protection Act, generally where the take to be authorized is associated with otherwise lawful activities (72 Federal Register 31141–31155 (June 5, 2007)). With the delisting of the bald eagle in 2007, this act is the primary law protecting bald eagles and golden eagles. Violators are subject to fines and/or imprisonment for up to 1 year.

#### ***Migratory Bird Treaty Act***

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). This prohibition includes direct and indirect acts, although harassment and habitat modifications are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA, which can be found in Title 50, Section 10.13 of the CFR, includes several hundred species, essentially all native birds. Loss of nonnative species, such as house sparrows, European starlings, and rock pigeons, is not covered by this statute.

#### ***U.S. Forest Service Sensitive Species***

The National Forest Management Act requires USFS to “provide for a diversity of plant and animal communities” (16 USC 1604(g)(3)(B)) as part of its multiple-use mandate. USFS must maintain “viable populations of existing native and desired nonnative species in the planning area” (36 CFR 219.19). The Sensitive Species program is designed to meet this mandate and to demonstrate USFS’s commitment to maintaining biodiversity on National Forest System lands. The program is a proactive approach to conserving species to prevent a trend toward listing under the ESA and to ensure the continued existence of viable, well-distributed populations. A “Sensitive Species” is any species of plant or animal that has been recognized by the Regional Forester to need special management to prevent the species from becoming threatened or endangered.

### ***Shasta-Trinity National Forest Land and Resource Management Plan***

The *Shasta-Trinity National Forest Land and Resource Management Plan* contains forest goals, standards, and guidelines designed to guide the management of the Shasta-Trinity National Forest. The following goals, standards, and guidelines related to wildlife resource issues associated with the study area were excerpted from the *Shasta-Trinity National Forest Land and Resource Management Plan* (USFS 1995).

### ***U.S. Forest Service Survey and Manage Standards and Guidelines***

In 1994, BLM and USFS adopted standards and guidelines developed as part of the *Northwest Forest Plan*. These standards and guidelines address management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. The *Northwest Forest Plan* was designed to address human and environmental needs served by the Federal forests of the western part of the Pacific Northwest and Northern California. The development of the *Northwest Forest Plan* was triggered in the early 1990s by the listing of the northern spotted owl and marbled murrelet as threatened under the ESA.

To mitigate potential impacts on plant and wildlife species that have the potential to occur within the range of the northern spotted owl, surveys are required for species thought to be rare, or whose status is unknown because of a lack of information. These species became known as the Survey and Manage species. The *Northwest Forest Plan* has gone through several revisions since its implementation in 1994, including the elimination of the Survey and Manage Mitigation Measure Standards and Guidelines in 2004. However, these guidelines were reinstated in January 2006 as the result of a court order.

### **Biological Diversity**

*Goals (LRMP, p. 4-4)* Integrate multiple resource management on a landscape level to provide and maintain diversity and quality of habitats that support viable populations of plants, fish, and wildlife.

*Standards and Guidelines (LRMP, p. 4-14)*

- **Natural Openings** – Management of natural openings will be determined at the project level consistent with desired future conditions.
- **Snags** – Over time, provide the necessary number of replacement snags to meet density requirements as prescribed for each land allocation and/or management prescription. Live, green culls and trees exhibiting decadence and/or active wildlife use are preferred.
- **Hardwood** – Apply the following standards in existing hardwood types:
  - Manage hardwood types for sustainability.

- Conversion to conifers will only take place to meet desired future ecosystem conditions.
- Where hardwoods occur naturally within existing conifer types on suitable timber lands, manage for a desired future condition for hardwoods as identified during ecosystem analysis consistent with management prescription standards and guidelines. Retain groups of hardwoods over single trees.

### **Threatened, Endangered, and Sensitive Species (Plants and Animals)**

#### *Goals (LRMP, p. 4-5)*

- Monitor and protect habitat for Federally listed Threatened and Endangered and candidate species. Assist in recovery efforts for Threatened and Endangered species. Cooperate with the State to meet objectives for State-listed species.
- Manage habitat for sensitive plants and animals in a manner that will prevent any species from becoming a candidate for Threatened and Endangered status.

#### *Goals (LRMP, p. 4-6)*

- Meet habitat or population objectives established for management indicators.
- Cooperate with Federal, State, and local agencies to maintain or improve wildlife habitat.
- Maintain natural wildlife species diversity by continuing to provide special habitat elements within Forest ecosystems.

#### *Standards and Guidelines (LRMP, pp. 4-29 through 4-30)*

- Minimize accidental electrocution of raptors by ensuring that newly constructed overhead power lines meet safe design standards.
- Consider transplants, introductions, or reintroductions of wildlife species only after ecosystem analysis and coordination with other agencies and the public.
- Manage habitat for Neotropical migrant birds to maintain viable population levels.
- Develop interpretation/view sites for wildlife viewing, photography, and study. Provide pamphlets, slide shows, and other educational material that enhance the watchable wildlife and other interpretive programs.

- Maintain and/or enhance habitat for Federally listed threatened and endangered or USFS sensitive species consistent with individual species recovery plans.

***Management Guide for the Shasta and Trinity Units of the Whiskeytown-Shasta-Trinity National Recreation Area***

The *Management Guide for the Whiskeytown-Shasta-Trinity National Recreation Area*, including the Shasta Unit of the National Recreation Area, contains management strategies intended to achieve or maintain a desired condition. These strategies take into account opportunities, management recommendations for specific projects, and mitigation measures needed to achieve specific goals. The following strategies relative to wildlife resource issues associated with the project site were excerpted from the management guide (USFS 1996).

**Vegetation (Management Guide, pp. IV-18 through IV-19)**

- Prescribed burning, fuel break construction, and other forms of vegetation manipulation will be used to reduce fire hazards and improve forest health.
- Recreation sites will be inventoried and vegetative management plans will be developed to ensure healthy and safe vegetation complexes are maintained over time.
- Bald eagle nest territories will be inventoried and vegetation management plans will be developed to ensure that suitable nest and perch trees are maintained over time.
- Chaparral and woodland habitat management will occur to meet wildlife objectives.
- Interpretive materials will address the need to conserve rare plant communities in accordance with the National Recreation Area Interpretive Plan.
- Diversity of native species will be emphasized. Eradication program will be implemented for nonnative, introduced species in areas where healthy, botanically diverse plant communities are necessary to meet ecosystem management objectives.

**Wildlife (Management Guide, pp. IV-19 through IV-20)**

- Management activities will assure population viability for all native and nonnative desirable species. Management to insure viability will occur within occupied habitat for bald eagle, peregrine falcon, northern spotted owl, northern goshawk, willow flycatcher, northwestern pond turtle, Pacific fisher, Shasta salamander, and

candidate species in accordance with species and/or territory management plans, Forest Orders, and appropriate laws and policy.

- Surveys will continue within potential suitable habitats to determine occupancy status for Threatened, Endangered, sensitive, and candidate species.
- Cooperation will continue with the DFG and the USFWS regarding habitat management of wildlife species inhabiting the National Recreation Area. Consultation with USFWS will continue regarding habitat management for threatened and endangered species.

***Section 404 of the Clean Water Act***

USACE regulates discharges of dredged or fill materials into waters of the United States under Section 404 of the Clean Water Act. Waters of the United States include lakes, rivers, streams, and relatively permanent tributaries and adjacent wetlands. Wetlands are defined under Section 404 as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support (and that do support under normal circumstances) a prevalence of vegetation typically adapted for life in saturated soil conditions. Activities that require a permit under Section 404 include, but are not limited to, placing fill or riprap, grading, mechanized land clearing, and dredging. Any activity that results in the deposit of dredged or fill material below the ordinary high-water mark of waters of the United States or within a jurisdictional wetland usually requires a Section 404 permit, even if the area is dry at the time the activity takes place.

***Executive Order 11312: Invasive Species***

Executive Order 13112 directs Federal agencies to use relevant programs and authorities to do all of the following:

- Prevent the introduction of invasive species
- Detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner
- Monitor invasive species populations accurately and reliably
- Provide for restoration of native species and habitat conditions in ecosystems that have been invaded
- Conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species
- Promote public education on invasive species and the means to address them

- Refrain from authorizing, funding, or carrying out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Executive Order 11312 established a national Invasive Species Council made up of Federal agencies and departments and a supporting Invasive Species Advisory Committee composed of State, local, and private entities. The Invasive Species Council and Advisory Committee oversee and facilitate implementation of the executive order, including preparation of a national invasive species management plan.

***Executive Order 11990: Protection of Wetlands***

Executive Order 11990 established the protection of wetlands and riparian systems as the official policy of the Federal government. It requires all Federal agencies to consider wetland protection as an important part of their policies and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

***Executive Order 13186: Migratory Birds***

Executive Order 13186 directs executive departments and agencies to take certain actions to further implement the MBTA. It requires that each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations develop and implement a memorandum of understanding with USFWS that shall promote the conservation of migratory bird populations.

***Executive Order 13443: Facilitation of Hunting Heritage and Wildlife Conservation***

Executive Order 13443 directs Federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management, including the U.S. Department of the Interior and the U.S. Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

## **13.2.2 State**

***California Endangered Species Act***

Under the CESA, DFG has the responsibility for maintaining a list of endangered and threatened species (California Fish and Game Code, Section 2070). DFG also maintains a list of “candidate species,” which are species for which DFG has issued a formal notice that they are under review for addition to

the list of endangered or threatened species. In addition, DFG maintains lists of “species of special concern,” which serve as species “watch lists.” Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any State-listed endangered or threatened species may be present in the project study area and, if so, whether the proposed project would have a potentially significant impact on any of these species. In addition, DFG encourages informal consultation on any proposed project that may affect a species that is a candidate for state listing.

Project-related impacts on species listed as endangered or threatened under the CESA would be considered significant. State-listed species are fully protected under the mandates of the CESA. “Take” of protected species incidental to otherwise lawful management activities may be authorized under Section 2081 of the California Fish and Game Code. Under the CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include “harm” or “harass,” as the Federal act does. As a result, the threshold for take under the CESA is higher than that under the ESA.

Authorization from DFG would be in the form of an incidental take permit or as a consistency determination (Section 2080.1(a) of the Fish and Game Code). Section 2080.1(a) of the Fish and Game Code authorizes DFG to accept a Federal biological opinion (BO) as the take authorization for a state-listed species when a species is listed under both the ESA and the CESA.

***Sections 3503 and 3513 of the California Fish and Game Code—  
Protection of Birds of Prey***

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (birds in the order of Falconiformes or Strigiformes (birds of prey)—i.e., eagles, hawks, owls, and falcons), including their nests or eggs. Section 3513 provides for adoption of the MBTA’s provisions. It states that it is unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird. These State codes offer no statutory or regulatory mechanism for obtaining an incidental take permit for the loss of nongame, migratory birds. Typical violations include destruction of active raptor nests resulting from removal of vegetation in which the nests are located. Violation of Sections 3503.5 and 3513 could also include disturbance of nesting pairs that results in failure of an active raptor nest.

***Fully Protected Species under the Fish and Game Code***

Protection of fully protected species is described in four sections of the Fish and Game Code (Sections 3511, 4700, 5050, and 5515) that list 37 fully protected species. These statutes prohibit take or possession at any time of fully protected species. DFG is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. DFG has

informed non-Federal agencies and private parties that they must avoid take of any fully protected species in carrying out projects.

***Section 1602 of the California Fish and Game Code—Streambed Alteration***

Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by DFG, pursuant to Section 1602 of the California Fish and Game Code. The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports wildlife, fish, or other aquatic life. This includes watercourses that have a surface or subsurface flow that supports or has supported riparian vegetation. DFG's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A DFG streambed alteration agreement must be obtained for a project that would result in an impact on a river, stream, or lake.

***Section 401 Water Quality Certification/Porter-Cologne Water Quality Control Act***

Under Section 401 of the Clean Water Act, an applicant for a Section 404 permit must obtain a certificate from the appropriate State agency stating that the intended dredging or filling activity is consistent with the State's water quality standards and criteria. In California, the authority to grant water quality certification is delegated by the State Water Resources Control Board to the nine Regional Water Quality Control Boards (RWQCB). Each of the RWQCBs must prepare and periodically update basin plans for water quality control in accordance with the Porter-Cologne Water Quality Control Act. Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Basin plans offer an opportunity to protect wetlands through the establishment of water quality objectives. The RWQCB's jurisdiction includes Federally protected waters as well as areas that meet the definition of "waters of the state." A water of the State is defined as any surface water or groundwater, including saline waters, within the boundaries of California. The RWQCB has the discretion to take jurisdiction over areas not Federally protected under Section 401, provided that those areas meet the definition of waters of the State. Mitigation requiring no net loss of wetlands functions and values of waters of the State is typically required by the RWQCB.

***California Department of Fish and Game Species Designations***

DFG maintains an informal list of species called "species of special concern." These are broadly defined as plant and wildlife species that are of concern to DFG because of population declines and restricted distributions, and/or because they are associated with habitats that are declining in California. These species are inventoried in the CNDDDB regardless of their legal status. Impacts on species of special concern may be considered significant.

### 13.2.3 Regional and Local

Shasta, Tehama, Glenn, Sutter, Sacramento, and Yolo counties and the cities of Redding, Colusa, and Sacramento have established codes and policies that address protection of natural resources, including vegetation, sensitive species, and trees, and are applicable to the project.

Shasta County's general plan emphasizes that the maintenance and enhancement of quality fish and wildlife habitat is critical to the recreation and tourism industry, and acknowledges that any adverse and prolonged decline of these resources could result in negative impacts on an otherwise vibrant industry. The general plan identifies efforts to protect and restore these habitats to sustain the long-term viability of the tourism and recreation industry (Shasta County 2004).

The City of Redding's general plan strives to strike a balance between development and conservation by implementing several measures such as creek-corridor protection, sensitive hillside development, habitat protection, and protection of prominent ridge lines that provide a backdrop to the city (City of Redding 2000).

Tehama County's general plan update provides an overarching guide to future development and establishes goals, policies, and implementation measures designed to address potential changes in county land use and development. The general plan identifies the importance of retaining agriculture as one of the primary uses of land in Tehama County (Tehama County 2009).

Glenn County's general plan provides a comprehensive plan for growth and development in Glenn County for the next 20 years (2007–2027). This plan recognizes that public lands purchased for wildlife preservation generate economic activity as scientists and members of the public come to view and study remnant ecosystems (Glenn County 1993).

The City of Colusa's general plan seeks to promote its natural resources through increased awareness and improved public access (City of Colusa 2007).

Sutter County's general plan contains policies that generally address preservation of natural vegetation, including wetlands. It requires that new development mitigate the loss of Federally protected wetlands to achieve "no net loss," but it does not include any other specific requirements (Sutter County 2010).

Sacramento County's general plan contains policies that promote protection of marsh and riparian areas, including specification of setbacks and "no net loss" of riparian woodland or marsh acreage (Sacramento County 1993). It also addresses the need to conserve vernal pools and ephemeral wetlands to ensure no net loss of vernal pool acreage. Several policies specifically promote protection of native oak trees, and, in some areas of the county, seek to ensure

that there is no net loss of canopy area. The general plan for the County of Sacramento is currently under revision.

Chapter 12.56, “Trees Generally,” of the City of Sacramento Municipal Code addresses the protection of trees within the city boundaries, including general protection of all trees on city property and specific protection of heritage trees (City of Sacramento 2011).

Yolo County’s general plan aims to provide an active and productive buffer of farmland and open space separating the Bay Area from Sacramento, and integrating green spaces into its communities (Yolo County 2009).

#### **13.2.4 Federal, State, and Local Programs and Projects**

##### ***California Bay-Delta Authority***

The California Bay-Delta Authority was established as a State agency in 2003 to oversee implementation of CALFED for the 25 Federal and State agencies working cooperatively to improve the quality and reliability of California’s water supplies while restoring the Bay-Delta ecosystem. The CALFED Ecosystem Restoration Program has provided a funding source for projects that include those involving acquisition of lands within the Sacramento River Conservation Area, initial baseline monitoring and preliminary restoration planning, and preparation of long-term habitat restoration management and monitoring plans.

##### ***Cantara Trustee Council***

The Cantara Trustee Council administers a grant program that has provided funding for numerous environmental restoration projects in the primary study area, including programs in the Fall River watershed, Sulphur Creek, the upper Sacramento River, Middle Creek, lower Clear Creek, Battle Creek, Salt Creek, and Olney Creek. The Cantara Trustee Council is a potential local sponsor for future restoration actions in the primary study area. The Cantara Trustee Council includes representatives from DFG, USFWS, the Central Valley RWQCB, the California Sportfishing Protection Alliance, and the Shasta Cascade Wonderland Association.

##### ***Resource Conservation Districts***

There are numerous resource conservation districts (RCD) within the study area. Once known as soil conservation districts, RCDs were established under California law with a primary purpose to implement local conservation measures. Although RCDs are locally governed agencies with locally appointed, independent boards of directors, they often have close ties to county agencies and the U.S. National Resources Conservation Service. RCDs are empowered to conserve resources within their districts by implementing projects on public and private lands and to educate landowners and the public about resource conservation. They are often involved in the formation and coordination of watershed working groups and other conservation alliances. In

the Shasta Lake and upper Sacramento River vicinity, districts include the Western Shasta County RCD and the Tehama County RCD. To the east are the Fall River and Pit River RCDs, and to the west and north are the Trinity County and Shasta Valley RCDs.

### ***Riparian Habitat Joint Venture***

The Riparian Habitat Joint Venture (RHJV) was initiated in 1994 and includes signatories from 18 Federal, State, and private agencies. The RHJV promotes conservation and the restoration of riparian habitat to support native bird population through three goals:

- Promote an understanding of the issues affecting riparian habitat through data collection and analysis.
- Double riparian habitat in California by funding and promoting on-the-ground conservation projects.
- Guide land managers and organizations to prioritize conservation actions.

RHJV conservation and action plans are documented in *The Riparian Bird Conservation Plan* (RHJV 2004). The conservation plan targets 14 “indicator” species of riparian-associated birds and provides recommendations for habitat protection, restoration, management, monitoring, and policy. The report notes habitat loss and degradation as one of the most important factors causing the decline of riparian birds in California. The RHJV has participated in monitoring efforts within the Sacramento National Wildlife Refuge Complex and other conservation areas. The RHJV’s conservation plan identifies lower Clear Creek as a prime breeding area for yellow warblers and song sparrows, advocating a continuous riparian corridor along lower Clear Creek.

### ***Sacramento River Advisory Council***

In 1986 the California Legislature passed Senate Bill 1086, which called for a management plan for the Sacramento River and its tributaries to protect, restore, and enhance fisheries and riparian habitat in an area stretching from the confluence of the Sacramento River with the Feather River and continuing northward to Keswick Dam, about 4 miles north of Redding. The law established an advisory council that included representatives of Federal and State agencies, county supervisors, and representatives of landowners, water contractors, commercial and sport fisheries, and general wildlife and conservation interests. Responsibilities of the advisory council included development of the *Sacramento River Conservation Area Forum Handbook* to guide management of riparian habitat and agricultural uses along the river (Resources Agency 2003). This action also resulted in formation in May 2000 of the Sacramento River Conservation Area Forum, a nonprofit, public benefit corporation with a board of directors that includes private landowners and public interest representatives from a seven-county area, an appointee of the

California Resources Agency, and ex-officio members from six Federal and State resource agencies. The work of the organization is generally focused on planning actions and river management within the Sacramento River Conservation Area planning area.

***Sacramento River Conservation Area Program***

Senate Bill 1086 called for a management plan for the Sacramento River and its tributaries to protect, restore, and enhance both fisheries and riparian habitat. The Sacramento River Conservation Area Program has an overall goal of preserving remaining riparian habitat and reestablishing a continuous riparian ecosystem along the Sacramento River between Redding and Chico, and reestablishing riparian vegetation along the river from Chico to Verona. The program is to be accomplished through an incentive-based, voluntary river management plan. The *Upper Sacramento River Fisheries and Riparian Habitat Management Plan* (Resources Agency 1989), identifies specific actions to help restore the Sacramento River fishery and riparian habitat between the Feather River and Keswick Dam. The *Sacramento River Conservation Area Forum Handbook* (Resources Agency 2003) is a guide to implementing the program. The Keswick Dam to Red Bluff portion of the conservation area includes areas within the 100-year floodplain, existing riparian bottomlands, and areas of contiguous valley oak woodland, totaling approximately 22,000 acres. The 1989 fisheries restoration plan recommended several actions specific to the study area:

- Fish passage improvements at RBDD (recently completed)
- Modification of the Spring Creek Tunnel intake for temperature control (completed)
- Spawning gravel replacement program (ongoing)
- Development of side-channel spawning areas, such as those at Turtle Bay in Redding (ongoing)
- Structural modifications to the Anderson-Cottonwood Irrigation District Dam to eliminate short-term flow fluctuations (completed)
- Maintaining instream flows through coordinated operation of water facilities (ongoing)
- Improvements at the Coleman National Fish Hatchery (partially complete)
- Measures to reduce acute toxicity caused by acid mine drainage and heavy metals (ongoing)
- Various fisheries improvements on Clear Creek (partially complete)

- Flow increases, fish screens, and revised gravel removal practices on Battle Creek (beginning summer 2006, ongoing monitoring)
- Control of gravel mining, improvements of spawning areas, improvements of land management practices in the watershed, and protection and restoration of riparian vegetation along Cottonwood Creek (ongoing)

### ***Sacramento River National Wildlife Refuge***

The Sacramento River National Wildlife Refuge (SRNWR) is composed of many units between the cities of Red Bluff and Princeton. The SRNWR along the middle Sacramento River is part of the Sacramento National Wildlife Refuge Complex, consisting of five refuges and three wildlife management areas within the Sacramento Valley. Reaches and subreaches of the river are delineated based generally on transitions in fluvial geomorphic riverine conditions, although county boundaries were considered as well. The middle Sacramento River region between Red Bluff and Colusa includes three units within the Chico Landing Subreach that contain restoration project sites addressed in the *Sacramento River–Chico Landing Subreach Habitat Restoration Draft Environmental Impact Report* (CBDA 2005). In addition, three areas proposed for restoration in this area occur within the larger SRNWR units that were evaluated in the *Environmental Assessment for Proposed Restoration Activities on the Sacramento River National Wildlife Refuge* (USFWS 2001; CBDA 2005).

In June 2005, USFWS issued the *Sacramento River National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Assessment and Finding of No Significant Impact* (USFWS 2005b) to serve as an integrated management plan for land that it acquires and manages for inclusion in the SRNWR. The SRNWR final comprehensive conservation plan includes goals, objectives, and strategies to guide management of lands within the SRNWR. It also includes assessments of and establishes parameters for “compatible uses,” which are uses that are considered compatible with the primary purposes for which the area was established. Riparian habitat restoration projects are being implemented under cooperative agreements between USFWS and other entities such as The Nature Conservancy (TNC) in accordance with the SRNWR final comprehensive conservation plan.

### ***Sacramento River Wildlife Area***

The Sacramento River Wildlife Area is managed by DFG and consists of approximately 3,770 acres of important riparian habitat located along a 70-mile reach of the lower Sacramento River. These lands are managed to protect and enhance habitat for wildlife species, and to provide the public with compatible, wildlife-related recreational uses. This management is guided by the *Sacramento River Comprehensive Management Plan* prepared in 2004.

***Sacramento River Preservation Trust***

The Sacramento River Preservation Trust is a private, nonprofit organization active in environmental education and advocacy to preserve the natural environmental values of the Sacramento River. The trust has participated in various conservation and land acquisition projects, including securing lands for the SRNWR. The group is pursuing designation of a portion of the Sacramento River between Redding and Red Bluff as a national conservation area.

***Sacramento River Watershed Program***

The Sacramento River Watershed Program is an effort to bring stakeholders together to share information and work together to address water quality and other water-related issues within the Sacramento River watershed. The group is funded congressionally through the U.S. Environmental Protection Agency. The program's primary goal is "to ensure that current and potential uses of Sacramento River watershed resources are sustained, restored, and where possible, enhanced while promoting the long-term social and economic vitality of the region." The Sacramento River Watershed Program manages grants for the Sacramento River Toxic Pollutants Control Program; performs extensive water quality monitoring, data collection, and data management for the watershed; and is instrumental in the study and monitoring of toxic pollutants. Although the program does not implement restoration projects, it is a potential partner for coordinating research and monitoring through consensus-based collaborative partnerships and promoting mutual education among the stakeholders of the Sacramento River watershed.

***Sacramento Watersheds Action Group***

The Sacramento Watersheds Action Group is a nonprofit corporation that secures funding for, designs, and implements projects that provide watershed restoration, streambank and slope stabilization, erosion control, watershed analysis, and road removal. The Sacramento Watersheds Action Group has successfully worked with local groups, agencies, and organizations to fund and complete restoration projects on the Sacramento River and tributaries downstream from Keswick Dam. Their projects include development of the *Sulphur Creek Watershed Analysis and Action Plan*, the Whiskeytown Reservoir Shoreline Erosion Control Project, the Sulphur Creek Crossing Restoration Project, and the Lower Sulphur Creek Realignment and Riparian Habitat Enhancement Project. The Sacramento Watersheds Action Group is a potential local sponsor for watershed restoration actions in the study area.

***Shasta Land Trust***

The Shasta Land Trust is a regional, nonprofit organization dedicated to conserving open space, wildlife habitat, and agricultural land. This organization works with public agencies and private landowners and is funded primarily through membership dues and donations. It employs various voluntary programs to protect and conserve valuable lands using conservation easements, land donations, and property acquisitions. The trust is a potential local partner for restoration activities in the Shasta Dam to Red Bluff area.

### ***The Nature Conservancy***

TNC is a private, nonprofit organization involved in environmental restoration and conservation throughout the United States and the world. TNC approaches environmental restoration primarily through strategic land acquisition from willing sellers and obtaining conservation easements. Some of the lands are retained by TNC for active restoration, research, or monitoring activities, while others are turned over to government agencies such as USFWS or DFG for long-term management. Lower in the Sacramento River basin, TNC has been instrumental in acquiring and restoring lands in the SRNWR and managing several properties along the Sacramento River. It also has pursued conservation easements on various properties at tributary confluences, including Cottonwood and Battle creeks.

### ***The Trust for Public Land***

The Trust for Public Land is a national, nonprofit organization involved in preserving lands with natural, historic, cultural, or recreational value, primarily through conservation real estate. This organization's Western Rivers Program has been involved in conservation efforts along the Sacramento River between Redding and Red Bluff (BLM's Sacramento River Bend Management Area), Battle Creek, Paynes Creek, Inks Creek, and Fenwood Ranch in Shasta County. The group promotes public ownership of conservation lands to ensure public access and enjoyment.

## **13.3 Environmental Consequences and Mitigation Measures**

This section describes the environmental evaluation methods, assumptions, and specific criteria used to determine significance for each resource area, and discusses impacts and proposed mitigation measures. This impacts assessment evaluates the project's compliance with requirements outlined in the *Wildlife Resources Technical Report*. Mitigation measures are presented (as needed) to reduce impacts to a less than significant level.

### **13.3.1 Methods and Assumptions**

The following sections describe the methods, processes, procedures, and assumptions used to formulate and conduct the environmental impact analysis.

This analysis of impacts on wildlife resources resulting from implementation of the project alternatives under consideration is based on review of existing documentation that addresses biological resources in or near the primary and extended study areas and on geographic information systems analysis.

Where specific habitat data were not available, suitable habitat data defined by California Wildlife Habitat Relationships (CWHR) were used to determine impacts.

The following assumptions about activity at Shasta Lake and vicinity have been made for the purposes of the impact analysis:

- Activity areas (construction areas for infrastructure and relocation areas) would be completely cleared.
- Cutting/clearing of vegetation would be conducted from late summer through late winter, to the extent feasible.
- Removal of cleared material could occur during the typical breeding season for birds in Shasta County.
- Removal of cleared vegetation would be done using conventional yarding systems and aerial (helicopter) systems.
- With the exception of Arbuckle Flat, no vegetation would be removed along the Pit Arm upstream from Painter Creek.
- No blasting would be required for the mining of materials within the current boundary of Shasta Lake.

For the upper Sacramento River and extended study area, the project has the potential to affect common wildlife and special-status wildlife species through the following impact mechanisms:

- Change in inundated width of the river from spring through fall
- Reduced frequency, duration, or magnitude of intermediate to large flows
- Altered geomorphic processes (e.g., meander, channel avulsion) along rivers
- Altered availability of groundwater
- Altered vegetative communities within the river corridor
- Temporary or permanent disturbance of habitat at Reading Island and gravel augmentation sites
- Mortality of individuals of special-status species at Reading Island and gravel augmentation sites

Potential effects on the upper Sacramento River and extended study area resulting from these impact mechanisms were assessed for common wildlife and special-status wildlife species associated with riparian and wetland habitats located between Shasta Dam and RBDD and within the extended study area that may be affected by altered hydrologic flows. It is assumed that construction-

related activities, their effects, and mitigation were considered in the “Shasta Lake and Vicinity” section. The assessment in this section was based in part on the potential effects on vegetation communities provided in Chapter 12, “Botanical Resources and Wetlands.”

### **13.3.2 Criteria for Determining Significance of Effects**

Significance criteria used to analyze the potential impacts of the project on wildlife resources include factual and scientific information and regulatory standards of county, State, and Federal agencies, including the State CEQA Guidelines. These criteria have been developed to establish thresholds to determine the significance of impacts pursuant to CEQA (Section 15064.7) and should not be confused with a “take” or adverse effect under the ESA. An environmental document prepared to comply with NEPA must consider the context and intensity of the environmental effects that would be caused by, or result from, the proposed action. Under NEPA, the significance of an effect is used solely to determine whether an environmental impact statement must be prepared. An EIS must identify reasonable means to “mitigate adverse environmental impacts” (40 E 1502.16(h)). An environmental document prepared to comply with CEQA must identify the potentially significant environmental effects of a proposed project. A “[s]ignificant effect on the environment” means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (State CEQA Guidelines, Section 15382). CEQA also requires that the environmental document propose feasible measures to avoid or substantially reduce significant environmental effects (State CEQA Guidelines, Section 15126.4(a)).

The following significance criteria were developed based on guidance provided by the State CEQA Guidelines, and consider the context and intensity of the environmental effects as required under NEPA. Impacts of an alternative on wildlife would be significant if project implementation would do any of the following:

- Result in mortality of State-listed or Federally listed wildlife species, or species that are candidates for listing or proposed for listing
- Have the potential to substantially reduce the habitat of any wildlife species, including those that are listed as endangered or threatened or are candidates or proposed for endangered or threatened status
- Have the potential to cause a wildlife population to drop below self-sustaining levels
- Have a substantial adverse effect, either directly or through habitat modifications, on any non-special-status wildlife species
- Substantially adversely affect, either directly or through habitat modifications, any wildlife species identified as a candidate, sensitive,

or special-status species in local or regional plans, policies, or regulations or by DFG or USFWS

- Interfere substantially with the movement of any native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites
- Conflict with or violate the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, State, or Federal habitat conservation plan relating to the protection of wildlife species
- Conflict with any State or local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance
- Substantially reduce the habitat of a wildlife species, cause a wildlife species to drop below self-sustaining levels, threaten to eliminate an animal community, or substantially reduce the number or restrict the range of an endangered, rare, or threatened species

Significance statements are relative to both existing conditions (2005) and future conditions (2030) unless stated otherwise. Impact conclusions are made using the significance criteria described above and include consideration of the “context” of the action and the “intensity” (severity) of its effects in accordance with NEPA guidance (40 CFR 1508.27).

### **13.3.3 Topics Eliminated from Further Consideration**

No topics related to wildlife resources that are included in the significance criteria listed above were eliminated from further consideration. All relevant topics are analyzed below.

### **13.3.4 Direct and Indirect Effects**

This section identifies how wildlife could be affected by the project. The project could affect wildlife by doing any of the following:

- Causing construction-related effects at Shasta Dam and around Shasta Lake
- Altering flow regimes downstream from Shasta Lake and downstream from other reservoirs with altered operations
- Increasing water supply reliability, which in turn could contribute to human population growth or changes in agricultural land uses in the CVP and SWP service areas

By altering storage and reservoir operations, the project would change flow regimes in downstream waterways. In turn, these alterations to the flow regime could affect wildlife, particularly by affecting their riparian and wetland habitats along several waterways.

**No-Action Alternative**

Under the No-Action Alternative, Reclamation would not pursue an action to enlarge Shasta Dam. No new facilities would be constructed at Shasta Dam and no facilities around Shasta Lake would be relocated to accommodate higher lake levels; thus, there would be no construction-related impacts. In addition, releases from Shasta Dam or other CVP reservoirs would not change as a result of a Shasta Dam enlargement. Reasonably foreseeable projects identified elsewhere in this PDEIS, however, would occur and have effects on wildlife but those effects are unknown, largely speculative for many such projects, and therefore are not addressed in detail below.

**Shasta Lake and Vicinity**

*Impact Wild-1 (No-Action): Take and Loss of Habitat for the Shasta Salamander* No direct take of the Shasta salamander or loss of its habitat would occur because the project would not be constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-2 (No-Action): Impacts on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat* No impacts or loss of habitat for the foothill yellow-legged frog or tailed frog would occur because the project would not be constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-3 (No-Action): Impacts on the Northwestern Pond Turtle and Its Habitat* No direct take or decrease of habitat quality for the northwestern pond turtle would occur because the project would not be constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-4 (No-Action): Impacts on the American Peregrine Falcon* No impact on the American peregrine falcon would occur because the project would not be constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-5 (No-Action): Take and Loss of Habitat for the Bald Eagle* No take or loss of habitat for the bald eagle would occur because the project would not be constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-6 (No-Action): Take and Loss of Nesting and Foraging Habitat for the Northern Spotted Owl* No take or loss of nesting and foraging habitat for the northern spotted owl would occur because the project would not be

constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-7 (No-Action): Impacts on the Purple Martin and Its Nesting Habitat* No impacts or loss of nesting habitat for the purple martin would occur because the project would not be constructed. No impact would occur. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-8 (No-Action): Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat* No impacts or loss of foraging and nesting habitat for the willow flycatcher, Vaux's swift, yellow warbler, and yellow-breasted chat would occur because the project would not be constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-9 (No-Action): Impacts on the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat* No impact or loss of foraging and nesting habitat for the long-eared owl, northern goshawk, Cooper's hawk, great blue heron, and osprey would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-10 (No-Action): Take and Loss of Habitat for the Pacific Fisher* No take or loss of habitat for the Pacific fisher would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-11 (No-Action): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtail and Their Habitat* No impact or loss of habitat for special-status bats (the pallid bat, spotted bat, western red bat, western mastiff bat, Townsend's big-eared bat, long-eared myotis, and Yuma myotis), the American marten, and ringtail would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-12 (No-Action): Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat* No impact or loss of habitat for special-status terrestrial mollusks (Shasta sideband, Wintu sideband, Shasta chaparral, and Shasta hesperian) would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-13 (No-Action): Permanent Loss of Wildlife Habitat* No permanent loss of habitat would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-14 (No-Action): Impacts on Other Birds of Prey (i.e., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (i.e., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat* No impact or loss of foraging and nesting habitat for other birds of prey and migratory bird species would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-15 (No-Action): Loss of Critical Deer Winter and Fawning Range* No loss of deer winter and fawning range would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

*Impact Wild-16 (No-Action): Take and Loss of California Red-Legged Frog* No loss of California red-legged frog habitat would occur because the project would not be implemented. No impact would occur. Mitigation is not required for the No-Action Alternative.

#### **Upper Sacramento River (Shasta Dam to Red Bluff)**

*Impact Wild-17 (No-Action): Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area* Effects on riparian vegetation in the upper Sacramento River area from continuing the existing dam operation under the No-Action Alternative would not have a substantial adverse effect on special-status wildlife. This impact would be less than significant.

Implementing the No-Action Alternative would not result in changes to existing facilities or reservoir operations. The No-Action Alternative would continue to alter the structure and species composition of riparian vegetation resulting from continued operation of the existing Shasta Dam, as described in Chapter 12, "Botanical Resources and Wetlands." Operation of the dam has decreased early successional riparian communities and increased the extent of mid-successional riparian communities. Although early and mid-successional riparian vegetation provides different habitat values and some shifts in species use may occur, implementing the No-Action Alternative would not have a substantial adverse effect on special-status wildlife associated with riparian vegetation, nor would it be likely to cause a population to be eliminated. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

*Impact Wild-18 (No-Action): Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes* Future conditions for bank swallows are not expected to differ substantially from existing conditions because of the restoration projects being implemented on the Sacramento River. This impact would be less than significant.

Dam operations under the No-Action Alternative would continue to alter geomorphic processes. Loss of eroding banks during winter flood flows could

limit the formation of suitable nesting habitat for bank swallow. However, future conditions for bank swallows are not expected to differ substantially from existing conditions because of the restoration projects being implemented on the Sacramento River. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

*Impact Wild-19 (No-Action): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Changes in Flow Regime* No adverse effects on vernal pool-associated wildlife species would occur. This impact would be less than significant.

The No-Action Alternative would not affect the hydrology of vernal pools or have an adverse effect on vernal pool-associated wildlife species. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

*Impact Wild-20 (No-Action): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area* Riparian habitat conditions would not differ from baseline conditions. This impact would be less than significant.

The No-Action Alternative would not conflict with existing plans promoting riparian habitat because conditions would not differ from the existing baseline. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

*Impact Wild-21 (No-Action): Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program* Under the No-Action Alternative, the gravel augmentation program would not be implemented. There would be no impact. Mitigation is not required for the No-Action Alternative.

*Impact Wild-22 (No-Action): Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration of Reading Island* Under the No-Action Alternative there would be no Reading Island restoration. Thus, there would be no impact. Mitigation is not required for the No-Action Alternative.

### **Lower Sacramento River and Delta**

*Impact Wild-23 (No-Action): Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta* Effects on riparian vegetation in the lower Sacramento River and Delta areas from continuing the existing dam operation under the No-Action Alternative would not have a substantial adverse effect on special-status wildlife. This impact would be less than significant.

This impact would be similar to Impact Wild-17 (No-Action) for the primary study area. The No-Action Alternative would continue to alter the structure and species composition of riparian habitat along the lower Sacramento River and

into the Delta resulting from continued operation of Shasta Dam. Dam operation, which has led to a decrease in early successional riparian communities and an increase in the extent of mid-successional riparian communities, would continue under the No-Action Alternative. Thus, the No-Action Alternative would affect habitats used by special-status wildlife species because early- and mid-successional riparian vegetation provide different habitat values. However, this change is expected to be small and is not likely to have a substantial adverse effect on special-status species, nor would it be likely to cause a population to be eliminated. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

*Impact Wild-24 (No-Action): Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes* Future conditions for bank swallows along the lower Sacramento River are not expected to differ substantially from existing conditions because of the restoration projects being implemented on the Sacramento River. This impact would be less than significant.

This impact would be similar to Impact Wild-18 (No-Action) for the primary study area. Dam operations under the No-Action Alternative would continue to alter geomorphic processes along the lower Sacramento River. Loss of eroding banks during winter flood flows could limit the formation of suitable nesting habitat for bank swallow. However, future conditions for bank swallows are not expected to differ substantially from existing conditions because of the restoration projects being implemented on the Sacramento River. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

*Impact Wild-25 (No-Action): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife Along the Lower Sacramento River and in the Delta from Changes in Flow Regime of the Sacramento River and Affected Tributaries, and Changes in Seasonal Water Availability* No adverse effects on vernal pool-associated wildlife species along the lower Sacramento River and in the Delta would occur. This impact would be less than significant.

This impact would be similar to Impact Wild-19 (No-Action) for the primary study area. The No-Action Alternative would not affect the hydrology of vernal pools or have an adverse effect on vernal pool-associated wildlife species. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

*Impact Wild-26 (No-Action): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta* No adverse effects on vernal pool-associated wildlife species along the lower Sacramento River and in the Delta would occur. This impact would be less than significant.

This impact would be similar to Impact Wild-20 (No-Action) for the primary study area. The No-Action Alternative would not conflict with existing plans promoting riparian habitat along the lower Sacramento River and in the Delta because conditions would not differ from the existing baseline. Therefore, this impact would be less than significant. Mitigation is not required for the No-Action Alternative.

#### **CVP/SWP Service Areas**

*Impact Wild-27 (No-Action): Impacts on Riparian-Associated or Aquatic Special-Status Wildlife in the CVP/SWP Service Areas Resulting from Modifications to Existing Flow Regimes* Changes to CVP and SWP water deliveries that would occur while the existing dam operation continues under the No-Action Alternative would not have a substantial adverse effect on special-status wildlife. This impact would be less than significant.

This impact would be similar to Impact Wild-17 (No-Action) for the primary study area and Impact Wild-21 (No-Action) for the lower Sacramento River and Delta. Although Shasta Dam would not be altered under the No-Action Alternative, CVP and SWP water storage, conveyance, and deliveries to the CVP and SWP service areas would change because of several reasonably foreseeable projects that would occur with or without enlarging Shasta Dam. CVP and SWP deliveries could increase or decrease based on any number of factors between now and 2030. Given environmental regulations to protect sensitive habitats and species, these changes are not likely to have a substantial adverse effect on special-status species, nor would they be likely to cause a population to be eliminated. This impact would be less than significant. Mitigation is not required for the No-Action Alternative.

#### **CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability**

CP1 focuses on increasing water supply reliability while contributing to increased survival of anadromous fish, actions that are consistent with the 2000 CALFED ROD. In addition to the common features above, CP1 primarily involves raising Shasta Dam 6.5 feet, an elevation change that would increase the reservoir's full pool by 8.5 feet and would enlarge the total storage space in the reservoir by 256,000 acre-feet. Under this plan, Shasta Dam operational guidelines would continue unchanged, with the additional storage retained for water supply reliability and increased anadromous fish survival.

#### **Shasta Lake and Vicinity**

*Impact Wild-1 (CP1): Take and Loss of Habitat for the Shasta Salamander* Ground-disturbing activities and vegetation removal associated with dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take of the Shasta salamander, a State-listed species, USFS sensitive species, survey and manage species, MSCS-covered species, and BLM sensitive species. Operation of equipment in or removal of suitable habitat

during the wet season could result in direct impacts on this species. In addition, the raising of Shasta Dam would result in the inundation of habitat for this species. This impact would be significant.

Collectively, 39 sites are known to occur within the areas surveyed by NSR (impoundment and relocation areas). Individuals were observed in both limestone and nonlimestone habitats in each arm. Within the impoundment area, presence of the Shasta salamander is presumed in all CHWR habitat types where it has been located. Shasta salamanders present will not be able to move out of the inundation area and will drown during the inundation period. This impact would be significant.

Inundation resulting from a 6.5-foot dam raise would result in a loss of 7 acres of limestone habitat and 1,197 acres of nonlimestone habitat. Impacts on limestone and nonlimestone habitat by CWHR type providing suitable habitat in the impoundment area are summarized in Table 13-6.

**Table 13-6. Impacts on Suitable Habitat for the Shasta Salamander in the Impoundment Area (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Limestone	0.00	0.82	0.00	5.17	0.00	1.50
Nonlimestone	222.14	42.84	348.85	203.70	122.02	257.57
Total	222.14	43.66	348.85	208.87	122.02	259.07

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Direct mortality of Shasta salamanders would occur in areas of suitable habitat where complete vegetation clearing is implemented and/or mechanized construction equipment is employed if these activities occur during the wet season when salamanders are on the surface. Construction activities in relocation areas would result in a loss of 35 acres of limestone habitat and 2,870 acres of nonlimestone habitat. This impact would be significant. Impacts on limestone and nonlimestone habitat by CWHR type providing suitable habitat in the relocation areas are summarized in Table 13-7.

**Table 13-7. Impacts on Suitable Habitat for the Shasta Salamander in Relocation Areas**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Limestone	0.00	0.00	0.00	35.71	0.00	0.00
Nonlimestone	388.18	0.00	1083.45	1020.46	100.34	278.00
Total	388.18	0.00	1083.45	1056.17	100.34	278.00

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Implementation of the project would take place over 3 to 4 years. Mortality of individuals could occur over multiple years if ground-disturbing activities are conducted during the wet season. This impact would be significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range (if appropriate). Shasta salamander surveys are ongoing and it is anticipated that protocol-level surveys will be conducted within the dam construction footprint and all relocation area footprints. Protocol-level surveys would provide specific information about the presence or absence of Shasta salamanders within individual construction footprints. Direct and indirect impacts based on those results will be reported in the FEIS. Additionally, other indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-2 (CPI): Impact on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat* Ground-disturbing activities and vegetation removal associated with dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take of the foothill yellow-legged frog, a California species of special concern, a USFS sensitive species, an MSCS-covered species, and a BLM sensitive species, and the tailed frog, a California species of special concern. Operation of equipment in or adjacent to riverine or riparian habitat would result in direct impacts on this species. In addition, inundation caused by the raising of Shasta Dam would result in the conversion of suitable riverine and riparian habitat to unsuitable lacustrine habitat. These impacts would be potentially significant.

Foothill yellow-legged frogs occur in many perennial streams within the impoundment area. They have been found in streams on all arms and the main body of the lake. Tailed frogs have not been found during surveys, but there are known occurrences in the McCloud and upper Sacramento arms. CWHR habitat types, montane riparian and riverine, are suitable habitat where these species might occur.

Individual foothill yellow-legged frog and tailed frogs will not be affected by the inundation caused by the raise of the dam. These animals will be able to swim upstream to suitable habitat.

Although frogs may move out of harms way, direct take of foothill yellow-legged frog and tailed frog could also occur as a result of project-associated construction activities in or near suitable aquatic habitat. Potential construction impacts include mortality of individuals because of equipment use and vehicle traffic within suitable aquatic and upland habitat. The potential for direct take would be temporary, occurring only during project construction. Project implementation could result in the degradation of suitable aquatic habitat

because of increased erosion, sedimentation, or accidental fuel leaks and spills. These impacts would be potentially significant.

Implementation of the project would take place over 3 to 4 years. Mortality of individuals could occur over multiple years if construction activities are conducted in perennial streams. This impact would be potentially significant.

Implementation of a 6.5-foot dam raise would result in inundation of 33 acres of habitat for the foothill yellow-legged frog and tailed frog. A total of 19 acres of suitable habitat would be lost because of vegetation removal associated with dam construction and construction in the relocation areas. Summaries of suitable habitat loss by arm are presented in Table 13-8.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range (if appropriate). Indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-8. Impacts on Suitable Habitat for the Foothill Yellow-Legged and Tailed Frog in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Riverine	0.00	0.35	2.30	3.81	0.59	0.00
Total	1.54	2.83	18.22	8.41	1.17	0.80
<b>Relocation Areas</b>						
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Riverine	0.00	0.00	0.39	3.75	0.00	0.00
Total	0.34	0.00	5.11	11.77	0.23	1.45

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate

*Impact Wild-3 (CPI): Impact on the Northwestern Pond Turtle and Its Habitat*  
Ground-disturbing activities and vegetation removal associated with dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take of the northwestern pond turtle, a California species of special concern, a USFS sensitive species, and an MSCS-covered species. These impacts would be potentially significant.

Individual northwestern pond turtles will not be impacted by the inundation caused by the raise of the dam. Lacustrine is suitable habitat for the northwestern pond turtle.

The northwestern pond turtle occurs throughout the perimeter of the impoundment area. In addition to aquatic habitats, this species uses upland habitats for nesting and overwintering. Nests are generally located on southfacing slopes of less than 60 degrees averaging 200 meters (660 feet) from an aquatic site (DFG 1994). Thus, loss of upland habitats adjacent to suitable aquatic habitat (within approximately 660 feet) could adversely affect this species.

Direct take of northern pond turtle eggs or juveniles could occur during the first inundation of habitat above 1,070 feet above msl. Turtles may lay eggs in suitable habitat that subsequently becomes inundated, resulting in the death of the eggs or overwintering juveniles. In addition, inundation caused by the raising of Shasta Dam would result in the conversion of suitable habitat to unsuitable lacustrine habitat. These impacts would be potentially significant.

Direct take of northwestern pond turtles could also occur as a result of project-associated construction activities in or near suitable aquatic and upland habitat. Potential construction impacts include mortality of individuals because of equipment use and vehicle traffic within suitable aquatic and upland habitat. In addition, project implementation could result in the degradation of suitable aquatic habitat because of increased erosion, sedimentation, or accidental fuel leaks and spills. Additionally, it is assumed that all vegetation will be removed within the relocation areas.

Implementation of the project would occur over 3 to 4 years. Mortality of individuals could occur over multiple years if construction activities are conducted in suitable aquatic and upland habitat. This impact would be potentially significant.

Implementation of a 6.5-foot raise of the dam would result in a loss of 33 acres of suitable habitat for the northwestern pond turtle (montane riparian, fresh emergent, lacustrine, and riverine). Seven acres of riverine habitat would be converted to lacustrine habitat. Because there are equally valuable components lost or gained in either habitat, the quality of the habitat would not be compromised. However, maximum lake elevation is infrequent and would not benefit the species throughout the remainder of the year. Thus, the conversion of suitable habitats to lacustrine habitat remains an impact on northwestern pond turtle habitat.

A total of 19 acres of suitable aquatic habitat would be lost because of vegetation removal associated with dam construction and construction of the relocation areas. Summaries of suitable habitat lost by arm are presented in Table 13-9.

**Table 13-9. Impacts on Suitable Habitat for the Northwestern Pond Turtle in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
Lacustrine	0.00	0.00	0.00	0.00	0.00	0.00
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Riverine	0.00	0.35	2.30	3.81	0.59	0.00
Total	1.54	2.83	18.22	8.41	1.17	0.80
<b>Relocation Areas</b>						
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Riverine	0.00	0.00	0.39	3.75	0.00	0.00
Total	0.34	0.00	5.11	44.41	0.23	1.45

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range (if appropriate). Impacts on upland habitats will be quantified based on proximity to aquatic habitat. Upland habitats will be quantified based on suitable slope, soil composition, and proximity to aquatic habitats. Indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-4 (CPI): Impact on the American Peregrine Falcon* Construction activities and vegetation removal associated with dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of American peregrine falcons, a State fully protected and MSCS-covered species. This impact would be potentially significant.

Cliffs within the Shasta Lake and vicinity portion of the primary study area provide suitable nesting habitat for the peregrine falcon. Overstory and complete vegetation removal is expected to occur within the impoundment area in suitable cliff habitat. Thus, overstory vegetation removal occurring in or near suitable cliff habitat during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests. Additionally, because of the steep terrain, trees would be yarded by helicopter. Noise generated by chainsaws and helicopter yarding could cause the abandonment of nests, resulting in the incidental loss of fertile eggs or nestlings. This impact would be potentially significant.

No known eyries would be inundated by a 6.5-foot raise in lake elevation; however, 8.5 vertical feet (full pool) of cliff habitat would be inundated. Peregrine falcons nest on sheer cliffs ranging in height from 75 to 2,000 feet. Eyries are generally located between 40 and 80 percent of total cliff height

(Pagel 1992). Based on the large area required for suitable nesting habitat for peregrine falcons, impacts on suitable cliff habitat for nesting would be less than significant. The conversion of uplands to lacustrine habitat would not adversely affect foraging habitat for the species because they frequently forage over water.

Implementation of the project would occur over 3 to 4 years. Impacts on nesting American peregrine falcons could occur over multiple years if construction activities were conducted in or adjacent to active nests. This impact would be potentially significant.

Because American peregrine falcons nest on vertical cliffs, construction or vegetation removal related to relocation areas is not anticipated to occur in suitable cliff habitat.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range (if appropriate). Suitable cliff habitats will be quantified and impacts on cliff habitats will be assessed. Indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-5 (CPI): Take and Loss of Habitat for the Bald Eagle* Ground-disturbing activities and vegetation removal associated with dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas in addition to inundation caused by the raising of Shasta Dam during the nesting season would result in the loss of nest and perch trees used by the bald eagle, a State-listed, fully protected, and USFS sensitive species, MSCS-covered species, and a BLM sensitive species. This impact would be significant.

Typically, 24 to 28 pairs nest in the vicinity of Shasta Lake. Vegetation removal within the impoundment area during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of bald eagle nests. Noise generated by vegetation removal, such as noise caused by helicopter yarding and chainsaw use, could also lead to nest abandonment, resulting in the incidental loss of fertile eggs or nestlings. The loss of nesting and foraging habitat would be a potentially significant impact.

Between eight and 14 nest trees may be impacted by any raise in elevation. Nest trees may be inundated by any of the three alternatives. If inundation of the impoundment area were to occur, nest trees within the impoundment area would die. Because peak inundation generally occurs in late April or early June, nest trees would be flooded toward the end of the nesting season. If eagles were nesting in these trees, it would be likely that young would fledge before the nest tree died from the effects of inundation. Because of inundation timing, it is not likely that individuals would be affected. Because bald eagles generally use the same nest for multiple years, the loss of nest trees would be a significant impact.

Inundation could also affect erosion and bank stability, which could affect nest trees that are in close proximity to the impoundment area. This would be a potentially significant impact.

The increase in lake elevation may increase access to eagle nests by recreational boaters. The increase in noise and human disturbance may lead to nest abandonment and the incidental loss of fertile eggs or young. Additionally, habitat inundated within the impoundment area would result in a loss of roosting and potential nest trees. This impact would be significant.

One eagle nest is located in the relocation area at Gregory Beach. Removal of nest trees would be a potentially significant impact. Additionally, one nest occurs near the Bailey Cove trail, which could be impacted by noise generated by vegetation removal activities. Vegetation removal and additional construction activities in the relocation areas would result in the same impacts on nesting bald eagles as described for vegetation removal activities proposed in the impoundment areas. This impact would be significant.

Implementation of the project would occur over 3 to 4 years. Impacts on nesting bald eagles could occur over multiple years if construction activities are conducted in or adjacent to active nests. This impact would be significant.

Dam construction, vegetation removal and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in a loss of 2,492 acres in the impoundment area and 2,387 acres in the relocation areas of nesting and roosting habitat for the bald eagle. Potential nest and roost trees occur in blue oak woodland, blue oak–foothill pine, Douglas-fir, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine habitats with tree diameters larger than 24 inches. Impacts on suitable bald eagle habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-10.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. Bald eagle nesting activity changes from year to year. The number of bald eagle nests is subject to change based on eagle activity at the time of construction and the subsequent inundation. Reclamation is currently working with the USFS to determine the current eagle activity to revise the number of nest trees that may be impacted. Indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-10. Impacts on Suitable Habitat for the Bald Eagle in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.32
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	4.04
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood	39.08	18.13	86.75	32.23	9.44	1.28
Montane hardwood–conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
<b>Total</b>	<b>189.17</b>	<b>36.46</b>	<b>256.65</b>	<b>186.82</b>	<b>92.18</b>	<b>43.05</b>
<b>Relocation Areas</b>						
Blue oak woodland	0.00	0.00	0.00	3.89	0.00	2.28
Blue oak–foothill pine	3.61	0.00	0.00	0.00	0.00	13.47
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood–conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
<b>Total</b>	<b>358.84</b>	<b>0.00</b>	<b>875.63</b>	<b>952.85</b>	<b>91.87</b>	<b>108.21</b>

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreages are approximate and will be revised based on habitat containing suitable tree diameters.

*Impact Wild-6 (CPI): Take and Loss of Nesting and Foraging Habitat for the Northern Spotted Owl* Construction activities and vegetation removal associated with the dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the northern spotted owl, a Federally listed as threatened species and MSCS-covered species. In addition, inundation caused by the raising of Shasta Dam could result in inundation of nest trees and would result in the loss of habitat, including critical habitat for this species. This impact would be potentially significant.

Vegetation removal within the impoundment area during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the northern spotted owl. Noise generated by vegetation removal activities including helicopter yarding and chainsaw use could also lead to nest abandonment resulting in the incidental loss of fertile eggs or nestlings. This impact would be potentially significant. Additionally, portions of upper Squaw Creek and Pit arms have been designated as critical habitat for the northern spotted owl. The loss of nesting, foraging and critical habitat would be a potentially significant impact.

A 6.5-foot dam raise could result in inundation of nest trees and would result in the loss of nesting and foraging habitat for this species. Once inundation of the impoundment area occurs, nest trees within the impoundment area would die. Because peak inundation generally occurs in late April or early June, nest trees would be flooded toward the end of the nesting season. If owls were nesting in these trees, it is likely that young would fledge before the nest tree dies from the effects of inundation. Because of inundation timing, it is not likely that individuals would be affected.

The increase in lake elevation could increase access to owl nests by recreational boaters. The increase in noise and human disturbance could lead to nest abandonment and the incidental loss of fertile eggs or young. This would be a potentially significant impact.

Additionally, construction activities and vegetation removal in relocation areas would also result in a loss of northern spotted owl nesting and foraging habitat. This would be a potentially significant impact.

Implementation of the project would occur over 3 to 4 years. Impacts on nesting northern spotted owls could occur over multiple years if construction activities were conducted in or adjacent to active nests. This impact would be potentially significant.

Dam construction, vegetation removal and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in a loss of 767 acres (20 acres of critical habitat) in the impoundment area and 2,349 acres in the relocation areas (19 acres of critical habitat) of nesting and foraging habitat for the northern spotted owl. CWHR types are a general representation of suitable nesting, roosting, and foraging habitat for northern spotted owl. Impacts on suitable spotted owl habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-11. The California Forest Practice Rules specify parameters for northern spotted owl nesting, roosting, and foraging habitats. Delineations of habitats defined by California Practice Rules are not available for this impact analysis.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-11. Impacts on Suitable Habitat for the Northern Spotted Owl in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood	39.08	18.13	86.75	32.23	9.44	1.28
Montane hardwood-conifer	34.65	0.50	69.23	68.73	55.70	5.68
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total	182.66	33.99	240.73	182.21	90.20	36.89
<b>Relocation Areas</b>						
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood-conifer	121.63	0.00	205.41	316.45	42.22	42.28
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total	354.90	0.00	870.91	940.93	91.64	91.02

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note: \*Acres are approximate.

*Impact Wild-7 (CPI): Impact on the Purple Martin and Its Nesting Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of purple martins, a California species of special concern. In addition, inundation caused by the raising of Shasta Dam would result in the loss of nest trees. This impact would be significant.

Based on data collected between 2007 and 2010, the number of purple martin nesting pairs ranged between 18 and 28. Shasta Lake is one of only two known interior breeding locations for purple martins in California. Purple martins nest only in snags (upslope and in the lake) in the vicinity of the Klikapudi Trail and east up the Pit Arm of the Shasta Lake vicinity of the primary study area. Overstory vegetation removal is proposed for the relocation of the Klikapudi Trail. With the exception of Arbuckle Flat, no vegetation would be removed from the Painter Creek inlet east on the Pit Arm.

Inundation of the impoundment area could result in the loss of nest trees in the lake and two known upland nest trees. Each nest tree contains several potential nest cavities at various heights above the water. Therefore, with an increase in inundation levels, potentially fewer nest cavities could be available from year to year. Loss of nest trees would be temporary, as trees that are inundated would die and become snags. New nesting snags would develop as dying trees are used by woodpeckers and cavities become available for purple martins. The temporal loss of nesting snags would be a significant impact.

Overstory vegetation removal is proposed for the relocation of the Klikapudi Trail. This could include removal of snags that are actively used for nesting or could provide nesting habitat for purple martin. Construction activities such as tree removal, site grading, and excavation and vegetation removal, including noise caused by helicopter yarding and chainsaw use during the nesting season, could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. Loss of fertile eggs or nesting adults, or any activities resulting in nest abandonment, would be significant.

Implementation of the project would occur over 3 to 4 years. Impacts on nesting purple martins could occur over multiple years if construction activities were conducted in or adjacent to active nests. This impact would be significant.

Purple martins forage high in the air and above the tree canopy. Conversion of upland habitats to lacustrine habitat would not have an effect on foraging habitat. Therefore, there would be no impact on foraging habitat.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-8 (CPI): Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the willow flycatcher, a State-listed endangered, USFS sensitive, and MSCS-covered species; the Vaux's swift, a California species of special concern; and the yellow warbler and yellow-breasted chat, both California species of special concern and MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of habitat, including nesting habitat, for these species. This impact would be potentially significant.

Vegetation removal within the impoundment area during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of these species. Noise generated by vegetation removal activities including helicopter yarding and chainsaw use could also lead to nest abandonment, resulting in the incidental loss of fertile eggs or nestlings. This impact would be potentially significant. The loss of nesting and foraging habitat would be a potentially significant impact.

A 6.5-foot dam raise would result in inundation of nesting and foraging habitat for these species. Understory vegetation in 15 percent of the impoundment area would be removed before inundation; the remainder would not survive the inundation. Therefore, inundation of the impoundment area would reduce the

nesting habitat for these species. If removal were completed outside of the breeding season, suitable nesting habitat would not be available and nesting would not be affected. However, 63 percent of vegetation would not be removed and would be inundated. Because peak inundation generally occurs in late April through early June, active nests established before and while lake levels were rising could be flooded. The loss of nests and nesting and foraging habitat from inundation would be a potentially significant impact.

Construction activities such as tree removal, site grading, and excavation and vegetation removal at the dam and in relocation areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. Additionally, noise generated by project construction activities and vegetation removal, including helicopter yarding and chainsaw use, could lead to nest abandonment resulting in the incidental loss of fertile eggs or nestlings. Vegetation removal in relocation areas would also result in a loss of nesting and foraging habitat. This would be a potentially significant impact.

Implementation of the project would occur over 3 to 4 years. Impacts on these species could occur over multiple years if construction activities were conducted adjacent to active nests. This impact would be potentially significant.

Dam construction, vegetation removal and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in a loss of 792 acres in the impoundment area and 2,364 acres in the relocation areas of nesting and foraging habitat for the Vaux's swift (Douglas-fir, montane hardwood, montane hardwood-conifer, montane riparian, and ponderosa pine). It would result in a loss of 26 acres in the impoundment area and 15 acres in the relocation areas for the willow flycatcher, yellow warbler, and yellow-breasted chat (montane riparian).

Impacts on suitable willow flycatcher, Vaux's swifts, yellow warblers, and yellow-breasted chats habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-12.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-9 (CPI): Impacts on the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the dam construction activities, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the long-eared owl, a

**Table 13-12. Impacts on Suitable Habitat for the Willow Flycatcher, Vaux’s Swift, Yellow Warbler, and Yellow-Breasted Chat in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
<b>Vaux’s Swift</b>						
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood	39.08	18.13	86.75	32.23	9.44	1.28
Montane hardwood–conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total Vaux's Swift Habitat	184.20	36.47	256.65	186.80	90.78	37.69
<b>Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat</b>						
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Total Habitat	1.54	2.48	15.92	4.60	0.58	0.80
<b>Relocation Areas</b>						
<b>Vaux’s Swift</b>						
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood–conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total Vaux's Swift Habitat	355.24	0.00	875.63	948.95	91.87	92.47
<b>Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat</b>						
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Total Habitat	0.34	0.00	4.72	8.02	0.23	1.45

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

California species of special concern and an MSCS-covered species; northern goshawk, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the Cooper’s hawk, an MSCS-covered species; the great blue heron, an MSCS-covered species; and the osprey, an MSCS-covered species. In addition, higher lake levels caused by raising Shasta Dam would result in the loss of foraging and nesting habitat for these species. This impact would be potentially significant.

Vegetation removal within the impoundment area during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of these species. Noise generated by vegetation removal activities, including helicopter yarding and chainsaw use, could also lead to nest abandonment, resulting in the incidental loss of fertile eggs or nestlings. This impact would be potentially significant. The loss of nesting and foraging habitat would be a potentially significant impact.

A 6.5-foot dam raise could result in inundation of nest trees and would result in the loss of nesting and foraging habitat for this species. If inundation of the impoundment area were to occur, nest trees within the impoundment area would die. Because peak inundation generally occurs in late April through early June, nest trees would be flooded toward the end of the nesting season. If these species were nesting in these trees, it is likely that young would fledge before the nest tree dies from the effects of inundation. Because of inundation timing, it is not likely that individuals would be affected. However, the loss of nesting and foraging habitat would be a potentially significant impact.

The increase in lake elevation could increase access to nests by recreational boaters. The increase in noise and human disturbance could lead to nest abandonment and the incidental loss of fertile eggs or young. This would be a potentially significant impact.

Construction activities such as tree removal, site grading, and excavation and vegetation removal at the dam and in relocation areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to nest abandonment. Additionally, noise generated by project construction activities and vegetation removal, including helicopter yarding and chainsaw use, could lead to nest abandonment, resulting in the incidental loss of fertile eggs or nestlings. Vegetation removal in relocation areas would also result in a loss of nesting and foraging habitat. This would be a potentially significant impact.

Implementation of the project would occur over 3 to 4 years. Impacts on these species could occur over multiple years if construction activities were conducted adjacent to active nests. This impact would be potentially significant.

Dam construction, vegetation removal and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in a loss of 580 acres in the impoundment area and 1,878 acres in the relocation areas of nesting and foraging habitat (Douglas-fir, montane hardwood–conifer, and ponderosa pine) for the long-eared owl and northern goshawk. There would be a loss of 1,050 acres in the impoundment area and 2,483 acres in the relocation areas of nesting and foraging habitat for the Cooper’s hawk and great blue heron (blue oak–foothill pine, closed-cone pine-cypress, Douglas-fir, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine).

Impacts on suitable habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-13.

Impacts on osprey are similar to those described for the bald eagle (Impact Wild-5 (CP1) and the other raptors addressed above).

**Table 13-13. Impacts on Suitable Habitat for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, and Great Blue Heron in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
<b>Long-Eared Owl and Northern Goshawk</b>						
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood-conifer	34.65	0.50	69.23	68.73	55.70	5.68
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total Habitat	143.59	15.86	153.98	149.98	80.76	35.61
<b>Cooper's Hawk and Great Blue Heron</b>						
Blue oak-foothill pine	4.96	0.00	0.00	0.00	1.40	4.04
Closed-cone pine-cypress	17.75	0.00	6.30	10.74	23.95	188.29
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood	39.08	18.13	86.75	32.23	9.44	1.28
Montane hardwood-conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total Habitat	206.91	36.46	262.95	197.55	116.13	230.03
<b>Relocation Areas</b>						
<b>Long-Eared Owl and Northern Goshawk</b>						
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood-conifer	121.63	0.00	205.41	316.45	42.22	42.28
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total Habitat	306.68	0.00	672.35	726.07	85.30	87.58
<b>Cooper's Hawk and Great Blue Heron</b>						
Blue oak-foothill pine	3.61	0.00	0.00	0.00	0.00	13.74
Closed-cone pine-cypress	0.11	0.00	56.90	8.95	1.94	33.72
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood-conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total Habitat	358.96	0.00	932.53	957.90	93.81	139.93

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate

There are 54 osprey nests within the perimeter of Shasta Lake. Six nest trees would be affected by a 6.5-foot dam raise. Eleven osprey nests are located in

relocation areas. Removal of nest trees would be a potentially significant impact. Because osprey generally use the same nest for multiple years, the loss of 17 nest trees (31 percent) collectively between the impoundment area and relocation areas would be a potentially significant impact.

Osprey nests also occur on towers and structures around the dam, otherwise, there is no suitable habitat for raptors near the dam. Blasting may occur in the vicinity of the dam. This would have a similar impact on nesting ospreys as noise generated by helicopter yarding or large construction equipment, which could result in nest abandonment and the loss of fertile eggs or young. This would be a potentially significant impact.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. Osprey nesting activity changes from year to year. The number of osprey nests is subject to change based on osprey activity at the time of construction and the subsequent inundation. An analysis of indirect and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-10 (CP1): Take and Loss of Habitat for the Pacific Fisher*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the Pacific fisher, a Federal candidate for listing, a California species of special concern, a USFS sensitive species, and a BLM sensitive species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

Vegetation removal within the impoundment area while kits (i.e., young) are in natal den trees could result in the incidental loss of kits. Noise generated by vegetation removal activities including helicopter yarding and chainsaw use may also lead to abandonment of young. However, females frequently move kits if the natal den is disturbed or threatened. Because females will move kits, it is not likely that individuals would be affected. However, the loss of denning, resting, and foraging habitat would be a potentially significant impact.

A 6.5-foot dam raise could result in inundation of natal den trees and would result in the loss of denning, resting, and foraging habitat for this species. If inundation of the impoundment area were to occur, nest trees within the impoundment area would die. Females frequently move kits if threatened or disturbed. Because females will move kits, it is not likely that individuals would be affected. However, the loss of denning, resting, and foraging habitat would be a potentially significant impact.

Construction activities such as tree removal, site grading, and excavation and vegetation removal at the dam and in relocation areas while kits are in natal den trees could result in the incidental loss of kits. Impacts on habitat would be the same as described for the impoundment area. This would be a potentially significant impact.

Implementation of the project would occur over 3 to 4 years. Impacts on the Pacific fisher could occur over multiple years if construction activities were conducted adjacent to denning or resting habitat. This impact would be potentially significant.

Dam construction, vegetation removal and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in a loss of 605 acres in the impoundment area and 1,893 acres in the relocation areas of habitat (Douglas-fir, montane hardwood-conifer, montane riparian, and ponderosa pine) for the Pacific fisher. This impact would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-14.

**Table 13-14. Impacts on Suitable Habitat for the Pacific Fisher in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood-conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total Habitat	145.13	18.34	169.90	154.59	81.34	36.41
<b>Relocation Areas</b>						
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood-conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total Habitat	307.03	0.00	677.07	734.08	85.53	89.03

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-11 (CP1): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtail and Their Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the pallid bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the western red bat, a USFS sensitive species; the western mastiff bat, a California species of special concern, an MSCS-covered species, and a BLM sensitive species; the Townsend's big-eared bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the long-eared Myotis, a BLM sensitive species; the Yuma Myotis, a BLM sensitive species; the American marten, a USFS sensitive species; and the ringtail, a State fully protected and MSCS-covered species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

Vegetation removal within the impoundment area while young bats are in maternity colonies or kits are in natal den trees could result in the incidental loss of young. Noise generated by vegetation removal activities including helicopter yarding and chainsaw use could also lead to young abandonment. Furthermore, depending on the season, the removal of large trees with cavities could result in the loss of pallid bat and Townsend's big-eared bat colonies. Potential direct impacts include the take of a maternity colony (females and young) and the take of individuals in a hibernaculum, which could eliminate an entire colony because of the loss of pregnant females. Mortality of young and the loss of reproductive and foraging habitat would be a potentially significant impact.

Inundation of a 6.5-foot dam raise would result in a loss of roosting and foraging habitat for special-status bats (pallid bat, spotted bat, western red bat, western mastiff bat, Townsend's big-eared bat, long-eared myotis, and Yuma myotis) that roost in hollow trees, snags, bridges, and caves. Loss of young could occur during the first inundation (above 1,070 feet msl) of bat maternity colony habitat because active maternity colonies could be flooded before young are volant (capable of flight). American marten and ringtails, which also use snags, hollow logs, and debris piles for reproduction and cover, could also be impacted. This impact would be potentially significant.

Two known caves, one occupied by Townsend's big-eared bats, are located on the Big Backbone Arm and would be wholly or partially inundated if the dam

were raised. Inundation of cave/cliff habitat could result in the loss of Townsend's big-eared bat, western mastiff bat, and long-eared myotis colonies. Potential direct impacts include the take of a maternity colony and the take of individuals in a hibernaculum, which could eliminate an entire colony because of the loss of pregnant females.

Spotted bats and long-eared myotis could also roost in crevices and caves in the Shasta Lake and vicinity portion of the primary study area. However, inundation of cave/cliff habitat is less likely to result in a significant impact on this population, because they do not roost colonially; thus, inundation of a cave would not result in the loss of an entire maternity colony.

Special-status bats may roost in bridges and could also be affected by bridge modification or removal. Direct impacts including mortality and the loss of roosting habitat would be significant.

Construction activities such as tree removal, site grading, and excavation and vegetation removal at the dam and in relocation areas while young bats are in maternity colonies or kits are in natal den trees could result in the incidental loss of young. Impacts on habitat would be the same as described for the impoundment area. This would be a potentially significant impact.

Implementation of the project would occur over 3 to 4 years. Impacts on these species could occur over multiple years if construction activities are conducted in or adjacent to reproductive habitat. This impact would be potentially significant.

Bats typically forage in open areas within the CWHR types listed as foraging habitat. Foraging habitat for the pallid bat, spotted bat, western mastiff bat, and Townsend's big-eared bat includes Douglas-fir, fresh emergent wetland, lacustrine, montane hardwood, montane hardwood-conifer, montane riparian, and ponderosa pine. These habitats are regionally abundant and therefore impacts on foraging habitat by inundation or vegetation removal in the relocation areas would be less than significant.

Dam construction, vegetation removal, and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in the loss of 13 acres in the impoundment area and 24 acres in the relocation areas of habitat for the pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat and Yuma myotis (barren, blue oak woodland, and blue oak-foothill pine). There would be a loss of 1,194 acres in the impoundment area and 2,821 acres in the relocation areas of habitat for the western red bat, long-eared myotis, and ringtail (barren, blue oak woodland, blue oak-foothill pine, closed-cone pine-cypress, Douglas-fir, mixed chaparral, montane hardwood, montane hardwood-conifer, montane riparian, and ponderosa pine); and a loss of 605 acres in the impoundment area and 1,893 acres in the relocation areas of habitat for the

American marten (Douglas-fir, montane hardwood-conifer, montane riparian, and ponderosa pine). This impact would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-15.

**Table 13-15. Impacts on Suitable Habitat for Special-Status Bats, American Marten, and Ringtail in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
<b>Pallid Bat, Spotted Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, and Yuma myotis</b>						
Barren	0.57	0.00	0.25	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.32
Blue oak-foothill pine	4.96	0.00	0.00	0.00	1.40	4.04
Total Habitat	5.53	0.00	0.25	0.00	1.40	5.36
<b>Western Red Bat, Long-Eared Myotis and Ringtail</b>						
Barren	0.57	0.00	0.25	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.32
Blue oak-foothill pine	4.96	0.00	0.00	0.00	1.40	4.04
Closed-cone pine-cypress	17.75	0.00	6.30	10.74	23.95	188.29
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Mixed chaparral	14.83	6.83	80.01	7.28	5.43	27.73
Montane hardwood	39.08	18.13	86.75	32.23	9.44	1.28
Montane hardwood-conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total Habitat	222.31	43.30	34321	204.84	121.56	259.07
<b>American Marten</b>						
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood-conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total Habitat	145.13	18.34	169.90	154.59	81.34	36.41

**Table 13-15. Impacts on Suitable Habitat for Special-Status Bats, American Marten, and Ringtail in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise) (contd.)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Relocation Areas</b>						
<b>Townsend's Big-Eared Bat, Spotted Bat, Pallid Bat, Western Mastiff Bat, and Yuma Myotis</b>						
Barren	0.00	0.00	0.00	0.82	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	3.89	0.00	2.28
Blue oak-foothill pine	3.61	0.00	0.00	0.00	0.00	13.74
Total Habitat	3.61	0.00	0.00	4.71	0.00	15.75
<b>Western Red Bat, Long-Eared Myotis, and Ringtail</b>						
Barren	0.00	0.00	0.00	0.82	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	3.89	0.00	2.28
Blue oak-foothill pine	3.61	0.00	0.00	0.00	0.00	13.74
Closed-cone pine-cypress	0.00	0.00	56.90	8.95	1.94	33.72
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Mixed chaparral	25.68	0.00	120.00	46.36	4.44	134.82
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood-conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total Habitat	384.64	0.00	1052.52	1008.98	98.24	276.75
<b>American Marten</b>						
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood-conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total Habitat	307.03	0.00	677.07	734.08	85.53	89.03

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreages are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-12 (CP1): Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat* All of these species are designated USFS sensitive and survey and manage species and are proposed for Federal listing. The Shasta sideband is also an MSCS-covered species. Ground-disturbing activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take and/or loss of suitable habitat for special-status terrestrial mollusks. In addition, the raising of Shasta Dam would result in the inundation of suitable habitat and direct take of these species. This impact would be significant.

These species are found in nearly all CWHR habitats along the lake. The Shasta sideband and Wintu sideband are associated with limestone formations in the McCloud River and in the Pit and Squaw Creek arms, respectively. Shasta chaparral is widespread and Shasta hesperian is found in mesic or riparian inclusions in most CWHR habitats.

Vegetation removal in the impoundment areas and construction activities such as tree removal, site grading, and excavation and vegetation removal at the dam and in relocation areas in suitable habitat could result in direct take. In addition, these activities and the inundation caused by a 6.5-foot dam raise would result in the mortality of individuals and the permanent loss of suitable habitat.

Dam construction, vegetation removal and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in the loss of 1,195 acres in the impoundment area and 2,868 acres in the relocation areas of habitat for Shasta chaparral (annual grassland, barren, blue oak woodland, blue oak–foothill pine, closed-cone pine-cypress, Douglas-fir, mixed chaparral, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine), 260 acres in the impoundment area and 2,870 acres in the relocation areas for Shasta hesperian (Douglas-fir, montane hardwood conifer, and montane riparian), 5.17 acres of limestone habitat in the impoundment area and 35.71 acres in the relocation areas for the Shasta sideband, and 1.50 acres of limestone habitat in the impoundment area and no limestone habitat in the relocation areas for Wintu sideband. This impact would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-16.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect and temporary impacts will be provided in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-16. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area: Shasta Sideband</b>						
Limestone	0.00	0.00	0.00	5.17	0.00	0.00
<b>Impoundment Area: Wintu Sideband</b>						
Limestone	0.00	0.00	0.00	0.00	0.00	1.50
<b>Impoundment Area: Shasta Chaparral</b>						
Annual grassland	0.07	0.00	0.96	0.37	0.00	0.00
Barren	0.57	0.00	0.25	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.32
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	4.04
Closed-cone pine–cypress	17.75	0.00	6.30	10.74	23.95	188.29
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Mixed chaparral	14.83	6.83	80.01	7.28	5.43	27.73
Montane hardwood	39.08	18.13	86.75	32.23	9.44	1.28
Montane hardwood–conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Total Habitat	222.38	43.30	344.18	205.21	121.56	259.07
<b>Impoundment Area: Shasta Hesperian</b>						
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Montane hardwood–conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Total Habitat	36.19	2.98	85.15	73.34	56.28	6.48
<b>Relocation Areas: Shasta Sideband</b>						
Limestone	0.00	0.00	0.00	35.71	0.00	0.00
<b>Relocation Areas: Wintu Sideband</b>						
Limestone	0.00	0.00	0.00	0.00	0.00	0.00
<b>Relocation Areas: Shasta Chaparral</b>						
Annual grassland	5.05		29.02	10.65	1.29	1.25
Barren	0.00	0.00	0.00	0.81	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	3.89	0.00	2.28
Blue oak–foothill pine	3.61	0.00	0.00	0.00	0.00	13.74
Closed-cone pine–cypress	0.11	0.00	56.90	8.95	1.94	33.72
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00

**Table 13-16. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise) (contd.)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Mixed chaparral	25.68	0.00	120.00	46.36	4.44	134.82
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood–conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Total Habitat	389.69	0.00	1081.54	1019.62	99.53	278.00
<b>Relocation Areas: Shasta Hesperian</b>						
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Montane hardwood–conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Total Habitat	121.97	0.00	210.13	327.65	42.45	43.73

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

*Impact Wild-13 (CPI): Permanent Loss of General Wildlife Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a permanent loss of habitat. In addition, inundation caused by the raising of Shasta Dam would result in the permanent loss of habitat. This would be a potentially significant impact.

Dam construction, vegetation removal and construction in the relocation areas, and inundation resulting from a 6.5-foot dam raise would result in a loss of 1,221 acres of general wildlife habitat in the impoundment area and 3,127 acres of general wildlife habitat in the relocation areas. Impacts on general wildlife habitat by CWHR type in the impoundment area and relocation areas are summarized in Tables 13-17 and 13-18.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-17. Impacts on CWHR Habitats in the Impoundment Area (6.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Annual grassland	0.07	0.00	0.96	0.37	0.00	0.00
Barren	0.57	0.00	0.25	0.00	0.00	0.00
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	4.04
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.32
Closed-cone pine–cypress	17.75	0.00	6.30	10.74	23.95	188.29
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00
Mixed chaparral	14.83	6.83	80.01	7.28	5.43	27.73
Montane hardwood	39.08	18.13	86.75	32.23	9.44	1.28
Montane hardwood–conifer	34.65	0.50	69.23	68.73	55.70	5.68
Montane riparian	1.54	2.48	15.92	4.60	0.58	0.80
Ponderosa pine	108.93	15.36	84.75	81.24	25.06	29.93
Riverine	0.00	0.35	2.30	3.81	0.59	0.00
Urban	10.95	0.00	1.37	4.74	0.00	0.75
Total	233.33	43.65	347.84	213.75	122.14	259.82

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreage values are approximate.

**Table 13-18. Impacts on CWHR Habitats in the Relocation Areas**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Annual grassland	5.05	0.00	29.02	10.65	1.29	1.25
Barren	0.00	0.00	0.00	0.82	0.00	0.00
Blue oak–foothill pine	3.61	0.00	0.00	0.00	0.00	13.74
Blue oak woodland	0.00	0.00	0.00	3.89	0.00	2.28
Closed-cone pine–cypress	0.11	0.00	56.90	8.95	1.94	33.72
Douglas-fir	0.00	0.00	0.00	3.18	0.00	0.00
Mixed chaparral	25.68	0.00	120.00	46.36	4.44	134.82
Montane hardwood	48.21	0.00	198.56	214.87	6.34	3.44
Montane hardwood–conifer	121.63	0.00	205.41	316.45	42.22	42.28
Montane riparian	0.34	0.00	4.72	8.02	0.23	1.45
Ponderosa pine	185.06	0.00	466.94	406.43	43.08	45.30
Riverine	0.00	0.00	0.39	3.75	0.00	0.00
Urban	21.05	0.00	230.58	0.48	0.00	2.49
Total	410.74	0.00	1312.51	1023.85	99.53	280.48

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreage values are approximate.

*Impact Wild-14 (CPI): Impacts on Other Birds of Prey (i.e., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (i.e., American robin, Anna’s hummingbird) and their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of other birds of prey and migratory bird species. In addition, inundation caused by the raising of Shasta Dam would result in the

loss of active nests and habitat for these species. This impact would be potentially significant.

Approximately 36 percent of the impoundment area would have either complete (15 percent) or overstory (21 percent) vegetation removal. If vegetation removal were to occur prior to or after the breeding season, there would be no impact on migratory birds or raptors. If inundation of the impoundment area were to occur, nest trees within the impoundment area would die. Because peak inundation generally occurs between late April and early June, nest trees would be flooded toward the end of the nesting season. If raptors were nesting in these trees, it is likely young would fledge before the nest tree died from the effects of inundation. However, approximately 84 percent of understory vegetation inundated could have ground or shrub nesting birds that would be impacted by inundation. Impacts on ground or understory nesters would be potentially significant.

Maximum inundation would occur in late April through early June during the breeding season and many nests could be established before and while lake levels are rising. In the portions of the impoundment where vegetation removal is not implemented, active bird nests would flood, resulting in mortality of young still dependent on the nest. This would be a potentially significant impact.

Additionally, removal of structures providing for raptor nests (e.g., power poles in the relocation areas) could result in mortality of young. This would be a potentially significant impact.

Vegetation in relocation areas would be completely removed. If vegetation removal were to occur prior to or after the breeding season, there would be no impact on migratory birds or raptors.

Implementation of the project would occur over 3 to 4 years. Impacts on these species could occur over multiple years if construction activities were conducted in or adjacent to reproductive habitat. This impact would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-15 (CPI): Loss of Critical Deer Winter and Fawning Range*  
Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of critical deer winter and fawning range. In addition, inundation caused by the

raising of Shasta Dam would result in the loss of critical deer range. This impact would be potentially significant.

Critical winter range is located on the west side of each arm of the lake, and critical fawning is located on the south-facing slope of Little Sugarloaf Creek. Critical range describes a deer corridor rather than specific habitats. Vegetation removal in the relocation areas and inundation of the impoundment area would result in the loss of critical winter and fawning range. This impact would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-16 (CP1): Take and Loss of the California Red-Legged Frog*  
Reclamation is concurrently completing an assessment of California red-legged frog habitat, which will be submitted to USFWS for review. Using the results of this assessment, USFWS will determine whether surveys are needed. Impacts on the California red-legged frog will be assessed if surveys are conducted and the California red-legged frog is found. Impacts for each alternative will not be assessed until USFWS has determined whether suitable habitat is present and whether surveys would be required. Mitigation for this impact is proposed in Section 13.3.5.

#### **Upper Sacramento River (Shasta Dam to Red Bluff)**

*Impact Wild-17 (CP1): Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area*  
Implementation of CP1 would result in a modified flow regime that would reduce the frequency, duration, and magnitude of intermediate to large flows below Shasta Dam during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and the formation of off-channel habitats. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

The operation of Shasta Dam has substantially modified the natural flow regime within the primary study area. Construction and operation of the dam has limited the frequency and magnitude of intermediate to large flows in winter and spring, and has increased flow volumes during the active growing season

(primarily March through October). Project implementation would be expected to amplify these effects. Reducing the magnitude, frequency, and duration of intermediate to large flows could alter the dynamics and structure of wetland and riparian habitats that support special-status wildlife species along the Sacramento River, downstream from Shasta Dam, throughout the primary study area (see Chapter 12, “Botanical Resources,” for more information). The effects of modified flow regimes would be attenuated downstream because of the cumulative tributary flow adding to the Sacramento River.

Special-status wildlife that could be affected by these changes includes special-status invertebrates, reptiles, amphibians, birds, and mammals, as discussed below.

- **Invertebrates** – Blue elderberry shrubs, the host plant for the valley elderberry longhorn beetle, are found throughout much of the Sacramento River’s riparian corridor. Shrubs within the corridor are unlikely to be affected by modification of the existing flow regimes. Elderberry shrubs are not commonly found growing immediately next to the river’s edge, but are often found on terraces or higher up the bank. Most of the effect on flow regime, including inundation during the growing season, would be concentrated in a narrow strip along the river channel that is already subjected to seasonal inundation. Because elderberry growing in these areas are already experience seasonal inundation periodically, the project is not likely to prevent establishment or substantially reduce the vigor of existing elderberry shrubs in the primary study area; therefore, this impact would be less than significant.
- **Reptiles and Amphibians** – The western pond turtle has been documented within the Sacramento River, and suitable habitat for the species is provided within the primary study area, including tributaries. Western pond turtles rely on habitat types (e.g., oxbow lakes) that have relatively slow rates of formation. Creation of new off-channel water bodies requires the periodic intermediate to large fall and winter flow events that drive the processes of meander migration and channel cutoff. Similarly, off-channel water bodies gradually “terrestrialize” (become terrestrial habitats) as they fill with sediment and organic detritus, and as they are colonized by vegetation. Consequently, activities that prevent the formation of off-channel water bodies (e.g., construction of levees and installation of bank armor) over the long term reduce the extent this important type of habitat for pond turtles. The increase in mean stage elevation resulting from project implementation could provide additional aquatic habitat for the species during some months of some years. However, less aquatic habitat could be available for northwestern pond turtle during winter, spring, and drought periods. Modifying the flow regime could also reduce the formation of off-channel water bodies over the long term. These

changes in habitat availability could reduce the size of the population along the Sacramento River over the long term. Therefore, alteration of habitat for the northwestern pond turtle would be a potentially significant impact.

- **Birds** – The riparian and wetland habitats along the Sacramento River floodway provide potential nesting and foraging habitat for western yellow-billed cuckoo, California yellow warbler, and yellow-breasted chat, all of which are special-status birds that nest in riparian vegetation. In addition, northern harrier and short-eared owl may nest in marshes in or adjacent to the stream channel. Other raptors—Cooper’s hawk, Swainson’s hawk, white-tailed kite, bald eagle, and osprey—may nest in trees in the riparian or oak woodlands in the study area. As described above, altering the flow regime could alter some existing riparian habitat. Over time, there would be less early successional (willow, cottonwood, and herbaceous dominated) and more mid-successional (mixed woodland) vegetation and a smaller amount of acreage recently disturbed by erosion or scouring after intermediate to large flows, as described in Chapter 12, “Botanical Resources.” These long-term changes to the structure of riparian vegetation are expected to result in a reduction of habitat value sufficient to cause the loss of nesting territories or affect the reproductive success of some riparian foraging and nesting birds. The birds most affected by this alteration would be those that make the most extensive use of willow thickets and cottonwood and willow-dominated riparian forests. This impact on special-status bird species that nest in riparian vegetation would be potentially significant.
- **Mammals** – Special-status mammals potentially occurring in the project area include pallid bat, western red bat, and ringtail. Riparian habitat can provide important foraging and roosting habitat for bats, but these species are not typically dependent on riparian habitats. The amount of potential foraging habitat would not decrease, and available riparian habitats – even if modified by the new flow regime below Shasta Dam – would still be sufficient for roosting habitat such that impacts on special-status bats would be less than significant. Potential changes in riparian vegetation along the river channel in the study area would not substantially reduce habitat for ringtail. Therefore, impacts on special-status mammals would be less than significant.

Because of substantial long-term effects on the habitat of northwestern pond turtle and some riparian-nesting special-status bird species, this impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-18 (CP1): Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes* CP1 would cause a

small reduction in the magnitude, duration, and frequency of intermediate to large flows, which also would alter the geomorphic processes along the Sacramento River, including the rate of bank erosion in the primary study area. However, the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

There are five known colonies of bank swallow along the Sacramento River in the primary study area (CNDDDB 2007). The bank swallow forms nesting colonies in steep-cut, eroding, river banks. Bank revetment has been preferentially applied to actively migrating bends which would otherwise be among the most suitable sites for bank swallow nests. The small reduction in intermediate to large flows by CP1 would cause a small reduction in the rate of erosion at the cut banks that remain unprotected by revetment. This alteration would not reduce the amount of bank swallow nesting habitat in the short or long term. Spring flows would remain comparable to existing and no-action conditions, and thus, the potential for spring flows to cause localized nest failure would remain comparable to existing and no-action conditions. Therefore, the impact to bank swallow would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-19 (CP1): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Changes in Flow Regime* Construction-related disturbances at Shasta Dam are not anticipated to disturb or permanently remove vernal pool habitat for special-status wildlife species along the upper Sacramento River. Altered flow regimes resulting from project-related dam operation are also not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species. This impact would be less than significant.

Vernal pools are present in upland areas near the Sacramento River and its tributaries in the primary study area. These pools provide habitat for numerous special-status species, such as vernal pool tadpole shrimp, vernal pool fairy shrimp, and western spadefoot toad. Critical habitat for three special-status wildlife species – Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp – is located within the primary study area. Critical habitat for these species in the primary study area is confined to vernal pool communities (USFWS 2006).

Vernal pools are generally not present within the active floodplain of regulated rivers in the primary study area; thus, vernal pools are not anticipated to be affected by dam construction, use of staging areas, and/or movement of heavy equipment during construction. Changes in flow regime in the primary study area likely would not affect vernal pool special-status species. Therefore, this

impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-20 (CP1): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

Several local and regional plans have been developed and adopted to promote conservation and enhancement of riparian habitat in the primary and extended study areas: the RHJV, Sacramento River Advisory Council Forum, Sacramento River Conservation Area Program, SRNWR comprehensive conservation plan and environmental assessment, and others. (See Section 13.2, “Regulatory Setting.”)

Because the project may have a potentially significant impact on riparian vegetation within the primary and extended study areas, the quality of riparian habitat may be reduced or distribution may be limited. This potential consequence of the project could conflict with the goals developed in local and regional conservation plans for the Sacramento River. Conflict of the project with the local and regional plans would be a potentially significant impact. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-21 (CP1): Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program* CP1 would not include the gravel augmentation program. There would be no impact. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-22 (CP1): Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration of Reading Island* CP1 would not include Reading Island restoration. There would be no impact. Mitigation for this impact is not needed, and thus not proposed.

**Lower Sacramento River and Delta** By altering storage and operations at several reservoirs, CP1 would change flow regimes in several downstream waterways. In turn, these alterations to the flow regime could particularly affect riparian and wetland habitats along these waterways. The potential effects on wildlife are similar to those discussed for the primary study area above. However, potential effects on flow and stages of the middle Sacramento River would be smaller than on the upper Sacramento River; changes in flows and

stages would diminish downstream from Red Bluff because of the effects of inflows from tributaries, and the effects of diversions and flood bypasses.

*Impact Wild-23 (CP1): Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta* Implementation of CP1 would modify the flow regime and would reduce the frequency, duration, and magnitude of intermediate to large flows in the lower Sacramento River during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. Although this change in surface and subsurface hydrology would be less than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats along the middle Sacramento River. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be similar to Impact Wild-17 (CP1). However, the effect of CP1 on flow in the Sacramento River would attenuate below RBDD because of the inflows from tributaries, and because of other diversions and flood bypasses. Nonetheless, along the middle Sacramento River, flow alterations could be sufficient to substantially affect habitat of western pond turtle and riparian-nesting birds as described for the upper Sacramento River. This impact would be potentially significant.

Flow alterations may not be sufficient to measurably affect special-status wildlife in the bypasses, along the Sacramento River below Colusa, or in the Delta. Flow alterations are more attenuated downstream by tributaries, diversions, and bypasses, and CalSim modeling indicated little change in the frequency and duration of bypass inundation. Also, downstream from Colusa, the river is confined to a narrow channel closely bordered by levees lined with riprap, and thus geomorphic processes (and thus riparian habitats) are relatively unresponsive to small changes in river flows. Furthermore, effects of flow alterations are also unlikely to extend to the Delta because the Central Valley's reservoirs and diversions are managed as a single integrated system (consisting of the CVP and SWP). The guidelines for this management, which are described in the Long-Term Operations Criteria and Plan (OCAP), have been designed to maintain standards for Delta inflow. CVP and SWP operations must be consistent with the OCAP to allow coverage by USFWS's and NMFS's OCAP BOs. Thus, this project is not anticipated to cause an alteration in Sacramento River flow to the Delta sufficient to alter habitat for special-status wildlife species in the lower Sacramento River and Delta portion of the extended study area.

Because of the potential for substantial effects on western pond turtle and riparian-nesting birds in the middle Sacramento River (i.e., RBDD to Colusa), this impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-24 (CP1): Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes* The effect of CP1 on bank swallow habitat along the lower Sacramento River would be similar to the effect along the upper Sacramento River, but smaller because the effect of CP1 on river flows would attenuate with distance downstream. The rate of bank erosion would be reduced, but the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized bank and nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

There are more than 100 presumed extant colonies of bank swallow in Butte, Glenn, Colusa, Yuba, Yolo, Sutter, and Sacramento counties (CNDDDB 2007). The effect on bank swallow along the lower Sacramento River would be similar to that described for the upper Sacramento River: a small reduction in the rate of erosion, but not a substantial change in the amount of bank swallow nesting habitat, or in spring flows that may cause localized nest failure. However, the effect of altered flow regimes on bank swallow nesting habitat along the lower Sacramento River would be smaller than along the upper Sacramento River, because flow alterations would be attenuated in the Sacramento River below RBDD because of the inflows from tributaries, and because of other diversions and flood bypasses. This impact on bank swallow would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-25 (CP1): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife Along the Lower Sacramento River and in the Delta from Changes in Flow Regime of the Sacramento River and Affected Tributaries, and Changes in Seasonal Water Availability* Altered flow regimes as a result of dam operation associated with the project are not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species in the lower Sacramento River and Delta portion of the extended study area. This impact would be less than significant.

Vernal pools are present in upland areas near the Sacramento River and its tributaries in the extended study area. These pools provide habitat for numerous special-status species. Critical habitat for three special-status species – vernal pool fairy shrimp, vernal pool tadpole shrimp, and Conservancy fairy shrimp – is located within the extended study area. Critical habitat for these species is confined to vernal pool communities (USFWS 2006).

Vernal pools are generally not present within the active floodplain of regulated rivers along the lower Sacramento River and in the Delta. Vernal pool special-

status species would also not likely be affected by changes in flow regime in the extended study area. Therefore, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-26 (CP1): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat Along the Lower Sacramento River and in the Delta* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

As discussed in Impact Wild-20 (CP1) for the upper Sacramento River, several local and regional plans have been developed and adopted to promote conservation and enhancement of riparian habitat in the primary and extended study areas: the RHJV, Sacramento River Advisory Council Forum, Sacramento River Conservation Area Program, SRNWR comprehensive conservation plan and environmental assessment, and others. (See Section 13.2, “Regulatory Framework.”)

Because the project may have a potentially significant impact on riparian vegetation within the primary and extended study areas, the quality of riparian habitat may be reduced or distribution may be limited. This potential consequence of the project could conflict with the goals developed in local and regional conservation plans for the Sacramento River. Conflict of the project with the local and regional plans would be a potentially significant impact.

**CVP/SWP Service Areas** Increased water supplies or increased supply reliability could reduce a limitation on growth or on other activities that could affect wildlife in the primary and extended study areas, potentially resulting in significant effects. The effects of this growth would be analyzed in general plan Environmental Impact Reports and in project-level CEQA compliance documents for the local jurisdictions in which the growth would occur. Mitigation of these effects would be the responsibility of these local jurisdictions, and not of Reclamation. The expected increase in water yield relative to the entire CVP/SWP service areas would be small, however. Assuming that this new yield could be provided to any number of geographic areas within the CVP and SWP service areas, the project’s impact on growth that could affect vegetation would be minor. Similarly, projects potentially affecting most aquatic habitats and listed species would require permits from DFG, USACE, and USFWS; it is anticipated that effects on these resources would be avoided, minimized, and/or mitigated during those agency consultations. Because the extent, location, and timing of induced growth is currently highly uncertain, and in the future the effects of this growth would be

analyzed and mitigated during land use planning and environmental review for specific projects, growth-inducing effects on wildlife are not discussed further in this chapter. However, additional discussion of growth-inducing effects specific to the project alternatives is provided in Section 26.4, “Growth-Inducing Impacts,” in Chapter 26, “Other Required Disclosures.”

*Impact Wild-27 (CP1): Impacts on Riparian-Associated or Aquatic Special-Status Wildlife in the CVP/SWP Service Areas Resulting from Modifications to Existing Flow Regimes* By altering storage and operations at several reservoirs associated with the CVP and SWP service areas, CP1 would change flow regimes in several downstream waterways. Modified flow regimes would reduce the frequency, duration, and magnitude of intermediate to large flows along the Sacramento River. However, based on the CalSim-II modeling results, the hydrologic effects on tributaries with CVP and SWP dams are expected to be less than effects on the Sacramento River. Most potential noticeable changes in flows and stages would diminish downstream from Red Bluff. The change in surface and subsurface hydrology could affect habitats adjacent to the river channel that provide habitat for special-status wildlife species. These changes are unlikely to result in substantial effects on the distribution or abundance of riparian-associated or aquatic special-status wildlife species in the CVP and SWP service areas outside of the primary study area. Therefore, this impact would be less than significant.

Several riparian-associated or aquatic special-status wildlife species may be present in the CVP and SWP service areas, such as least Bell’s vireo and arroyo toad. As discussed under Impact Wild-17 (CP1) for the upper Sacramento River and Impact Wild-21 (CP1) for the lower Sacramento River and Delta portion of the extended study area, construction and operation of Shasta Dam has limited the frequency and magnitude of intermediate to large flows in winter and spring, and has increased flow volumes during the active growing season (primarily March–October). Project implementation would be expected to amplify these effects. However, the effect of altered flow regimes by the project would attenuate in the Sacramento River below RBDD because of the inflows from tributaries, and because of other diversions and flood bypasses. Effects of flow alterations from Shasta Dam are also unlikely to extend to the CVP and SWP service areas because the reservoirs and diversions are managed as a single integrated system (consisting of the CVP and SWP). The guidelines for this management, which are described in the OCAP, have been designed to maintain standards for Delta inflow. CVP and SWP operations must be consistent with the OCAP to allow coverage by the OCAP biological opinion. Thus, this project is not anticipated to sufficiently alter flow to the CVP/SWP service areas to have a substantial effect on riparian habitat upon which special-status wildlife species depend. Therefore, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

**CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability**

Like CP1, this comprehensive plan focuses on enlarging Shasta Dam and Shasta Lake consistent with the goals of the 2000 CALFED ROD, and was formulated for the primary purposes of increased water supply reliability and increased survival of anadromous fish. In addition to the common features above, CP2 involves raising Shasta Dam 12.5 feet, an elevation change that would raise the full pool by 14.5 feet (6 feet higher than under CP1) and would enlarge the total storage space in the reservoir by 443,000 acre-feet.

With respect to wildlife impacts, dam construction activities for CP1 through CP5 would be so similar that they are considered to be identical for purposes of this analysis. Because CP2 would result in higher lake levels than CP1, CP2 would also require more relocation of utilities, public service facilities, and recreational facilities than CP1. However, the wildlife impact analysis for CP1 assumes maximum impacts related to mechanized vegetation clearing and construction within the relocation areas. Therefore, vegetation clearing and construction impacts within the relocation areas would be identical for CP1–CP5. Because CP2 would result in higher lake levels than CP1, CP2 would result in a larger (and deeper) area of inundation than CP1, in turn requiring more vegetation clearing within the inundation area than CP1.

**Shasta Lake and Vicinity**

*Impact Wild-1 (CP2): Take and Loss of Habitat for the Shasta Salamander*  
Ground-disturbing activities associated with construction could result in direct take of the Shasta salamander, a State-listed species, USFS sensitive species, survey and manage species, MSCS-covered species, and BLM sensitive species. In addition, the raising of Shasta Dam would result in the inundation of habitat for this species. This impact would be significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the Shasta salamander. This impact would be significant.

Inundation resulting from a 12.5-foot dam raise would result in a loss of 10 acres of limestone habitat and 1,689 acres of nonlimestone habitat. Impacts on limestone and nonlimestone by CWHR type providing suitable habitat in the impoundment area are summarized in Table 13-19.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range (if appropriate). Surveys of the Shasta salamander are ongoing and it is anticipated that protocol-level surveys will be conducted within the dam construction footprint and all relocation area footprints. Protocol-level surveys would provide specific information about the presence or absence of Shasta salamanders within individual construction footprints. Mitigation for acres affected would then be

refined based on these results. Direct and indirect impacts based on those results will be reported in the FEIS. Additionally, other indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-19. Impacts on Suitable Habitat for the Shasta Salamander in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Limestone	0.00	1.14	0.00	7.29	0.00	2.06
Nonlimestone	310.46	60.07	494.61	292.21	171.03	358.92
Total	310.46	61.21	494.61	299.50	171.03	360.98

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreage values are approximate.

*Impact Wild-2 (CP2): Impact on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat* Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the foothill yellow-legged frog, a California species of special concern, a USFS sensitive species, an MSCS-covered species, and a BLM sensitive species, and of the tailed frog, a California species of special concern. In addition, the raising of Shasta Dam would result in the conversion of suitable riverine and riparian habitat to unsuitable lacustrine habitat. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the foothill yellow-legged and tailed frogs. This impact would be potentially significant.

Implementation of a 12.5-foot raise of the dam would result in inundation of 45 acres of habitat for the foothill yellow-legged frog and tailed frog. A summary of suitable habitat loss by arm is presented in Table 13-20.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-20. Impacts on Suitable Habitat for the Foothill Yellow-Legged and Tailed Frog in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Riverine	0.00	0.42	4.02	4.51	0.84	0.00
Total	2.72	3.65	24.59	10.63	1.84	1.19

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreage values are approximate.

*Impact Wild-3 (CP2): Impact on the Northwestern Pond Turtle and Its Habitat*  
Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the northwestern pond turtle, an MSCS-covered species, a California species of special concern, and a USFS sensitive species. In addition, project implementation could result in the degradation of suitable aquatic habitat because of increased erosion and sedimentation. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the northwestern pond turtle. This impact would be potentially significant.

Implementation of a 12.5-foot raise of the dam would result in conversion of 35 acres of montane riparian and 10 acres of riverine habitat to lacustrine habitat. Because there are equally valuable components lost or gained in either habitat, the quality of the habitat would not be compromised. However, maximum lake inundation would be infrequent (at most 1 month per year) and would not benefit the species throughout the remainder of the year. Thus, the conversion to lacustrine remains an impact on northwestern pond turtle habitat. A summary of suitable habitat loss by arm is presented in Table 13-21.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range. Analysis impacts on upland habitats will be quantified. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-21. Impacts on Suitable Habitat for the Northwestern Pond Turtle in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Riverine	0.00	0.42	4.02	4.51	0.84	0.00
Total	2.72	3.65	24.59	10.63	1.84	1.19

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreage values are approximate.

*Impact Wild-4 (CP2): Impact on the American Peregrine Falcon* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of American peregrine falcons, a State fully protected species and MSCS-covered species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the American peregrine falcon.

Similar to CP1, overstory and complete vegetation removal is expected to occur within the impoundment area in suitable cliff habitat. Thus, overstory vegetation removal occurring in or near suitable cliff habitat during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests. Additionally, because of the steep terrain, trees would be yarded by helicopter. Noise generated by chainsaws and helicopter yarding could cause the abandonment of nests, resulting in the incidental loss of fertile eggs or nestlings. This impact would be potentially significant.

No known eyries would be inundated with a 12.5-foot raise in lake elevation; however, 14.5 vertical feet (full pool) of cliff habitat would be inundated. Based on the large area required for suitable nesting habitat for peregrine falcons, impacts on suitable cliff habitat for nesting would be less than significant. The conversion of uplands to lacustrine habitat would not adversely affect foraging habitat for the species because they frequently forage over water. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-5 (CP2): Take and Loss of Habitat for the Bald Eagle*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas in addition to

inundation caused by the raising of Shasta Dam during the nesting season would result in the loss of nest and perch trees used by the bald eagle, a State-listed species, fully protected species, and USFS sensitive species, an MSCSMSCS-covered species, and a BLM sensitive species. This impact would be significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the bald eagle. This impact would be potentially significant.

Any raise in elevation would inundate between 8 and 14 nest trees. If inundation were to occur, nest trees within the impoundment area would die. Because peak inundation generally occurs in late April or early June, nest trees would be flooded toward the end of the nesting season. If eagles were nesting in these trees, it would be likely that young would fledge before the nest tree died from the effects of inundation. Because of inundation timing, it is not likely that individuals would be affected. Because bald eagles generally use the same nest for multiple years, the loss of nest trees would be a significant impact.

Inundation could also affect erosion and bank stability, which could affect nest trees that are in close proximity to the impoundment area. This would be a potentially significant impact.

Inundation resulting from a 12.5-foot dam raise would result in a loss 1,132 acres of nesting and roosting habitat for the bald eagle. Potential nest and roost trees are located in blue oak woodland, blue oak–foothill pine, Douglas-fir, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine habitats with tree diameters larger than 24 inches. Impacts on suitable spotted owl habitat by CWHR type in the impoundment area are summarized in Table 13-22.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. Bald eagle nesting activity changes from year to year. The number of bald eagle nests is subject to change based on eagle activity at the time of construction and the subsequent inundation. Reclamation is currently working with the USFS to determine the current eagle activity to revise the number of nest trees that may be impacted. Indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-22. Impacts on Suitable Habitat for the Bald Eagle in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.65
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	5.27
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood–conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total	263.88	51.21	363.82	263.97	130.26	58.53

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreages are approximate and will be revised based on habitat containing suitable tree diameters.

*Impact Wild-6 (CP2): Take and Loss of Nesting and Foraging Habitat for the Northern Spotted Owl* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the northern spotted owl, a Federally listed as threatened species and MSCS-covered species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of habitat, including critical habitat for this species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the northern spotted owl. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in a loss of 1,080 acres (29 acres of critical habitat) of nesting and foraging habitat for the northern spotted owl. Impacts on suitable habitat for the spotted owl by CWHR type in the impoundment area are summarized in Table 13-23.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-23. Impacts on Suitable Habitat for the Northern Spotted Owl in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood-conifer	48.77	0.70	99.06	97.70	78.41	7.73
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total	254.11	47.99	343.25	257.85	126.80	50.42

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

*Impact Wild-7 (CP2): Impact on the Purple Martin and Its Nesting Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of purple martins, a California species of special concern. In addition, inundation caused by the raising of Shasta Dam would result in the loss of nest trees. This impact would be significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. Similar to CP1, nest trees occurring in the lake could be adversely affected by inundation and related vegetation removal. These impacts would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-8 (CP2): Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the willow flycatcher, a State-listed as endangered species, USFS sensitive species, and MSCS-covered species; the Vaux's swift, a California species of special concern; and the yellow warbler and yellow-breasted chat, both California species of special concern and MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of habitat, including nesting habitat, for these species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in a loss of 1,115 acres of nesting and foraging habitat for the Vaux's swift (Douglas-fir, montane hardwood, montane hardwood-conifer, montane riparian, and ponderosa pine) and 35 acres for the willow flycatcher, yellow warbler, and yellow-breasted chat (montane riparian).

Impacts on suitable habitats for the willow flycatcher, Vaux's swifts, yellow warbler, and yellow-breasted chat habitat by CWHR type in the impoundment area is summarized in Table 13-24.

**Table 13-24. Impacts on Suitable Habitat for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Vaux's Swift</b>						
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood-conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total Vaux's Swift Habitat	256.83	51.22	363.82	263.97	127.80	51.61
<b>Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat</b>						
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Total Habitat	2.72	3.23	20.57	6.12	1.00	1.19

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-9 (CP2): Impacts on the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the long-eared owl, a California species of special concern and an MSCS-covered species; the northern goshawk, a California species of special concern, a USFS sensitive

species, and a BLM sensitive species; the Cooper’s hawk, an MSCS-covered species; the great blue heron, an MSCS-covered species; and the osprey, an MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of foraging and nesting habitat for these species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in a loss of 1,080 acres of nesting and foraging habitat (Douglas-fir, montane hardwood–conifer, and ponderosa pine) for the long-eared owl and northern goshawk, and 1,473 acres of nesting and foraging habitat for the Cooper’s hawk and great blue heron (blue oak–foothill pine, closed-cone pine-cypress, Douglas-fir, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine).

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-25.

**Table 13-25. Impacts on Suitable Habitat for the Long-Eared Owl, Northern Goshawk, Cooper’s Hawk, and Great Blue Heron in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Long-Eared Owl and Northern Goshawk</b>						
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood–conifer	48.77	0.70	99.06	97.70	78.41	7.73
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total Habitat	254.11	47.99	343.25	257.85	126.80	50.42
<b>Cooper’s Hawk and Great Blue Heron</b>						
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	5.27
Closed-cone pine-cypress	24.40	0.00	8.95	14.89	32.72	262.31
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood–conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total Habitat	288.28	51.22	372.77	278.86	162.98	319.19

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Impacts on the osprey would be similar to those described for CP1. There are 54 osprey nests within the perimeter of Shasta Lake. There are six nest trees that would be affected by a 12.5-foot dam raise. Eleven osprey nests are located in relocation areas. Removal of nest trees would be a potentially significant impact. Because osprey generally use the same nest for multiple years, the loss of 17 nest trees (31 percent) collectively between the impoundment area and relocation areas would be a potentially significant impact.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. Osprey nesting activity changes from year to year. The number of osprey nests is subject to change based on current eagle activity at the time of construction and the subsequent inundation. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-10 (CP2): Take and Loss of Habitat for the Pacific Fisher*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the Pacific fisher, a Federal candidate for listing, a California species of special concern, a USFS sensitive species, and a BLM sensitive species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be identical to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in a loss of 855 acres of habitat (Douglas-fir, montane hardwood–conifer, montane riparian, and ponderosa pine) for the Pacific fisher.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-26.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-26. Impacts on Suitable Habitat for the Pacific Fisher in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood–conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total Habitat	203.53	25.47	243.34	218.66	114.49	49.84

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

*Impact Wild-11 (CP2): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend’s Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtail and Their Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the pallid bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the western red bat, a USFS sensitive species; the western mastiff bat, a California species of special concern, an MSCS-covered species, and a BLM sensitive species; the Townsend’s big-eared bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the long-eared Myotis, a BLM sensitive species; the Yuma Myotis, a BLM sensitive species; the American marten, a USFS sensitive species; and the ringtail, a State fully protected and MSCS-covered species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in the loss of 18 acres of habitat for the pallid bat, spotted bat, western mastiff bat, Townsend’s big-eared bat and Yuma myotis (barren, blue oak woodland, and blue oak–foothill pine); the loss of 1,677 acres of habitat for the western red bat long-eared myotis, and ringtail (barren, blue oak woodland, blue oak–foothill pine, closed-cone pine-cypress, Douglas-fir, mixed chaparral, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine); and the loss of 855 acres of habitat for the American marten (Douglas-fir,

montane hardwood–conifer, montane riparian, and ponderosa pine). This impact would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-27.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-12 (CP2): Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat* All of these species are designated USFS sensitive and survey and manage species and are proposed for Federal listing. The Shasta sideband is also an MSCS-covered species. Ground-disturbing activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take and/or loss of suitable habitat for special-status terrestrial mollusks. In addition, the raising of Shasta Dam would result in the inundation of suitable habitat and direct take of this species. This would be a significant impact.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in the loss of 1,680 acres of habitat for the Shasta chaparral (annual grassland, barren, blue oak woodland, blue oak–foothill pine, closed-cone pine-cypress, Douglas-fir, mixed chaparral, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine), 367 acres in the impoundment area for Shasta hesperian (Douglas-fir, montane hardwood conifer, and montane riparian), 7 acres of limestone habitat for the Shasta sideband, and 2 acres of limestone habitat for the Wintu sideband. This impact would be potentially significant.

**Table 13-27. Impacts on Suitable Habitat for Special-Status Bats, American Marten, and Ringtail in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
<b>Pallid Bat, Spotted Bat, Western Mastiff Bat, Townsend's Big-Eared Bat and, Yuma Myotis</b>						
Barren	0.77	0.00	0.36	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.65
Blue oak-foothill pine	7.05	0.00	0.00	0.00	2.46	5.27
Total	7.82	0.00	0.36	0.00	2.46	6.92
<b>Western Red Bat, Long-Eared Myotis, and Ringtail</b>						
Barren	0.77	0.00	0.36	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.65
Blue oak-foothill pine	7.05	0.00	0.00	0.00	2.46	5.27
Closed-cone pine-cypress	24.40	0.00	8.95	14.89	32.72	262.31
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Mixed chaparral	20.58	9.56	112.76	10.97	7.35	40.11
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood-conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total Habitat	309.64	60.78	485.90	289.83	170.34	360.96
<b>American Marten</b>						
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood-conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total Habitat	203.53	25.47	243.34	218.66	114.49	49.84

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreages are approximate.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-28.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-28. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area: Shasta Sideband</b>						
Limestone	0.00	0.00	0.00	7.29	0.00	0.00
<b>Impoundment Area: Wintu Sideband</b>						
Limestone	0.00	0.00	0.00	0.00	0.00	2.06
<b>Impoundment Area: Shasta Chaparral</b>						
Annual grassland	0.36	0.00	1.53	0.53	0.00	0.00
Barren	0.77	0.00	0.36	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.65
Blue oak-foothill pine	7.05	0.00	0.00	0.00	2.46	5.27
Closed-cone pine-cypress	24.40	0.00	8.95	14.89	32.72	262.31
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Mixed chaparral	20.58	9.56	112.76	10.97	7.35	40.11
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood-conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Total Habitat	310.00	60.78	487.42	290.36	170.34	360.96
<b>Impoundment Area: Shasta Hesperian</b>						
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00
Montane hardwood-conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Total Habitat	51.49	3.93	119.63	103.82	79.41	8.92

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

*Impact Wild-13 (CP2): Permanent Loss of General Wildlife Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a permanent loss of habitat. In addition, inundation caused by the raising of Shasta Dam would result in a permanent loss of habitat. This would be a potentially significant impact.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in a greater loss of general wildlife habitat. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in a loss of 1,715 acres of general wildlife habitat in the impoundment area. Impacts on general wildlife habitat by CWHR type in the impoundment area are summarized in Table 13-29.

**Table 13-29. Impacts on CWHR Habitats in the Impoundment Area (12.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Annual grassland	0.36	0	1.53	0.53	0	0
Barren	0.77	0	0.36	0.00	0	0.00
Blue oak–foothill pine	7.05	0	0	0	2.46	5.27
Blue oak woodland	0	0	0	0	0	1.65
Closed-cone pine–cypress	24.40	0	8.95	14.89	32.72	262.31
Douglas-fir	0	0	0	0.06	0	0
Mixed chaparral	20.58	9.56	112.76	10.97	7.35	40.11
Montane hardwood	53.30	25.75	120.48	45.31	13.31	1.77
Montane hardwood–conifer	48.77	0.70	99.06	97.70	78.41	7.73
Montane riparian	2.72	3.23	20.57	6.12	1.00	1.19
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	40.92
Riverine	0	0.42	4.02	4.51	0.84	0
Urban	16.65	0	1.63	6.42	0	1.24
<b>Total</b>	<b>326.64</b>	<b>61.20</b>	<b>492.71</b>	<b>301.28</b>	<b>171.18</b>	<b>362.19</b>

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-14 (CP2): Impacts on Other Birds of Prey (i.e., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (i.e., American robin, Anna’s hummingbird) and their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of other birds of prey and migratory bird species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of active nests and habitat for these species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in greater impacts on nesting migratory birds and raptors. This impact would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-15 (CP2): Loss of Critical Deer Winter and Fawning Range*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of critical deer winter and fawning range. In addition, inundation caused by the raising of Shasta Dam would result in the loss of critical deer range. This would be a potentially significant impact.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by a 12.5-foot raise of Shasta Dam would result in the loss of 1,679 acres of suitable deer habitat. This impact would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-16 (CP2): Take and Loss of the California Red-Legged Frog*

Reclamation is concurrently completing an assessment of California red-legged frog habitat, which will be submitted to USFWS for review. Based on this assessment, USFWS will determine whether surveys are needed. Impacts on the California red-legged frog will be assessed if surveys are conducted and California red-legged frog is found. Impacts for each alternative will not be assessed until USFWS has determined whether suitable habitat is present and whether surveys would be required. Mitigation for this impact is proposed in Section 13.3.5.

**Upper Sacramento River (Shasta Dam to Red Bluff)**

*Impact Wild-17 (CP2): Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area*

Implementation of CP2 would result in a modified flow regime that would reduce the frequency, duration, and magnitude of intermediate to large flows below Shasta Dam during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and the formation of off-channel habitats. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be similar to Impact Wild-17 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. The differences in flow regime among the alternatives are described in detail in Chapter 6, “Hydrology, Hydraulics, and Water Management.” This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-18 (CP2): Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes* CP2 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows, which also would alter the geomorphic processes along the Sacramento River, including the rate of bank erosion in the primary study area. However, the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be similar to Impact Wild-18 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. Nonetheless, for the same reasons as CP1, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-19 (CP2): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Changes in Flow Regime* Construction-related disturbances at Shasta Dam are not anticipated to disturb or permanently remove vernal pool habitat for special-status wildlife species along the upper Sacramento River. Altered flow regimes resulting from project-related dam operation are also not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species. This impact would be less than significant.

This impact would be similar to Impact Wild-19 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. This impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-20 (CP2): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be similar to Impact Wild-20 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-21 (CP2): Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program* CP2 would not include the gravel augmentation program. There would be no impact. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-22 (CP2): Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration of Reading Island* CP2 would not include Reading Island restoration. There would be no impact. Mitigation for this impact is not needed, and thus not proposed.

### **Lower Sacramento River and Delta**

*Impact Wild-23 (CP2): Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta* Implementation of CP2 would modify the flow regime and would reduce the frequency, duration, and magnitude of intermediate to large flows in the lower Sacramento River during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. Although this change in surface and subsurface hydrology would be less than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats along the middle Sacramento River. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be similar to Impact Wild-23 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-24 (CP2): Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes* The effect of CP2 on bank swallow habitat along the lower Sacramento River would be similar to the effect along the upper Sacramento River, but smaller because the effect of CP2 on river flows would attenuate with distance downstream. The rate of bank erosion would be reduced, but the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may

cause localized bank and nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be similar to Impact Wild-24 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. Nonetheless, for the same reasons described for CP1, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-25 (CP2): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife Along the Lower Sacramento River and in the Delta from Changes in Flow Regime of the Sacramento River and Affected Tributaries, and Changes in Seasonal Water Availability* Altered flow regimes as a result of dam operation associated with the project are not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species in the lower Sacramento River and Delta portion of the extended study area. This impact would be less than significant.

This impact would be similar to Impact Wild-25 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. This impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-26 (CP2): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat Along the Lower Sacramento River and in the Delta* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be similar to Impact Wild-26 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

#### **CVP/SWP Service Areas**

*Impact Wild-27 (CP2): Impacts on Riparian-Associated or Aquatic Special-Status Wildlife in the CVP/SWP Service Areas Resulting from Modifications to Existing Flow Regimes* By altering storage and operations at several reservoirs associated with the CVP and SWP service areas, CP2 would change flow regimes in several downstream waterways. Modified flow regimes would reduce the frequency, duration, and magnitude of intermediate to large flows along the Sacramento River. However, based on the CalSim-II modeling results,

the hydrologic effects on tributaries with CVP and SWP dams are expected to be less than effects on the Sacramento River. Most potential noticeable changes in flows and stages would diminish downstream from Red Bluff. The change in surface and subsurface hydrology could affect habitats adjacent to the river channel that provide habitat for special-status wildlife species. These changes are unlikely to result in substantial effects on the distribution or abundance of riparian-associated or aquatic special-status wildlife species in the CVP and SWP service areas outside of the primary study area. Therefore, this impact would be less than significant.

This impact would be similar to Impact Wild-27 (CP1). The extent of the impact would be potentially greater under CP2 than under CP1 but less than under CP3. This impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

**CP3 – 18.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**

CP3 is similar to CP1 and CP2. It focuses on the greatest practical enlargement of Shasta Dam and Shasta Lake consistent with the goals of the 2000 CALFED ROD, and was formulated for the primary purposes of increased water supply reliability and increased survival of anadromous fish. In addition to the common features above, CP3 involves raising Shasta Dam 18.5 feet, an elevation change that would increase the full pool by 20.5 feet and enlarge the total storage space in the reservoir by 634,000 acre-feet to 5.19 million acre-feet.

With respect to wildlife impacts, dam construction activities for CP1 through CP5 would be so similar that they are considered to be identical for purposes of this analysis. Because CP3 would result in higher lake levels than CP1, CP3 would also require more relocation of utilities, public service facilities, and recreational facilities than CP1. However, the wildlife impact analysis for CP1 assumes maximum impacts related to mechanized vegetation clearing and construction within the relocation areas. Therefore, vegetation clearing and construction impacts within the relocation areas would be identical for CP1 through CP5. Because CP3 would result in higher lake levels than CP1, CP3 would result in a larger (and deeper) area of inundation than CP1, in turn requiring more vegetation clearing within the inundation area than CP1.

**Shasta Lake and Vicinity**

*Impact Wild-1 (CP3): Take and Loss of Habitat for the Shasta Salamander*  
Ground-disturbing activities associated with construction could result in direct take of the Shasta salamander, a State-listed species, USFS sensitive species, survey and manage species, MSCS-covered species, and BLM sensitive species. In addition, the raising of Shasta Dam would result in the inundation of habitat for this species. This impact would be significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an

18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the Shasta salamander. This impact would be significant.

Inundation resulting from an 18.5-foot dam raise would result in a loss of 15 acres of limestone habitat and 2,429 acres of nonlimestone habitat. Impacts on limestone and nonlimestone by CWHR type providing suitable habitat in the impoundment area are summarized in Table 13-30.

**Table 13-30. Impacts on Suitable Habitat for the Shasta Salamander in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Limestone	0.00	1.63	0.00	10.51	0.00	2.85
Nonlimestone	437.60	90.04	723.57	424.44	242.77	510.99
Total	437.60	91.67	723.57	434.95	242.77	513.84

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range (if appropriate). Surveys of the Shasta salamander are ongoing and it is anticipated that protocol-level surveys will be conducted within the dam construction footprint and all relocation area footprints. Protocol-level surveys would provide specific information about the presence or absence of Shasta salamanders within individual construction footprints. Mitigation for acres affected would then be refined based on these results. Direct and indirect impacts based on those results will be reported in the FEIS. Additionally, other indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-2 (CP3): Impact on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat* Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the foothill yellow-legged frog, a California species of special concern, a USFS sensitive species, an MSCS-covered species, and a BLM sensitive species, and of the tailed frog, a California species of special concern. In addition, the raising of Shasta Dam would result in the conversion of suitable riverine and riparian habitat to unsuitable lacustrine habitat. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the foothill yellow-legged and tailed frogs. This impact would be potentially significant.

Implementation of an 18.5-foot raise of the dam would result in inundation of 77 acres of habitat for the foothill yellow-legged frog and tailed frog. A summary of suitable habitat loss by arm is presented in Table 13-31.

**Table 13-31. Impacts on Suitable Habitat for the Foothill Yellow-Legged and Tailed Frog in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Riverine	0.00	0.88	5.24	15.43	1.41	0.00
Total	4.16	7.55	31.40	29.34	2.94	1.57

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-3 (CP3): Impact on the Northwestern Pond Turtle and Its Habitat*  
Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the northwestern pond turtle, an MSCS-covered species, a California species of special concern, and a USFS sensitive species. In addition, project implementation could result in the degradation of suitable aquatic habitat because of increased erosion and sedimentation. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the northwestern pond turtle. This impact would be potentially significant.

Implementation of an 18.5-foot raise of the dam would result in the conversion of 54 acres of montane riparian and 23 acres of riverine habitat to lacustrine habitat. Because equally valuable components are lost or gained in either habitat, the quality of the habitat would not be compromised. However, maximum lake inundation would be infrequent (at most 1 month per year) and would not benefit the species throughout the remainder of the year. Thus, the conversion to lacustrine habitat would remain an impact on northwestern pond turtle habitat. A summary of suitable habitat loss by arm is presented in Table 13-32.

**Table 13-32. Impacts on Suitable Habitat for the Northwestern Pond Turtle in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Riverine	0.00	0.88	5.24	15.43	1.41	0.00
Total	4.16	7.55	31.40	29.34	2.94	1.57

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed or in the species range (if appropriate). Analysis impacts on upland habitats will be quantified. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-4 (CP3): Impact on the American Peregrine Falcon* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of American peregrine falcons, a State fully protected species and MSCS-covered species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the American peregrine falcon.

Similar to CP1, overstory and complete vegetation removal is expected to occur within the impoundment area in suitable cliff habitat. Thus, overstory vegetation removal occurring in or near suitable cliff habitat during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests. Additionally, because of the steep terrain, trees would be yarded by helicopter. Noise generated by chainsaws and helicopter yarding could cause the abandonment of nests, resulting in the incidental loss of fertile eggs or nestlings. This impact would be potentially significant.

No known eyries would be inundated with a 18.5-foot raise in lake elevation; however, 20.5 (full pool) vertical feet of cliff habitat would be inundated. Based on the large area required for suitable nesting habitat for peregrine falcons, impacts on suitable cliff habitat for nesting would be less than significant. The conversion of uplands to lacustrine habitat would not adversely affect foraging habitat for the species because they frequently forage over water. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-5 (CP3): Take and Loss of Habitat for the Bald Eagle*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas in addition to inundation caused by the raising of Shasta Dam during the nesting season would result in the loss of nest and perch trees used by the bald eagle, a State-listed species, fully protected species, and USFS sensitive species, an MSCS-covered species, and a BLM sensitive species. This impact would be significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the bald eagle. This impact would be potentially significant.

Any raise in elevation would inundate between 8 and 14 nest trees. If inundation were to occur, nest trees within the impoundment area would die. Because peak inundation generally occurs in late April or early June, nest trees would be flooded toward the end of the nesting season. If eagles were nesting in these trees, it would be likely that young would fledge before the nest tree died from the effects of inundation. Because of inundation timing, it is not likely that individuals would be affected. Because bald eagles generally use the same nest for multiple years, the loss of nest trees would be a significant impact.

Inundation could also affect erosion and bank stability, which could affect nest trees that are in close proximity to the impoundment area. This would be a potentially significant impact.

Inundation resulting from an 18.5-foot dam raise would result in a loss 1,637 acres of nesting and roosting habitat for the bald eagle. Potential nest and roost trees occur in blue oak woodland, blue oak–foothill pine, Douglas-fir, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine habitats with tree diameters greater than 24 inches. Impacts on suitable spotted owl habitat by CWHR type in the impoundment area are summarized in Table 13-33.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. Bald eagle nesting activity changes from year to year. The number of bald eagle nests is subject to change based on eagle activity at the time of construction and the subsequent inundation. Reclamation is currently working with the USFS to determine the current eagle activity to revise the number of nest trees that may be impacted. Indirect and temporary impacts will be analyzed in the FEIS. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-33. Impacts on Suitable Habitat for the Bald Eagle in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	1.94
Blue oak-foothill pine	10.36	0.00	0.00	0.00	4.29	6.81
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total	373.80	77.15	535.78	383.00	186.44	80.87

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreages are approximate and will be revised based on habitat containing suitable tree diameters.

*Impact Wild-6 (CP3): Take and Loss of Nesting and Foraging Habitat for the Northern Spotted Owl* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the northern spotted owl, a Federally listed as threatened species and MSCS-covered species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of habitat, including critical habitat for this species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for the northern spotted owl. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in a loss of 1,560 acres (42 acres of critical habitat) of nesting and foraging habitat for the northern spotted owl. Impacts on suitable spotted owl habitat by CWHR type in the impoundment area are summarized in Table 13-34.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-34. Impacts on Suitable Habitat for the Northern Spotted Owl in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total	359.28	70.47	509.62	369.09	180.62	70.54

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

*Impact Wild-7 (CP3): Impact on the Purple Martin and Its Nesting Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of purple martins, a California species of special concern. In addition, inundation caused by the raising of Shasta Dam would result in the loss of nest trees. This impact would be significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. Similar to CP1, nest trees occurring in the lake could be adversely affected by inundation and related vegetation removal. These impacts would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-8 (CP3): Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the willow flycatcher, a State-listed as endangered species, USFS sensitive species, and MSCS-covered species; the Vaux's swift, a California species of special concern; and the yellow warbler and yellow-breasted chat, both California species of special concern and MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of habitat, including nesting habitat, for these species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in a loss of 1,614 acres of nesting and foraging habitat for the Vaux’s swift (Douglas-fir, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine) and 54 acres for the willow flycatcher, yellow warbler, and yellow-breasted chat (montane riparian).

Impacts on suitable habitats for the willow flycatcher, Vaux’s swift, yellow warbler, and yellow-breasted chat by CWHR type in the impoundment area are summarized in Table 13-35.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-35. Impacts on Suitable Habitat for the Vaux’s Swift, Yellow Warbler, and Yellow-Breasted Chat in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area</b>						
<b>Vaux’s Swift</b>						
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood–conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total Vaux’s Swift Habitat	363.44	77.14	535.78	383.00	182.15	72.11
<b>Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat</b>						
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Total Habitat	4.16	6.67	26.16	13.91	1.53	1.57

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

*Impact Wild-9 (CP3): Impacts on the Long-Eared Owl, Northern Goshawk, Cooper’s Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the long-eared owl, a

California species of special concern and an MSCS-covered species; the northern goshawk, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the Cooper’s hawk, an MSCS-covered species; the great blue heron, an MSCS-covered species; and the osprey, an MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of foraging and habitat for these species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in a loss 1,560 acres of nesting and foraging habitat (Douglas-fir, montane hardwood-conifer, and ponderosa pine) for the long-eared owl and northern goshawk, and 2,120 acres of nesting and foraging habitat for the Cooper’s hawk and great blue heron (blue oak-foothill pine, closed-cone pine-cypress, Douglas-fir, montane hardwood, montane hardwood-conifer, montane riparian, and ponderosa pine).

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-36.

**Table 13-36. Impacts on Suitable Habitat for the Long-Eared Owl, Northern Goshawk, Cooper’s Hawk, and Great Blue Heron in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Long-Eared Owl and Northern Goshawk</b>						
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total Habitat	359.28	70.47	509.62	369.09	180.62	70.54
<b>Cooper’s Hawk and Great Blue Heron</b>						
Blue oak-foothill pine	10.36	0.00	0.00	0.00	4.29	1.94
Closed-cone pine-cypress	32.68	0.00	12.95	20.79	44.72	373.48
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total Habitat	406.48	77.14	548.73	403.79	231.16	447.53

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate.

Impacts on the osprey are similar to those described for CP1. There are 54 osprey nests within the perimeter of Shasta Lake. Seven nest trees would be affected by an 18.5-foot dam raise. Eleven osprey nests are located in relocation areas. Removal of nest trees would be a potentially significant impact. Because ospreys generally use the same nest for multiple years, the loss of 18 nest trees (33 percent) collectively between the impoundment area and the relocation areas would be a potentially significant impact.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. Osprey nesting activity changes from year to year. The number of osprey nests is subject to change based on current osprey activity at the time of construction and the subsequent inundation. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-10 (CP3): Take and Loss of Habitat for the Pacific Fisher*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the Pacific fisher, a Federal candidate for listing, a California species of special concern, a USFS sensitive species, and a BLM sensitive species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in a loss of 1,242 acres of habitat (Douglas-fir, montane hardwood–conifer, montane riparian, and ponderosa pine) for the Pacific fisher.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-37.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-37. Impacts on Suitable Habitat for the Pacific Fisher in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total Habitat	289.95	38.38	364.77	316.94	162.72	69.62

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate

*Impact Wild-11 (CP3): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend’s Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtail and Their Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the pallid bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the western red bat, a USFS sensitive species; the western mastiff bat, a California species of special concern, an MSCS-covered species, and a BLM sensitive species; the Townsend’s big-eared bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the long-eared Myotis, a BLM sensitive species; the Yuma Myotis, a BLM sensitive species; the American marten, a USFS sensitive species; and the ringtail, a State fully protected and MSCS-covered species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in the loss of 25 acres of habitat for the pallid bat, spotted bat, western mastiff bat, Townsend’s big-eared bat, and Yuma myotis (barren, blue oak woodland, and blue oak-foothill pine); the loss of 2,412 acres of habitat for the western red bat, long-eared myotis and ringtail (barren, blue oak woodland, blue oak-foothill pine, closed-cone pine-cypress, Douglas-fir, mixed chaparral, montane hardwood, montane hardwood-conifer, montane riparian, and ponderosa pine); and the loss of 855 acres of habitat for the American marten (Douglas-fir, montane hardwood-conifer, montane riparian, and ponderosa pine). This impact would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-38.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-38. Impacts on Suitable Habitat for Special-Status Bats, American Marten, and Ringtail in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Pallid Bat, Spotted Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, and Yuma Myotis</b>						
Barren	1.06	0.00	0.55	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	6.81
Blue oak-foothill pine	10.36	0.00	0.00	0.00	4.29	1.94
Total	11.42	0.00	0.55	0.00	4.29	8.76
<b>Western Red Bat, Long-Eared Bat, and Ringtail</b>						
Barren	1.06	0.00	0.55	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	6.81
Blue oak-foothill pine	10.36	0.00	0.00	0.00	4.29	1.94
Closed-cone pine-cypress	32.68	0.00	12.95	20.79	44.72	373.48
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Mixed chaparral	29.19	13.64	161.04	15.06	10.35	59.50
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total Habitat	436.74	90.78	710.32	418.85	241.51	513.85
<b>American Marten</b>						
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total Habitat	289.95	38.38	364.77	316.94	162.72	69.62

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreages are approximate.

*Impact Wild-12 (CP3): Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat* All of these species are designated USFS sensitive and survey and manage species and are proposed for Federal listing. The Shasta sideband is also an MSCS-covered species. Ground-disturbing activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take and/or loss of suitable habitat for special-status terrestrial mollusks. In addition, the raising of Shasta

Dam would result in the inundation of suitable habitat and direct take of this species. This would be a significant impact.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of suitable habitat for these species. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in the loss of 2,416 acres of habitat for the Shasta chaparral and Shasta hesperian (annual grassland, barren, blue oak woodland, blue oak-foothill pine, closed-cone pine-cypress, Douglas-fir, mixed chaparral, montane hardwood, montane hardwood-conifer, montane riparian, and ponderosa pine), 539 acres in the impoundment area for Shasta hesperian (Douglas-fir, montane hardwood conifer, and montane riparian), 11 acres of limestone habitat for the Shasta sideband and 3 acres of limestone habitat for the Wintu sideband. This impact would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-39.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

**Table 13-39. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
<b>Impoundment Area: Shasta Sideband</b>						
Limestone	0.00	0.00	0.00	10.5	0.00	0.00
<b>Impoundment Area: Wintu Sideband</b>						
Limestone	0.00	0.00	0.00	0.00	0.00	2.85
<b>Impoundment Area: Shasta Chaparral</b>						
Annual grassland	0.44	0.00	3.10	0.70	0.00	0.00
Barren	1.06	0.00	0.55	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	6.81
Blue oak-foothill pine	10.36	0.00	0.00	0.00	4.29	1.94
Closed-cone pine-cypress	32.68	0.00	12.95	20.79	44.72	373.48
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Mixed chaparral	29.19	13.64	161.04	15.06	10.35	59.50
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Total Habitat	437.18	90.78	713.42	419.55	241.51	513.85
<b>Impoundment Area: Shasta Hesperian</b>						
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Montane hardwood-conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Total Habitat	74.84	7.66	176.58	154.84	113.16	12.12

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acres are approximate

*Impact Wild-13 (CP3): Permanent Loss of General Wildlife Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a permanent loss of habitat. In addition, inundation caused by the raising of Shasta Dam would result in a permanent loss of habitat. This would be a potentially significant impact.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of general wildlife habitat. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in a loss of 2,472 acres of general wildlife habitat in the impoundment area. Impacts on general wildlife habitat by CWHR type in the impoundment area are summarized in Table 13-40.

**Table 13-40. Impacts on CWHR Habitats in the Impoundment Area (18.5-Foot Dam Raise)**

Habitat	Area (acres*)					
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm
Annual grassland	0.44	0.00	3.10	0.70	0.00	0.00
Barren	1.05	0.00	0.55	0.00	0.00	0.00
Blue oak–foothill pine	10.36	0.00	0.00	0.00	4.29	1.94
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	6.81
Closed-cone pine–cypress	32.68	0.00	12.95	20.79	44.72	373.48
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00
Mixed chaparral	29.19	13.64	161.04	15.06	10.35	59.50
Montane hardwood	73.49	38.76	171.01	66.06	19.43	2.49
Montane hardwood–conifer	70.68	0.99	150.42	140.93	111.63	10.55
Montane riparian	4.16	6.67	26.16	13.91	1.53	1.57
Ponderosa pine	215.11	30.72	188.19	161.74	49.56	57.50
Riverine	0.00	0.88	5.24	15.43	1.41	0.00
Urban	21.95	00.00	1.95	7.96	0.00	1.92
Total	459.11	91.67	720.06	442.93	242.92	515.77

Source: Data compiled by North State Resources, Inc., in 2011 based on habitat assessments and mapping

Note:

\*Acreage values are approximate.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-14 (CP3): Impacts on Other Birds of Prey (i.e., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (i.e., American robin, Anna’s hummingbird) and their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of other birds of prey and migratory bird species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of active nests and habitat for these species. This impact would be potentially significant.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in greater impacts on nesting migratory birds and raptors. This impact would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-15 (CP3): Loss of Critical Deer Winter and Fawning Range*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of critical deer winter and fawning range. In addition, inundation caused by the raising of Shasta Dam would result in the loss of critical deer range. This would be a potentially significant impact.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP1. However, inundation caused by an 18.5-foot raise of Shasta Dam would result the loss of 2,415 acres of suitable deer habitat. This impact would be potentially significant.

Additional analysis of impacts will be conducted in relation to suitable habitats available in the Shasta Lake watershed. An analysis of indirect impacts and temporary impacts will be completed in subsequent documents. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-16 (CP3): Take and Loss of the California Red-Legged Frog*

Reclamation is concurrently completing an assessment of California red-legged frog habitat, which will be submitted to USFWS for review. Based on this assessment, USFWS will determine whether surveys are needed. Impacts on the California red-legged frog will be assessed if surveys are conducted and California red-legged frog is found. Impacts for each alternative will not be assessed until USFWS has determined whether suitable habitat is present and whether surveys would be required. Mitigation for this impact is proposed in Section 13.3.5.

**Upper Sacramento River (Shasta Dam to Red Bluff)**

*Impact Wild-17 (CP3): Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area*

Implementation of CP3 would result in a modified flow regime that would reduce the frequency, duration, and magnitude of intermediate to large flows below Shasta Dam during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and the formation of off-channel habitats. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be similar to Impact Wild-17 (CP1). Altered flow regimes as a result of dam operation associated with the project could be greatest under CP3 because the alterations of flow regimes would be more substantial than under CP1 and CP2. The differences in flow regime among the alternatives are described in detail in Chapter 6, “Hydrology, Hydraulics, and Water Management.” This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-18 (CP3): Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes* CP3 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows, which also would alter the geomorphic processes along the Sacramento River, including the rate of bank erosion in the primary study area. However, the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be similar to Impact Wild-18 (CP1). The extent of the impact would be potentially greater under CP1 or CP2. Nonetheless, for the same reasons as CP1, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-19 (CP3): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Changes in Flow Regime* Construction-related disturbances at Shasta Dam are not anticipated to disturb or permanently remove vernal pool habitat for special-status wildlife species along the upper Sacramento River. Altered flow regimes resulting from project-related dam operation are also not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species. This impact would be less than significant.

This impact would be similar to Impact Wild-19 (CP1). The extent of the impact could be greatest under CP3 because the alterations of flow regimes would be more substantial than under CP1 and CP2; however, vernal pool habitats are not expected to be affected by the flows. Therefore, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-20 (CP3): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less

likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be similar to Impact Wild-20 (CP1). These effects associated with the project could be greatest under CP3 because the alterations of flow regimes would be more substantial than under CP1 and CP2. This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-21 (CP3): Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program* CP3 would not include the gravel augmentation program. There would be no impact. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-22 (CP3): Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration of Reading Island* CP3 would not include Reading Island restoration. There would be no impact. Mitigation for this impact is not needed, and thus not proposed.

#### **Lower Sacramento River and Delta**

*Impact Wild-23 (CP3): Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta* Implementation of CP3 would modify the flow regime and would reduce the frequency, duration, and magnitude of intermediate to large flows in the lower Sacramento River during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. Although this change in surface and subsurface hydrology would be less than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be similar to Impact Wild-23 (CP1). These effects associated with the project could be greatest under CP3 because the alterations of flow regimes would be more substantial than under CP1 and CP2. This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-24 (CP3): Impacts on Bank Swallow along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes* The effect of

CP3 on bank swallow habitat Along the lower Sacramento River would be similar to the effect along the upper Sacramento River, but smaller because the effect of CP3 on river flows would attenuate with distance downstream. The rate of bank erosion would be reduced, but the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized bank and nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be similar to Impact Wild-24 (CP1). The extent of the impact would be potentially greater under CP3 than under CP1 or CP2. Nonetheless, for the same reasons described for CP1, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-25 (CP3): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife Along the Lower Sacramento River and in the Delta from Changes in Flow Regime of the Sacramento River and Affected Tributaries, and Changes in Seasonal Water Availability* Altered flow regimes as a result of dam operation associated with the project are not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species in the lower Sacramento River and Delta portion of the extended study area. This impact would be less than significant.

This impact would be similar to Impact Wild-25 (CP1). These effects associated with the project could be greatest under CP3 because the alterations of flow regimes would be more substantial than under CP1 and CP2. This impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-26 (CP3): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be similar to Impact Wild-26 (CP1). These effects associated with CP3 could be greatest under CP3 because the alterations of flow regimes would be more substantial than under CP1 and CP2. This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

### **CVP/SWP Service Areas**

*Impact Wild-27 (CP3): Impacts on Riparian-Associated or Aquatic Special-Status Wildlife in the CVP/SWP Service Areas Resulting from Modifications to Existing Flow Regimes* By altering storage and operations at several reservoirs associated with the CVP and SWP service areas, CP3 would change flow regimes in several downstream waterways. Modified flow regimes would reduce the frequency, duration, and magnitude of intermediate to large flows along the Sacramento River. However, based on the CalSim-II modeling results, the hydrologic effects in tributaries with CVP and SWP dams, outside of the primary study area, are expected to be less than effects on the Sacramento River. Most potential noticeable changes in flows and stages would diminish downstream from Red Bluff. The change in surface and subsurface hydrology could affect habitats adjacent to the river channel that provide habitat for special-status wildlife species. These changes are unlikely to result in substantial effects on the distribution or abundance of riparian-associated or aquatic special-status wildlife species in the CVP and SWP service areas outside of the primary study area. Therefore, this impact would be less than significant.

This impact would be similar to Impact Wild-27 (CP1). These effects associated with the project could be greatest under CP3 because the alterations of flow regimes would be more substantial than under CP1 and CP2. This impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

### **CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply Reliability**

The primary function of CP4 is to address survival of anadromous fish, while still improving water supply reliability. CP4 focuses on increasing the volume of cold water available to the temperature control device through reservoir reoperations and on raising Shasta Dam by 18.5 feet. As with CP3 and the common features above, this raise would increase the full pool by 20.5 feet and enlarge total reservoir storage space by 634,000 acre-feet.

In addition to the activities common to CP1–CP3, CP4 includes augmenting locations along the Upper Sacramento River segment of the study area with gravel to increase spawning habitat for anadromous fish. Gravel placement would occur at one or more sites per year over a 10-year period and would be accomplished by one of three methods; lateral berms, talus cone, direct placement in river; as appropriate depending on specific conditions, including geomorphology, of the augmentation site. To the extent available, existing river access points would be used to deliver gravel to the river; however, temporary new access roads would be needed in some cases, mostly adjacent to the river, and would be extended from existing dirt roads. Furthermore, under CP4, riparian, floodplain, and side channel habitat restoration would be constructed at Reading Island to restore habitat for anadromous salmonids in the Anderson

Creek Slough. This Reading Island project could involve some vegetation clearing.

With respect to wildlife impacts, dam construction activities for CP1–CP5 would be so similar that they are considered to be identical for purposes of this analysis. Because CP4 would result in higher lake levels than CP1, CP4 would also require more relocation of utilities, public service facilities, and recreational facilities than CP1. However, the wildlife impact analysis for CP1 assumes maximum impacts related to mechanized vegetation clearing and construction within the relocation areas. Therefore, vegetation clearing and construction impacts within the relocation areas would be identical for CP1–CP5. Because CP4 would result in higher lake levels than CP1, CP4 would result in a larger (and deeper) area of inundation than CP1, in turn requiring more vegetation clearing within the inundation area than CP1. CP4 would also involve some vegetation clearing in the Upper Sacramento River portion of the study area to provide access for gravel augmentation.

#### **Shasta Lake and Vicinity**

*Impact Wild-1 (CP4): Take and Loss of Habitat for the Shasta Salamander*  
Ground-disturbing activities associated with construction could result in direct take of the Shasta salamander, a State-listed species, USFS sensitive species, survey and manage species, MSCS-covered species, and BLM sensitive species. In addition, the raising of Shasta Dam would result in the inundation of habitat for this species. This impact would be significant.

This impact would be similar to Impact Wild-1 (CP3) and would be significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-2 (CP4): Impact on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat*  
Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the foothill yellow-legged frog, a California species of special concern, a USFS sensitive species, an MSCS-covered species, and a BLM sensitive species, and of the tailed frog, a California species of special concern. In addition, the raising of Shasta Dam would result in the conversion of suitable riverine and riparian habitat to unsuitable lacustrine habitat. This impact would be potentially significant.

This impact would be similar to Impact Wild-2 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-3 (CP4): Impact on the Northwestern Pond Turtle and Its Habitat*  
Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the northwestern pond turtle, an MSCS-covered species, a California species of special concern, and a USFS sensitive species. In addition, project implementation could result in the degradation of suitable aquatic

habitat because of increased erosion and sedimentation. This impact would be potentially significant.

This impact would be similar to Impact Wild-3 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-4 (CP4): Impact on the American Peregrine Falcon* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of American peregrine falcons, a State fully protected species and MSCS-covered species. This impact would be potentially significant.

This impact would be similar to Impact Wild-4 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-5 (CP4): Take and Loss of Habitat for the Bald Eagle* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas in addition to inundation caused by the raising of Shasta Dam during the nesting season would result in the loss of nest and perch trees used by the bald eagle, a State-listed species, fully protected species, and USFS sensitive species, an MSCS-covered species, and a BLM sensitive species. This impact would be significant.

This impact would be similar to Impact Wild-5 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-6 (CP4): Take and Loss of Nesting and Foraging Habitat for the Northern Spotted Owl* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the northern spotted owl, a Federally listed as threatened species and MSCS-covered species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of habitat, including critical habitat for this species. This impact would be potentially significant.

This impact would be similar to Impact Wild-6 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-7 (CP4): Impact on the Purple Martin and Its Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting

season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of purple martins, a California species of special concern. In addition, inundation caused by the raising of Shasta Dam would result in the loss of nest trees. This impact would be significant.

This impact would be similar to Impact Wild-7 (CP3) and would be significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-8 (CP4): Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the willow flycatcher, a State-listed as endangered species, USFS sensitive species, and MSCS-covered species; the Vaux's swift, a California species of special concern; and the yellow warbler and yellow-breasted chat, both California species of special concern and MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of habitat, including nesting habitat, for these species. This impact would be potentially significant.

This impact would be similar to Impact Wild-8 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-9 (CP4): Impacts on the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the long-eared owl, a California species of special concern and an MSCS-covered species; the northern goshawk, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the Cooper's hawk, an MSCS-covered species; the great blue heron, an MSCS-covered species; and the osprey, an MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of foraging and nesting habitat for these species. This impact would be potentially significant.

This impact would be similar to Impact Wild-9 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-10 (CP4): Take and Loss of Habitat for the Pacific Fisher* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss

of habitat for the Pacific fisher, a Federal candidate for listing, a California species of special concern, a USFS sensitive species, and a BLM sensitive species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

This impact would be similar to Impact Wild-10 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-11 (CP4): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtail and Their Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the pallid bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the western red bat, a USFS sensitive species; the western mastiff bat, a California species of special concern, an MSCS-covered species, and a BLM sensitive species; the Townsend's big-eared bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the long-eared Myotis, a BLM sensitive species; the Yuma Myotis, a BLM sensitive species; the American marten, a USFS sensitive species; and the ringtail, a State fully protected and MSCS-covered species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

This impact would be similar to Impact Wild-11 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-12 (CP4): Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat* All of these species are designated USFS sensitive and survey and manage species and are proposed for Federal listing. The Shasta sideband is also an MSCS-covered species. Ground-disturbing activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take and/or loss of suitable habitat for special-status terrestrial mollusks. In addition, the raising of Shasta Dam would result in the inundation of suitable habitat and direct take of this species. This would be a significant impact.

This impact would be similar to Impact Wild-12 (CP3) and would be significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-13 (CP4): Permanent Loss of General Wildlife Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a permanent loss of habitat. In addition, inundation caused by the raising of Shasta Dam would result in a permanent loss of habitat. This would be a potentially significant impact.

This impact would be similar to Impact Wild-13 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-14 (CP4): Impacts on Other Birds of Prey (i.e., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (i.e., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of other birds of prey and migratory bird species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of active nests and habitat for these species. This impact would be potentially significant.

This impact would be similar to Impact Wild-14 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-15 (CP4): Loss of Critical Deer Winter and Fawning Range*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of critical deer winter and fawning range. In addition, inundation caused by the raising of Shasta Dam would result in the loss of critical deer range. This would be a potentially significant impact.

This impact would be identical to Impact Wild-15 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-16 (CP4): Take and Loss of the California Red-Legged Frog*

Reclamation is concurrently completing an assessment of California red-legged frog habitat, which will be submitted to USFWS for review. Based on this assessment, USFWS will determine whether surveys are needed. Impacts on the California red-legged frog will be assessed if surveys are conducted and California red-legged frog is found. Impacts for each alternative will not be assessed until USFWS has determined whether suitable habitat is present and whether surveys would be required. Mitigation for this impact is proposed in Section 13.3.5.

**Upper Sacramento River (Shasta Dam to Red Bluff)**

*Impact Wild-17 (CP4): Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area* Implementation of CP4 would result in a modified flow regime that would reduce the frequency, duration, and magnitude of intermediate to large flows below Shasta Dam during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and the formation of off-channel habitats. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be the same as Impact Wild-17 (CP1) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-18 (CP4): Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes* CP4 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows, which also would alter the geomorphic processes along the Sacramento River, including the rate of bank erosion in the primary study area. However, the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be the same as Impact Wild-18 (CP1) and would be less than significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-19 (CP4): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Dam Construction and from Changes in Flow Regime* Construction-related disturbances at Shasta Dam are not anticipated to disturb or permanently remove vernal pool habitat for special-status wildlife species in the primary study area. Altered flow regimes resulting from project-related dam operation are also not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species. This impact would be less than significant.

This impact would be the same as Impact Wild-19 (CP1) and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-20 (CP4): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be the same as Impact Wild-20 (CP1) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-21 (CP4): Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program* CP4 would include the gravel augmentation program. Implementing the gravel augmentation program could result in temporary or short-term disturbance of riparian vegetation that has the potential to support special-status wildlife and there are no vernal pools or other seasonal wetland habitats at the augmentation sites. However, riparian-associated special-status wildlife species could be killed during riparian vegetation removal. Direct loss of individuals of riparian-associated special-status species during vegetation removal would be a potentially significant impact.

CP4 would include the gravel augmentation program. Implementing the gravel augmentation program could result in temporary disturbance of habitat or removal of riparian vegetation that has the potential to support special-status wildlife. Gravel augmentation would occur at one to a few sites per year over a 10-year period so the area of impact in a given year would be very small. A total of 15 potential augmentation sites have been identified between Keswick Dam and RBDD. Gravel placement itself is not expected to result in substantial adverse effects on any wildlife species, and there are no vernal pools or other seasonal wetland habitats at the augmentation sites. Short-term habitat loss also would not be sufficient to substantially affect any wildlife species. However, riparian-associated special-status wildlife species could be killed during riparian vegetation removal. Direct loss of riparian-associated special-status species during vegetation removal would be a potentially significant impact. Potential effects on special-status wildlife species are as follows:

- **Invertebrates** – Blue elderberry shrubs, the host plant for the valley elderberry longhorn beetle, are found throughout much of the Sacramento River's riparian corridor. Gravel augmentation activities have the potential to directly and indirectly affect blue elderberry shrubs, and valley elderberry longhorn beetles potentially present in the shrubs. Eleven individual elderberry shrubs and/or clumps are present within 100 feet of areas that would be disturbed during gravel

augmentation; these shrubs are located 20 feet or more from the access trail. No elderberry shrub removal is required; the nearest project activity is restricted to use of the access trail. Disturbance of elderberry shrubs would be a potentially significant impact.

- **Reptiles and Amphibians** – The northwestern pond turtle has been documented within the Sacramento River, and suitable habitat for the species is provided within the primary study area. Riparian vegetation that would be removed along the river corridor provides potential cover and foraging habitat for northwestern pond turtle. Augmentation activities would take place during the northwestern pond turtle breeding season so there is also potential to effect nests, eggs, or nesting females during vegetation clearing, grading, and gravel placement. Therefore, loss of habitat for the northwestern pond turtle would be a potentially significant impact.
- **Birds** – The riparian and wetland habitats along the Sacramento River floodway provide potential nesting and foraging habitat for western yellow-billed cuckoo, California yellow warbler, and yellow-breasted chat, all of which are special-status birds that nest in riparian vegetation. In addition, northern harrier and short-eared owl may nest in marshes in or adjacent to the stream channel. Other raptors – Cooper’s hawk, Swainson’s hawk, white-tailed kite, bald eagle, and osprey – may nest in trees in the riparian habitat in the study area. Gravel augmentation activities would be limited to a one-month window from late August to September each year. Therefore, gravel augmentation would generally be conducted outside of the nesting season of most of these species. However, there would still be some potential for active nests to be present in gravel augmentation and vegetation removal areas until mid September. For example, the nesting season for Swainson’s hawk, white-tailed kite, and other raptors is from March 1 to September 15 and the nesting season of many other species extends through August 31. Therefore, vegetation removal or disturbance of active nests could result in direct mortality or loss or abandonment of active nests. This would be a potentially significant impact.
- **Mammals** – Special-status mammals potentially occurring in the project area include pallid bat, western red bat, and ringtail. Riparian habitat can provide important foraging and roosting habitat for bats, but these species are not typically dependent on riparian habitats. The amount of potential foraging habitat would not decrease appreciably, and available riparian habitats would still be sufficient for roosting habitat such that impacts on special-status bats would be less than significant. Removal of small amounts of riparian vegetation along the river channel in the study area would not substantially reduce habitat

for ringtail. Therefore, impacts on special-status mammals would be less than significant.

Because of the potential to affect valley elderberry longhorn beetle, northwestern pond turtle, and riparian-associated special-status birds, this impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-22 (CP4): Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration of Reading Island* Restoring connectivity between Anderson Creek Slough and the Sacramento River, rehabilitating the existing boat ramp, and constructing a handicap fishing access area could result in disturbance and short-term removal of riparian vegetation that support riparian-associated special-status wildlife species that could be killed during riparian vegetation removal. Direct loss of riparian-associated special-status species during vegetation removal would be a potentially significant impact.

CP4 would include restoration actions at Reading Island. Potential effects of these actions on special-status wildlife species are as follows:

- **Invertebrates** – Blue elderberry shrubs, the host plant for the valley elderberry longhorn beetle, are found throughout much of the Sacramento River’s riparian corridor and may be present on the levee separating Anderson Slough and the Sacramento River. Elderberry shrubs may be present throughout Reading Island, including near the boat ramp and areas under consideration for constructing handicap fishing access. Construction activities on Reading Island have the potential to directly and indirectly affect blue elderberry shrubs, and valley elderberry longhorn beetles potentially present in the shrubs. Disturbance of elderberry shrubs would be a potentially significant impact.
- **Reptiles and Amphibians** – The northwestern pond turtle has been documented within the Sacramento River, and suitable habitat for the species is provided within the primary study area. Riparian vegetation that would be removed along the river corridor provides potential cover and foraging habitat for northwestern pond turtle. Boat ramp rehabilitation, construction of fishing access, and habitat restoration activities would take place during the northwestern pond turtle breeding season so there is also potential to effect nests, eggs, or nesting females during vegetation clearing, grading, and gravel placement. Therefore, loss of habitat for the northwestern pond turtle would be a potentially significant impact.
- **Birds** – The riparian habitat along the Sacramento River and Anderson Slough provide potential nesting and foraging habitat for western yellow-billed cuckoo, California yellow warbler, and yellow-breasted

chat, all of which are special-status birds that nest in riparian vegetation. In addition, northern harrier and short-eared owl may nest in marshes in or adjacent to the stream channel. Other raptors—Cooper’s hawk, Swainson’s hawk, white-tailed kite, bald eagle, and osprey—may nest in trees in the riparian habitat along these waterways and throughout Reading Island. Vegetation removal or disturbance of active nests could result in direct mortality or loss or abandonment of active nests. This would be a potentially significant impact.

- **Mammals** – Special-status mammals potentially occurring in the project area include pallid bat, western red bat, and ringtail. Riparian habitat can provide important foraging and roosting habitat for bats, but these species are not typically dependent on riparian habitats. The amount of potential foraging habitat would not decrease appreciably, and available riparian habitats would still be sufficient for roosting habitat such that impacts on special-status bats would be less than significant. Rehabilitating the existing boat ramp and constructing handicap fishing access would result in minimal vegetation removal. Restoring connectivity of the side channel between Anderson Slough and the river could result in greater amounts of vegetation removal, but this would still be a relatively small amount of riparian vegetation. Removal of small amounts of riparian vegetation along the river corridor, Anderson Slough, or Reading Island would not substantially reduce habitat for ringtail. Therefore, impacts on special-status mammals would be less than significant.

Because of the potential to affect valley elderberry longhorn beetle, northwestern pond turtle, and riparian-associated special-status birds, this impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

### **Lower Sacramento River and Delta**

*Impact Wild-23 (CP4): Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta* Implementation of CP4 would modify the flow regime and would reduce the frequency, duration, and magnitude of intermediate to large flows in the lower Sacramento River during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. Although this change in surface and subsurface hydrology would be less than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats along the middle Sacramento River. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for

some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be the same as Impact Wild-23 (CP1) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-24 (CP4): Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes* The effect of CP4 on bank swallow habitat along the lower Sacramento River would be similar to the effect along the upper Sacramento River, but smaller because the effect of CP4 on river flows would attenuate with distance downstream. The rate of bank erosion would be reduced, but the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized bank and nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be the same as Impact Wild-24 (CP1), and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-25 (CP4): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife Along the Lower Sacramento River and in the Delta from Changes in Flow Regime of the Sacramento River and Affected Tributaries, and Changes in Seasonal Water Availability* Altered flow regimes as a result of dam operation associated with the project are not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species in the lower Sacramento River and Delta portion of the extended study area. This impact would be less than significant.

This impact would be the same as Impact Wild-25 (CP1) and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-26 (CP4): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be the same as Impact Wild-26 (CP1) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

### **CVP/SWP Service Areas**

*Impact Wild-27 (CP4): Impacts on Riparian-Associated or Aquatic Special-Status Wildlife in the CVP/SWP Service Areas Resulting from Modifications to Existing Flow Regimes* By altering storage and operations at several reservoirs associated with the CVP and SWP service areas, CP4 would change flow regimes in several downstream waterways. Modified flow regimes would reduce the frequency, duration, and magnitude of intermediate to large flows along the Sacramento River. However, based on the CalSim-II modeling results, the hydrologic effects on tributaries with CVP and SWP dams are expected to be less than effects on the Sacramento River. The change in surface and subsurface hydrology could affect habitats adjacent to the river channel that provide habitat for special-status wildlife species. These changes are unlikely to result in substantial effects on the distribution or abundance of riparian-associated or aquatic special-status wildlife species in the CVP and SWP service areas outside of the primary study area. Therefore, this impact would be less than significant.

This impact would be the same as Impact Wild-27 (CP1) and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

### **CP5 – 18.5-Foot Dam Raise, Combination Plan**

CP5 would address both the primary and secondary planning objectives. It involves enlarging Shasta Dam by 18.5 feet, which is consistent with the objectives of the 2000 CALFED ROD, and also includes the common features described above. In addition, CP5 involves (1) implementing environmental restoration features along the lower reaches of major tributaries to Shasta Lake, (2) constructing shoreline fish habitat around Shasta Lake, and (3) constructing either additional or improved recreation features at various locations around Shasta Lake to increase the value of the recreational experience. Formulation of specific environmental restoration features and increased recreation components is included in the Draft Feasibility Report.

CP5 would also include implementing the same gravel augmentation program and the same riparian, floodplain, and side channel habitat restoration at Reading Island as described for CP4.

### **Shasta Lake and Vicinity**

*Impact Wild-1 (CP5): Take and Loss of Habitat for the Shasta Salamander* Ground-disturbing activities associated with construction could result in direct take of the Shasta salamander, a State-listed species, USFS sensitive species, survey and manage species, MSCS-covered species, and BLM sensitive species. In addition, the raising of Shasta Dam would result in the inundation of habitat for this species. This impact would be significant.

This impact would be similar to Impact Wild-1 (CP3) and would be significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-2 (CP5): Impact on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat* Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the foothill yellow-legged frog, a California species of special concern, a USFS sensitive species, an MSCS-covered species, and a BLM sensitive species, and of the tailed frog, a California species of special concern. In addition, the raising of Shasta Dam would result in the conversion of suitable riverine and riparian habitat to unsuitable lacustrine habitat. This impact would be potentially significant.

This impact would be similar to Impact Wild-2 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-3 (CP5): Impact on the Northwestern Pond Turtle and Its Habitat* Ground-disturbing activities associated with construction could result in direct take (e.g., because of operation of equipment in or adjacent to riverine or riparian habitat) of the northwestern pond turtle, an MSCS-covered species, a California species of special concern, and a USFS sensitive species. In addition, project implementation could result in the degradation of suitable aquatic habitat because of increased erosion and sedimentation. This impact would be potentially significant.

This impact would be similar to Impact Wild-3 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-4 (CP5): Impact on the American Peregrine Falcon* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of American peregrine falcons, a State fully protected species and MSCS-covered species. This impact would be potentially significant.

This impact would be similar to Impact Wild-4 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-5 (CP5): Take and Loss of Habitat for the Bald Eagle*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas in addition to inundation caused by the raising of Shasta Dam during the nesting season would result in the loss of nest and perch trees used by the bald eagle, a State-listed species, fully protected species, and USFS sensitive species, an MSCS-covered species, and a BLM sensitive species. This impact would be significant.

This impact would be similar to Impact Wild-5 (CP3) and would be significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-6 (CP5): Take and Loss of Nesting and Foraging Habitat for the Northern Spotted Owl*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the northern spotted owl, a Federally listed as threatened species and MSCS-covered species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of habitat, including critical habitat for this species. This impact would be potentially significant.

This impact would be similar to Impact Wild-6 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-7 (CP5): Impact on the Purple Martin and Its Nesting Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of purple martins, a California species of special concern. In addition, inundation caused by the raising of Shasta Dam would result in the loss of nest trees. This impact would be significant.

This impact would be similar to Impact Wild-7 (CP3) and would be significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-8 (CP5): Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the willow flycatcher, a State-listed as endangered species, USFS sensitive species, and MSCS-covered species; the Vaux's swift, a California species of special concern; and the yellow warbler and yellow-breasted chat, both California species of special concern and MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of habitat, including nesting habitat, for these species. This impact would be potentially significant.

This impact would be similar to Impact Wild-8 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-9 (CP5): Impacts on the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of the long-eared owl, a California species of special concern and an MSCS-covered species; the northern goshawk, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the Cooper's hawk, an MSCS-covered species; the great blue heron, an MSCS-covered species; and the osprey, an MSCS-covered species. In addition, the raising of Shasta Dam would result in the loss of foraging and nesting habitat for these species. This impact would be potentially significant.

This impact would be similar to Impact Wild-9 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-10 (CP5): Take and Loss of Habitat for the Pacific Fisher*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the Pacific fisher, a Federal candidate for listing, a California species of special concern, a USFS sensitive species, and a BLM sensitive species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

This impact would be similar to Impact Wild-10 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-11 (CP5): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtail and Their Habitat*

Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of habitat for the pallid bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the western red bat, a USFS sensitive species; the western mastiff bat, a California species of special concern, an MSCS-covered species, and a BLM sensitive species; the Townsend's big-eared bat, a California species of special concern, a USFS sensitive species, and a BLM sensitive species; the long-eared Myotis, a BLM sensitive species; the Yuma Myotis, a BLM sensitive species; the American marten, a USFS sensitive species; and the ringtail, a State fully protected and MSCS-covered species. Furthermore, take (including mortality of individuals because of destruction or disturbance of active roost sites or dens) could result from construction activities and vegetation clearing. This impact would be potentially significant.

This impact would be similar to Impact Wild-11 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-12 (CP5): Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat* All of these species are designated USFS sensitive and survey and manage species and are proposed for Federal listing. The Shasta sideband is also an MSCS-covered species. Ground-disturbing activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas could result in direct take and/or loss of suitable habitat for special-status terrestrial mollusks. In addition, the raising of Shasta Dam would result in the inundation of suitable habitat and direct take of this species. This would be a significant impact.

This impact would be similar to Impact Wild-12 (CP3) and would be a significant impact. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-13 (CP5): Permanent Loss of General Wildlife Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a permanent loss of habitat. In addition, inundation caused by the raising of Shasta Dam would result in a permanent loss of habitat. This would be a potentially significant impact.

This impact would be similar to Impact Wild-13 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-14 (CP5): Impacts on Other Birds of Prey (i.e., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (i.e., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat* Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas during the nesting season could result in the incidental loss of fertile eggs or nestlings or otherwise lead to the abandonment of nests of other birds of prey and migratory bird species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of active nests and habitat for these species. This impact would be potentially significant.

This impact would be similar to Impact Wild-14 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-15 (CP5): Loss of Critical Deer Winter and Fawning Range*  
Construction activities and vegetation removal associated with the construction of raising the dam, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in a loss of critical deer winter and fawning range. In addition, inundation caused by the raising of Shasta Dam would result in the loss of critical deer range. This would be a potentially significant impact.

This impact would be similar to Impact Wild-15 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Additional impacts may occur depending on specific restoration and recreation enhancement details. These impacts will be quantified when the details of the proposed actions are developed.

*Impact Wild-16 (CP5): Take and Loss of the California Red-Legged Frog*  
Reclamation is concurrently completing an assessment of California red-legged frog habitat, which will be submitted to USFWS for review. Based on this assessment, USFWS will determine whether surveys are needed. Impacts on the California red-legged frog will be assessed if surveys are conducted and California red-legged frog is found. Impacts for each alternative will not be assessed until USFWS has determined whether suitable habitat is present and whether surveys would be required. Mitigation for this impact is proposed in Section 13.3.5.

#### **Upper Sacramento River (Shasta Dam to Red Bluff)**

*Impact Wild-17 (CP5): Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area*  
Implementation of CP5 would result in a modified flow regime that would reduce the frequency, duration, and magnitude of intermediate to large flows below Shasta Dam during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and the formation of off-channel habitats. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in

substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be the same as Impact Wild-17 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-18 (CP5): Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes* CP5 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows, which also would alter the geomorphic processes along the Sacramento River, including the rate of bank erosion in the primary study area. However, the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be the same as Impact Wild-18 (CP3) and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-19 (CP5): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Dam Construction and from Changes in Flow Regime* Construction-related disturbances at Shasta Dam are not anticipated to disturb or permanently remove vernal pool habitat for special-status wildlife species in the primary study area. Altered flow regimes resulting from project-related dam operations are also not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species. This impact would be less than significant.

This impact would be the same as Impact Wild-19 (CP3) and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-20 (CP5): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be the same as Impact Wild-20 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-21 (CP5): Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program* CP5 includes the gravel augmentation program. Implementing the gravel augmentation program could

result in disturbance or removal of riparian vegetation that has the potential to support special-status wildlife. Gravel augmentation would occur at one to a few sites per year over a 10-year period so the area of impact in a given year would be very small. Thus, gravel placement is not expected to result in any substantial short- or long-term adverse effects on any wildlife species. However, riparian-associated special-status wildlife species could be killed during riparian vegetation disturbance or removal. Direct loss of individuals of riparian-associated special-status species during vegetation removal would be a potentially significant impact.

This impact would be the same as Impact Wild-21 (CP4) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-22 (CP5): Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration of Reading Island* Restoring connectivity between Anderson Creek Slough and the Sacramento River, rehabilitating the existing boat ramp, and constructing a handicap fishing access area could result in disturbance and short-term removal of riparian vegetation that support riparian-associated special-status wildlife species that could be killed during riparian vegetation removal. Direct loss of riparian-associated special-status species during vegetation removal would be a potentially significant impact.

This impact would be the same as Impact Wild-22 (CP4) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

#### **Lower Sacramento River and Delta**

*Impact Wild-23 (CP5): Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta* Implementation of CP5 would modify the flow regime and would reduce the frequency, duration, and magnitude of intermediate to large flows in the lower Sacramento River during winter and spring in some years, and would increase the volume of flows from spring through fall of most years. Although this change in surface and subsurface hydrology would be less than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats along the middle Sacramento River. Reduced formation of off-channel habitat would be a substantial long-term effect on the habitat of western pond turtle. Also, although the total amount of riparian vegetation would not be substantially altered, the portion of riparian vegetation in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. In particular, these changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Therefore, this impact would be potentially significant.

This impact would be the same as Impact Wild-23 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

*Impact Wild-24 (CP5): Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes* The effect of CP5 on bank swallow habitat along the lower Sacramento River would be similar to the effect along the upper Sacramento River, but smaller because the effect of CP5 on river flows would attenuate with distance downstream. The rate of bank erosion would be reduced, but the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be substantially reduced. High flows during the nesting season that may cause localized bank and nest failure would not be increased. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be the same as Impact Wild-24 (CP3), and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-25 (CP5): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife Along the Lower Sacramento River and in the Delta from Changes in Flow Regime of the Sacramento River and Affected Tributaries, and Changes in Seasonal Water Availability* Altered flow regimes as a result of dam operation associated with the project are not anticipated to temporarily disturb or permanently remove vernal pool habitat for special-status wildlife species in the lower Sacramento River and Delta portion of the extended study area. This impact would be less than significant.

This impact would be the same as Impact Wild-25 (CP3) and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

*Impact Wild-26 (CP5): Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta* Several conservation and management plans have been adopted in the primary and extended study areas with goals of promoting riparian habitat along the Sacramento River. Because flow regimes and riverine geomorphic processes could be altered with project implementation, riparian habitat could be affected in such a manner that the goals of the local and regional plans would be less likely to be attained. This potential conflict between the project and local and regional plans to promote riparian habitat would be a potentially significant impact.

This impact would be the same as Impact Wild-26 (CP3) and would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

#### **CVP/SWP Service Areas**

*Impact Wild-27 (CP5): Impacts on Riparian-Associated or Aquatic Special-Status Wildlife in the CVP/SWP Service Areas Resulting from Modifications to Existing Flow Regimes* By altering storage and operations at several reservoirs associated with the CVP and SWP service areas, CP5 would change flow regimes in several downstream waterways. Modified flow regimes would reduce the frequency, duration, and magnitude of intermediate to large flows along the Sacramento River. However, based on the CalSim-II modeling results,

the hydrologic effects on tributaries with CVP and SWP dams are expected to be less than effects on the Sacramento River. Most potential noticeable changes in flows and stages would diminish downstream from Red Bluff. The change in surface and subsurface hydrology could affect habitats adjacent to the river channel that provide habitat for special-status wildlife species. These changes are unlikely to result in substantial effects on the distribution or abundance of riparian-associated or aquatic special-status wildlife species in the CVP and SWP service areas outside of the primary study area. Therefore, this impact would be less than significant.

This impact would be the same as Impact Wild-27 (CP3) and would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

### **13.3.5 Mitigation Measures**

Table 13-41 presents a summary of mitigation measures for wildlife resources.

**Table 13-41. Summary of Mitigation Measures for Wildlife Resources**

<b>Impact</b>		<b>No-Action Alternative</b>	<b>CP1</b>	<b>CP2</b>	<b>CP3</b>	<b>CP4</b>	<b>CP5</b>	
Impact Wild-1: Take and Loss of Habitat for the Shasta Salamander	LOS before Mitigation	NI	S	S	S	S	S	
	Mitigation Measure	None required.	Mitigation Measure Wild-1: Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander.					
	LOS after Mitigation	NI	SU	SU	SU	SU	SU	
Impact Wild-2: Impact on the Foothill Yellow-Legged Frog and Tailed Frog and Their Habitat	LOS before Mitigation	NI	PS	PS	PS	PS	PS	
	Mitigation Measure	None required.	Mitigation Measure Wild-2: Avoid, Relocate, and Acquire Mitigation Lands for Foothill Yellow-Legged Frog and Tailed Frog.					
	LOS after Mitigation	NI	SU	SU	SU	SU	SU	
Impact Wild-3: Impact on the Northwestern Pond Turtle and Its Habitat	LOS before Mitigation	NI	PS	PS	PS	PS	PS	
	Mitigation Measure	None required.	Mitigation Measure Wild-3: Avoid, Relocate, and Acquire Mitigation Lands for Northwestern Pond Turtle.					
	LOS after Mitigation	NI	SU	SU	SU	SU	SU	
Impact Wild-4: Impact on the American Peregrine Falcon	LOS before Mitigation	NI	PS	PS	PS	PS	PS	
	Mitigation Measure	None required.	Mitigation Measure Wild-4: Conduct Preconstruction Surveys for the American Peregrine Falcon and Establish Buffers.					
	LOS after Mitigation	NI	LTS	LTS	LTS	LTS	LTS	
Impact Wild-5: Take and Loss of Habitat for the Bald Eagle	LOS before Mitigation	NI	S	S	S	S	S	
	Mitigation Measure	None required.	Mitigation Measure Wild-5: Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers.					
	LOS after Mitigation	NI	SU	SU	SU	SU	SU	

**Table 13-41. Summary of Mitigation Measures for Wildlife Resources (contd.)**

<b>Impact</b>		<b>No-Action Alternative</b>	<b>CP1</b>	<b>CP2</b>	<b>CP3</b>	<b>CP4</b>	<b>CP5</b>
Impact Wild-6: Take and Loss of Nesting and Foraging Habitat for the Northern Spotted Owl	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-6: Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Northern Spotted Owl and Establish Buffers.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact Wild-7: Impact on the Purple Martin and Its Habitat	LOS before Mitigation	NI	S	S	S	S	S
	Mitigation Measure	None required.	Mitigation Measure Wild-7: Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact Wild-8: Impacts on the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Their Foraging and Nesting Habitat	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-8: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact Wild-9: Impacts on the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Their Foraging and Nesting Habitat	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-9: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, and Great Blue Heron and Establish Buffers.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU

**Table 13-41. Summary of Mitigation Measures for Wildlife Resources (contd.)**

<b>Impact</b>		<b>No-Action Alternative</b>	<b>CP1</b>	<b>CP2</b>	<b>CP3</b>	<b>CP4</b>	<b>CP5</b>	
Impact Wild-10: Take and Loss of Habitat for the Pacific Fisher	LOS before Mitigation	NI	PS	PS	PS	PS	PS	
	Mitigation Measure	None required.	Mitigation Measure Wild-10: Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Pacific Fisher and Establish Buffers.					
Impact Wild-11: Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, and Yuma Myotis), the American Marten, and Ringtails and Their Habitat	LOS after Mitigation	NI	SU	SU	SU	SU	SU	
	LOS before Mitigation	NI	PS	PS	PS	PS	PS	
Impact Wild-12: Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat	Mitigation Measure	None required.	Mitigation Measure Wild-11: Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for Special-Status Bats, American Marten, and Ringtails and Establish Buffers.					
	LOS after Mitigation	NI	SU	SU	SU	SU	SU	
Impact Wild-12: Impacts on Special-Status Terrestrial Mollusks (Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat	LOS before Mitigation	NI	S	S	S	S	S	
	Mitigation Measure	None required.	Mitigation Measure Wild-12: Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks.					
Impact Wild-13: Permanent Loss of General Wildlife Habitat	LOS after Mitigation	NI	SU	SU	SU	SU	SU	
	LOS before Mitigation	NI	PS	PS	PS	PS	PS	
Impact Wild-13: Permanent Loss of General Wildlife Habitat	Mitigation Measure	None required.	Mitigation Measure Wild-13: Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat.					
	LOS after Mitigation	NI	SU	SU	SU	SU	SU	

**Table 13-41. Summary of Mitigation Measures for Wildlife Resources (contd.)**

<b>Impact</b>		<b>No-Action Alternative</b>	<b>CP1</b>	<b>CP2</b>	<b>CP3</b>	<b>CP4</b>	<b>CP5</b>
Impact Wild-14: Impacts on Other Birds of Prey (i.e., Red-Tailed Hawk and Red-Shouldered Hawk) and Migratory Bird Species (i.e., American Robin, Anna's Hummingbird) and Their Foraging and Nesting Habitat	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-14: Conduct Preconstruction Surveys for Other Nesting Raptors and Migratory Birds and Establish Buffers.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact Wild-15: Loss of Critical Deer Winter and Fawning Range	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-15: Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact Wild-16: Take and Loss of the California Red-Legged Frog	LOS before Mitigation	NI	TBD	TBD	TBD	TBD	TBD
	Mitigation Measure	None required.	TBD				
	LOS after Mitigation	NI	TBD	TBD	TBD	TBD	TBD
Impact Wild-17: Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area	LOS before Mitigation	LTS	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-17: Implement Mitigation Measure Bot-7: Develop and Implement a Rivierine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS

**Table 13-41. Summary of Mitigation Measures for Wildlife Resources (contd.)**

<b>Impact</b>		<b>No-Action Alternative</b>	<b>CP1</b>	<b>CP2</b>	<b>CP3</b>	<b>CP4</b>	<b>CP5</b>
Impact Wild-18: Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes	LOS before Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
Impact Wild-19: Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Changes in Flow Regime	LOS before Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
Impact Wild-20: Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area	LOS before Mitigation	LTS	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-20: Implement Mitigation Measure Bot-7: Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
Impact Wild-21: Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program	LOS before Mitigation	NI	NI	NI	NI	PS	PS
	Mitigation Measure	None required.	None needed; thus, none proposed.		Mitigation Measure Wild-21: Conduct Preconstruction Surveys for Elderberry Shrubs, Northwestern Pond Turtle, and Nesting Riparian Raptors and Other Nesting Birds. Avoid Removal or Degradation of Elderberry Shrubs and Avoid Vegetation Removal near Active Nest Sites.		
	LOS after Mitigation	NI	NI	NI	NI	LTS	LTS

**Table 13-41. Summary of Mitigation Measures for Wildlife Resources (contd.)**

Impact	No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact Wild-22: Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration of Reading Island	LOS before Mitigation	NI	NI	NI	PS	PS
	Mitigation Measure	None needed; thus, none proposed.			Mitigation Measure Wild-22: Implement Mitigation Measure Wild-21: Conduct Preconstruction Surveys for Elderberry Shrubs, Northwestern Pond Turtle, and Nesting Riparian Raptors and Other Nesting Birds. Avoid Removal or Degradation of Elderberry Shrubs and Avoid Vegetation Removal near Active Nest Sites.	
Impact Wild-23: Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta	LOS after Mitigation	NI	NI	NI	LTS	LTS
	Mitigation Measure	PS	PS	PS	PS	PS
Impact Wild-24: Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes	Mitigation Measure	Mitigation Measure Wild-23: Implement Mitigation Measure Bot-7: Develop and Implement a Rivierine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS
Impact Wild-24: Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes	Mitigation Measure	LTS	LTS	LTS	LTS	LTS
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS

**Table 13-41. Summary of Mitigation Measures for Wildlife Resources (contd.)**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact Wild-25: Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife Along the Lower Sacramento River and in the Delta from Changes in Flow Regime of the Sacramento River and Affected Tributaries, and Changes in Seasonal Water Availability	LOS before Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
Impact Wild-26: Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	Mitigation Measure Wild-26: Implement Mitigation Measure Bot-7: Develop and Implement a Rivierine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities.				
Impact Wild-27: Impacts on Riparian-Associated or Aquatic Special-Status Wildlife in the CVP/SWP Service Areas Resulting from Modifications to Existing Flow Regimes	LOS before Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS

**Key:**

- LOS = level of significance
- LTS = less than significant
- NI = no impact
- PS = potentially significant
- S = significant
- SU = significant and unavoidable
- TBD = to be determined

**No-Action Alternative**

No mitigation measures are needed for this alternative.

**CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability**

No mitigation is needed for Impacts Wild-18 (CP1), Wild-19 (CP1), Wild-21, Wild-22, Wild-24 (CP1), Wild-25 (CP1), and Wild-27 (CP1). Mitigation is provided below for the remaining impacts of CP1 on wildlife species.

**Mitigation Measure Wild-1 (CP1): Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander** To avoid or minimize impacts on the Shasta salamander, the following measures will be implemented:

*Inundation Area* It is unfeasible to quantify the number of individual Shasta salamanders that would be lost in the impoundment area. Direct loss of individuals and of limestone habitat from inundation cannot be mitigated. Mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of Shasta salamander habitat.

Potential mitigation lands containing comparable Shasta salamander habitat have been identified adjacent to the project. Shasta salamander has been found in both limestone and nonlimestone habitat in this site. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- Protocol-level surveys will be conducted in all relocation areas to determine presence or absence of the Shasta salamander. If absent, no further mitigation is required.
- When feasible, use of heavy equipment and excavation in limestone substrates will be avoided.
- To minimize impacts on individuals, preconstruction surveys, in consultation with DFG and USFS, will be conducted by a qualified biologist prior to construction activities during the wet season. Individuals will be relocated to suitable limestone habitat in the vicinity of detection.
- In occupied relocation areas, mitigation measures developed for loss of suitable limestone and nonlimestone habitat in the impoundment area will be applied.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot

be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-2 (CP1): Avoid, Relocate, and Acquire Mitigation Lands for Foothill Yellow-Legged Frog and Tailed Frog** To avoid or minimize impacts on the foothill yellow-legged frog and tailed frog, the following measures will be implemented:

*Inundation Area* Individual foothill yellow-legged frog and tailed frogs will not be affected by the inundation caused by the raise of the dam. Animals will be able to swim upstream to suitable habitat.

It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of foothill yellow-legged frog and tailed frog habitat lost to inundation. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable foothill yellow-legged frog and tailed frog habitat have been identified adjacent to the project. The foothill yellow-legged frog is found in this area. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- To the extent feasible, projects planned in relocation areas will be designed to avoid construction in perennial streams and their associated riparian zones.
- When instream construction activities must occur, a preconstruction survey of the foothill yellow-legged frog and tailed frog adults, larvae, and eggs will be conducted by a qualified biologist before ground-disturbing activities begin in perennial stream and riparian habitat. This survey will be conducted within the construction boundary no more than 1 week before instream or adjacent riparian construction activities begin. If foothill yellow-legged frog or tailed frog adults, larvae, or eggs are detected, the biologist in coordination with DFG and USFS will relocate them to a suitable stream habitat outside the construction boundary. If frogs are absent, no further surveys will be required.
- If adults are found to actively use the stream where construction activities are intended to take place, a qualified biologist will relocate all individuals to suitable habitat outside the construction zone daily before instream activities resume.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring

and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-3 (CP1): Avoid, Relocate, and Acquire Mitigation Lands for Northwestern Pond Turtle** To avoid or minimize impacts on the northwestern pond turtle, the following measures will be implemented:

*Inundation Area* Individual northwestern pond turtles will not be impacted by the inundation caused by the raise of the dam. Lacustrine is suitable habitat for the northwestern pond turtle. The loss of northwestern pond turtle nests in the inundation zone if inundated while eggs are in the nest is unavoidable.

It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of northwestern pond turtle habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable northwestern pond turtle habitat have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- To the extent feasible, projects planned in relocation areas will be designed to avoid all suitable aquatic habitat and its associated riparian zone.
- When construction activities are to occur within suitable northwestern pond turtle habitat as defined in Impact Wild-3 (CP1), a qualified biologist will conduct a minimum of one preconstruction survey for northwestern pond turtles and their nests. The survey will be conducted no more than 1 week prior to construction. If a pond turtle nest is found, the biologist will flag the site and determine whether construction activities can avoid impacting the nest. If the nest cannot be avoided, DFG and the USFS will be contacted for further direction and construction activities in that location will be halted.
- In the event that a pond turtle is observed within the construction limits, the contractor will temporarily halt construction activities until a qualified biologist has moved the turtle to a safe location within suitable habitat outside of the construction limits.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot

be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-4 (CP1): Conduct Preconstruction Surveys for the American Peregrine Falcon and Establish Buffers** To avoid or minimize impacts on nesting American peregrine falcons, the following measures will be implemented:

*Inundation Area* Individual American peregrine falcons will not be impacted by the inundation caused by the raise of the dam.

*Vegetation Removal and Construction Activities*

- To the extent feasible, projects planned in relocation areas will be designed to avoid suitable cliff habitat.
- If vegetation removal or construction occurs outside of the breeding season (February 1 through July 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- For proposed construction activities between February 1 and July 31 within 0.5 mile of a known American peregrine falcon eyrie or suitable habitat identified in Impact Wild-4 (CP1), a qualified biologist will conduct a protocol-level survey. The survey will be conducted no more than 2 weeks before construction begins. If an active nest is found, a qualified biologist, in consultation with DFG, will determine the construction-free buffer zone to be established around the nest until the young have fledged. In consultation with DFG, a plan will be developed to monitor whether construction activity is disturbing the nesting process and to determine when the young have fledged.

Implementation of this mitigation measure will reduce impacts on American peregrine falcon to a less than significant level.

**Mitigation Measure Wild-5 (CP1): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers** To avoid or minimize impacts on nesting bald eagles, the following measures will be implemented:

*Inundation Area*

- For each year of project activity, all active bald eagle nests will be located using the National Bald Eagle Management Guidelines (USFWS 2007b).
- During initial inundation of the impoundment area, active eagle nests occurring within the inundation area will be protected by the placement of floating buoys and signage prohibiting access to the

established buffer developed in consultation with DFG, USFS, and USFWS (see measures below).

- It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of bald eagle habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Potential mitigation lands containing comparable bald eagle habitat have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS.

#### *Vegetation Removal and Construction Activities*

- For each year of vegetation removal or construction activity, all active bald eagle nests will be located and mapped using the National Bald Eagle Management Guidelines (USFWS 2007b).
- If vegetation removal or construction occurs outside of the breeding season (January 1 through August 1), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- If vegetation removal is to occur between January 1 and August 1, a 660-foot to 0.5-mile buffer will be established around active nests in consultation with DFG and USFS. No vegetation removal or construction activity will occur within the established buffer during the limited operating period.

The avoidance and relocation measures for vegetation removal and construction activities and the nest protection measures within the inundation area would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-6 (CP1): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Northern Spotted Owl and Establish Buffers** To avoid or minimize impacts on nesting northern spotted owls, the following measures will be implemented:

#### *Inundation Area*

- All suitable habitat within 1.3 miles of the impoundment and relocation areas will be delineated by type using California Forest Practice Rules to determine suitable nesting and roosting habitat for the northern spotted owl.

- For each year of vegetation removal or construction activity, protocol-level surveys using current approved USFWS protocol will be conducted in all delineated suitable northern spotted owl habitat.
- If nests are found, during initial inundation of the impoundment area, active northern spotted owl nests located within the inundation area will be protected by the placement of floating buoys and signage prohibiting access to the established buffer developed in consultation with DFG and USFS (see measures below).
- It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of northern spotted owl habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Potential mitigation lands containing comparable northern spotted owl habitat have been identified adjacent to the project. Additional discussion of how these lands may be applied as mitigation will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- For each year of vegetation removal or construction activity, protocol-level surveys using current approved USFWS protocol will be conducted in all delineated suitable northern spotted owl habitat.
- If vegetation removal or construction occurs outside of the breeding season (February 1 through August 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- If vegetation removal is to occur between February 1 and August 31, a 660-foot to 0.5-mile buffer will be established around active nests in consultation with DFG, USFS and USFWS. No vegetation removal or construction activity will occur within the established buffer during the limited operating period.

The avoidance and relocation measures for vegetation removal and construction activities and the nest protection measures within the inundation area would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-7 (CP1): Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers** To avoid or minimize impacts on nesting purple martins, the following measures will be implemented:

*Inundation Area* Individual purple martins actively nesting within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated.

*Vegetation Removal and Construction Activities*

- To the extent feasible, all snags in the Pit Arm will be retained. Vegetation will not be removed from the Pit Arm from Painter Creek north, with exception of Arbuckle Campground, which will recruit snags from trees that will die from inundation.
- If vegetation removal or construction occurs outside of the breeding season (April 1 through August 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- If proposed vegetation removal and construction activities are to take place on the Pit Arm from April 1 through August 31, a qualified biologist will conduct a protocol-level survey to locate active nests. The survey will be conducted no more than 2 weeks before construction begins. If an active nest is found, a qualified biologist, in consultation with DFG, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with DFG, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.
- A monitoring and adaptive management plan will be developed to explore and develop options to provide additional nesting habitat for the purple martin (e.g., artificial nesting structures, girdling trees to develop snags).

Implementation of this mitigation measure will reduce impacts on individual purple martins nesting during the implementation of the project; however, these measures would not protect purple martins actively nesting within the impoundment area when the lake reaches maximum inundation and might not fully mitigate the loss of snags used for nesting. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-8 (CP1): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers** To avoid or minimize impacts on nesting willow flycatchers, Vaux's swifts, yellow warblers, and yellow-breasted chats, the following measures will be implemented:

*Inundation Area* Individuals actively nesting within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated.

It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of willow flycatcher, Vaux's swift, yellow warbler, and yellow-breasted chat habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable willow flycatcher, Vaux's swift, yellow warbler, and yellow-breasted chat habitat have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS.

#### *Vegetation Removal and Construction Activities*

- To the extent feasible, projects planned in relocation areas will be designed to avoid riparian habitat.
- To the extent feasible, construction activities will be avoided within riparian habitat and snags suitable for Vaux's swift nesting.
- If vegetation removal or construction occurs outside of the breeding season (April 1 through August 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- If proposed vegetation removal and construction activities are to occur within 250 feet of suitable habitat for willow flycatchers, Vaux's swifts, yellow warblers, and yellow-breasted chats between April 1 and August 31, a qualified biologist will conduct a preconstruction survey no more than 2 weeks before construction activities begin. If an active nest is found, a qualified biologist, in consultation with DFG, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with DFG, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.
- If willow flycatchers are detected during the preconstruction survey, protocol-level surveys using a current approved USFWS protocol will be conducted to locate and monitor active nests.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities; however, these measures would not protect individuals actively nesting within the impoundment area when the lake reaches maximum inundation. Also, the

effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-9 (CP1): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, and Great Blue Heron and Establish Buffers** To avoid or minimize impacts on nesting special-status raptors, the following measures will be implemented:

*Inundation Area* It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of habitat of these species. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable habitat have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- To the extent feasible, construction activities will be avoided within riparian habitat.
- If vegetation removal or construction takes place outside of the breeding season (February 1 through August 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- If proposed vegetation removal and construction activities are to take place within 0.25 mile of suitable habitat for the long-eared owl, northern goshawk, Cooper's hawk, and great blue heron between February 1 and August 31, a qualified biologist will conduct a preconstruction survey no more than 2 weeks before construction activities begin. Protocol-level surveys will be conducted in suitable goshawk habitat.
- If vegetation removal is to occur between February 1 and August 31, a construction-free buffer will be established around active nests in consultation with DFG and USFS. No vegetation removal or construction activity will occur within the established buffer during the limited operating period.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot

be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-10 (CP1): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Surveys for the Pacific Fisher and Establish Buffers** To avoid or minimize impacts on Pacific fisher natal dens, the following measures will be implemented:

*Inundation Area* Pacific fisher natal dens within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. However, female fishers often move young to alternate natal dens if threatened or disturbed.

It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of Pacific fisher habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable habitat and where Pacific fishers are known to occur have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- If vegetation removal or construction occurs outside of the breeding season (February 1 through May 1), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- If proposed vegetation removal and construction activities are to occur in suitable habitat for the Pacific fisher between February 1 and May 1, a qualified biologist will conduct a preconstruction survey for potential natal or maternity den trees no more than 2 weeks before construction activities begin. If an active den is found, a qualified biologist, in consultation with USFS, BLM (if on BLM land), and USFWS, will determine a construction-free buffer zone to be established around the den until the mother and young have dispersed. In consultation with USFWS, a plan will be developed to monitor whether construction activity is disturbing the reproductive success and to determine when the young have dispersed.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-11 (CP1): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for Special-Status Bats, American Marten, and Ringtails and Establish Buffers** To avoid or minimize impacts on bats and ringtails, the following measures will be implemented:

*Inundation Area* Maternity colonies or natal dens within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. However, female western red bats, American martens, and ringtails would be expected to move young to alternate locations if threatened or disturbed.

It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of habitat of these species. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable habitat where these species are known to be found have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation and at what ratios will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- A preconstruction survey conducted by a qualified bat biologist for roosting bats will be conducted prior to the inundation or removal of any bridges, buildings, known caves or trees 12 inches or larger in diameter at breast height. If no active roosts are found, then no further action will be warranted. If a maternity roost is present, in consultation with DFG, a qualified bat biologist will determine the extent of construction-free zones around active nurseries. If either a maternity roost or a hibernacula is present, either of the following measures will be implemented.

To the extent feasible, the project will be redesigned to avoid the loss of the maternity or hibernacula roost.

- If the project cannot be redesigned, removal of the occupied tree or structure should begin before maternity colonies form (i.e., prior to March 1) or after young are volant (flying) (i.e., after July 31). The established disturbance-free buffer will be observed during the maternity roost season (March 1 through July 31).
- If a nonbreeding bat hibernacula is found in a structure or tree scheduled for removal, the individuals will be safely evicted, under the direction of a qualified bat biologist (as determined by a memorandum of understanding with DFG), by opening the roosting area to allow air flow through the cavity. Removal of the tree or structure will follow

not before the following day (i.e., there should be at least 1 night between initial disturbance for air flow and the demolition). This action will allow bats to leave during dark hours, thus increasing their chance of finding new roosts with a minimum of potential predation during daylight. Trees with roosts that need to be removed should first be disturbed at dusk, just prior to removal that same evening, to allow bats to escape at night.

- For the American marten and ringtail, if vegetation removal or construction occurs outside of the breeding season (February 1 through May 1), no further mitigation is necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- If proposed vegetation removal and construction activities are to occur in suitable habitat for the American marten and ringtail between February 1 and May 1, a qualified biologist will conduct a preconstruction survey for potential natal or maternity den trees no more than 2 weeks before construction activities begin. If an active den is found, a qualified biologist, in consultation with DFG and USFS, will determine a construction-free buffer zone to be established around the den until the mother and young have dispersed. In consultation with DFG and USFS, a plan will be developed to monitor whether construction activity is disturbing the reproductive success and to determine when the young have dispersed.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the loss of some individuals from inundation cannot be mitigated. Also, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-12 (CP1): Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks** To avoid or minimize impacts on special-status terrestrial mollusks, the following measures will be implemented:

*Inundated Area* It is infeasible to quantify the loss of individuals in the impoundment area. The loss of individuals and loss of limestone habitat (for Shasta and Wintu sideband snails) cannot be mitigated. Suitable limestone habitat will be quantified. It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of the habitat of these species. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable special-status habitat have been identified adjacent to the project. Shasta sideband, Shasta chaparral, and Shasta hesperian snails have been found at this site. Additional discussion of how these lands could be applied as mitigation and at what ratios will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- When feasible, use of heavy equipment and excavation in limestone substrates and riparian or mesic habitats will be avoided.
- Guidelines provided in *Management Recommendations for Survey and Manage Terrestrial Mollusks* (Burke et al. 1999) will be applied.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the loss of some individuals from inundation cannot be mitigated. Also, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-13 (CP1): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat** It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of wildlife habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Potential mitigation lands containing comparable habitat and where these species are known to occur have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation will be presented in the FEIS. However, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-14 (CP1): Conduct Preconstruction Surveys for Other Nesting Raptors and Migratory Birds and Establish Buffers** To avoid or minimize impacts on nesting raptors and migratory birds, the following measures will be implemented:

*Inundation Area* Individuals actively nesting within the impoundment area could be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. However, tree-nesting species might fledge prior to loss of the nest, because it is anticipated that the structure will remain through the duration of the breeding season.

It is anticipated that mitigation lands will be acquired and placed in conservation easements to mitigate for the loss of the habitat of these species.

Additionally, opportunities for restoration and enhancement of habitat will be explored and defined.

Potential mitigation lands containing comparable habitat have been identified adjacent to the project. Additional discussion of how these lands could be applied as mitigation and at what ratios will be presented in the FEIS.

*Vegetation Removal and Construction Activities*

- To the extent feasible, construction activities will be avoided within riparian habitat.
- If vegetation removal or construction occurs outside of the breeding season (February 1 through August 31), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.
- For raptors, if proposed vegetation removal and construction activities are to occur within 0.25 mile of suitable habitat for nesting raptors between February 1 and August 31, a qualified biologist will conduct a preconstruction survey no more than 2 weeks before construction activities begin. If an active nest is found, a qualified biologist, in consultation with DFG, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with DFG, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.

The avoidance and relocation measures for vegetation removal and construction activities would effectively mitigate impacts caused by those activities. However, the loss of some individuals from inundation cannot be mitigated. Also, the effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. This impact, therefore, is considered significant and unavoidable.

**Mitigation Measure Wild-15 (CP1): Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range** Implement Mitigation Measure Wild-13 for loss of critical deer wintering and fawning range. Similar to Mitigation Measure Wild-13 (CP1), this impact is considered significant and unavoidable.

**Mitigation Measure Wild-16 (CP1)** Mitigation has yet to be determined for potential impacts to the California red-legged frog. At this time, no feasible mitigation has been determined. This impact is considered significant and unavoidable.

**Mitigation Measure Wild-17 (CP1): Implement Mitigation Measure Bot-7 (CP1): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area**

Reclamation will implement Mitigation Measure Bot-7 (CP1), “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities,” described in Chapter 12, “Botanical Resources and Wetlands.” Implementation of this mitigation measure would reduce Impact Wild-17 (CP1) to a less than significant level.

**Mitigation Measure Wild-20 (CP1): Implement Mitigation Measure Bot-7 (CP1): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area**

Reclamation will implement Mitigation Measure Bot-7 (CP1), “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities,” described in Chapter 12, “Botanical Resources and Wetlands.” Implementation of this mitigation measure would reduce Impact Wild-20 (CP1) to a less than significant level.

**Mitigation Measure Wild-23 (CP1): Implement Mitigation Measure Bot-7 (CP1): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes**

Reclamation will implement Mitigation Measure Bot-7 (CP1), “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities,” described in Chapter 12, “Botanical Resources and Wetlands.” Implementation of this mitigation measure would reduce Impact Wild-23 (CP1) to a less than significant level.

**Mitigation Measure Wild-26 (CP1): Implement Mitigation Measure Bot-7 (CP1): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta**

Reclamation will implement Mitigation Measure Bot-7 (CP1), “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities,” described in Chapter 12, “Botanical Resources and Wetlands.” Implementation of this mitigation measure would reduce Impact Wild-26 (CP1) to a less than significant level.

**CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability**

No mitigation is needed for Impacts Wild-18 (CP2), Wild-19 (CP2), Wild-21 (CP2), Wild-22 (CP2), Wild-24 (CP2), Wild-25 (CP2), and Wild-27 (CP2). Mitigation is provided below for the remaining impacts of CP2 on wildlife species.

**Mitigation Measure Wild-1 (CP2): Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander** This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Implementation of this mitigation measure will reduce impacts on the Shasta salamander; however, because impacts cannot be fully mitigated, Impact Wild-1 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-2 (CP2): Avoid, Relocate, and Acquire Mitigation Lands for Foothill Yellow-Legged Frog and Tailed Frog** This mitigation measure is identical to Mitigation Measure Wild-2 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-2 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-3 (CP2): Avoid, Relocate, and Acquire Mitigation Lands for Northwestern Pond Turtle** This mitigation measure is identical to Mitigation Measure Wild-3 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-3 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-4 (CP2): Conduct Preconstruction Surveys for the American Peregrine Falcon and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-4 (CP1). Implementation of this mitigation measure will reduce Impact Wild-4 (CP2) to a less than significant level.

**Mitigation Measure Wild-5 (CP2): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-5 (CP1). Implementation of this mitigation measure will reduce impacts on individual bald eagles nesting during the implementation of the project; however, all nest trees in the inundation zone will be lost; therefore, Impact Wild-5 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-6 (CP2): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Northern Spotted Owl and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts on individual northern spotted owls nesting during the implementation of the

project; however, nest trees located within the inundation zone will be lost; therefore, Impact Wild-6 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-7 (CP2): Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-7 (CP1). Implementation of this mitigation measure will reduce impacts on individual purple martins nesting during the implementation of the project; however, these measures might not fully mitigate the loss of snags used for nesting; therefore, Impact Wild-7 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-8 (CP2): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-8 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-8 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-9 (CP2): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, and Great Blue Heron and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-9 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-10 (CP2): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Pacific Fisher and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-10 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-10 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-11 (CP2): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for Special-Status Bats, American Marten, and Ringtails and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-11 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-11 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-12 (CP2): Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks** This mitigation measure is identical to Mitigation Measure Wild-12 (CP1). Implementation of this mitigation measure will reduce impacts on special-status

terrestrial mollusks; however, because impacts cannot be fully mitigated, Impact Wild-12 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-13 (CP2): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat** This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-13 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-14 (CP2): Conduct Preconstruction Survey for Other Nesting Raptors and Migratory Birds and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-14 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-14 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-15 (CP2): Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range** This mitigation measure is identical to Mitigation Measure Wild-15 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP2) is considered significant and unavoidable.

**Mitigation Measure Wild-16 (CP2)** Mitigation has yet to be determined for potential impacts to the California red-legged frog. At this time, no feasible mitigation has been determined. This impact is considered significant and unavoidable.

**Mitigation Measure Wild-17 (CP2): Implement Mitigation Measure Bot-7 (CP2): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area** This mitigation measure is identical to Mitigation Measure Bot-7 (CP2). Implementation of this mitigation measure would reduce Impact Wild-17 (CP2) to a less than significant level.

**Mitigation Measure Wild-20 (CP2): Implement Mitigation Measure Bot-7 (CP2): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area** This mitigation measure is identical to Mitigation Measure Bot-7 (CP2). Implementation of this mitigation measure would reduce Impact Wild-20 (CP2) to a less than significant level.

**Mitigation Measure Wild-23 (CP2): Implement Mitigation Measure Bot-7 (CP2): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes** This mitigation measure is identical to Mitigation Measure Bot-7 (CP2). Implementation of this mitigation measure would reduce Impact Wild-23 (CP2) to a less than significant level.

**Mitigation Measure Wild-26 (CP2): Implement Mitigation Measure Bot-7 (CP2): Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta** This mitigation measure is identical to Mitigation Measure Bot-7 (CP2). Implementation of this mitigation measure would reduce Impact Wild-26 (CP2) to a less than significant level.

**CP3 – 18.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
No mitigation is needed for Impacts Wild-18 (CP3), Wild-19 (CP3), Wild-21 (CP3), Wild-22 (CP3), Wild-24 (CP3), Wild-25 (CP3), and Wild-27 (CP3). Mitigation is provided below for the remaining impacts of CP3 on wildlife species.

**Mitigation Measure Wild-1 (CP3): Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander** This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Implementation of this mitigation measure will reduce impacts on the Shasta salamander; however, because impacts cannot be fully mitigated, Impact Wild-1 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-2 (CP3): Avoid, Relocate, and Acquire Mitigation Lands for Foothill Yellow-Legged Frog and Tailed Frog** This mitigation measure is identical to Mitigation Measure Wild-2 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-2 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-3 (CP3): Avoid, Relocate, and Acquire Mitigation Lands for Northwestern Pond Turtle** This mitigation measure is identical to Mitigation Measure Wild-3 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-3 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-4 (CP3): Conduct Preconstruction Surveys for the American Peregrine Falcon and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-4 (CP1). Implementation of

this mitigation measure will reduce Impact Wild-4 (CP3) to a less than significant level.

**Mitigation Measure Wild-5 (CP3): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-5 (CP1). Implementation of this mitigation measure will reduce impacts on individual bald eagles nesting during the implementation of the project; however, all nest trees in the inundation zone will be lost; therefore, Impact Wild-5 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-6 (CP3): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Northern Spotted Owl and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts on individual northern spotted owls nesting during the implementation of the project; however, nest trees located within the inundation zone will be lost; therefore, Impact Wild-6 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-7 (CP3): Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-7 (CP1). Implementation of this mitigation measure will reduce impacts on individual purple martins nesting during the implementation of the project; however, these measures might not fully mitigate the loss of snags used for nesting; therefore, Impact Wild-7 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-8 (CP3): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-8 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-8 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-9 (CP3): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, and Great Blue Heron and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-9 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-10 (CP3): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Pacific Fisher and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-10 (CP1). Implementation of this mitigation measure will reduce impacts

to these species; however, because impacts cannot be fully mitigated, Impact Wild-10 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-11 (CP3): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for Special-Status Bats, American Marten, and Ringtails and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-11 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-11 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-12 (CP3): Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks** This mitigation measure is identical to Mitigation Measure Wild-12 (CP1). Implementation of this mitigation measure will reduce impacts on special-status terrestrial mollusks; however, because impacts cannot be fully mitigated, Impact Wild-12 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-13 (CP3): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat** This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-13 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-14 (CP3): Conduct Preconstruction Survey for Other Nesting Raptors and Migratory Birds and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-14 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-14 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-15 (CP3): Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range** This mitigation measure is identical to Mitigation Measure Wild-15 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP3) is considered significant and unavoidable.

**Mitigation Measure Wild-16 (CP3)** Mitigation has yet to be determined for potential impacts to the California red-legged frog. At this time, no feasible mitigation has been determined. This impact is considered significant and unavoidable.

**Mitigation Measure Wild-17 (CP3): Implement Mitigation Measure Bot-7 (CP3) to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area** This mitigation measure is identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-17 (CP3) to a less than significant level.

**Mitigation Measure Wild-20 (CP3): Implement Mitigation Measure Bot-7 (CP3) to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area** This mitigation measure is identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-20 (CP3) to a less than significant level.

**Mitigation Measure Wild-23 (CP3): Implement Mitigation Measure Bot-7 (CP3) to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes** This mitigation measure is identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-23 (CP3) to a less than significant level.

**Mitigation Measure Wild-26 (CP3): Implement Mitigation Measure Bot-7 (CP3) to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta** This mitigation measure is identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-26 (CP3) to a less than significant level.

***CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply Reliability***

No mitigation is needed for Impacts Wild-18 (CP4), Wild-19 (CP4), Wild-22 (CP4), Wild-24 (CP4), Wild-25 (CP4), and Wild-27 (CP4). Mitigation is provided below for the remaining impacts of CP4 on wildlife species.

**Mitigation Measure Wild-1 (CP4): Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander** This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Implementation of this mitigation measure will reduce impacts on the Shasta salamander; however, because impacts cannot be fully mitigated, Impact Wild-1 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-2 (CP4): Avoid, Relocate, and Acquire Mitigation Lands for Foothill Yellow-Legged Frog and Tailed Frog** This mitigation measure is identical to Mitigation Measure Wild-2 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-2 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-3 (CP4): Avoid, Relocate, and Acquire Mitigation Lands for Northwestern Pond Turtle** This mitigation measure is identical to Mitigation Measure Wild-3 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-3 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-4 (CP4): Conduct Preconstruction Surveys for the American Peregrine Falcon and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-4 (CP1). Implementation of this mitigation measure will reduce Impact Wild-4 (CP4) to a less than significant level.

**Mitigation Measure Wild-5 (CP4): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-5 (CP1). Implementation of this mitigation measure will reduce impacts on individual bald eagles nesting during the implementation of the project; however, all nest trees in the inundation zone will be lost; therefore, Impact Wild-5 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-6 (CP4): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Northern Spotted Owl and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts on individual northern spotted owls nesting during the implementation of the project; however, nest trees located within the inundation zone will be lost; therefore, Impact Wild-6 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-7 (CP4): Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-7 (CP1). Implementation of this mitigation measure will reduce impacts on individual purple martins nesting during the implementation of the project; however, these measures might not fully mitigate the loss of snags used for nesting; therefore, Impact Wild-7 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-8 (CP4): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-8 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-8 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-9 (CP4): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, and Great Blue Heron and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-9 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-10 (CP4): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Pacific Fisher and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-10 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-10 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-11 (CP4): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for Special-Status Bats, American Marten, and Ringtails and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-11 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-11 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-12 (CP4): Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks** This mitigation measure is identical to Mitigation Measure Wild-12 (CP1). Implementation of this mitigation measure will reduce impacts on special-status terrestrial mollusks; however, because impacts cannot be fully mitigated, Impact Wild-12 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-13 (CP4): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat** This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-13 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-14 (CP4): Conduct Preconstruction Survey for Other Nesting Raptors and Migratory Birds and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-14 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-14 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-15 (CP4): Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range** This mitigation measure is identical to Mitigation Measure Wild-15 (CP1).

Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP4) is considered significant and unavoidable.

**Mitigation Measure Wild-16 (CP4)** Mitigation has yet to be determined for potential impacts to the California red-legged frog. At this time, no feasible mitigation has been determined. This impact is considered significant and unavoidable.

**Mitigation Measure Wild-17 (CP4): Implement Mitigation Measure Bot-7 (CP1) to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area** This mitigation measure is identical to Mitigation Measure Bot-7 (CP1). Implementation of this mitigation measure would reduce Impact Wild-17 (CP4) to a less than significant level.

**Mitigation Measure Wild-20 (CP4): Implement Mitigation Measure Bot-7 (CP1) to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area** This mitigation measure is identical to Mitigation Measure Bot-7 (CP1). Implementation of this mitigation measure would reduce Impact Wild-20 (CP4) to a less than significant level.

**Mitigation Measure Wild-21 (CP4): Conduct Preconstruction Surveys for Elderberry Shrubs, Northwestern Pond Turtle, and Nesting Riparian Raptors and Other Nesting Birds. Avoid Removal or Degradation of Elderberry Shrubs and Avoid Vegetation Removal Near Active Nest Sites** To avoid impacts on valley elderberry longhorn beetle, northwestern pond turtle, and nesting raptors, and other nesting birds, the following measures will be implemented:

*Valley Elderberry Longhorn Beetle:*

- A worker awareness training program for construction personnel will be conducted by a qualified biologist/restoration ecologist before augmentation activities begin. The program will inform all construction personnel about the life history and status of the beetle, the need to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to USFWS within 30 days of the completion of training.
- Elderberry shrubs shall be protected through establishment of a fenced avoidance area. Fencing will be placed at least 20 feet from the dripline of the shrubs where they occur along the access trail. Signs will be posted along the avoidance area. The signs will state: "This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to

prosecution, fines, and imprisonment.” Signs will be readable from a distance of 20 feet and will be maintained during construction activities.

- No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of elderberry shrubs. Roadways and disturbed areas within 100 feet of elderberry shrubs will be watered at least twice a day and as needed to minimize dust emissions.

*Northwestern Pond Turtle:*

- When construction activities are to occur within suitable northwestern pond turtle habitat as defined in Impact Wild-3 (CP1), a qualified biologist will conduct a minimum of one preconstruction survey for northwestern pond turtles and their nests. The survey will be conducted no more than 1 week prior to construction. If a pond turtle nest is found, the biologist will flag the site and determine whether construction activities can avoid impacting the nest. If the nest cannot be avoided, DFG will be contacted for further direction and construction activities in that location will be halted.
- In the event that a pond turtle is observed within the construction limits, the contractor will temporarily halt construction activities until a qualified biologist has moved the turtle to a safe location within suitable habitat outside of the construction limits.

*Birds:*

- For each year of vegetation removal for gravel augmentation activity, all active bald eagle nests will be located and mapped using the National Bald Eagle Management Guidelines (USFWS 2007).
- In consultation with DFG and USFS, a 660-foot to 0.5-mile buffer will be established around active nests. Vegetation will be retained and no construction activities will occur within this buffer.
- If proposed vegetation removal would occur between April 1 and August 31, a qualified biologist will conduct a preconstruction survey for nesting special-status birds no more than 2 weeks before construction activities begin. If an active nest is found, a qualified biologist, in consultation with DFG, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with DFG, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.

The avoidance measures for elderberry and the nest protection measures within the gravel augmentation sites would effectively mitigate impacts on riparian-associated special-status wildlife species to a less than significant level.

**Mitigation Measure Wild-23 (CP4): Implement Mitigation Measure Bot-7 (CP1) to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes** This mitigation measure is identical to Mitigation Measure Bot-7 (CP1). Implementation of this mitigation measure would reduce Impact Wild-23 (CP4) to a less than significant level.

**Mitigation Measure Wild-26 (CP4): Implement Mitigation Measure Bot-7 (CP1) to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta** This mitigation measure is identical to Mitigation Measure Bot-7 (CP1). Implementation of this mitigation measure would reduce Impact Wild-26 (CP4) to a less than significant level.

***CP5 – 18.5-Foot Dam Raise, Combination Plan***

No mitigation is needed for Wild-18 (CP5), Wild-19 (CP5), Wild-24 (CP5), Wild-25 (CP5), and Wild-27 (CP5). Mitigation is provided below for the remaining impacts of CP5 on wildlife species.

**Mitigation Measure Wild-1 (CP5): Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander** This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Implementation of this mitigation measure will reduce impacts on the Shasta salamander; however, because impacts cannot be fully mitigated, Impact Wild-1 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-2 (CP5): Avoid, Relocate, and Acquire Mitigation Lands for Foothill Yellow-Legged Frog and Tailed Frog** This mitigation measure is identical to Mitigation Measure Wild-2 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-2 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-3 (CP5): Avoid, Relocate, and Acquire Mitigation Lands for Northwestern Pond Turtle** This mitigation measure is identical to Mitigation Measure Wild-3 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-3 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-4 (CP5): Conduct Preconstruction Surveys for the American Peregrine Falcon and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-4 (CP1). Implementation of

this mitigation measure will reduce Impact Wild-4 (CP5) to a less than significant level.

**Mitigation Measure Wild-5 (CP5): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Bald Eagle and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-5 (CP1). Implementation of this mitigation measure will reduce impacts on individual bald eagles nesting during the implementation of the project; however, all nest trees in the inundation zone will be lost; therefore, Impact Wild-5 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-6 (CP5): Acquire and Preserve Mitigation Lands; Conduct Protocol-Level Surveys for the Northern Spotted Owl and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts on individual northern spotted owls nesting during the implementation of the project; however, nest trees located within the inundation zone will be lost; therefore, Impact Wild-6 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-7 (CP5): Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-7 (CP1). Implementation of this mitigation measure will reduce impacts on individual purple martins nesting during the implementation of the project; however, these measures might not fully mitigate the loss of snags used for nesting; therefore, Impact Wild-7 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-8 (CP5): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey for the Willow Flycatcher, Vaux's Swift, Yellow Warbler, and Yellow-Breasted Chat and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-8 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-8 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-9 (CP5): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, and Great Blue Heron and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-9 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-10 (CP5): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Pacific Fisher and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-10 (CP1). Implementation of this mitigation measure will reduce impacts

to these species; however, because impacts cannot be fully mitigated, Impact Wild-10 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-11 (CP5): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for Special-Status Bats, American Marten, and Ringtails and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-11 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-11 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-12 (CP5): Avoid Suitable Habitat; Acquire and Preserve Mitigation Lands for Special-Status Terrestrial Mollusks** This mitigation measure is identical to Mitigation Measure Wild-12 (CP1). Implementation of this mitigation measure will reduce impacts on special-status terrestrial mollusks; however, because impacts cannot be fully mitigated, Impact Wild-12 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-13 (CP5): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat** This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-13 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-14 (CP5): Conduct Preconstruction Survey for Other Nesting Raptors and Migratory Birds and Establish Buffers** This mitigation measure is identical to Mitigation Measure Wild-14 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-14 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-15 (CP5): Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range** This mitigation measure is identical to Mitigation Measure Wild-15 (CP1). Implementation of this mitigation measure will reduce impacts to these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP5) is considered significant and unavoidable.

**Mitigation Measure Wild-16 (CP5)** Mitigation has yet to be determined for potential impacts to the California red-legged frog. At this time, no feasible mitigation has been determined. This impact is considered significant and unavoidable.

**Mitigation Measure Wild-17 (CP5): Implement Mitigation Measure Bot-7 (CP3) to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area** This mitigation measure is

identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-17 (CP5) to a less than significant level.

**Mitigation Measure Wild-20 (CP5): Implement Mitigation Measure Bot-7 (CP3) to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area** This mitigation measure is identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-20 (CP5) to a less than significant level.

**Mitigation Measure Wild-21 (CP5): Implement Mitigation Measure Wild-21 (CP4) to Reduce Impacts on Riparian-Associated Special-Status Wildlife Species During Implementation of the Gravel Augmentation Program** This mitigation measure is identical to Mitigation Measure Wild-21 (CP4). Implementation of this mitigation measure would reduce Impact Wild-21 (CP5) to a less than significant level.

**Mitigation Measure Wild-22 (CP5): Conduct Preconstruction Surveys for Elderberry Shrubs, Northwestern Pond Turtle, and Nesting Riparian Raptors and Other Nesting Birds. Avoid Removal or Degradation of Elderberry Shrubs and Avoid Vegetation Removal near Active Nest Sites** To avoid impacts on valley elderberry longhorn beetle, northwestern pond turtle, nesting raptors, and other nesting birds, the following measures will be implemented as part of the Reading Island project:

*Valley Elderberry Longhorn Beetle:*

- Prior to implementing any construction activities associated with Reading Island restoration plans, including constructing recreational facilities, a survey shall be conducted to identify and map all elderberry shrubs.
- New roads, trails, and recreational facilities shall be constructed a minimum of 100 feet from elderberry shrubs.
- Removal and disturbance of elderberry shrubs shall be avoided, to the extent feasible, during construction activities to restore connectivity between the Sacramento River and Anderson Slough and during rehabilitation of the boat ramp.
- A worker awareness training program for construction personnel will be conducted by a qualified biologist / restoration ecologist before gravel augmentation activities begin. The program will inform all construction personnel about the life history and status of the beetle, the need to avoid damaging the elderberry plants, and the possible penalties for not complying with these requirements. Written documentation of the training will be submitted to USFWS within 30 days of the completion of training.

- Elderberry shrubs shall be protected through establishment of a fenced avoidance area. Fencing will be placed at least 20 feet from the dripline of the shrubs. Signs will be posted along the avoidance area. The signs will state: “This area is the habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.” Signs will be readable from a distance of 20 feet and will be maintained during construction activities.
- No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant will be used within 100 feet of elderberry shrubs. Roadways and disturbed areas within 100 feet of elderberry shrubs will be watered at least twice a day and as needed to minimize dust emissions.
- If removal of elderberry shrubs during construction of the river connection is unavoidable, Reclamation shall consult with USFWS. No project construction shall proceed in areas potentially containing valley elderberry longhorn beetle until a BO has been issued by USFWS, and Reclamation has abided by all pertinent conditions in the BO relating to the proposed construction. Relocation of existing elderberry shrubs and planting of new elderberry seedlings shall be implemented on a no-net-loss basis. Compensatory mitigation for elderberry shrubs that would be removed from their current locations would be developed in consultation with USFWS during the Section 7 consultation process. Compensatory mitigation may include planting replacement elderberry seedlings or cuttings and associated native plants within BLM managed public lands on Reading Island or purchasing credits at an approved mitigation bank, or a combination thereof. Relocated and replacement shrubs and associated native plantings shall be placed in conservation areas providing a minimum of 1,800 square feet per transplanted shrub.

*Northwestern Pond Turtle:*

This mitigation measure is identical to Mitigation Measure Wild-21 (CP4) for northwestern pond turtles.

*Birds:*

- For each year of vegetation removal for Reading Island restoration and recreation construction, all active bald eagle nests will be located and mapped using the National Bald Eagle Management Guidelines (USFWS 2007b).
- In consultation with DFG and USFS, a 660-foot to 0.5-mile buffer will be established around active nests. Vegetation will be retained and no construction activities will occur within this buffer.

- If proposed vegetation removal would occur between April 1 and August 31, a qualified biologist will conduct a preconstruction survey for nesting special-status birds no more than 2 weeks before construction activities begin. If an active nest is found, a qualified biologist, in consultation with DFG, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with DFG, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.

The avoidance measures for elderberry and the nest protection measures within the Reading Island construction sites would effectively mitigate impacts on riparian-associated special-status wildlife species to a less than significant level.

**Mitigation Measure Wild-23 (CP5): Implement Mitigation Measure Bot-7 (CP3) to Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes** This mitigation measure is identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-23 (CP5) to a less than significant level.

**Mitigation Measure Wild-26 (CP5): Implement Mitigation Measure Bot-7 (CP3) to Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta** This mitigation measure is identical to Mitigation Measure Bot-7 (CP3). Implementation of this mitigation measure would reduce Impact Wild-26 (CP5) to a less than significant level.

### 13.3.6 Cumulative Effects

A large number of past actions have occurred in the study area. These past actions have substantially degraded wildlife resources within the primary and extended study areas. This degradation is indicated by the number of species that have been listed as threatened or endangered under the CESA and ESA, or considered species of special concern by DFG.

Past actions have caused these effects by converting habitat to developed or agricultural land uses, altering biotic interactions or physical processes, and damaging or causing mortality from human activities (e.g., vegetation removal during road, levee, or utility maintenance).

Flood control and water supply projects have also altered physical processes within the study area's remaining natural vegetation. Levees have isolated large areas of floodplain from rivers and streams throughout the study area, reducing the frequency of inundation and sediment scour and deposition and altering the extent and quality of riparian habitats. By reducing the magnitude and frequency of winter and spring peak flows and increasing the volume of summer and fall flows, water storage projects have altered the riparian habitats

that were not isolated from rivers by levees. In particular, the operation of Shasta Dam (beginning in 1945) and the other major reservoirs of the CVP and SWP has strongly affected aquatic and riparian communities along the Sacramento River, other Central Valley rivers, and in the Delta (Fremier 2003; TNC et al. 2008).

The effects of climate change on operations at Shasta Lake could potentially affect wildlife both at the lake and downstream. As described in the Climate Change Projection Appendix, climate change could result in higher reservoir releases in the future because of an increase in winter and early-spring inflow into the lake from high-intensity storm events. The change in reservoir releases could be necessary to manage for flood events resulting from these potentially larger storms. The potential increase in releases from the reservoir could lead to long-term changes in flooding frequency, downstream habitat for wildlife, and water temperatures which could affect habitat along the Sacramento River and in the Delta. Climate change is also expected to result in changes to conditions for agricultural land and forest land, which are both habitat types. See Chapter 10, "Agriculture and Important Farmland," for a detailed discussion of effects on these habitat types.

#### ***Shasta Lake and Vicinity***

The construction of Shasta Dam and the subsequent flooding of the area now known as Shasta Lake affected botanical and wildlife resources endemic to the region. For example, based on population locations, Shasta snow-wreath populations may have connected at the confluence of the Pit River, Squaw Creek, McCloud River, and Sacramento River prior to inundation. The creation of Shasta Lake fragmented this species habitat and populations. As a result, these populations are more vulnerable to extirpation.

As described in Section 13.3, without mitigation, CP1 through CP5 could cause potentially significant effects on wildlife habitats and special-status wildlife species in the primary and extended study areas. These effects could be caused by project construction activities; increased elevations of the water surface of Shasta Lake; and alteration of the flow regime of the Sacramento River and associated geomorphic processes, and thus of riparian vegetation. Although causing similar effects, CP1 through CP5 differ in the magnitude of their effects. At Shasta Lake and its vicinity, these potential adverse effects would be similar for all alternatives, but differ with the height of the dam raise: the effects of CP2 would be greater than CP1, but less than CP3 through CP5 (which would be identical). Along the upper Sacramento River and in the extended study area, potential adverse effects would be the result of altered flow regimes and would differ with both the height of the dam raise and operation of the dam: the effects of CP2 would be greater than CP1 and CP4 (which would be identical), but less than CP3 and CP5 (which also would have identical effects).

At Shasta Lake and vicinity, CP1 through CP5 would cause the take and loss of habitat for numerous species including Shasta salamander, foothill yellow-

legged frog, tailed frog, Northwestern pond turtle, American peregrine falcon, bald eagle, northern spotted owl, purple martin, Vaux's swift, yellow warbler, yellow-breasted chat, long-eared owl, northern goshawk, Cooper's hawk, osprey, Pacific fisher, and other special-status species. The wildlife mitigation measures described in Section 13.3.5 would reduce impacts on wildlife resources, although the adverse effects of CP1 through CP5 caused by construction activities and inundation would not be eliminated. Because the overall effect of past actions on these species has been cumulatively significant, and the likely additional effects of reasonably foreseeable future actions on wildlife habitat at Shasta Lake and in its vicinity, the adverse effects under CP1 through CP5 would cause a cumulatively considerable incremental contribution to the significant cumulative impact on wildlife.

***Upper Sacramento River and Extended Study Area***

**CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability** As described in Chapter 2, “Alternatives” without mitigation, CP1 could cause potentially significant effects on vegetation, wildlife habitats, and special-status wildlife species in the primary and extended study areas. These effects could be caused by alteration of the flow regime of the Sacramento River and associated geomorphic processes in the primary study area or the extended study area, or both. Given major past alterations to vegetation and wildlife habitat along the Sacramento River, the contributing adverse effects from CP1 would be cumulatively considerable. With implementation of Mitigation Measure Bot-7, “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities” (see Chapter 12, “Botanical Resources and Wetlands”), adverse effects from CP1 would no longer result in a cumulatively considerable incremental contribution to significant cumulative effects on these resources.

As stated previously, effects of climate change on operations at Shasta Lake could include a higher frequency of high flow events, potentially resulting in changes to downstream habitats. Potentially significant effects on vegetation, wildlife habitats, and special-status wildlife species that would occur with implementation of CP1 could contribute to potentially significant affects of climate change on habitat acreages and distribution. However, with implementation of the mitigation measures listed above to reduce project-related impacts of CP1, CP1 would not make a considerable contribution to a potentially significant cumulative effect.

**CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability** The cumulative effects of CP2 would be similar to those of CP1, but greater in magnitude. Given major past alterations to vegetation and wildlife habitat along the Sacramento River, the contributing adverse effects from CP2 would be cumulatively considerable. With implementation of Mitigation Measure Bot-7, “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered

Flow Regimes on Riparian and Wetland Communities” (see Chapter 12, “Botanical Resources and Wetlands”), adverse effects from CP2 would no longer result in a cumulatively considerable incremental contribution to significant cumulative effects on these resources.

As stated previously, effects of climate change on operations at Shasta Lake could include a higher frequency of high flow events, potentially resulting in changes to downstream habitats. Potentially significant effects on vegetation, wildlife habitats, and special-status wildlife species that would occur with implementation of CP2 could contribute to potentially significant affects of climate change on habitat acreages and distribution. However, with implementation of the mitigation measures listed above to reduce project-related impacts of CP2, CP2 would not make a considerable contribution to a potentially significant cumulative effect.

**CP3 – 18.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**

The cumulative effects of CP3 would be similar to those of CP1, but greater in magnitude. Given major past alterations to vegetation and wildlife habitat along the Sacramento River, the contributing adverse effects from CP3 would be cumulatively considerable. With implementation of Mitigation Measure Bot-7, “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities” (see Chapter 12, “Botanical Resources and Wetlands”), adverse effects from CP3 would no longer result in a cumulatively considerable incremental contribution to significant cumulative effects on these resources.

As stated previously, effects of climate change on operations at Shasta Lake could include a higher frequency of high flow events, potentially resulting in changes to downstream habitats. Potentially significant effects on vegetation, wildlife habitats, and special-status wildlife species that would occur with implementation of CP3 could contribute to potentially significant affects of climate change on habitat acreages and distribution. However, with implementation of the mitigation measures listed above to reduce project-related impacts of CP3, CP3 would not make a considerable contribution to a potentially significant cumulative effect.

**CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply**

**Reliability** The cumulative effects of CP4 would be similar to those of CP1, but greater in magnitude. Given major past alterations to vegetation and wildlife habitat along the Sacramento River, the contributing adverse effects from CP4 would be cumulatively considerable. With implementation of Mitigation Measure Bot-7, “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities” (see Chapter 12, “Botanical Resources and Wetlands”), adverse effects from CP4 would no

longer result in a cumulatively considerable incremental contribution to significant cumulative effects on these resources.

As stated previously, effects of climate change on operations at Shasta Lake could include a higher frequency of high flow events, potentially resulting in changes to downstream habitats. Potentially significant effects on vegetation, wildlife habitats, and special-status wildlife species that would occur with implementation of CP4 could contribute to potentially significant affects of climate change on habitat acreages and distribution. However, with implementation of the mitigation measures listed above to reduce project-related impacts of CP4, CP4 would not make a considerable contribution to a potentially significant cumulative effect.

**CP5 – 18.5-Foot Dam Raise, Combination Plan** The cumulative effects of CP5 would be similar to those of CP1, but greater in magnitude. Given major past alterations to vegetation and wildlife habitat along the Sacramento River, the contributing adverse effects from CP5 would be cumulatively considerable. With implementation of Mitigation Measure Bot-7, “Develop and Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan to Avoid and Compensate for the Impact of Altered Flow Regimes on Riparian and Wetland Communities” (see Chapter 12, “Botanical Resources and Wetlands”), adverse effects from CP5 would no longer result in a cumulatively considerable incremental contribution to significant cumulative effects on these resources.

As stated previously, effects of climate change on operations at Shasta Lake could include a higher frequency of high flow events, potentially resulting in changes to downstream habitats. Potentially significant effects on vegetation, wildlife habitats, and special-status wildlife species that would occur with implementation of CP5 could contribute to potentially significant affects of climate change on habitat acreages and distribution. However, with implementation of the mitigation measures listed above to reduce project-related impacts of CP5, CP5 would not make a considerable contribution to a potentially significant cumulative effect.