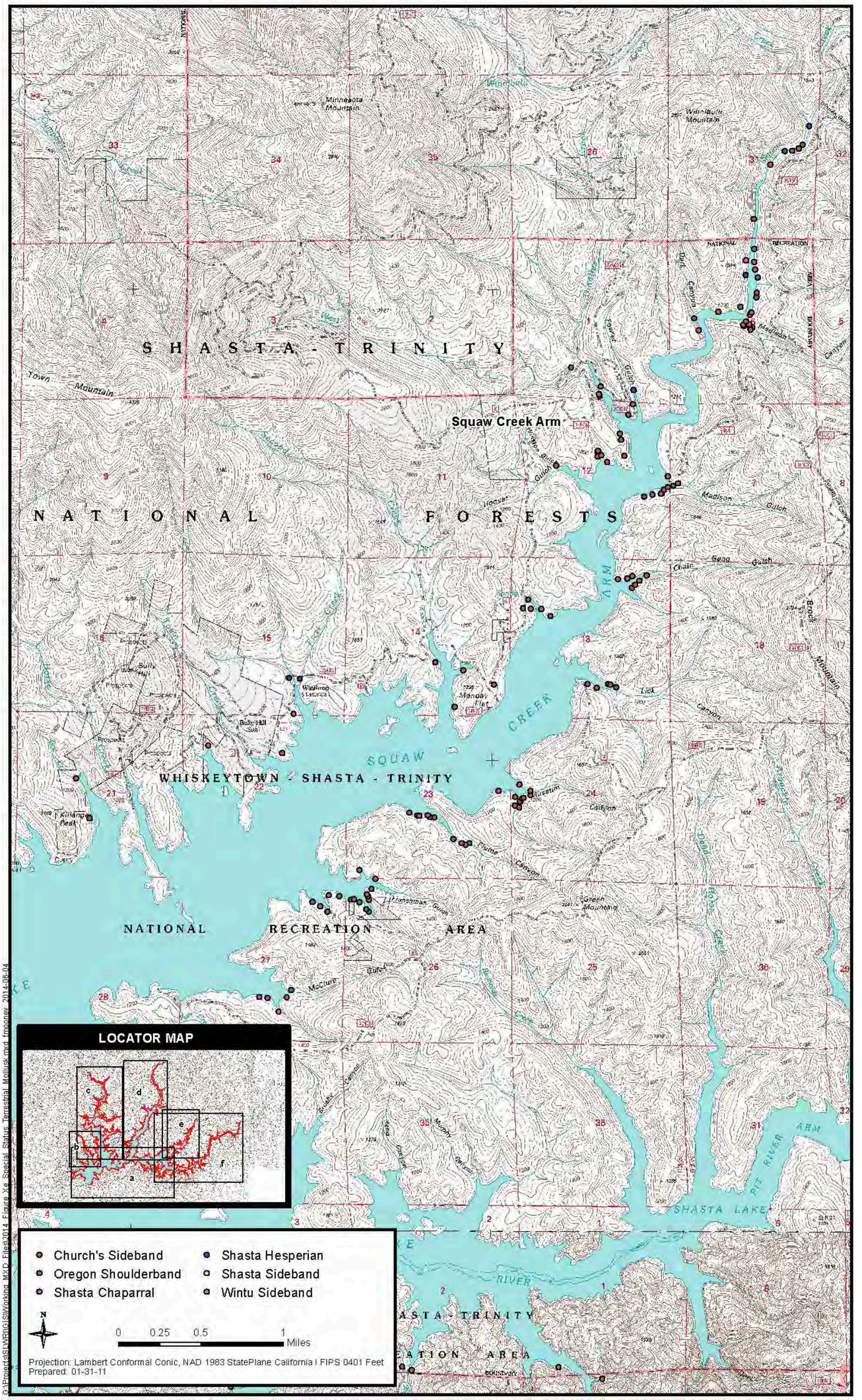

Figure 13-6e. Special-Status Wildlife Occurring in Shasta Lake and Vicinity

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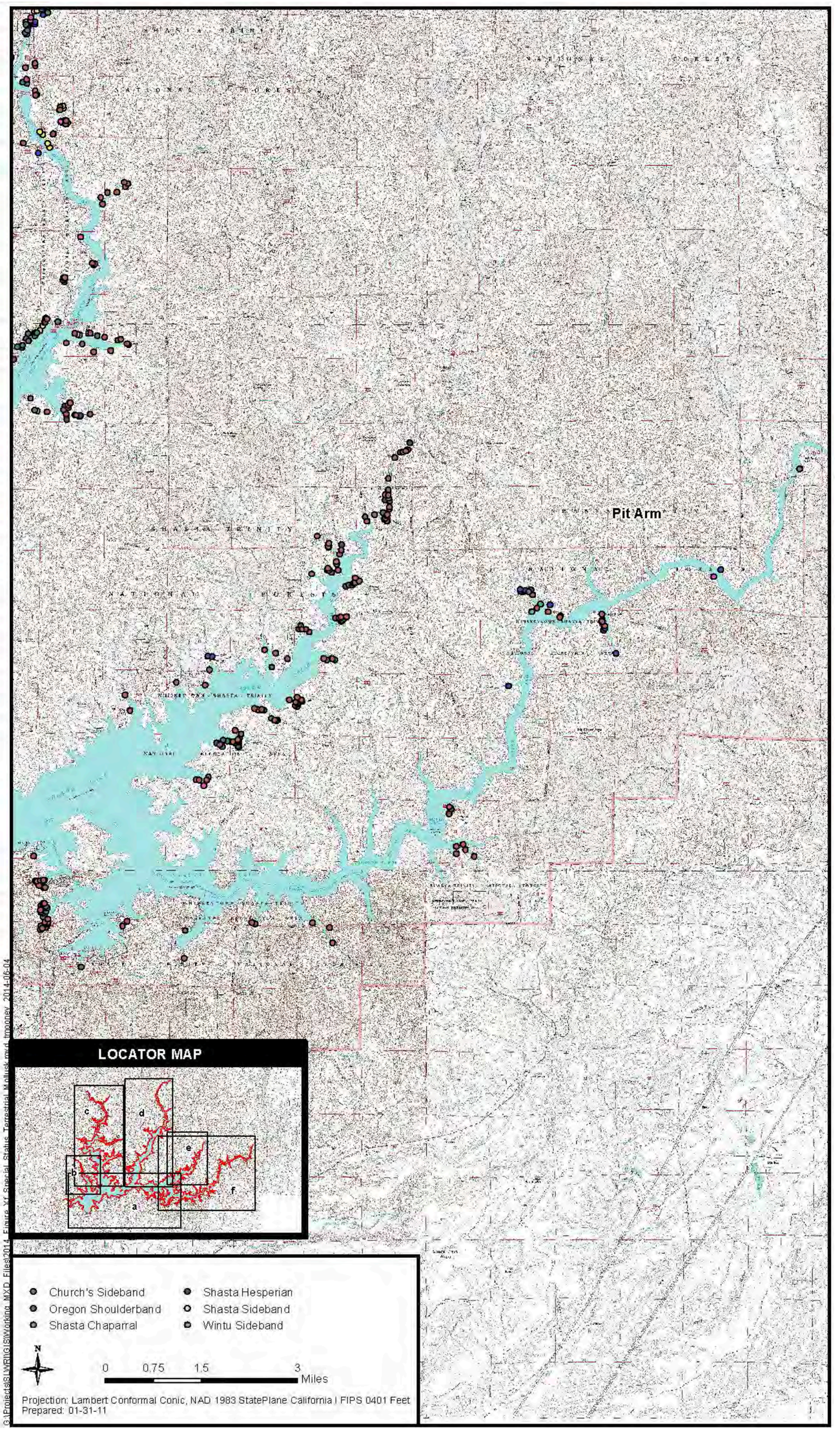

Figure 13-6f. Special-Status Terrestrial Mollusks Occurring in Shasta Lake and Vicinity

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These surveys also provided a basic understanding of purple martin ecology in the Shasta Lake and vicinity portion of the primary study area. Purple martin monitoring has continued through 2013, providing additional information on species distribution and habitat use (Figures 13-5d through 13-5f). The nesting purple martin population has totaled 18, 21, 24, 28, 42,27, and 17 pairs from 2007 through 2013, respectively. Most nest sites occur in flooded snags located in the reservoir; however, monitoring results show an increase in use of upland nest sites. Limited historical information from purple martin surveys information from 1978 to 2001 showed 14 to 19 nesting pairs at Shasta Lake. During the monitoring period, the nesting purple martin population showed small increases from 2007 through 2010, a large increase in 2011, and then generally returned to 2009 and 2010 levels in 2012. For unknown reasons a marked decrease to 17 pairs occurred in 2013, a population size similar to historic numbers. The 2007 to 2013 monitoring results initially show a stable to increasing population, followed by a decrease and return to more historic levels.

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 13-5a through 13-5f). Forest carnivore surveys conducted during 2007 and 2010 along the McCloud Arm for this project and another unrelated project detected Pacific fisher and found that the species occurs in all areas of the Shasta Lake and vicinity portion of the primary study area. 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 during the forest carnivore surveys.

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 region. Additionally, these findings show Pacific fishers in areas generally (previously) not considered habitat in California, including open second-growth conifer, hardwood–conifer, and hardwood habitats that have extensive chaparral components. Pacific fishers were also detected in forest habitats that were barren or semi-barren 50 to 60 years ago because of historical copper mining and smelting activities, 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 and 2012. In consultation with the 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 was submitted to the USFWS.

Upper Sacramento River (Shasta Dam to Red Bluff)

The following section provides a detailed discussion of wildlife species of concern specific to the potential Sacramento River downstream habitat restorations areas, as well as the wildlife species of concern known to occur or with potential to occur along the Sacramento River throughout the rest of the primary study area.

A list of special-status wildlife species with the potential to occur in the primary study area from Shasta Dam to the Red Bluff Pumping Plant (Table 13-5) was compiled based on habitat suitability and known occurrences within the area covered in the Shasta Dam, Redding, Enterprise, Cottonwood, Balls Ferry, Bend, and Red Bluff East U.S. Geological Survey 7.5-minute quadrangle maps (CNDDB 2012; USFWS 2011). This list also includes species that are identified by USFS as sensitive, or endemic; identified by BLM as sensitive; designated by the NWFP as S&M; or designated as MSCS covered species. 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 13-5. 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 Pumping Plant

Common Name	Scientific Name	Status[1]	Potential for Occurrence
Invertebrates			
Conservancy fairy shrimp	*Branchinecta conservatio*	FE, MSCS	Unlikely to occur. No suitable habitat is present along the river corridor.
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FPD, FT, MSCS	Known to occur. Elderberry shrubs are present within the riparian woodland community along the Sacramento River.
Vernal pool tadpole shrimp Critical Habitat	*Lepidurus packardi*	FE, MSCS	Unlikely to occur. No suitable habitat is present along the river corridor. Critical habitat does not occur within the river corridor.
Vernal pool fairy shrimp Critical Habitat	*Branchinecta lynchi*	FT, MSCS	Unlikely to occur. No suitable habitat is present along the river corridor. Critical habitat does not occur within the river corridor.
Amphibians			
Shasta salamander	*Hydromantes shastae*	CT, BLM S, USFS S	Unlikely to occur. Suitable habitat generally is not found within the river corridor downstream from Shasta Dam.
California red-legged frog	*Rana aurora draytonii*	FT, CSC, MSCS	Could occur along the Sacramento River if suitable habitat is present
Foothill yellow-legged frog	*Rana boylii*	CSC, USFS S, MSCS	Could occur along the Sacramento River if suitable habitat is present
Western spadefoot toad	*Spea hammondii*	CSC, MSCS	Unlikely to occur. No suitable habitat is present along the Sacramento River corridor.
Reptiles			
Giant garter snake	*Thamnophis gigas*	FT, CT, MSCS	Unlikely to occur in the primary study area; however, known to occur in the extended study area.
Western pond turtle	*Actinemys (Clemmys) marmorata*	CSC, USFS S, MSCS	Known to occur. Suitable habitat is present in the primary study area.
Birds			
Cackling goose *(Aleutian Canada goose)*	*Branta hutchinsii leucopareia*	FD, MSCS	Unlikely to occur within the banks of the Sacramento River where flows could be altered.
American peregrine falcon *(nesting)*	*Falco peregrinus anatum*	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)	*Haliaeetus leucocephalus*	FD, CE, CP, USFS S, MSCS	Known to occur along the Sacramento River in the primary study area.
Bank swallow (nesting)	*Riparia riparia*	CT, MSCS	Known to occur along the Sacramento River in the primary study area.
Black-crowned night heron (rookery)	*Nycticorax nycticorax*	BLM S, MSCS	Could nest in trees adjacent to the Sacramento River.

Table 13-5. 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 Pumping Plant (contd.)

Common Name	Scientific Name	Status[1]	Potential for Occurrence
California gull (nesting colony)	*Larus californicus*	MSCS	Not within breeding range. Could occur in the study area during winter or migration.
Cooper's hawk (nesting)	*Accipiter cooperii*	MSCS	Could occur. Suitable nesting and foraging habitat is present in the primary study area.
Double-crested cormorant (rookery)	*Phalacrocorax auritus*	MSCS	Could nest in trees adjacent to the Sacramento River.
Golden eagle	*Aquila chrysaetos*	CP, BLM S, MSCS	No suitable nesting habitat along the Sacramento River. Unlikely to forage along the river corridor.
Great blue heron (rookery)	*Ardea herodius*	MSCS	Could nest in trees adjacent to the Sacramento River.
Great egret (rookery)	*Casmerodius albus*	MSCS	Could nest in trees adjacent to the Sacramento River.
Greater sandhill crane (nesting and wintering)	*Grus canadensis tabida*	CT, CP, MSCS	Unlikely to breed in the primary study area. Unlikely to use the Sacramento River corridor during winter or migration.
Least bittern (nesting)	*Ixobrychus exilis*	CSC, MSCS	Could nest along the Sacramento River if suitable habitat is present.
Lesser sandhill crane (wintering)	*Grus canadensis canadensis*	CSC	Does not breed in California. Unlikely to use the Sacramento River corridor during winter or migration.
Little willow flycatcher (nesting)	*Empidonax traillii brewsteri*	CE, MSCS	Unlikely to breed in the primary study area because of the area's elevation, but may use riparian woodlands during migration.
Loggerhead shrike (nesting)	*Lanius ludovidianus*	CSC	Likely to nest and forage in woodlands and scrub habitats in the primary study area.
Long-billed curlew (nesting)	*Numenius americanus*	MSCS	Does not breed in the primary study area. Unlikely to use the Sacramento River corridor during winter or migration.
Long-eared owl (nesting)	*Asio otus*	CSC, MSCS	Does not nest in lowland Central Valley areas. Unlikely to forage along the Sacramento River corridor where flows would be altered.
Northern harrier (nesting)	*Circus cyaneus*	CSC, MSCS	Likely to occur. Suitable nesting and foraging habitat is present in the primary study area.
Northern spotted owl (nesting) (critical habitat)	*Strix occidentalis caurina*	FT, MSCS	Unlikely to occur along the Sacramento River corridor because of a lack of suitable habitat. Critical habitat does not occur in the primary study area.
Osprey (nesting)	*Pandion haliaetus*	MSCS	Known to nest along the Sacramento River in the primary study area.
Purple martin (nesting)	*Progne subis*	CSC	Could occur. Potentially suitable habitat is present along the Sacramento River corridor.
Short-eared owl (nesting)	*Asio flammeus*	CSC, MSCS	Could occur. Potentially suitable habitat is present in the primary study area.

Table 13-5. 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 Pumping Plant (contd.)

Common Name	Scientific Name	Status[1]	Potential for Occurrence
Snowy egret (rookery)	*Egretta thula*	MSCS	Could nest in trees adjacent to the Sacramento River.
Swainson's hawk (nesting)	*Buteo swainsoni*	CT, USFS S, MSCS	Could occur. Suitable nesting and foraging habitat is present in the primary study area.
Tricolored blackbird (nesting colony)	*Agelaius tricolor*	CSC, MSCS	Could occur. Potentially suitable habitat is present in the primary study area.
Western yellow-billed cuckoo (nesting)	*Coccyzus americanus occidentalis*	FT, CE, USFS S, MSCS	Likely to nest and forage in the primary study area.
Western burrowing owl (burrow sites)	*Athene cunicularia hypugea*	CSC, MSCS	Unlikely to occur along the Sacramento River corridor because of a lack of suitable nesting habitat.
White-tailed kite (nesting)	*Elanus leucurus*	CP, MSCS	Likely to occur. Suitable nesting and foraging habitat is present in the primary study area.
Yellow-breasted chat (nesting)	*Icteria virens*	CSC, MSCS	Likely to nest and forage in the primary study area
Yellow warbler (nesting)	*Setophaga (Dendroica) petechia*	CSC, MSCS	Could nest and forage in the primary study area. Likely to use riparian woodlands during migration.
Pacific fisher	*Martes pennanti*	FC, CSC, USFS S	Unlikely to occur. No suitable habitat is available along the Sacramento River corridor.
Ringtail	*Bassariscus astutus*	CP, MSCS	Could occur. Potentially suitable habitat is present along the Sacramento River corridor.
Pallid bat	*Antrozous pallidus (roosting)*	CSC, BLM S, USFS S	Could occur. Potentially suitable habitat is present in woodland in the primary study area.
Western mastiff bat (roosting)	*Eumops perotis californicus*	CSC, BLM S, MSCS	Unlikely to roost along the Sacramento River corridor because suitable roost sites are lacking.

Key:
BLM = U.S. Department of the Interior, Bureau of Land Management
CE = California endangered
CSC = California Species of Special Concern
CP = California fully protected
CT = California threatened
FC = Federal candidate for listing
FD = Federally delisted
FE = Federally endangered
FPD = Proposed for Federal delisting
FT = Federally listed as threatened
S = Sensitive
MSCS = Multi Species Conservation Strategy
USFS = U.S. Department of Agriculture, Forest Service

Biological Resource Assessments for Potential Sacramento River Downstream Habitat Restoration Areas Reclamation conducted biological resource assessments at each of the six potential Sacramento River downstream habitat restoration areas during 2013. The assessments include botanical surveys for special-status plants and noxious weeds, vegetation and wildlife habitat

mapping, general wildlife surveys, breeding bird surveys, California red-legged frog habitat assessments, and delineations of Waters of the U.S. The biological resource assessment results are included as Attachments 12-17 to the Wildlife Resources Technical Report in the Biological Resources Appendix. Potentially occurring special-status wildlife species at the potential Sacramento River downstream habitat restoration areas are documented in Attachments 18-23 to the Wildlife Resources Technical Report in the Biological Resources Appendix

Table 13-6. Wildlife Species of Concern in the Potential Sacramento River Downstream Habitat Restoration Areas

Common Name	Scientific Name	Status	Potential for Occurrence
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	Potentially occurring in blue elderberry shrubs.
California red-legged frog	*Rana draytonii*	FT, CSC, MSCS m	Potentially occurring at restoration sites or locations in the vicinity with potential breeding habitat present.
Western pond turtle	*Actinemys marmorata*	CSC, USFS S, MSCS m	Potentially occurring in stream or other wetland habitats. Adjacent upland habitats are potential nesting areas.
Double-crested cormorant	*Phalacrocorax auritus*	MSCS m	Commonly occurs in the general vicinity in riverine and adjacent riparian habitats. No known rookery sites at any potential Sacramento River downstream habitat restoration areas.
Great egret	*Ardea alba*	MSCS m	Commonly occurs in the general vicinity in riverine and adjacent riparian habitats. No known rookery sites at any potential Sacramento River downstream habitat restoration areas.
Great blue heron	*Ardea herodias*	MSCS m	Commonly occurs in the general vicinity in riverine and adjacent riparian habitats. No known rookery sites at any potential Sacramento River downstream habitat restoration areas.
Black-crowned night heron	*Nycticorax nycticorax*	MSCS m	Commonly occurs in the general vicinity in riverine and adjacent riparian habitats. No known rookery sites at any potential Sacramento River downstream habitat restoration areas.
Cooper's hawk	*Accipiter cooperi*	MSCS m	Potentially occurring in forested riparian and woodland habitats.
Bald eagle	*Haliaeetus leucocephalus*	FD, FB, CE, CP, USFS S, MSCS m, BLMS	Occurs year-round in the vicinity. Two known nests in the general vicinity of the potential Sacramento River downstream habitat restoration areas
Osprey	*Pandion haliaetus*	MSCS m	Commonly occurs in the general vicinity of the potential Sacramento River downstream habitat restoration areas. No known nests at any potential Sacramento River downstream habitat restoration areas.

Table 13-6. Wildlife Species of Concern in the Potential Sacramento River Downstream Habitat Restoration Areas (contd.)

Common Name	Scientific Name	Status	Potential for Occurrence
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT, CE	Occurs only along the upper Sacramento Valley portion of the Sacramento River from Colusa to Red Bluff, the Feather River in Sutter Co., the South Fork Kern River in Kern Co., the Owen's River in Inyo Co., and along the Santa Ana, Amargosa, and lower Colorado Rivers. Riparian forest habitats in the potential Sacramento River downstream habitat restoration areas provide potential nesting habitat; however, these areas is located approximately 24 miles north of the northern extent of the known species geographic range.
Barrows goldeneye	*Bucephala islandica*	—/SC	Winter visitor to bays, lagoons, estuaries, freshwater lakes and large fast-moving rivers. Formerly nested in California at high mountain lakes. Regularly occurs on the Sacramento River in the Redding area during winter.
Willow flycatcher	*Empidonax traillii*	CE, USFS S, MSCS r	Uncommon migrant species in riparian habitat; may occur briefly during migration. No potentially nesting habitat present.
Yellow warbler	*Dendroica petechia brewsteri*	CSC, MSCS r	Potentially occurring in riparian habitats.
Yellow-breasted chat	*Icteria virens*	CSC, MSCS m	Potentially occurring in riparian habitats.
Pallid bat	*Antrozous pallidus*	CSC, USFS S, BLMS	Potentially occurring in riparian forest and woodland habitats.
Townsend's big-eared bat	*Plecotus townsendii*	CSC, USFS S	Potentially occurring in riparian forest and woodland habitats.
Western red bat	*Lasiurus blossevillii*	CSC	Potentially occurring in riparian forest and woodland habitats.
Ringtail	*Bassariscus astutus*	CP, MSCS m	Potentially occurring in riparian forest and woodland habitats.

Key:
BLM S = U.S. Department of the Interior, Bureau of Land Management sensitive
CD= California delisted
CE = California endangered
CP = California fully protected
CSC = California species of special concern
CT = California threatened
FB = Federal Bald and Golden Eagle Protection Act
FC = Federal candidate for listing
FD = Federally delisted
FP = Federally petitioned for listing
FPD = Proposed for Federal delisting
FT = Federally listed as threatened
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.
MSCS = Multi-Species Conservation Strategy covered species
r = Contribute to recovery. Implement some of the actions deemed necessary to recover species' populations in the Multi-Species Conservation Strategy focus area.
USFS M = U.S. Department of Agriculture, Forest Service survey and manage species
USFS S = U.S. Department of Agriculture, Forest Service sensitive

Lower Sacramento River and Delta

Numerous special-status wildlife species are associated with riparian, floodplain, and side-channel wetland habitats along the Sacramento River and

in the Delta (Table 13-7). 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 sensitive species discussed in this section are representative species selected from the many species present in the extended study area and are presented as examples to illustrate the breadth of resources. 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 CNDDB.

Table 13-7. Representative Sensitive Wildlife Species of Riparian and Perennial Wetland Communities Along the Sacramento River and in the Delta

Common Name	Scientific Name	Status[1]	Habitat Description
Invertebrates			
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	Elderberries in riparian woodlands or savanna communities.
Reptiles			
Western pond turtle	*Actinemys (Clemmys) marmorata*	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	*Thamnophis giga*	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.
Birds			
Tricolored blackbird	*Agelaius tricolor*	CSC	*Foraging:* On ground in croplands, grassy fields, flooded land, and along edges of ponds. *Nesting:* Dense cattails, tules, or thickets near fresh water.
Swainson's hawk	*Buteo swainsoni*	CT	*Foraging:* Open desert, grassland, or cropland containing scattered, large trees or small groves. *Nesting:* Open riparian habitat, in scattered trees or small groves in sparsely vegetated flatlands. Usually found near water in the Central Valley.
Northern harrier	*Circus cyaneus*	CSC	*Nesting:* 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	*Coccyzus americanus occidentalis*	FT CE	*Nesting:* 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 uses adjacent walnut orchards.
Yellow warbler	*Setophaga (Dendroica) petechia*	CSC	*Nesting*: Low, open-canopy riparian deciduous woodlands with a heavy brush understory; sometimes in montane shrubbery in open conifer forests.

Table 13-7. Representative Sensitive Wildlife Species of Riparian and Perennial Wetland Communities Along the Sacramento River and in the Delta (contd.)

Common Name	Scientific Name	Status[1]	Habitat Description
White-tailed kite	*Elanus leucurus*	FP	*Foraging:* Undisturbed, open grasslands, meadows, farmlands, and emergent wetlands. *Nesting:* Large groves of dense, broad-leafed deciduous trees close to foraging areas.
Greater sandhill crane	*Grus canadensis tabida*	CT FP	*Foraging: Open grasslands, grain fields, and open wetlands.* *Roosting: In flocks standing in moist fields or in shallow water.* *Nesting: Open habitats with shallow lakes and fresh emergent wetlands.*
Bald eagle	*Haliaeetus leucocephalus*	CE FP	*Foraging: Large bodies of water or free-flowing rivers with abundant fish and adjacent snags or other perches.* *Nesting: Large, old-growth trees or snags in remote, mixed stands near water.*
Yellow-breasted chat	*Icteria virens*	CSC	*Foraging and nesting:* Riparian thickets of willow and other brushy species near streams or other watercourses.
California black rail	*Laterallus jamaicensis coturniculus*	CT FP	*Foraging and nesting:* 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	*Melospiza melodia maxillaries*	CSC	*Foraging:* The bare surface of tidally exposed mud among tules and along slough margins in brackish marshes. *Nesting:* Along edges of sloughs and bays supporting mixed stands of bulrush, cattail, and other emergent vegetation.
Bank swallow	*Riparia riparia*	CT	*Foraging:* Open riparian areas, grassland, wetlands, water, and cropland. *Nesting:* Vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, and lakes.
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	CSC	*Foraging:* Fresh emergent wetland and sometimes along shorelines and in nearby open fields, preferably on moist ground. *Nesting:* Dense emergent wetland of cattails and tules, often along border of lake or pond.

Table 13-7. Representative Sensitive Wildlife Species of Riparian and Perennial Wetland Communities Along the Sacramento River and in the Delta (contd.)

Common Name	Scientific Name	Status[1]	Habitat Description
Mammals			
Pallid bat	*Antrozous pallidus*	CSC	*Foraging:* Relatively open oak woodlands, over water near riparian and upland forests and woodlands, and orchards and vineyards. *Roosting:* Rocky outcrops, cliffs, and crevices.
Western mastiff bat	*Eumops perotis*	CSC	*Foraging:* Over water in broad, open areas near riparian and upland forests and woodlands. *Roosting:* Crevices in vertical cliffs, usually granite or consolidated sandstone, and in broken terrain with exposed rock faces.
Western red bat	*Lasiurus blossevillii*	CSC	*Foraging:* Over water edges in open areas near riparian and upland forests and woodlands; orchards. *Roosting:* Trees along edges or in habitat mosaics in a variety of habitats and orchards.
Townsend's big-eared bat	*Plecotus townsendii*	CSC	*Foraging:* Water edges in open areas near riparian and upland forests and woodlands. *Roosting:* Caves, mines, tunnels, buildings, or other human-made structures in woodlands. Prefers mesic habitats.
Salt-marsh harvest mouse	*Reithrodontomys raviventris*	FE CE FP	Salt marsh dominated by pickleweed and salt grass. Generally requires nonsubmerged, salt-tolerant vegetation for escape during high tides.

Source: CNDDB 2012

Note:

[1] Status definitions:

Key:

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

Sacramento River from Red Bluff Pumping Plant to the Delta Many of the special-status wildlife species described above for the upper Sacramento River 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 the potential to occur in a portion of the extended study area from Red Bluff Pumping Plant 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*).

Sacramento–San Joaquin River Delta Many special-status species are known or likely to occur in the Delta because of the presence of extensive 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 packardi*) and vernal pool fairy shrimp (*Branchinecta lynchi*). The valley elderberry longhorn beetle has been found in the Delta region on McCormack-Williamson and New Hope tracts (CNDDB 2012).

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 plant species occur in the San Joaquin River region. Most of the special-status wildlife species are associated with grasslands (which include vernal pools), 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. These areas support many wildlife species, most of which are highly adapted to these altered 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/or CESA 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 (CDFG 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 (CDFG 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 maintains 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, western pond turtle (*Actinemys marmorata*), osprey (*Pandion haliaetus*), peregrine falcon (*Falco peregrinus anatum*), yellow-breasted chat (*Icteria virens*), yellow warbler (*Dendroica petechia brewsteri*), and Townsend's big-eared bat (*Plecotus townsendii*) (Figures 13-5a through 13-5f).

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 designated critical habitat. If a Federal action may affect a listed species or its designated 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 designated critical habitat, thereby protecting areas necessary for the conservation of the species.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC 661–667e, as amended) 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 further 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 from the ESA 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 (*Passer domesticus*), European starlings (*Sturnus vulgaris*), and rock pigeons (*Columba livia*), 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* (STNF LRMP) 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).

Biological Diversity

Goals (STNP 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 (STNF 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 (STNF 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 (STNF 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 (STNF 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.

U.S. Forest Service Survey and Manage

Standards and Guidelines The 1994 ROD for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management for Late-Successional and Old-Growth Related Species in the Range of the Northern Spotted Owl (NWFP ROD) amended or was incorporated into BLM and USFS land management plans to require certain actions for rare amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropods that occupy late-successional and old-growth forests (USFS and BLM 1994). These rare species were identified in Appendix C of the NWFP ROD collectively as S&M species. The NWFP ROD also established protection buffers on matrix lands for certain species (i.e., protection buffer species) that were not on the 1994 S&M list and required that those buffers be managed as

part of the Late Successional Reserve network. Four survey strategies were developed to guide management of S&M species: (1) manage known sites, (2) survey before ground-disturbing activities, (3) conduct extensive surveys, and (4) conduct general regional surveys.

The NWFP ROD also established overall objectives for managing S&M species populations that were referred to as "persistence objectives." These objectives were based on the USFS viability provision in the 1982 National Forest System Land and Resource Management Planning Regulation for the National Forest Management Act of 1976. This provision is targeted toward vertebrate species, but also was applied to nonvertebrate species to the greatest extent practicable, as described in the NWFP ROD. The provision generally states that the USFS will manage habitat "to maintain viable populations of existing native and desired non-native vertebrate species in the planning area" (36 CFR 219.19). Although the viability standard is part of the USFS planning regulations, the protections for S&M species were also applied to BLM lands in the NWFP ROD with a goal of protecting the long-term health and sustainability of all Federal forests within the range of the northern spotted owl and the species that inhabit them. Because of the uncertainty associated with the continued persistence of species due to natural factors, the NWFP ROD noted that compliance with the planning regulations is not subject to precise numerical interpretations and cannot be fixed at any single threshold; rather, "as in any administrative field, common sense and agency expertise must be applied" (NWFP ROD, p. 44).

The 2001 S&M ROD (USFS and BLM 2001) modified the management direction provided in the NWFP ROD for S&M and protection buffer species and amended BLM and USFS land management plans in the range of the northern spotted owl accordingly. The list of S&M species was also modified to remove 72 species in all or part of their range because new information indicated they were secure or otherwise did not meet the basic criteria for S&M. Species remaining on the list were assigned to one of six categories using the following criteria: their relative rarity, the ability to reasonably and consistently locate occupied sites during surveys before habitat- disturbing activities, and the level of information known about the species or group of species. The 2001 S&M ROD also removed the direction specific to protection buffer species, excluding these species from S&M Standards and Guidelines requirements. As part of the 2001 Standards and Guidelines, objectives, criteria, and management direction were defined for each category. Specific criteria were also established to add, remove, or change species categories based on new information and as part of the annual species review processes.

In 2004 and again in 2007, the BLM and USFS issued a ROD to eliminate the S&M requirements of the 2001 S&M ROD and to provide protection for species on the S&M lists by managing them under the agencies' special-status species programs. As a result of litigation, the requirements of the 2001 S&M ROD were reinstated. In a subsequent court-mandated settlement agreement (USFS

and BLM 2011), the list of S&M species was modified. The settlement agreement also made the following modifications: (1) acknowledged existing exemption categories (2006 Pechman Exemptions), (2) updated the 2001 S&M species list, (3) established a transition period for application of the species list, and (4) established new exemption categories (2011 Exemptions). Agency decisions made after September 30, 2012, are required to use the 2011 S&M list. Some species considered in the S&M program also occur on non-Federal lands. The requirements of the 1994 NWFP ROD and 2001 S&M ROD as modified under the 2011 Settlement Agreement apply only to lands managed by the BLM and USFS within the range of the northern spotted owl. The 2011 Settlement Agreement was later struck down by the court and the S&M program has reverted to the requirements of the 2001 S&M ROD with the 2006 Pechman Exemptions still intact.

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 NRA, contains management guidance intended to achieve or maintain a desired condition (USFS 2014). These strategies take into account opportunities, management recommendations for specific projects, and mitigation measures needed to achieve specific goals. The following guidance relative to wildlife resource issues associated with the project site were excerpted from the management guide.

Maintaining Key Wildlife Habitat Components

- Limestone outcrops within the Shasta Unit are recognized as a unique habitat component for various wildlife species. The cool moist microclimate present within these outcrops provides the habitat to escape the hot, dry summer season. Maintaining limestone habitats is a top priority within the NRA. Actions which could negatively impact limestone habitats (road building, dozer-line construction, piling and burning) will be avoided if limestone habitats would be degraded.

- Due to the important role down woody material and snags play in the ecosystem, design projects to maintain large down logs and large snags. In general, down logs and snags will be retained unless they pose a direct risk to public safety. It is recognized that projects implementing prescribed fire will directly impact large snags and logs. These projects are encouraged, as they are essential in maintaining a healthy and diverse ecosystem. It is also recognized that the effects of prescribed fire on snags and down logs is a dynamic process, as fire will consume some snags and logs, but also some trees are killed by fire, which provides for recruitment of new snags and logs.

- 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 NRA 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 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 other special-status 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 CDFW 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.

U.S. Bureau of Land Management Resource Management Plan

BLM manages a number of public land areas within the primary study area, including the Shasta/Chappie Off-Highway Vehicle Area west of Shasta Dam. These areas fall under the Northern California BLM district and the resource management plan of the Redding BLM field office. The purpose of BLM's resource management plans is to provide overall direction for managing and allocating public resources in the planning area. BLM is responsible for administering the following strategies related to resource issues common to the portion of the Redding Resource Area lands located near the study area and vicinity (BLM 1992, 1993, 2005).

- Provide a regional opportunity for motorized recreation with a focus within the Shasta/Chappie Off-Highway Vehicle Area.

- Enhance non-motorized recreation opportunities within the area via a greenway connecting Redding to Shasta Dam along the Sacramento River.

- Maintain or improve the long-term sustained yield of forest products available from commercial forest lands.
- Improve the long-term condition and protection of deer winter range habitat.
- Maintain special-status species habitat.
- Maintain the existing scenic quality of the areas.
- Maintain opportunities to explore and develop freely available minerals on public lands.

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 11312 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, CDFW has the responsibility for maintaining a list of endangered and threatened species (California Fish and Game Code Section 2070). CDFW also maintains a list of "candidate species," which are species for which CDFW has issued a formal notice that they are under review for addition to the list of endangered or threatened species. In addition, CDFW 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, CDFW 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 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 CDFW would be in the form of an incidental take permit or as a consistency determination (Fish and Game Code Section 2080.1(a)). Fish and Game Code Section 2080.1(a) authorizes CDFW 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 California Fish and Game Code Section 3503, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided in other sections. 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 California Fish and Game Code Sections 3511, 4700, 5050, and 5515, which list 37 fully protected species. These statutes prohibit take or possession at any time of fully protected species. CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species. CDFW 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 CDFW, pursuant to California Fish and Game Code Section 1602. 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. CDFW's jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A CDFW 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 (regional water boards). Each of the regional water boards 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 regional water boards' 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 regional water boards have 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 regional water board.

California Department of Fish and Wildlife Species Designations

CDFW 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 CDFW 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 CNDDB 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 goals and policies that promote management, protection, and restoration of natural habitats and sensitive species of plants and animals throughout the county (Sacramento County 2011). This includes policies for "no net loss" of riparian and oak woodland. The Sacramento County general plan includes specific setbacks from streams that can be 200 feet wide; development within setbacks is prohibited except for passive recreation and stormwater facilities in the outside-most 50 feet. 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.

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.

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 (CBDA) was established as a State agency in 2003 to oversee implementation of CALFED for the numerous Federal and State agencies working cooperatively to improve the quality and reliability of California's water supplies while restoring the Bay-Delta ecosystem. The July 2000 CALFED *Final Programmatic EIS/EIR* (CALFED 2000c) analyzed a range of alternatives to address these needs and included a MSCS to provide a framework for compliance with ESA, CESA, and Natural Community Conservation Planning Act. The August 2000 CALFED Programmatic ROD identified 12 action plans, including Ecosystem Restoration, Watersheds, and Water Supply Reliability, among others (CALFED 2000d). The 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. In 2009, the California Legislature passed sweeping water reform legislation, including the establishment of the Delta Stewardship Council (DSC). The DSC was transferred all the responsibilities, programs, staff and most of the funding from the CBDA, and the CBDA was dissolved. The DSC was also given additional mandates, including the development of a Delta Plan to guide activities and programs of State and local programs in the legal Delta through a consistency determination process.

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 CDFW, 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 (*Setophaga petechia*) and song sparrows (*Melospiza melodia*), 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* (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 Resources Agency, and ex-officio members from six Federal and State resource agencies.

Sacramento River Conservation Area Program

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 Red Bluff Diversion Dam (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 CDFW 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 and data collection and 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 CDFW, 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, including construction-related changes at the potential restoration sites
- Temporary or permanent disturbance of habitat at restoration and gravel augmentation sites
- Mortality of individuals of special-status species at restoration 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 the Red Bluff Pumping Plant and within the extended study area that may be affected by altered hydrologic flows. It is assumed that construction-related activities at the dam, their effects, and mitigation were considered in the "Shasta Lake and Vicinity" section.

The assessment of potential effects on resources downstream from Keswick Dam was based on review of the output from the SLWRI 2012 Version CalSim-II model. Monthly averages by water year type[1] were reviewed for substantial trends in stage or flow that could alter habitat used by sensitive species or affect species directly. Trend data generated by CalSim-II were considered representative of the potential changes resulting from the project alternatives. A change of less than 2 percent (plus or minus) was considered essentially equivalent to baseline operations and therefore not a substantial change. When monthly average values were changed more than 2 percent, the alternative was considered to result in a substantial change in a species habitat or directly affect the species. Monthly flow results were used to simulate mean daily flows. The use of monthly averages in the evaluation was considered more representative of potential long-term changes in flows than values from the individual months. Results for individual months (e.g., December 1944) were not used in this analysis because the extreme values presented there are sometimes artifacts of model operations and not indicative of how the system would actually operate. See Section 12.3, "Methods and Assumptions," in Chapter 12, "Botanical Resources and Wetlands," for a more detailed discussion of this modeling. The differences in flow regime among the alternatives are described in detail in Chapter 6, "Hydrology, Hydraulics, and Water Management." A more detailed description of the SLWRI 2012 Version CalSim-II model, the modeling

[1] Throughout this document, water year types are defined according to the Sacramento Valley Index Water Year Hydrologic Classification, unless specified otherwise.

methodology used to evaluate this project, and key assumptions are provided in the Modeling Appendix.

The CALFED Ecosystem Restoration Program's Sacramento River Ecological Flows Study (TNC et al. 2008) was also consulted during the evaluation of impacts. This report summarizes the results of a multifaceted analysis conducted to determine the effects of the proposed (18.5-foot) raise of Shasta Dam and the proposed North-of-the-Delta Offstream Storage Reservoir facilities on several focal species, including western pond turtle and bank swallow. CalSim data were also used as inputs for this study; hypothetical flow scenarios were based on historical flows recorded at three locations along the Sacramento River. An appendix to this report is the "Linkages Report" (Stillwater Sciences 2007), which focused the mainstem Sacramento River corridor between Keswick Dam and Colusa. The Linkages Report sought to define how flow characteristics (e.g., magnitude, timing, duration, and frequency) and associated management actions (e.g., gravel augmentation, changes in bank armoring) influence the creation and maintenance of habitats for several native species that occur in the Sacramento River corridor.

The SLWRI 2012 Version CalSim-II model was used to aid in the evaluation of potential impacts of the project alternatives on water-related resources, including riparian habitats along the upper and lower Sacramento River and in the Delta. This computer modeling used historical data about California hydrology to represent the variety of weather and hydrologic patterns, including wet periods and droughts, under which water storage and conveyance facilities would be operated. Two scenarios (base cases) of water demands, storage, and conveyance were used in the modeling runs: 2005 facilities and demands ("existing conditions") and forecasted 2030 demands and reasonably foreseeable projects and facilities ("future conditions"). A modeling run was conducted for each of these base cases combined with each alternative, so that the effects of the No-Action Alternative and other alternatives could be evaluated relative to both existing and future conditions. CalSim-II is a useful tool for this type of comparative analysis. The model is run twice: first to represent a base condition (no action), and second with a specific change (action) to assess the differences in results caused by the input change.

Maximum vs. Likely Area of Impact in Relocation Areas

The relocation areas identified by Reclamation in the 2013 Draft EIS were based on preliminary information, as planning and related engineering designs were incomplete at that time. Habitat impacts disclosed for the relocation areas in the June 2013 Draft EIS assumed complete impact (i.e., 100% loss) within all the relocation areas. Since that time, Reclamation revised the relocation area boundaries by conducting additional planning and design that in many cases reduced the size of the relocation areas. Additionally, Reclamation designed infrastructure and other activities within the revised relocation areas to avoid wetlands and other sensitive resources, and reduce habitat impacts to the extent feasible.

Since final relocation area planning and designs are incomplete, each relocation area contains a “maximum” and “likely” impact area. The maximum area of impact is defined as the maximum area potentially impacted by project activities occurring within the relocation areas, while the likely impact area represents Reclamation’s best estimate of the actual impact (i.e., “most likely”). For the purposes of this Administrative Final EIS, habitat impacts are based on the assumption of complete loss within the likely impact areas. Table 13-8 shows a comparison of the maximum and likely CWHR habitats in the relocation areas.

Table 13-8. Summary of "Maximum and Likely" CWHR Wildlife Habitats in the Relocation Areas

Plant Series	Area (Acres)													
	Main Body		Big Back-bone Arm		Sacramento Arm		McCloud Arm		Squaw Creek Arm		Pit Arm		Total	
	Max	Likely	Max	Likely	Max	Likely	Max	Likely	Max	Likely	Max	Likely	Max	Likely
Annual grassland	4.79	0.40	0.00		26.46	4.95	9.75	0.53	0.84	0.70	0.23	0.01	42.07	6.59
Barren	22.37	12.46	0.00		72.18	11.97	29.71	5.38	11.53	0.00	12.06	2.96	147.86	32.76
Blue oak–foothill pine	1.91	0.01	0.00		0.00	0.00	0.00	0.00	0.00	0.00	7.24	2.35	9.16	2.36
Blue oak woodland	0.00	0.00	0.00		0.00	0.00	3.68	0.00	0.00	0.00	0.92	0.00	4.59	0.00
Closed-cone pine–cypress	0.11	0.05	0.00		41.98	5.65	9.63	2.23	1.94	0.23	12.50	0.94	66.15	9.11
Douglas-fir	0.00	0.00	0.00		0.00	0.00	3.02	0.00	0.00	0.00	0.00	0.00	3.02	0.00
Mixed chaparral	12.65	3.36	0.00		56.11	3.95	26.92	4.11	4.44	1.70	33.98	9.63	134.11	22.77
Montane hardwood	35.81	19.73	0.00		137.77	20.89	148.13	21.64	6.34	0.24	0.13	0.13	328.17	62.63
Montane hardwood–conifer	104.31	24.69	0.00		117.35	19.27	221.40	33.48	29.04	2.61	30.09	6.62	502.19	86.66
Montane riparian	0.34	0.08	0.00		1.35	0.33	3.08	0.25	0.23	0.04	0.02	0.02	5.02	0.72
Ponderosa pine	156.24	79.56	0.00		398.26	96.79	272.10	47.58	43.08	16.04	22.09	0.77	891.77	240.74
Riverine	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Urban	20.66	15.64	0.00		228.60	217.29	0.48	0.27	0.00	0.00	0.57	0.57	250.30	233.76
Total	**359.20**	**155.98**	**0.00**		**1080.05**	**381.09**	**727.90**	**115.47**	**97.44**	**21.56**	**119.83**	**24.00**	**2384.42**	**698.10**

Key:
CWHR = California Wildlife Habitat Relationships
Max = maximum

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 EIS 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" (CEQA Section 15382). CEQA also requires that the environmental document propose feasible measures to avoid or substantially reduce significant environmental effects (CEQA 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 CDFW 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:

- Inundating existing habitat around Shasta Lake and causing habitat loss

- 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 EIS, however, would occur and have effects on wildlife but those effects are unknown or largely speculative for many such projects, and therefore are not addressed in detail below.

Shasta Lake and Vicinity

Impact Wild-1 (No-Action): Impacts on 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): Impacts on Habitat for the Bald Eagle No take of 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): Impacts on Dispersal 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 is not required for the No-Action Alternative.

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

Impact Wild-10 (No-Action): Impacts on Habitat for the Pacific Fisher No take or loss of habitat for the Pacific fisher would occur because the project would not be constructed. 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, Yuma Myotis, and Fringed 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, Yuma Myotis, and fringed myotis), the American marten, and ringtail would occur because the project would not be constructed. No impact would occur. Mitigation is not required for the No-Action Alternative.

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

Impact Wild-13 (No-Action): Permanent Loss of Wildlife Habitat and Western Bumble Bee Habitat No permanent loss of 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-14 (No-Action): Impacts on Other Birds of Prey (e.g., red-tailed hawk and Red-shouldered Hawk) and Migratory Bird Species (e.g., 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

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

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

Impact Wild-16 (No-Action): Impacts on California Red-Legged Frog No loss of California red-legged frog habitat would occur because the project would not be constructed. 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 only very small changes in flows greater than 30,000 cfs (a magnitude that strongly affects bank erosion and meander migration) would occur along the upper Sacramento River (see Section 12.3, "Environmental Consequences and Mitigation Measures" in Chapter 12, "Botanical Resources and Wetlands" [reference Impact Bot-7 (No-Action)]) and would result in no change to the ongoing geomorphic processes in the upper Sacramento River (see Section 11.3, "Environmental Consequences and Mitigation Measures ," in Chapter 11, "Fisheries and Aquatic Ecosystems" [reference Impact Aqua-14 (No-Action)]).

Because water from high-flow events would be captured and stored and would be metered out in an even fashion, dam operations under the No-Action Alternative would continue with only very small changes in flows and no changes to the ongoing geomorphic processes along the upper Sacramento River. Therefore, future conditions for bank swallows are not expected to differ substantially from existing conditions. 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 The No-Action Alternative would not alter vernal pool hydrology or affect vernal pool–associated wildlife in the upper Sacramento River area. Because the No-Action Alternative would not affect this resource, no impact would occur. 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 along the upper Sacramento River under the No-Action Alternative would not differ from baseline conditions. The No-Action Alternative would not conflict with existing plans promoting conservation, protection, and restoration of riparian habitat. Local plans and policies that influence riparian management would remain in place and continue to be locally enforced. Because conditions would not differ from the existing baseline, no impact would occur. 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. No impact would occur. 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 Projects Under the No-Action Alternative, none of the restoration work described in Chapter 2, "Alternatives," would be conducted downstream from Shasta Dam. Thus, special-status wildlife species found in riparian habitat would not be affected. No impact would occur. 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 provides 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 only very small changes in flows greater than 30,000 cfs (a magnitude that strongly affects bank erosion and meander migration) would occur along the uppermost portion of the lower Sacramento River (see Section 12.3, “Environmental Consequences and Mitigation Measures” in Chapter 12, “Botanical Resources and Wetlands” [reference Impact Bot-14 (No-Action)]) and no project-related alteration of river flows would occur in the lower Sacramento River (see Section 11.3, “Environmental Consequences and Mitigation Measures” in Chapter 11, “Fisheries and Aquatic Ecosystems” [reference Lower Sacramento River, Tributaries, Delta, and Trinity River subsection under No-Action Alternative)]). 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 with only very small changes in flows and the ongoing geomorphic processes along the lower Sacramento River.. Although ongoing dam operations tend to result in the loss of eroding banks during winter flood flows, which could limit the formation of suitable nesting habitat for bank swallow, the future conditions for bank swallows are not expected to differ substantially from existing conditions. 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 The No-Action Alternative would not affect the hydrology of vernal pools or have an adverse effect on vernal pool–associated wildlife species in the lower Sacramento River and Delta area. Because the No-Action Alternative would not affect this

resource, no impact would occur. 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 Riparian habitat conditions along the lower Sacramento River or in the Delta would not differ from baseline under the No-Action Alternative. The No-Action Alternative would not conflict with existing plans promoting conservation, protection, and restoration of riparian habitat along the lower Sacramento River and in the Delta. Because conditions would not differ from the existing baseline, no impact would occur. 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 could change because of several reasonably foreseeable projects that could 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. For these reasons, 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 Programmatic 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, S&M species, MSCS-covered species, and BLM sensitive species. Additionally, the raising of Shasta Dam would result in the inundation of habitat for this species. This impact would be significant.

Collectively, 38 Shasta salamander occurrences are known within the impoundment and relocation areas surveyed by Reclamation. Shasta salamanders have been found or are known to occur in nearly every CWHR habitat present along each arm. These known locations occur in CWHR habitats characterized by the presence (limestone habitat) or absence (nonlimestone habitat) of limestone substrate. Within the impoundment area, the presence of the Shasta salamander is presumed in all CHWR habitats, except "non-habitat" barren areas (e.g., paved parking lots, boat ramps). For the purposes of this impact analysis, all CWHR habitats in the impoundment and relocation areas are stratified as limestone or nonlimestone habitat.

Inundation resulting from a 6.5-foot dam raise would result in a loss of approximately 8 acres of limestone habitat and 1,187 acres of nonlimestone habitat. Impacts on limestone and nonlimestone habitats in the impoundment area are summarized in Table 13-9.

Table 13-9. Impacts on Suitable Habitat for the Shasta Salamander in the Impoundment Area (6.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Limestone	0.00	0.82	0.00	5.43	0.00	1.50	7.75
Nonlimestone	222.31	42.48	343.21	199.40	121.55	258.72	1187.67
Total	222.31	43.30	343.21	204.83	121.55	260.22	1195.42

Note:
[1] Acreage values 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 up to approximately 1 acre of limestone habitat and 424 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 13-10.

Mortality of individuals could occur over multiple years during project implementation if ground-disturbing activities are conducted during the wet season. This impact would be significant. Mitigation for this impact is proposed in Section 13.3.5.

Table 13-10. Impacts on Suitable Habitat for the Shasta Salamander in Relocation Areas

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Limestone	0.00	0.00	0.00	0.96	0.00	0.00	0.96
Nonlimestone	127.48	0.00	146.88	108.34	20.86	20.45	424.03
Total	127.48	0.00	146.88	109.30	20.86	22.09	424.99

Note:
[1] Acreage values are approximate.

Impact Wild-2 (CP1): 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 these 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 frogs 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 harm's 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.

Mortality of individuals could occur over multiple years during project implementation 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 approximately 35 acres of habitat for the foothill yellow-legged frog and tailed frog. Approximately 0.72 acre 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 13-11. Mitigation for this impact is proposed in Section 13.3.5.

Table 13-11. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Riverine	0.00	0.35	2.30	3.81	0.59	0.00	7.04
Total	1.54	2.83	18.22	8.41	1.17	2.59	34.75
Relocation Areas							
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Total	0.08	0.00	0.33	0.25	0.23	0.02	0.72

Note:
[1] Acreage values are approximate.

Impact Wild-3 (CP1): 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 and riverine are suitable habitats 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 south-facing slopes of less than 60 degrees averaging 200 meters (660 feet) from an aquatic site (CDFG 1994). Thus, loss of upland habitats adjacent to suitable

aquatic habitat (within approximately 660 feet) could adversely affect this species.

Direct take of northwestern 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.

Mortality of individuals could occur over multiple years during project implementation 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 conversion of approximately 35 acres of suitable habitat for the northwestern pond turtle. Approximately 7 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.

Approximately 0.72 acre 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 13-12.

Table 13-12. Impacts on Suitable Habitat for the Northwestern Pond Turtle in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Riverine	0.00	0.35	2.30	3.81	0.59	0.00	7.04
Total	1.54	2.83	18.22	8.41	1.17	2.59	34.75
Relocation Areas							
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Total	0.08	0.00	0.33	0.25	0.04	0.02	0.72

Note:
[1]Acreage values are approximate.

Impact Wild-4 (CP1): 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.

Impacts on nesting American peregrine falcons could occur over multiple years during project implementation if construction activities were conducted in or

adjacent to active nests. This impact would be potentially significant. Construction or vegetation removal related to relocation areas is not anticipated to occur in suitable cliff habitat. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-5 (CP1): 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 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.

Three known bald eagle nest trees would be affected by inundation with a 6.5-foot dam raise. When inundation 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 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.

Impacts on nesting bald eagles could occur over multiple years during project implementation if construction activities are conducted at or adjacent to active nest sites. This impact would be significant.

Dam construction, vegetation removal, and inundation resulting from a 6.5-foot dam raise would result in a loss of approximately 979 acres of bald eagle nesting and roosting habitat in the impoundment area and 393 acres in the relocation areas. Potential nest and roost trees occur in blue oak woodland, blue oak–foothill pine, Douglas-fir, Klamath mixed conifer, montane hardwood, montane hardwood–conifer, montane riparian, and ponderosa pine habitats and are typically found in trees with diameters greater than 24 inches. Impacts on suitable bald eagle habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-13.

Mitigation for this impact is proposed in Section 13.3.5.

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

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	2.21	2.21
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	16.35	22.71
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	5.51	5.51
Montane hardwood	39.08	18.13	86.75	34.61	9.44	39.49	227.49
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.19
Total	189.17	36.46	256.65	186.73	92.18	217.86	979.05

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

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	Mc Cloud Arm	Squaw Creek Arm	Pit Arm	Total
Relocation Areas							
Blue oak–foothill pine	0.01	0.00	0.00	0.00	0.00	2.34	2.35
Montane hardwood	19.73	0.00	20.89	21.64	0.24	0.13	62.63
Montane hardwood–conifer	24.69	0.00	19.27	33.48	2.61	6.62	86.66
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Ponderosa pine	79.56	0.00	96.79	47.58	16.04	0.77	240.74
Total	124.07	0.00	137.28	102.95	18.93	9.88	393.11

Note:
[1] Acreage values are approximate.

Impact Wild-6 (CP1): Loss of Dispersal 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 would result in the loss of northern spotted owl dispersal habitat, a species Federally listed as threatened and an MSCS-covered species. This impact would be potentially significant.

Reclamation conducted a habitat analysis within the Shasta Lake and vicinity portion of the primary study area to determine potential project impacts to northern spotted owl habitat. The analysis was performed using a GIS-based habitat model developed by the USFS northern California forests in coordination with the USFWS. The USFS developed this model using the Existing Vegetation data (EVEG) created by the USFS Remote Sensing Lab. The habitat model is referred to as NSO EVEG and defines potential northern spotted owl habitat by incorporating the vegetation data and specific northern spotted owl habitat attributes, including overstory canopy cover, proportion of conifer and hardwood trees, average tree diameter, vegetation alliance, elevation, geographic location, and ecologic setting. Using the vegetation data and northern spotted owl habitat attributes, the NSO EVEG model designates polygons as potential northern spotted owl dispersal, nesting/roosting, and foraging habitats, or non-habitat. Reclamation queried the NSO EVEG model within the Shasta Lake and vicinity portion of the primary study area to determine the amount and location(s) of potential northern spotted owl dispersal, nesting/roosting, and foraging habitats.

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 northern spotted owl dispersal habitat, including approximately 437 acres in the

impoundment area and 340 acres in the relocation areas. Impacts on potential northern spotted owl dispersal habitat in the impoundment area and relocation areas are summarized in Table 13-14. No nesting/roosting or foraging habitat occurs in the Shasta Lake and vicinity portion of the primary study area; therefore, no impacts to these habitats would occur.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-14. Impacts on Dispersal Habitat for the Northern Spotted Owl in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Dispersal	66.10	7.12	103.16	107.22	54.25	100.05	437.89
Foraging	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nesting/roosting	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	66.10	7.12	103.16	107.22	54.25	100.05	437.89
Relocation Areas							
Dispersal	70.00	0.00	167.27	86.24	8.08	9.34	340.92
Foraging	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nesting/roosting	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	70.00	0.00	167.27	86.24	8.08	9.34	340.92

Note:
[1] Acreage values are approximate.

Impact Wild-7 (CP1): Impact on the Purple Martin and Its Nesting Habitat
Construction activities and vegetation removal associated with 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 available nest trees. This impact would be significant.

Shasta Lake supports the largest and one of only a few known purple martin breeding locations in interior northern California. Between 18 and 42 nesting pairs occur at Shasta Lake based on monitoring performed by Reclamation since 2007. The purple martin nest sites are found in flooded snags located in the existing reservoir and adjacent uplands, and occur from the vicinity of Jones Valley east up the Pit Arm. Overstory vegetation removal is proposed for the relocation of the Clikapudi Trail (Jones Valley area). With the exception of Arbuckle Flat, no vegetation removal is proposed on the Pit Arm east of the Painter Creek inlet.

Inundation of the impoundment area would result in the loss of nest trees in the lake and several 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, fewer potential nest cavities could be available from year to year. Loss of nest trees may be temporary, as trees that are inundated would die, become snags, and provide potential nest sites. The temporal loss of nesting snags would be a significant impact.

Overstory vegetation removal is proposed for the relocation of the Clikapudi 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 a significant impact.

Impacts on nesting purple martins could occur over multiple years during project implementation if construction activities were conducted at or adjacent to active nest sites. This impact would be significant.

Purple martins forage high in the air and above the tree canopy. Conversion of upland habitats to lacustrine habitat may have an effect on foraging habitat due to the loss of insect-producing vegetation; however, insect production also occurs in lacustrine habitats. Therefore, there would be an insignificant impact on foraging habitat.

Mitigation for all impacts to purple martin is proposed in Section 13.3.5.

Impact Wild-8 (CP1): 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, 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, 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.

Impacts on these species could occur over multiple years during project implementation if construction activities were conducted adjacent to active nests. This impact would be potentially significant.

Dam construction, vegetation removal, and inundation resulting from a 6.5-foot dam raise would result in a loss of approximately 954 acres in the impoundment area and 390 acres in the relocation areas of potential nesting and foraging habitat for the Vaux's swift. These activities would also result in the loss of approximately 28 acres in the impoundment area and 0.72 acre in the relocation areas of willow flycatcher, yellow warbler, and yellow-breasted chat habitat. The loss of habitat for these species would be a potentially significant impact.

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 13-15. Mitigation for this impact is proposed in Section 13.3.5.

Table 13-15. Impacts on Suitable Habitat for the Vaux's Swift, Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Vaux's Swift							
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	5.51	5.51
Montane hardwood	39.08	18.13	86.75	34.61	9.44	39.49	227.49
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.20
Total Vaux's Swift Habitat	184.21	36.46	256.65	186.73	90.77	199.30	954.12
Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat							
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Total Habitat	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Relocation Areas							
Vaux's Swift							
Montane hardwood	19.73	0.00	20.89	21.64	0.24	0.13	62.63
Montane hardwood–conifer	24.67	0.00	19.27	33.48	2.61	6.62	86.66
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Ponderosa pine	79.56	0.00	96.79	47.57	16.04	0.77	240.74
Total Vaux's Swift Habitat	124.06	0.00	137.28	102.95	18.93	7.54	390.75
Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat							
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Total Habitat	0.08	0.00	0.33	0.25	0.04	0.02	0.72

Note:
[1] Acreage values are approximate.

Impact Wild-9 (CP1): 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 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; and the Cooper's hawk, the great blue heron, and the osprey, which are MSCS-covered species. Higher lake levels caused by raising Shasta Dam would result in the loss of foraging and nesting habitat for the long-eared owl, northern goshawk, and Cooper's hawk. This impact would be

potentially significant. Higher lake levels would also result in the loss of nesting habitat for osprey and great blue heron. This impact would be potentially significant. Foraging habitat would increase for osprey and great blue heron. No impact to foraging habitat for these species would occur.

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. When inundation of the impoundment area occurs, 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, 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.

Impacts on these species could occur over multiple years during project implementation if construction activities were conducted adjacent to active nests. This impact would be potentially significant.

Dam construction, vegetation removal, and inundation resulting from a 6.5-foot dam raise would result in a loss of approximately 699 acres in the impoundment area and 327 acres in the relocation areas of long-eared owl and northern goshawk nesting and foraging habitat. There would be a loss of approximately

1,072 acres in the impoundment area and 402 acres in the relocation areas of Cooper's hawk and great blue heron nesting and foraging habitat.

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

Table 13-16. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Long-Eared Owl and Northern Goshawk							
Douglas-fir	0.00	Douglas-fir	0.00	Douglas-fir	0.00	Douglas-fir	0.00
Klamath mixed conifer	0.00	Klamath mixed conifer	0.00	Klamath mixed conifer	0.00	Klamath mixed conifer	0.00
Montane hardwood–conifer	34.65	Montane hardwood–conifer	34.65	Montane hardwood –conifer	34.65	Montane hardwood –conifer	34.65
Ponderosa pine	108.93	Ponderosa pine	108.93	Ponderosa pine	108.93	Ponderosa pine	108.93
Total Habitat	143.59	Total Habitat	143.59	Total Habitat	143.59	Total Habitat	143.59
Cooper's Hawk and Great Blue Heron							
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	16.35	22.71
Closed-cone pine-cypress	17.75	0.00	6.30	10.78	23.95	36.71	95.49
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	5.51	5.51
Montane hardwood	39.08	18.13	86.75	34.61	9.44	39.49	227.49
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.19
Total Habitat	206.91	36.46	262.95	197.51	116.13	252.36	1072.33

Table 13-16. 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) (contd.)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Relocation Areas							
Long-Eared Owl and Northern Goshawk							
Douglas-fir	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Montane hardwood–conifer	24.69	0.00	19.27	33.48	2.61	6.62	86.66
Ponderosa pine	79.56	0.00	96.78	47.58	16.04	0.77	240.74
Total Habitat	104.25	0.00	116.05	81.06	116.05	7.38	327.40
Cooper's Hawk and Great Blue Heron							
Blue oak–foothill pine	0.01	0.00	0.00	0.00	0.00	2.34	2.36
Closed-cone pine-cypress	0.05	0.00	5.65	2.23	0.23	0.94	9.10
Douglas-fir	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Montane hardwood	19.73	0.00	20.89	21.64	0.24	0.13	62.63
Montane hardwood–conifer	24.68	0.00	19.27	33.48	2.61	6.62	86.66
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Ponderosa pine	79.56	0.00	96.79	47.58	16.04	0.77	240.74
Total Habitat	124.12	0.00	142.93	105.19	19.16	10.82	402.22

Note:
[1] Acreage values are approximate.

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

There are 54 osprey nest trees along 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 of the total in the Shasta Lake and vicinity) 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.

Impact Wild-10 (CP1): Take and Loss of Habitat for the Pacific Fisher
Construction activities and vegetation removal associated with 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 Pacific fisher 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. When inundation of the impoundment area occurs, natal den 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, 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.

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

Dam construction, vegetation removal, and inundation resulting from a 6.5-foot dam raise would result in a loss of approximately 749 acres of Pacific fisher habitat in the impoundment area. Approximately 330 acres of Pacific fisher habitat would be lost in the relocation areas. This impact would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-17.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-17. Impacts on Suitable Habitat for the Pacific Fisher in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Blue oak-foothill pine	4.95	0.00	0.00	0.00	1.40	16.35	22.71
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	5.51	5.51
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.19
Total Habitat	150.08	18.34	169.90	152.12	82.74	176.16	749.34
Relocation Areas							
Blue oak-foothill pine	0.01	0.00	0.00	0.00	0.00	2.35	2.36
Douglas-fir	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Montane hardwood–conifer	24.69	0.00	19.27	33.48	2.61	6.62	86.66
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Ponderosa pine	96.78	0.00	96.79	47.58	16.04	0.77	240.74
Total Habitat	104.34	0.00	116.39	81.31	18.69	9.75	330.48

Note:
[1] Acreage values are approximate.

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, Yuma Myotis, and Fringed Myotis), the American Marten, and Ringtail and Their Habitat Construction activities and vegetation removal associated with 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 fringed myotis, a USFS 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, Yuma myotis, and fringed 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 these species 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 on 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, 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.

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

Foraging habitat for the pallid bat, spotted bat, western mastiff bat, and Townsend's big-eared bat includes Douglas-fir, fresh emergent wetland, lacustrine habitat, 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 inundation resulting from a 6.5-foot dam raise would result in the loss of approximately 31 acres of reproductive and roosting habitat for the pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis in the impoundment area. Approximately 35 acres of reproductive and roosting habitat for these species would be lost in the relocation areas. Additionally, one limestone cave located on the Big Backbone Arm that is a known Townsend's big-eared bat roost would be affected by flooding. A 6.5-foot dam raise would result in the loss of approximately 1,201 acres of reproductive and roosting habitat for the western red bat and long-eared myotis. Approximately 457 acres of reproductive and roosting habitat for these species would be lost in the relocation areas. These impacts would be potentially significant.

Dam construction, vegetation removal, and inundation resulting from a 6.5-foot dam raise would result in the loss of approximately 1,201 acres of ringtail habitat. Approximately 457 acres of ringtail habitat would be lost in the relocation areas. A 6.5-foot dam raise would result in the loss of approximately 724 acres of American marten habitat in the impoundment area and 328 acres in the relocation areas. These impacts would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-18.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-18. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Townsend's Big-Eared Bat, Spotted Bat, Pallid Bat, Western Mastiff Bat, Yuma Myotis, and Fringed Myotis							
Barren	1.02	0.64[2]	4.04	0.85	0.00	0.59	6.50
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	2.21	2.21
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	16.35	22.71
Total Habitat	5.98	0.00	4.04	0.85	1.40	19.16	31.43
Western Red Bat, Long-Eared Myotis, and Ringtail							
Barren	1.02	0.00	4.04	0.85	0.00	0.59	6.50
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	2.21	2.21
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	16.35	22.71
Closed-cone pine-cypress	17.75	0.00	6.30	10.78	23.95	36.71	95.49
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	5.51	5.51
Mixed chaparral	14.83	6.83	80.01	7.32	5.43	5.66	120.07
Montane hardwood	39.08	18.13	86.75	34.61	9.44	39.49	227.49
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.19
Total Habitat	222.76	43.30	347.00	205.68	121.56	260.81	1201.01
American Marten							
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	3.36	3.36
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.19
Total Habitat	145.13	18.34	169.90	152.12	81.34	157.66	724.48

Table 13-18. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Relocation Areas							
Townsend's Big-Eared Bat, Spotted Bat, Pallid Bat, Western Mastiff Bat, Yuma Myotis, and Fringed Myotis							
Barren	12.46	0.00	11.97	5.37	0.00	2.96	32.76
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue oak–foothill pine	0.01	0.00	0.00	0.00	0.00	2.35	2.36
Total Habitat	12.47	0.00	0.00	5.37	0.00	5.34	35.12
Western Red Bat, Long-Eared Myotis, and Ringtail							
Barren	12.46	0.00	11.96	5.37	0.00	2.96	32.76
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue oak–foothill pine	0.01	0.00	0.00	0.00	0.00	2.35	2.36
Closed-cone pine-cypress	0.05	0.00	5.65	2.23	0.23	0.94	9.11
Douglas-fir	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mixed chaparral	3.36	0.00	3.95	4.11	1.70	9.63	22.77
Montane hardwood	19.73	0.00	20.89	21.64	0.24	0.13	62.63
Montane hardwood–conifer	24.69	0.00	19.27	33.48	2.61	6.62	86.66
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Ponderosa pine	79.56	0.00	96.79	47.56	16.04	0.77	240.74
Total Habitat	139.94	0.00	158.84	114.68	20.86	23.42	457.74
American Marten							
Douglas-fir	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Montane hardwood–conifer	24.69	0.00	19.27	33.49	2.61	6.62	86.66
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.25	0.72
Ponderosa pine	79.56	0.00	96.79	47.58	16.04	47.58	240.74
Total Habitat	104.33	0.00	116.39	81.31	18.69	328.12	328.12

Note:
[1] Acreage values are approximate.

Impact Wild-12 (CP1): Impacts on Special-Status Terrestrial Mollusks (Church's Sideband, Shasta Sideband, Wintu Sideband, Oregon Shoulderband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat All of these species are designated USFS sensitive and/or S&M species, and the Shasta sideband is also an MSCS-covered species. The Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian have also been petitioned for Federal listing. Ground-disturbing activities and vegetation removal associated with 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. For the purposes of this impact analysis for Shasta sideband and Wintu sideband, all CWHR habitats in the impoundment and relocation areas are stratified as limestone or nonlimestone habitat. Shasta chaparral occurs in many CWHR habitats and Shasta hesperian is found in riparian habitats.

Vegetation removal in the impoundment areas and construction activities, such as tree removal, site grading, 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 approximately 1,195 and 425 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat in the impoundment area and relocation areas, respectively. Shasta hesperian habitat loss in the impoundment area and relocation areas would be approximately 28 and 0.72 acre, respectively. The 6.5-foot dam raise would also result in the loss of approximately 5 acres of Shasta sideband habitat in the impoundment area and 0.97 acre in the relocation areas. Wintu sideband habitat loss includes approximately 1.50 acres in the impoundment area. These impacts would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area and relocation areas are summarized in Table 13-19.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-19. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area and Relocation Areas (6.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area: Shasta Sideband							
Limestone	0.00	0.00	0.00	5.43	0.00	0.00	5.43
Impoundment Area: Wintu Sideband							
Limestone	0.00	0.00	0.00	0.00	0.00	1.50	1.50
Impoundment Area: Church's sideband, Oregon Shoulderband, Shasta Chaparral							
Barren	0.57	0.00	0.25	0.00	0.00	0.00	0.81
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	2.21	2.21
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	16.36	22.71
Closed-cone pine–cypress	17.75	0.00	6.30	10.74	23.95	36.71	95.49
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	5.51	5.51
Mixed chaparral	14.83	6.83	80.01	7.32	5.43	5.65	120.07
Montane hardwood	39.08	18.13	86.75	34.61	9.44	39.49	227.49
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.19
Total Habitat	222.31	43.30	343.21	204.83	121.56	260.23	1195.43
Impoundment Area: Shasta Hesperian							
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Total Habitat	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Relocation Areas: Shasta Sideband							
Limestone	0.00	0.00	0.00	0.97	0.00	0.00	0.97
Relocation Areas: Wintu Sideband							
Limestone	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Relocation Areas: Church's sideband, Oregon Shoulderband, Shasta Chaparral							
Barren	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Blue oak–foothill pine	0.01	0.00	0.00	0.00	0.00	2.35	2.36
Closed-cone pine–cypress	0.05	0.00	5.65	5.65	0.23	0.94	9.11
Douglas-fir	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mixed chaparral	3.36	0.00	3.95	3.95	1.70	9.63	22.77
Montane hardwood	19.73	0.00	20.89	20.89	0.24	0.13	62.63
Montane hardwood–conifer	24.69	0.00	19.27	19.27	2.61	6.62	86.66

Table 13-19. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Relocation Areas: Church's sideband, Oregon Shoulderband, Shasta Chaparral (contd.)							
Montane riparian	0.08	0.00	0.33	0.33	0.04	0.02	0.72
Ponderosa pine	79.56	0.00	96.78	96.79	16.04	0.77	240.74
Total Habitat	127.48	0.00	146.88	146.88	20.86	20.46	424.98
Relocation Areas: Shasta Hesperian							
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Total Habitat	0.08	0.00	0.33	0.25	0.04	0.02	0.72

Note:
[1] Acreage values are approximate.

Impact Wild-13 (CP1): Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat The western bumblebee is designated USFS sensitive. Construction activities and vegetation removal associated with 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.

These general habitats also represent potential western bumble bee habitat. Construction activities and vegetation removal associated with 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 containing flowering shrubs and forbs, which serve as potential Western bumble bee nectar sources and potential underground burrow locations. 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 1,227 acres of general wildlife and western bumble bee habitat in the impoundment area and 698 acres of general wildlife and western bumble bee habitat in the relocation areas. Impacts on general wildlife and western bumble bee habitat by CWHR type in the impoundment area and relocation areas are summarized in Tables 13-20 and 13-21.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-20. Impacts on CWHR Habitats and Western Bumble Bee Habitat in the Impoundment Area (6.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Annual grassland	0.07	0.00	0.96	0.37	0.00	0.37	1.78
Barren	1.02	0.00	4.04	0.85	0.00	0.59	6.50
Blue oak–foothill pine	4.96	0.00	0.00	0.00	1.40	16.35	22.71
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	2.21	2.21
Closed-cone pine–cypress	17.75	0.00	6.30	10.78	23.95	36.71	95.49
Douglas-fir	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	5.51	5.51
Mixed chaparral	14.83	6.83	80.01	7.32	5.43	5.65	120.07
Montane hardwood	39.08	18.13	86.75	34.61	9.44	39.49	227.49
Montane hardwood–conifer	34.65	0.50	69.23	66.31	55.70	89.81	316.21
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Ponderosa pine	108.93	15.36	84.75	81.20	25.06	61.89	377.19
Riverine	0.00	0.35	2.30	3.81	0.59	0.00	7.05
Urban	10.95	0.00	1.37	4.74	0.00	0.26	17.33
Total	233.79	43.65	351.64	214.60	122.14	261.46	1227.27

Note:
[1] Acreage values are approximate.
Key:
CWHR = California Wildlife Habitat Relationships

Table 13-21. Impacts on CWHR Habitats and Western Bumble Bee Habitat in the Relocation Areas

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Annual grassland	0.40	0.00	4.95	0.53	0.70	0.01	6.59
Barren	12.46	0.00	11.97	5.38	0.00	2.96	32.76
Blue oak–foothill pine	0.01	0.00	0.00	0.00	0.00	2.35	2.36
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Closed-cone pine–cypress	0.05	0.00	5.65	2.23	0.23	0.94	9.11
Douglas-fir	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mixed chaparral	3.36	0.00	3.95	4.11	1.70	9.63	22.77
Montane hardwood	19.73	0.00	20.89	21.64	0.24	0.13	62.63
Montane hardwood–conifer	24.69	0.00	19.27	33.48	2.61	6.62	86.66
Montane riparian	0.08	0.00	0.33	0.25	0.04	0.02	0.72
Ponderosa pine	79.56	0.00	96.78	47.58	16.04	0.77	240.74

Table 13-21. Impacts on CWHR Habitats and Western Bumble Bee Habitat in the Relocation Areas (contd.)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Riverine	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Urban	15.64	0.00	217.29	0.27	0.00	0.57	233.76
Total	155.98	0.00	381.09	115.47	21.56	23.99	698.10

Note:
[1] Acreage values are approximate.
Key:
CWHR = California Wildlife Habitat Relationships

Impact Wild-14 (CP1): Impacts on Other Birds of Prey (e.g., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (e.g., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat Construction activities and vegetation removal associated with 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 could 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 be subject to either complete (15 percent) or overstory (21 percent) vegetation removal. If vegetation removal were to occur before or after the breeding season, there would be no impact on migratory birds or raptors. When inundation of the impoundment area occurs, 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 the 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 area 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 occurred during the breeding season, there would a potentially significant impact on migratory birds or raptors.

Impacts on these species could occur over multiple years during project implementation if construction activities were conducted in or adjacent to reproductive habitat. This impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-15 (CP1): Loss of Critical Deer Winter and Fawning Range
Construction activities and vegetation removal associated with 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.

Impacts caused by construction and vegetation clearing for the dam and relocation areas under a 6.5-foot raise of Shasta Dam would result in the loss of approximately 3,962 acres of critical deer winter and/or fawning range. This impact would be potentially significant. 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 completed California red-legged frog habitat assessments in coordination with the USFWS in the applicable impoundment and relocation areas, and the potential downstream Sacramento River restoration sites. The assessment results will enable Reclamation and the USFWS to determine if habitat for the species occurs, if impacts are anticipated, and if additional 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 discussed 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 Implementing CP1 would increase available water storage in Shasta Reservoir and result in a modified flow regime, which would modify the flow and stages of the upper Sacramento River. Monthly flow results were used to simulate mean daily flows. On average, in each month, changes in mean monthly flow would be reductions or increases of several percent, and often less

than 2 percent. Changes of 2 percent or less are considered essentially equivalent to baseline operations and therefore do not represent a substantial change. Generally, these effects diminish with distance downstream because of the influence of inflows from tributaries and of diversions and flood bypasses.

Implementing CP1 would reduce the frequency, duration, and magnitude of intermediate to large flows downstream from Shasta Dam during winter (December through February) in some water years, especially wet and above-normal years, because of the increase in storage space that could be filled in some years, usually after dry or critical water years. Conversely, CP1 would increase flow volumes in fall of most years (September through November) because more water would be available for delivery in the driest months. During spring and summer (generally March through August), changes in mean monthly flows would be small reductions or increases (generally less than 2 percent) and typically would be transitional between small reductions in winter flows and small increases in summer flows.

These changes in surface and subsurface hydrology could affect habitats adjacent to the river channel and reduce the formation of off-channel habitats in the long term, which would adversely affect the habitat of western pond turtle.

The portion of riparian vegetation in early successional stages would be reduced, although the total amount of riparian vegetation would not decline substantially. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species, particularly western yellow-billed cuckoos. Because CP1 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

The operation of Shasta Dam has substantially modified the natural flow regime in the primary study area. As discussed previously, dam construction and operation has limited the frequency and magnitude of intermediate to large flows downstream from the dam in winter and spring, and has increased flow volumes during the active growing season (primarily March through October). Implementation of CP1 would be expected to amplify these effects (Table 13-22) because CP1 would increase available storage. These changes are most noticeable in the modeling data for wet and above-normal water years. 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 and Wetlands,” for more information.)

The effects of modified flow regimes would be somewhat attenuated downstream because of the cumulative tributary flow adding to the Sacramento River. However, many of these tributaries are also part of the CVP and SWP

and would likely be operated differently should CP1 be implemented. CP1 would increase the volume of flows in summer and fall of most years, most dramatically in September and October. This change is also a result of increased storage, which allows more water to be available for delivery in the driest months of the year. Although the relative contribution of CP1 to overall changes downstream from Keswick Dam would attenuate, it appears based on the modeling that in September of dry and critical water years, the effect of CP1 would be a substantial increase in flows all the way down to Freeport (Table 13-22).

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

- **Invertebrates** – Blue elderberry shrubs, the host plants 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 floodplain terraces or higher up the bank. Most of the effect of CP1 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. Elderberry shrubs growing in these areas already experience periodic seasonal inundation. CP1 would alter flows substantially (beyond the ±2 percent threshold), but the change in river stage is predicted by CalSim-II to generally be less than about 4 inches. Because of this relatively small vertical change in water surface elevation, implementing CP1 is not likely to prevent establishment or substantially reduce the vigor of existing elderberry shrubs in the primary study area. Therefore, the impact of CP1 on invertebrate species would be less than significant.

Table 13-22. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP1

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick Dam												
Wet	1.6%	0.8%	-6.0%	-2.9%	-0.5%	0.4%	0.3%	0.1%	0.2%	0.3%	0.3%	0.4%
Above Normal	5.1%	-1.5%	-1.4%	-2.2%	-5.2%	-2.2%	0.0%	-3.0%	-1.4%	0.1%	0.9%	5.9%
Below Normal	0.9%	-0.7%	0.1%	-0.9%	-0.7%	-1.1%	0.2%	-2.6%	1.1%	0.2%	0.0%	1.3%
Dry	2.4%	4.1%	-2.0%	-2.0%	-1.0%	0.0%	0.7%	1.4%	2.3%	1.5%	2.3%	3.9%
Critical	2.3%	4.8%	1.0%	-0.6%	1.7%	0.8%	1.0%	1.8%	0.6%	0.7%	-0.2%	5.6%
Bend Bridge												
Wet	1.4%	1.4%	-3.1%	-1.2%	-0.3%	0.3%	0.2%	0.1%	0.2%	0.3%	0.3%	0.4%
Above Normal	4.0%	-1.1%	-0.6%	-1.2%	-2.8%	-1.3%	0.0%	-2.1%	-1.0%	0.0%	0.8%	5.5%
Below Normal	0.8%	-0.1%	0.0%	-0.5%	-0.4%	-0.8%	0.1%	-1.6%	1.0%	0.2%	-0.1%	1.2%
Dry	2.1%	3.1%	-1.0%	-1.0%	-0.5%	0.0%	0.5%	1.1%	2.1%	1.5%	2.3%	3.6%
Critical	1.6%	3.9%	0.8%	-0.4%	1.5%	0.6%	0.8%	1.6%	0.5%	0.6%	-0.2%	5.2%
Butte City												
Wet	1.6%	2.0%	-2.3%	-0.7%	-0.2%	0.3%	0.1%	-0.1%	0.0%	0.2%	0.2%	0.4%
Above Normal	4.3%	-0.8%	-0.4%	-0.9%	-1.9%	-0.8%	0.2%	-2.4%	-1.2%	-0.3%	0.8%	5.8%
Below Normal	1.2%	0.2%	0.3%	-0.6%	-0.3%	-0.7%	-0.3%	-1.5%	1.4%	0.3%	0.0%	1.0%
Dry	2.4%	3.2%	-0.7%	-0.5%	-0.2%	0.0%	0.8%	1.0%	3.2%	2.3%	3.2%	3.8%
Critical	1.4%	4.3%	0.8%	-0.5%	1.4%	0.5%	1.1%	2.2%	0.6%	0.9%	-0.2%	4.8%
Wilkins Slough												
Wet	1.6%	2.2%	-1.6%	-0.2%	0.0%	0.3%	0.1%	-0.1%	0.0%	0.2%	0.2%	0.4%
Above Normal	4.3%	-0.8%	-0.4%	-0.6%	-1.1%	-0.4%	0.2%	-2.4%	-1.2%	-0.3%	0.8%	5.8%
Below Normal	1.2%	0.2%	0.3%	-0.6%	0.0%	-0.7%	-0.3%	-1.5%	1.4%	0.3%	0.0%	1.0%
Dry	2.4%	3.2%	-0.7%	-0.4%	-0.2%	0.0%	0.8%	1.0%	3.2%	2.3%	3.2%	3.8%
Critical	1.4%	4.3%	0.8%	-0.5%	1.4%	0.5%	1.1%	2.2%	0.6%	0.9%	-0.2%	4.8%
Verona												
Wet	1.5%	1.7%	-1.3%	-0.2%	0.0%	0.2%	0.1%	-0.2%	0.0%	0.1%	-0.1%	0.2%
Above Normal	3.2%	-0.1%	-0.3%	-0.4%	-1.3%	-0.2%	0.1%	-1.0%	-0.8%	-0.2%	0.4%	2.3%
Below Normal	0.6%	0.1%	-0.1%	0.0%	0.1%	-0.5%	-0.2%	-0.4%	1.4%	0.1%	-0.1%	-0.3%
Dry	1.3%	2.5%	-0.8%	-0.2%	-0.2%	0.0%	0.5%	0.7%	-1.0%	1.1%	1.8%	5.7%
Critical	0.5%	3.6%	0.8%	-0.2%	1.1%	0.4%	0.7%	2.0%	0.5%	0.8%	-1.5%	3.1%

Table 13-22. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP1 (contd.)

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Freeport												
Wet	0.7%	0.5%	-0.3%	-0.2%	0.1%	0.1%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%
Above Normal	1.2%	-0.5%	0.0%	0.0%	-0.5%	-0.1%	0.1%	-0.8%	-0.6%	-0.1%	0.0%	0.5%
Below Normal	-0.1%	-0.6%	0.5%	0.5%	0.3%	-0.3%	0.1%	-0.5%	0.3%	-0.1%	-0.4%	0.0%
Dry	1.2%	1.4%	-0.5%	-0.1%	-0.1%	-0.1%	0.2%	0.5%	-0.2%	0.7%	1.7%	4.3%
Critical	0.1%	1.8%	0.8%	-0.2%	0.9%	-0.1%	0.4%	0.9%	0.0%	1.4%	0.5%	2.4%

- **Reptiles and Amphibians** – The presence of western pond turtle within the Sacramento River has been documented, and suitable habitat for the species is provided in the primary study area, including tributaries. Although they will use low-velocity areas of the main channels, western pond turtles also rely on habitat types (e.g., oxbow lakes) that have relatively slow rates of formation. Creation of new off-channel water bodies requires 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 become terrestrial habitats as they fill with sediment and organic detritus and are colonized by riparian vegetation. Consequently, activities that prevent the long-term formation of off-channel water bodies (e.g., constructing levees and installing bank armor) reduce the extent of this important type of habitat for pond turtles. The increase in mean stage elevation resulting from implementation of CP1 could provide additional aquatic habitat for the species during some months of some years. A key potentially limiting factor for the western pond turtle is the relationship between water level and flow in off-channel water bodies during the summer incubation season (Stillwater Sciences 2007). The Sacramento River stage and flows would not be substantially changed during summer; however, less aquatic habitat for western pond turtle could be available during winter, spring, and drought periods. Modifying the flow regime by capturing channel-forming flows could also reduce the formation of off-channel water bodies in the long term. These changes in habitat availability could reduce the size of the western pond turtle population along the Sacramento River in the long term by reducing turtle survival and reproductive success. Therefore, the impact of CP1 on the western pond turtle and its habitat would be potentially significant.

- **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 (e.g., 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 (see Chapter 12, “Botanical Resources and Wetlands.”) These long-term changes to the structure of riparian vegetation are expected to change habitat values, causing the loss of,

and in some cases expanding, nesting territories or affecting the reproductive success of some riparian foraging and nesting birds. The birds most adversely affected by this alteration would be those that make the most extensive use of willow thickets and cottonwood- and willow-dominated riparian forests, such as yellow-billed cuckoo and yellow-breasted chat. This loss of nesting habitat would eventually lead to a reduction in local populations of sensitive bird species as habitat became unsuitable for nesting. Although some species, such as raptors that nest in later successional riparian habitats, could benefit from the long-term changes, the impact of CP1 on special-status bird species that nest in early successional 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 under CP1, and available roosting areas in riparian habitats–even if modified by the new flow regime downstream from Shasta Dam–would not be subject to a substantial reduction. Therefore, the impact of CP1 on special-status bats would be less than significant. Potential changes in riparian vegetation along the river channel in the primary study area would not substantially reduce habitat for ringtail because this species is known to use a variety of habitats and forage on a wide array of items that would not be substantially altered (Belluomini 1980). Therefore, the impact of CP1 on special-status mammals would be less than significant.

Implementing CP1 would result in substantial long-term effects on the habitat of western pond turtle and some riparian-nesting special-status bird species. Therefore, 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 Bank swallows generally benefit from bank erosion caused by high winter stream flow (which renews nesting habitat while they are in overwintering habitats to the south); high spring and summer flows, however, have the potential to adversely affect bank swallow colonies by destroying active nests (Stillwater Sciences 2007). Implementing CP1 would increase available water storage in Shasta Reservoir and result in a modified flow regime, which would modify the flow and stages of the upper Sacramento River. Monthly flow results were used to simulate mean daily flows; on average, in each month, changes in mean monthly flow would be reductions or increases of several percent, and often less than 2 percent. Changes of 2 percent or less are considered essentially equivalent to baseline operations and therefore do not represent a substantial change.

Generally, these effects diminish with distance downstream because of the influence of inflows from tributaries and of diversions and flood bypasses.

Implementing CP1 would reduce the frequency, duration, and magnitude of intermediate to large flows downstream from Shasta Dam during winter (December through February) in some water years, especially wet and above-normal years, because of the increase in storage space that could be filled in some years, usually after dry or critical water years. Conversely, CP1 would increase flow volumes in fall of most years (September through November) because more water would be available for delivery in the driest months. During spring and summer (generally March through August), changes in mean monthly flows would be small reductions or increases (generally less than 2 percent) and typically would be transitional between small reductions in winter flows and small increases in summer flows.

The rates of geomorphic processes, such as bank erosion and the average rate of meander migration, are strongly related to flow regime and the cumulative portion of flow exceeding a threshold volume. On portions of the Sacramento River, this threshold may be around 30,000 cubic feet per second (cfs) (Larsen et al. 2006; Stillwater Sciences 2007), which is well below the bankfull discharge but well above flows during spring and summer. However, other important thresholds for bank erosion and channel avulsion along the Sacramento River have been estimated within the range of 10,000–80,000 cfs (Stillwater Sciences 2007). For additional discussion of the relationship of geomorphic processes to flow along the Sacramento River, see the *Fisheries and Aquatic Ecosystem Technical Report.*

CalSim-II results temporally downscaled to mean daily values also indicate the relative magnitude of changes to the flow regime. The simulated change in mean daily discharges greater than 30,000 cfs below the Red Bluff Pumping Plant and Hamilton City is summarized in Figure 12-4 in Chapter 12, “Botanical Resources and Wetlands.” Flows of this magnitude strongly affect bank erosion and meander migration. Overall, these modeling results suggest only a very small change in flows greater than 30,000 cfs along the uppermost portion of the lower Sacramento River. This change is not likely sufficient to cause significant effects on bank swallow.

Any effects would likely occur along the upper Sacramento River throughout the primary study area. In the primary study area, changes in the number of mean daily flows within the magnitude of intermediate and large flows (i.e., greater than 30,000 cfs), which affect bank erosion and meander migration, would be small. Downstream from Keswick Dam and the Red Bluff Pumping Plant, the number of days with mean flows greater than 30,000 cfs would be reduced by approximately 9 and 2 percent, respectively.

Therefore, although there would be a slight alteration of the river’s geomorphic processes in some years and the rate of bank erosion would be reduced, the

length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not decline substantially. High flows during the nesting season that may cause localized nest failure would not increase. The impact on habitat for bank swallow nesting colonies, and therefore bank swallows themselves, would be less than significant.

There are seven known colonies of bank swallow along the Sacramento River in the primary study area (CNDDB 2012). The bank swallow forms nesting colonies in steep-cut, eroding river banks. Generally installed to protect upland land uses, bank revetment has been preferentially applied to actively migrating bends that otherwise would be among the most suitable sites for bank swallow nests. The 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. As modeled, spring flows at Keswick Dam and Bend Bridge would be substantially reduced under some water year conditions (e.g., February and March of above-normal years, May of above-normal and below-normal years), but generally would remain within the ±2 percent threshold that is considered essentially equivalent to existing conditions (Table 13-22). Therefore, the potential for spring flows to cause localized bank swallow nest failure would remain comparable to existing and no-action conditions.

The rate of bank failure is not expected to change substantially, and nest failure caused by spring flows may be reduced under certain conditions. Therefore, the impact of CP1 on 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 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). However, vernal pools are generally not present within the active floodplain of the upper Sacramento River in the primary study area; thus, vernal pools are not anticipated to be affected by changes in flows that could result from implementation of CP1. Changes in flow regime in the primary study area likely would not affect vernal pool special-status species. Because CP1 would not affect vernal pool habitat or the species that occur within the habitat, no impact would occur. 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 more difficult to attain. Therefore, this impact would be potentially significant.

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. Examples of these include the RHJV, Sacramento River Advisory Council Forum, Sacramento River Conservation Area Program, and SRNWR comprehensive conservation plan and environmental assessment (See Section 13.2, "Regulatory Setting.")

Because CP1 may have a potentially significant impact on riparian vegetation in 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. This impact would be potentially significant. 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 Gravel augmentation is not included as part of CP1. Therefore, no impact would occur. 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 Projects CP1 would not include any specific restoration components. Therefore, no impact would occur. 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 those for 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 Implementing 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. It also would increase flow volumes in fall of most years. This change in surface and subsurface hydrology would be of a smaller magnitude than in the upper Sacramento River, but could affect habitats adjacent to the river channel and the long-term formation of off-channel habitats along the lower Sacramento River, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP1 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

This impact would be similar to Impact Wild-17 (CP1) for the upper Sacramento River. However, the effect of CP1 on flow in the Sacramento River would generally attenuate downstream from Red Bluff Pumping Plant because of the inflows from tributaries, and because of other diversions and flood bypasses. CalSim-II modeling indicates that in most months and under most types of water years, changes in flows from Bend Bridge downstream would be within the ±2 percent to be considered essentially equivalent to existing conditions (Table 13-22). The exceptions to this are in September of dry and critical water years, for which the model predicts substantial flow increases. 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 (Impact Wild-17 (CP1)). 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 downstream from Colusa, or in the Delta, for several reasons:

- Flow alterations are more attenuated downstream by tributaries, diversions, and bypasses, and the results of CalSim-II modeling indicate little change in the frequency and duration of bypass inundation.

- Downstream from Colusa, the river is confined to a narrow channel closely bordered by levees lined with riprap; thus, geomorphic processes and riparian habitats are relatively unresponsive to small changes in river flows.

The effects of flow alterations are 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 CVP and SWP are managed to maintain standards for Delta inflow. CVP and SWP operations are constrained by USFWS's 2008 Formal ESA Consultation on the Proposed Coordinated

Operations of the CVP and SWP (2008 USFWS BO) and NMFS's 2009 BO and Conference Opinion on the Long-Term Operations of the CVP and SWP (2009 NMFS BO).

Thus, implementation of CP1 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. However, because of the potential for substantial effects on western pond turtle and riparian-nesting birds in the lower Sacramento River (i.e., Red Bluff Pumping Plant 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 Implementing CP1 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the lower Sacramento River. This reduction also would alter the river's geomorphic processes. 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 decline substantially. High flows during the nesting season that may cause localized bank and nest failure would not increase. The impact on habitat for bank swallow nesting colonies, and therefore bank swallows themselves, 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 (CNDDB 2012). The effect of CP1 on bank swallow along the lower Sacramento River would be similar to that described for the upper Sacramento River. There would be a small reduction in the rate of bank erosion, but not a substantial change in the amount of bank swallow nesting habitat, or increases in spring flows that may cause a substantial increase in localized nest failure. However, the effect of altered flow regimes on bank swallow nesting habitat along the lower Sacramento River would be smaller than the effect along the upper Sacramento River (described in Impact Wild-18 (CP1)). Flow alterations in the Sacramento River downstream from Red Bluff Pumping Plant would be attenuated by tributary inflow, and by other diversions and flood bypasses that would also alter instream flows. For these reasons, this impact 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 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). However, vernal pools are generally not present within the active floodplain of regulated rivers along the lower Sacramento River and in the Delta. The largest increase in water surface elevation predicted to occur under CP1 for locations in the lower river is about 4 inches at Verona in September of dry water years. This increase would not result in river inundation of vernal pool habitat. Because all of the other predicted increases in water surface elevation are less than this, vernal pool special-status species would not likely be affected by changes in flow regime in the extended study area. Because CP1 would not affect vernal pool habitat or the species that occur within the habitat, no impact would occur. 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 more difficult to attain. Therefore, this impact would be potentially significant.

This impact is similar to Impact Wild-20 (CP1) for the upper Sacramento River. For the same reasons as described for the upper Sacramento River, this impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

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 EIRs 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 deliveries relative to the entire CVP/SWP service areas would be small, however. Assuming that this increased deliveries 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 wildlife habitat for sensitive species would be minor. Similarly, projects potentially affecting sensitive habitats and listed species would require permits from CDFW, 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. 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 for the upper Sacramento River and the lower Sacramento River and Delta under Impact Wild-17 (CP1) and Impact Wild-21 (CP1), respectively, 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). Implementation of CP1 would be expected to amplify these effects.

However, the effect of project-related alteration of flow regimes would attenuate somewhat in the Sacramento River downstream from Red Bluff Pumping Plant 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 CVP and SWP are managed to maintain standards for Delta inflow. CVP and SWP operations are constrained by the 2008 USFWS BO and NMFS's 2009 BO. 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 Programmatic 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, including a loss of up to 35 acres of limestone habitat and 2,870 acres of nonlimestone habitat. Because CP2 would result in higher lake levels than CP1, CP2 would also 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, S&M 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 approximately 10 acres of limestone habitat and 1,668 acres of nonlimestone habitat. Impacts to limestone and nonlimestone habitats in the impoundment area are summarized in Table 13-23

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-23. Impacts on Suitable Habitat for the Shasta Salamander in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Limestone	0.00	1.14	0.00	7.64	0.00	2.06	10.83
Nonlimestone	309.64	59.64	485.89	282.19	170.34	360.68	1668.38
Total	309.64	60.78	485.89	289.83	170.34	362.74	1679.21

Note:
[1] 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 approximately 47 acres of habitat for the foothill yellow-legged frog and tailed frog. A summary of suitable habitat loss by arm is presented in Table 13-24.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-24. Impacts on Suitable Habitat for the Foothill Yellow-Legged and Tailed Frog in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Riverine	0.00	0.42	4.02	4.51	0.84	0.00	9.80
Total	2.72	3.65	24.59	10.63	1.84	3.62	47.05

Note:
[1] 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 approximately 37 acres of montane riparian and approximately 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 13-25.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-25. Impacts on Suitable Habitat for the Northwestern Pond Turtle in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Riverine	0.00	0.42	4.02	4.51	0.84	0.00	9.80
Total	2.72	3.65	24.59	10.63	1.84	3.62	47.05

Note:
[1] Acreage values are approximate.

Impact Wild-4 (CP2): Impact on the American Peregrine Falcon Construction activities and vegetation removal associated with 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, 12.5 vertical feet (full pool) of cliff habitat would be inundated. The impacts on this amount of cliff habitat suitable 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 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 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.

Six known bald eagle nest trees would be affected by a 12.5-foot dam raise due to inundation. When inundation 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 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 of approximately 1,376 acres of bald eagle nesting and roosting habitat. Impacts on suitable bald eagle habitat by CWHR type in the impoundment area are summarized in Table 13-26.

Mitigation for this impact is proposed in Section 13.3.5.

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

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	3.03	3.03
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	22.80	32.31
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Montane hardwood	53.30	25.75	120.47	48.59	13.31	55.23	316.66
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.06
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.04	21.54	123.71	114.71	35.08	85.84	532.91
Total	263.88	51.21	363.82	263.88	130.26	303.95	1376.97

Note:
[1] Acreage values are approximate.

Impact Wild-6 (CP2): Loss of Dispersal Habitat for the Northern Spotted Owl
Construction activities and vegetation removal associated with the dam raise, construction activities in the relocation areas, and removal of various amounts of vegetation in the impoundment areas would result in the loss of northern spotted owl dispersal habitat, a Federally listed as threatened 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 dispersal 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 approximately 643 acres of dispersal 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 13-27.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-27. Impacts on Suitable Habitat for the Northern Spotted Owl in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Dispersal	96.85	10.29	155.97	157.79	77.74	144.87	643.51
Foraging	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nesting/roosting	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	96.85	10.29	155.97	157.79	77.74	144.87	643.51

Note:
[1] Acreage values are approximate.

Impact Wild-7 (CP2): Impact on the Purple Martin and Its Nesting Habitat
Construction activities and vegetation removal associated with 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. Also 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.

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 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, which is State-listed as endangered, a USFS sensitive species, and an 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 approximately 1,341 acres of Vaux's swift nesting and foraging habitat in the

impoundment area. Additionally, approximately 37 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat would be lost in the impoundment area.

Impacts on suitable habitats for the willow flycatcher, Vaux's swift, yellow warbler, and yellow-breasted chat habitat by CWHR type in the impoundment area is summarized in Table 13-28.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-28. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Vaux's Swift							
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Montane hardwood	53.30	25.75	120.48	48.59	13.31	55.23	316.66
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.07
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.04	21.54	123.71	114.71	35.08	85.84	532.91
Total Vaux's Swift Habitat	256.83	51.22	363.82	263.85	127.80	278.12	1,341.63
Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat							
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Total Habitat	2.72	3.23	20.57	6.12	1.00	3.62	37.26

Note:
[1] Acreage values are approximate.

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 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; Cooper's hawk, an MSCS-covered species; great blue heron, an MSCS-covered species; and 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 approximately 987 acres of nesting and foraging habitat for long-eared owl and northern goshawk, approximately 1,505 acres of nesting and foraging habitat for the Cooper's hawk, and approximately 1,505 acres of nesting habitat for the great blue heron. Foraging habitat would increase for osprey and great blue heron. No impact to foraging habitat for these species would occur.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-29.

Impacts to osprey would be the same as described for CP1. There are 54 osprey nests within the perimeter of Shasta Lake. Six nest trees would be affected by a 12.5-foot dam raise and 11 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 of the total in the Shasta Lake and vicinity) between the impoundment area and relocation areas would be a potentially significant impact.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-29. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Long-Eared Owl and Northern Goshawk							
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.07
Ponderosa pine	152.04	21.54	123.71	114.71	35.08	85.84	532.91
Total Habitat	200.81	22.23	222.77	209.13	113.49	219.27	987.70

Table 13-29. 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) (contd.)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Cooper's Hawk and Great Blue Heron							
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	22.80	32.31
Closed-cone pine-cypress	24.40	0.00	8.95	14.95	32.72	50.54	131.58
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Montane hardwood	53.30	25.75	120.48	48.59	13.31	55.23	316.66
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.07
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.04	21.54	123.71	114.71	35.08	85.84	532.91
Total Habitat	288.28	51.22	372.77	278.81	162.98	351.45	1505.51

Note:
[1] Acreage values are approximate.

Impact Wild-10 (CP2): Take and Loss of Habitat for the Pacific Fisher
Construction activities and vegetation removal associated with 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 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 approximately 1,057 acres of Pacific fisher habitat.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-30.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-30. Impacts on Suitable Habitat for the Pacific Fisher in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Blue oak-foothill pine	7.05	0.00	0.00	0.00	2.46	22.80	32.31
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.06
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.04	21.54	123.71	114.71	35.08	85.84	532.91
Total Habitat	203.53	25.47	243.34	215.23	114.49	245.68	1057.27

Note:
[1] Acreage values 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, Yuma Myotis, and Fringed Myotis), the American Marten, and Ringtail and Their Habitat Construction activities and vegetation removal associated with 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 fringed myotis, a USFS 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.

Dam construction, vegetation removal, and construction in the relocation areas, and inundation resulting from a 12.5-foot dam raise would result in the loss of approximately 45 acres of reproductive and roosting habitat for the pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis in the impoundment area. Additionally, one limestone cave

located on the Big Backbone Arm that is a known Townsend's big-eared bat roost would be affected by flooding. A 12.5-foot dam raise would result in the loss of approximately 1,687 acres of reproductive and roosting habitat for the western red bat and long-eared myotis. These impacts would be potentially significant.

Dam construction, vegetation removal, and inundation resulting from a 12.5-foot dam raise would result in the loss of approximately 1,687 acres of ringtail habitat. A 12.5-foot dam raise would result in the loss of approximately 1,022 acres of American marten habitat in the impoundment area. These impacts would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-31.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-31. Impacts on Suitable Habitat for Special-Status Bats, American Marten, and Ringtail in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Pallid Bat, Spotted Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Yuma Myotis, and Fringed Myotis							
Barren	1.40	0.89[1]	5.58	1.86	0.00	0.97	9.81
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	3.03	3.03
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	22.80	32.31
Total	8.45	0.00	5.58	1.86	2.46	26.80	45.15
Western Red Bat, Long-Eared Myotis, and Ringtail							
Barren	1.40	0.00	5.58	1.86	0.00	0.96	9.81
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	3.03	3.03
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	22.80	32.31
Closed-cone pine-cypress	24.40	0.00	8.95	14.95	32.72	50.53	131.58
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Mixed chaparral	20.58	9.56	112.76	11.02	7.35	8.26	169.54
Montane hardwood	53.30	25.75	120.48	48.54	13.31	55.23	316.66

Table 13-31. Impacts on Suitable Habitat for Special-Status Bats, American Marten, and Ringtail in the Impoundment Area (12.5-Foot Dam Raise) (contd.)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.76	447.06
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.04	21.54	123.71	114.78	35.08	85.84	532.91
Total Habitat	310.27	60.78	491.12	291.69	170.34	363.71	1687.70
American Marten							
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	4.70	4.70
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.06
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.03	21.54	123.71	114.71	35.08	85.84	532.91
Total Habitat	203.53	25.46	243.34	215.26	114.49	219.92	1022.00

Note:
[1] Acreage values are approximate.

Impact Wild-12 (CP2): Impacts on Special-Status Terrestrial Mollusks (Church's sideband, Shasta Sideband, Wintu Sideband, Oregon shoulderband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat All of these species are designated USFS sensitive and/or S&M species, and the Shasta sideband is also an MSCS-covered species. The Shasta sideband, Wintu sideband, Shasta chaparral, and Shasta hesperian are also petitioned for Federal listing. Ground-disturbing activities and vegetation removal associated with 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.

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 approximately 1,679 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat; and 37 acres of Shasta hesperian habitat in the impoundment area. Approximately 7 acres of Shasta sideband habitat and 2 acres of Wintu sideband would be lost. These impacts would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-32.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-32. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area: Shasta Sideband							
Limestone	0.00	0.00	0.00	7.64	0.00	0.00	7.64
Impoundment Area: Wintu Sideband							
Limestone	0.00	0.00	0.00	0.00	0.00	2.06	2.06
Impoundment Area: Church's sideband, Oregon shoulderband, Shasta Chaparral							
Barren	0.77	0.00	0.36	0.00	0.00	0.00	1.13
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	3.03	3.03
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	22.80	32.31
Closed-cone pine–cypress	24.40	0.00	8.95	14.96	32.72	50.54	131.58
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Mixed chaparral	20.58	9.56	112.76	11.02	7.35	8.26	169.54
Montane hardwood	53.30	25.75	120.47	48.59	13.31	55.23	316.66
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.07
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.04	21.54	123.71	114.71	35.08	85.84	532.91
Total Habitat	310.00	60.78	485.89	289.83	170.34	362.74	1679.21
Impoundment Area: Shasta Hesperian							
Montane riparian	1.54	2.48	15.92	4.60	0.58	2.59	27.71
Total Habitat	1.54	2.48	15.92	4.60	0.58	2.59	27.71

Note:
[1] Acres are approximate.

Impact Wild-13 (CP2): Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat Construction activities and vegetation removal associated with 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.

These general habitats also represent potential Western bumble bee habitat. Construction activities and vegetation removal associated with 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 containing flowering shrubs and forbs, which serve as potential Western bumble bee nectar sources, and potential underground burrow locations. 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.

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 and Western bumble bee habitat. This impact would be potentially significant.

Inundation resulting from a 12.5-foot dam raise would result in a loss of approximately 1,725 acres of general wildlife habitat and Western bumble bee habitat in the impoundment area. Impacts on general wildlife habitat and Western bumble bee habitat by CWHR type in the impoundment area are summarized in Table 13-33.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-33. Impacts on CWHR Habitats and Western Bumble Bee Habitat in the Impoundment Area (12.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Annual grassland	0.36	0.00	1.53	0.53	0.00	0.38	2.79
Barren	1.40	0.00	5.58	1.86	0.00	0.97	9.81
Blue oak–foothill pine	7.05	0.00	0.00	0.00	2.46	22.79	32.31
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	3.03	3.03
Closed-cone pine–cypress	24.40	0.00	8.95	14.96	32.72	50.54	131.58
Douglas-fir	0.00	0.00	0.00	0.06	0.00	0.00	0.06
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	7.66	7.66
Mixed chaparral	20.58	9.56	112.76	11.02	7.35	8.26	169.54
Montane hardwood	53.30	25.75	120.48	48.59	13.31	55.23	316.66
Montane hardwood–conifer	48.77	0.70	99.06	94.36	78.41	125.77	447.06
Montane riparian	2.72	3.23	20.57	6.12	1.00	3.62	37.26
Ponderosa pine	152.04	21.54	123.71	114.71	35.08	85.84	532.91
Riverine	0.00	0.42	4.02	4.51	0.84	0.00	9.79

Table 13-33. Impacts on CWHR Habitats and Western Bumble Bee Habitat in the Impoundment Area (12.5-Foot Dam Raise) (contd.)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Urban	16.65	0.00	1.63	6.42	0.00	0.66	25.37
Total	327.28	61.20	498.30	303.14	171.18	364.75	1725.85

Note:
[1]Acreage values are approximate.

Impact Wild-14 (CP2): Impacts on Other Birds of Prey (e.g., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (e.g., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat Construction activities and vegetation removal associated with 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 could 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.

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 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 approximately 4,446 acres of critical deer winter and/or fawning range. This impact would be potentially significant. 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 completed California red-legged frog habitat assessments in coordination with the USFWS in the applicable impoundment and relocation areas, and the potential downstream Sacramento River restoration sites. The assessment results will enable Reclamation and the USFWS to determine if

habitat for the species occurs, if impacts are anticipated, and if additional 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 discussed 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 Implementing CP2 would increase available water storage in Shasta Reservoir and result in a modified flow regime. This modification would reduce the frequency, duration, and magnitude of intermediate to large flows downstream from Shasta Dam from December through January in most types of water years, extending through March in above-normal water years. Conversely, CP2 would increase the volume of flows from summer through fall of most years, especially in dry and critical water years. One of the goals of CP2 is to improve water supply during the driest of years, so this increase is not unexpected. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and reduce the long-term formation of off-channel habitats, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP2 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

This impact would be similar to Impact Wild-17 (CP1). CP2 would affect habitat for sensitive species through the same pathways (alteration of off-channel habitat for western pond turtles, changes to successional patterns of vegetation) as discussed for CP1. The only difference between the two is the extent of the impact. Under CP2, the reductions in winter flows would be both more frequent and of larger magnitude than modeled to occur under CP1. In all water year types (except below-normal years and December of critical years), flows would be reduced by CP2 in December and January by on average about 2.2 and 8.0 percent. In above-normal years, this extends through February (-6.3 percent) and March (-5.2 percent) (Table 13-34). 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 Implementing CP2 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the Sacramento River in the primary study area. This reduction also would alter the river's geomorphic processes, including the rate of bank erosion. However, the length of eroding banks would not be

substantially altered, and thus, nesting habitat for bank swallows would not decline substantially. High flows during the nesting season that may cause localized nest failure would not increase substantially (generally less than an average of a 3-inch increase in water surface elevation in the worst case). For these reasons, 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 could be greater under CP2 than under CP1 because reductions in channel-forming flows could be more extensive than under CP1. Nonetheless, for the same reasons as discussed for 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 As mentioned in Impact Wild-19 (CP1), vernal pools are generally not present within the active floodplain of the upper Sacramento River in the primary study area; vernal pools are found in upland locations outside of the main river channel and the floodplain. Thus, vernal pools are not anticipated to be affected by changes in flows that could result from implementation of CP2. Because CP2 would not affect vernal pool habitat or the species that occur within the habitat, no impact would occur. Mitigation for this impact is not needed, and thus not proposed.

Table 13-34. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP2

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick												
Wet	1.2%	2.0%	-8.0%	-4.7%	-1.3%	0.4%	0.3%	0.4%	0.5%	0.5%	0.7%	0.9%
Above Normal	3.6%	0.0%	-2.5%	-2.2%	-6.3%	-5.2%	0.1%	-3.0%	-3.2%	0.3%	0.9%	8.6%
Below Normal	2.7%	-0.6%	-0.8%	-1.6%	-1.2%	-1.8%	0.5%	-4.0%	1.3%	0.1%	0.3%	1.3%
Dry	5.8%	5.3%	-2.8%	-3.3%	-0.6%	0.0%	1.8%	2.2%	3.9%	2.5%	4.9%	7.3%
Critical	3.6%	6.5%	1.5%	2.4%	1.6%	0.9%	0.9%	1.3%	0.8%	3.6%	-0.2%	9.4%
Bend Bridge												
Wet	1.1%	2.3%	-4.2%	-2.0%	-0.8%	0.3%	0.2%	0.4%	0.5%	0.4%	0.6%	0.8%
Above Normal	2.8%	-0.4%	-0.9%	-1.2%	-3.5%	-2.9%	0.1%	-2.0%	-2.4%	0.3%	0.8%	8.2%
Below Normal	2.4%	0.0%	-0.5%	-0.9%	-0.7%	-1.3%	0.4%	-2.6%	1.2%	0.1%	0.2%	1.2%
Dry	4.8%	4.6%	-1.5%	-1.6%	-0.3%	0.0%	1.4%	1.8%	3.7%	2.5%	4.8%	6.7%
Critical	2.7%	5.3%	1.3%	2.1%	1.4%	0.7%	0.8%	1.2%	0.7%	3.5%	-0.2%	8.6%
Butte City												
Wet	1.2%	3.0%	-3.2%	-1.2%	-0.5%	0.2%	0.2%	0.1%	0.3%	0.3%	0.6%	0.7%
Above Normal	3.3%	0.0%	-0.6%	-0.9%	-2.6%	-1.9%	0.2%	-2.6%	-2.8%	0.0%	0.7%	8.8%
Below Normal	2.5%	0.3%	-0.3%	-1.1%	-0.4%	-1.1%	-0.2%	-2.5%	1.6%	-0.1%	0.1%	0.9%
Dry	5.3%	5.0%	-1.1%	-1.0%	0.1%	-0.1%	2.2%	1.9%	5.3%	3.4%	6.6%	6.8%
Critical	2.5%	5.8%	1.3%	1.7%	1.3%	0.6%	1.1%	1.7%	1.0%	5.4%	-0.1%	8.6%
Wilkins Slough												
Wet	1.2%	3.2%	-2.0%	-0.5%	-0.1%	0.3%	0.2%	0.1%	0.3%	0.3%	0.6%	0.7%
Above Normal	3.3%	0.0%	-0.6%	-0.7%	-1.3%	-0.9%	0.2%	-2.6%	-2.8%	0.0%	0.7%	8.8%
Below Normal	2.5%	0.3%	0.0%	-1.1%	0.1%	-1.1%	-0.2%	-2.5%	1.6%	-0.1%	0.1%	0.9%
Dry	5.3%	5.0%	-1.1%	-0.9%	0.0%	-0.1%	2.2%	1.9%	5.3%	3.4%	6.6%	6.8%
Critical	2.5%	5.8%	1.3%	1.7%	1.3%	0.6%	1.1%	1.7%	1.0%	5.4%	-0.1%	8.6%
Verona												
Wet	0.4%	2.4%	-1.8%	-0.4%	-0.1%	0.2%	0.1%	0.0%	0.2%	0.0%	0.0%	0.4%
Above Normal	2.2%	0.7%	-0.5%	-0.4%	-1.7%	-0.5%	0.1%	-1.1%	-1.6%	0.0%	0.4%	3.5%
Below Normal	1.4%	1.0%	-0.5%	-0.4%	0.1%	-0.7%	-0.1%	-1.0%	1.6%	-0.1%	0.1%	-0.3%
Dry	3.2%	3.7%	-1.1%	-0.5%	-0.1%	0.0%	1.3%	1.0%	-1.5%	2.6%	3.4%	10.1%
Critical	0.7%	4.1%	0.8%	1.3%	0.8%	0.3%	0.7%	2.0%	1.2%	6.2%	-1.4%	5.4%

Table 13-34. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP2 (contd.)

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Freeport												
Wet	0.4%	0.7%	-0.3%	-0.4%	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
Above Normal	1.9%	-0.4%	-0.1%	0.2%	-0.4%	-0.4%	0.1%	-0.9%	-1.3%	-0.1%	0.1%	0.6%
Below Normal	0.4%	0.2%	0.3%	0.5%	0.2%	-0.5%	0.2%	-1.1%	0.4%	-0.3%	-0.4%	0.2%
Dry	2.3%	2.8%	-0.7%	-0.3%	0.1%	0.1%	1.0%	0.7%	-0.5%	1.7%	2.8%	8.0%
Critical	-0.1%	2.8%	1.0%	1.5%	0.7%	0.0%	0.7%	0.9%	0.0%	2.1%	0.6%	3.6%

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 more difficult to attain. Therefore, this impact would be potentially significant.

This impact would be similar to Impact Wild-20 (CP1). The extent of the impact could be greater under CP2 than under CP1. 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 Gravel augmentation is not included as part of CP2. Therefore, no impact would occur. 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 Projects CP2 would not include any specific restoration components. Therefore, no impact would occur. 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 Implementing 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 in some years. It also would increase the flow volumes in late summer and fall of most years. Although this change in surface and subsurface hydrology would be of a smaller magnitude than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats along the lower Sacramento River, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP2 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

This impact would be similar to Impact Wild-23 (CP1). Because CP2 could substantially reduce available habitat for special-status wildlife, 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 Implementing CP2 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the lower Sacramento River. This reduction also would alter the river's geomorphic processes. 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 decline substantially. High flows during the nesting season that may cause localized bank and nest failure would not increase substantially. The impact on habitat for bank swallow nesting colonies, and therefore bank swallows themselves, would be less than significant.

This impact would be similar to Impact Wild-24 (CP1). 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. Because the extent of bank erosion and flooding of nesting sites is not expected to substantially change under CP2, 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 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). However, vernal pools are generally not present within the active floodplain of regulated rivers along the lower Sacramento River and in the Delta. Because the sensitive habitat and species are located outside of the area affected by the changes in flows, CP2 would not alter this habitat. Therefore, no impact would occur. 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 more difficult to attain. Therefore, this impact would be potentially significant.

This impact would be similar to 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 (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. 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 CVP and SWP are operated as an integrated system with the same downstream management targets and goals. CVP and SWP operations are constrained by the 2008 USFWS BO and the 2009 NMFS BO. Thus, implementation of CP2 is not anticipated to sufficiently alter flow to the CVP/SWP service areas to have a substantial effect on the riparian habitat upon which special-status wildlife species depend. For these reasons, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

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

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 Programmatic 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 CP2, CP3 would also require more relocation of utilities, public service facilities, and recreational facilities than CP2, including a loss of up to 35 acres of limestone habitat and 2,870 acres of nonlimestone habitat. Because CP3 would result in higher lake levels than CP2, CP3 would also result in a larger (and deeper) area of inundation than CP2, in turn requiring more vegetation clearing within the inundation area than CP2.

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, S&M 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 approximately 16 acres of limestone habitat and 2,399 acres of nonlimestone habitat. Impacts on limestone and nonlimestone habitats in the impoundment area are summarized in Table 13-35.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-35. Impacts on Suitable Habitat for the Shasta Salamander in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Limestone	0.00	1.63	0.00	11.09	0.00	2.85	15.57
Nonlimestone	436.74	89.15	710.35	407.76	241.51	511.00	2399.56
Total	436.74	90.78	710.35	418.85	241.51	513.85	2415.13

Note:
[1] Acreage values are approximate.

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 approximately 80 acres of foothill yellow-legged frog and tailed frog habitat. A summary of suitable habitat loss by arm is presented in Table 13-36.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-36. Impacts on Suitable Habitat for the Foothill Yellow-Legged and Tailed Frog in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Riverine	0.00	0.88	5.24	15.43	1.41	0.00	22.96
Total	4.16	7.55	31.40	29.34	2.94	5.52	80.90

Note:
[1] Acreage values are approximate.

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 approximately 58 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 13-37.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-37. Impacts on Suitable Habitat for the Northwestern Pond Turtle in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Riverine	0.00	0.88	5.24	15.43	1.41	0.00	22.96
Total	4.16	7.55	31.40	29.34	2.94	5.52	80.90

Note:
[1] Acreage values are approximate.

Impact Wild-4 (CP3): Impact on the American Peregrine Falcon Construction activities and vegetation removal associated with 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 an 18.5-foot raise in lake elevation; however, 18.5 (full pool) vertical feet of cliff habitat would be inundated. The impacts on this amount of cliff habitat suitable 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 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.

Six known bald eagle nest trees would be affected by an 18.5-foot dam raise due to inundation. When inundation 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 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 of approximately 1,989 acres of bald eagle nesting and roosting habitat. Impacts on suitable bald eagle habitat by CWHR type in the impoundment area are summarized in Table 13-38.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-38. Impacts on Suitable Habitat for the Bald Eagle in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	4.18	4.18
Blue oak–foothill pine	10.36	0.00	0.00	0.00	4.29	32.33	46.98
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	10.96	10.96
Montane hardwood	73.49	38.76	171.02	70.36	19.43	78.84	451.91
Montane hardwood–conifer	70.68	0.99	150.43	136.53	111.63	179.48	649.76

Table 13-38. Impacts on Suitable Habitat for the Bald Eagle in the Impoundment Area (18.5-Foot Dam Raise) (contd.)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.21	161.64	49.56	122.07	767.30
Total	373.80	77.15	535.81	382.82	186.44	433.38	1989.40

Note:
[1] Acreage values are approximate.

Impact Wild-6 (CP3): Loss of Dispersal Habitat for the Northern Spotted Owl
Construction activities and vegetation removal associated with 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 species that is Federally listed as threatened species and an MSCS-covered species. In addition, inundation caused by the raising of Shasta Dam would result in the loss of 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 approximately 976 acres of northern spotted owl dispersal habitat. Impacts on suitable spotted owl habitat by CWHR type in the impoundment area are summarized in Table 13-39.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-39. Impacts on Suitable Habitat for the Northern Spotted Owl in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Dispersal	145.16	17.49	243.53	239.73	114.12	216.06	976.09
Foraging	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nesting/Roosting	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	145.16	17.49	243.53	239.73	114.12	216.06	976.09

Note:
[1] Acreage values are approximate.

Impact Wild-7 (CP3): Impact on the Purple Martin and Its Nesting Habitat
Construction activities and vegetation removal associated with 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. Also 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.

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 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 species State listed as endangered, a USFS sensitive species, and an 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 approximately 1,938 acres of Vaux's swift nesting and foraging habitat in the impoundment area. Additionally, approximately 58 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat would be lost in the impoundment area.

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 13-40.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-40. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area							
Vaux's Swift							
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	10.96	10.96
Montane hardwood	73.49	38.76	171.01	70.36	19.43	78.84	451.91
Montane hardwood–conifer	70.68	0.99	150.43	136.54	111.63	179.48	649.76
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.20	161.64	49.56	122.07	767.30
Total Vaux's Swift Habitat	363.44	77.14	535.81	382.82	182.15	396.86	1938.24
Willow Flycatcher, Yellow Warbler, and Yellow-Breasted Chat							
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Total Habitat	4.16	6.67	26.16	13.91	1.53	5.52	57.94

Note:
[1] Acreage values 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 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 of approximately 1,428 acres of nesting and foraging habitat for the long-eared owl and northern goshawk, approximately 2,167 acres of nesting and foraging habitat for the Cooper's hawk, and approximately 2,167 acres of nesting habitat

for the great blue heron. Foraging habitat would increase for osprey and the great blue heron. No impact to foraging habitat for these species would occur.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-41.

Table 13-41. 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[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Long-Eared Owl and Northern Goshawk							
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	10.96	10.96
Montane hardwood–conifer	70.68	0.99	150.43	136.54	111.63	179.48	649.76
Ponderosa pine	215.11	30.72	188.21	161.64	49.56	122.07	767.30
Total Habitat	285.80	31.72	338.61	298.36	161.19	312.51	1428.39
Cooper's Hawk and Great Blue Heron							
Blue oak–foothill pine	10.36	0.00	0.00	0.00	4.29	32.33	46.98
Closed-cone pine-cypress	32.68	0.00	12.95	20.89	44.72	70.52	181.77
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	10.96	10.96
Montane hardwood	73.49	38.76	171.02	70.55	19.43	78.84	451.91
Montane hardwood–conifer	70.68	0.99	150.43	136.54	111.63	179.48	649.76
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.21	161.63	49.56	122.06	767.30
Total Habitat	406.48	77.15	548.77	403.70	231.16	499.73	2167.00

Note:
[1] Acreage values are approximate.

Impacts to osprey would be similar to those described for CP1. There are 54 osprey nests within the perimeter of Shasta Lake. Seven nest trees would be affected by a 12.5-foot dam raise, and 11 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 18 nest trees (33 percent of the total in the Shasta Lake and vicinity) between the impoundment area and relocation areas would be a potentially significant impact.

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 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 approximately 1,533 acres of Pacific fisher habitat.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-42.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-42. Impacts on Suitable Habitat for the Pacific Fisher in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Blue oak-foothill pine	10.36	0.00	0.00	0.00	4.29	32.33	46.98
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	10.96	10.96
Montane hardwood–conifer	70.68	0.99	150.43	136.53	111.63	179.48	649.76
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.21	161.64	49.56	122.07	767.30
Total Habitat	300.32	38.39	364.80	312.45	167.00	350.36	1533.31

Note:
[1] Acreage values 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, Yuma Myotis, and Fringed Myotis), the American Marten, and Ringtail and Their Habitat Construction activities and vegetation removal associated with 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 fronged myotis, a USFS 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.

Dam construction, vegetation removal, and inundation resulting from an 18.5-foot dam raise would result in the loss of approximately 69 acres of reproductive and roosting habitat for the pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis in the impoundment area. Additionally, one limestone cave located on the Big Backbone Arm that is a known Townsend's big-eared bat roost would be affected by flooding. An 18.5-foot dam raise would result in the loss of approximately 2,431 acres of reproductive and roosting habitat for the western red bat and long-eared myotis. These impacts would be potentially significant.

Dam construction, vegetation removal, and inundation resulting from an 18.5-foot dam raise would result in the loss of approximately 2,431 acres of ringtail habitat. An 18.5-foot dam raise would result in the loss of approximately 1,482 acres of American marten habitat in the impoundment area. These impacts would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-43.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-43. Impacts on Suitable Habitat for Special-Status Bats, American Marten, and Ringtail in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Pallid Bat, Spotted Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Yuma Myotis, and Fringed Myotis							
Barren	2.30	1.28[2]	10.60	3.56	0.00	1.35	17.81
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	4.18	4.18
Blue oak–foothill pine	10.36	0.00	0.00	0.00	4.29	32.33	46.98
Total	12.66	0.00	10.60	3.56	4.29	37.86	68.98
Western Red Bat, Long-Eared Myotis, and Ringtail							
Barren	2.30	0.00	10.60	3.56	0.00	1.35	17.81
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	4.18	4.18
Blue oak–foothill pine	10.36	0.00	0.00	0.00	4.29	32.33	46.98
Closed-cone pine-cypress	32.68	0.00	12.95	20.89	44.72	70.52	181.77
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	10.96	10.96
Mixed chaparral	29.19	13.64	161.04	15.14	10.35	12.99	242.36
Montane hardwood	73.49	38.76	171.02	70.37	19.43	78.84	451.91
Montane hardwood–conifer	70.68	0.99	150.43	136.54	111.63	179.48	649.76
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.21	161.64	49.56	122.07	767.30
Total Habitat	437.98	90.78	720.42	422.41	241.51	518.25	2431.35
American Marten							
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	6.73	6.73
Montane hardwood–conifer	70.68	0.99	150.43	136.54	111.63	179.48	649.76
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.21	161.64	49.56	122.07	767.30
Total Habitat	289.95	38.38	364.79	312.45	162.72	313.80	1482.09

Note:
[1] Acreage values are approximate.
[2] Represents the amount of the limestone outcrop impacted at the Big Backbone Arm cave location.

Impact Wild-12 (CP3): Impacts on Special-Status Terrestrial Mollusks (Church's sideband, Shasta Sideband, Wintu Sideband, Oregon shoulderband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat All of these species are designated USFS sensitive and/or S&M species, and the Shasta sideband is also an MSCS-covered species. The Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian are also petitioned for Federal listing. Ground-disturbing activities and vegetation removal associated

with 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.

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 approximately 2,415 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat; and 58 acres of Shasta hesperian habitat in the impoundment area. Approximately 11 acres of Shasta sideband habitat and 3 acres of Wintu sideband habitat would be lost. These impacts would be potentially significant.

Impacts on suitable habitat by CWHR type in the impoundment area are summarized in Table 13-44.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-44. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Impoundment Area: Shasta Sideband							
Limestone	0.00	0.00	0.00	11.09	0.00	0.00	11.09
Impoundment Area: Wintu Sideband							
Limestone	0.00	0.00	0.00	0.00	0.00	2.85	2.85
Impoundment Area: Church's sideband, Oregon shoulderband, Shasta Chaparral							
Barren	1.06	0.00	0.55	0.00	0.00	0.00	1.61
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	4.18	4.18
Blue oak–foothill pine	10.36	0.00	0.00	0.00	4.29	32.33	46.98
Closed-cone pine-cypress	32.68	0.00	12.95	20.89	44.72	70.52	181.77
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Klamath mixed conifer	0.00	0.00	0.00	0.00	0.00	10.96	10.96
Mixed chaparral	29.19	13.64	161.04	15.14	10.35	12.99	242.36
Montane hardwood	73.49	38.76	171.02	70.37	19.43	78.84	451.91
Montane hardwood–conifer	70.68	0.99	150.43	136.54	111.63	179.48	649.76

Table 13-44. Impacts on Suitable Habitat for Special-Status Terrestrial Mollusks in the Impoundment Area (18.5-Foot Dam Raise) (contd.)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.21	161.64	49.56	122.07	767.30
Total Habitat	436.74	90.78	710.36	418.85	241.51	516.90	2415.14
Impoundment Area: Shasta Hesperian							
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Total Habitat	4.16	6.67	26.16	13.91	1.53	5.52	57.94

Note:
[1] Acres are approximate.

Impact Wild-13 (CP3): Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat Construction activities and vegetation removal associated with 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.

These general habitats also represent potential western bumble bee habitat. Construction activities and vegetation removal associated with 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 containing flowering shrubs and forbs, which serve as potential western bumble bee nectar sources, and potential underground burrow locations. 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.

Impacts caused by construction and vegetation clearing for the dam and relocation areas would be similar to CP2. However, inundation caused by an 18.5-foot raise of Shasta Dam would result in a greater loss of general wildlife habitat and western bumble bee habitat. This impact would be potentially significant.

Inundation resulting from an 18.5-foot dam raise would result in a loss of approximately 2,492 acres of general wildlife habitat and western bumble bee habitat in the impoundment area. Impacts on general wildlife habitat and western bumble bee habitat by CWHR type in the impoundment area are summarized in Table 13-45.

Mitigation for this impact is proposed in Section 13.3.5.

Table 13-45. Impacts on CWHR Habitats and Western Bumble Bee Habitat in the Impoundment Area (18.5-Foot Dam Raise)

Habitat	Area (Acres[1])						
	Main Body	Big Backbone Arm	Sacramento Arm	McCloud Arm	Squaw Creek Arm	Pit Arm	Total
Annual grassland	0.44	0.00	3.10	0.70	0.00	0.38	4.62
Barren	2.30	0.00	10.60	3.56	0.00	1.35	17.81
Blue oak–foothill pine	10.36	0.00	0.00	0.00	4.29	4.18	4.18
Blue oak woodland	0.00	0.00	0.00	0.00	0.00	32.33	46.98
Closed-cone pine–cypress	32.68	0.00	12.95	20.89	44.72	70.52	181.77
Douglas-fir	0.00	0.00	0.00	0.36	0.00	0.00	0.36
Mixed chaparral	29.19	13.64	161.04	15.14	10.35	13.00	242.36
Montane hardwood	73.49	38.76	171.01	70.55	19.43	78.84	451.91
Montane hardwood–conifer	70.68	0.99	150.42	136.36	111.63	179.48	649.76
Montane riparian	4.16	6.67	26.16	13.91	1.53	5.52	57.94
Ponderosa pine	215.11	30.72	188.19	161.64	49.56	122.07	767.30
Riverine	0.00	0.88	5.24	15.43	1.41	0.00	22.96
Urban	21.95	0.00	1.95	7.96	0.00	1.27	33.14
Total	460.37	91.67	730.72	446.49	242.92	519.90	2492.07

Note:
[1] Acreage values are approximate.

Impact Wild-14 (CP3): Impacts on Other Birds of Prey (e.g., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (e.g., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat Construction activities and vegetation removal associated with 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 could 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.

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 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 in the loss of approximately 5,182 acres of critical deer winter and/or fawning range. This impact would be potentially significant.

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 completed California red-legged frog habitat assessments in coordination with the USFWS in the applicable impoundment and relocation areas, and the potential downstream Sacramento River restoration sites. The assessment results will enable Reclamation and the USFWS to determine if habitat for the species occurs, if impacts are anticipated, and if additional 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 discussed 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 Implementing CP3 would increase available water storage in Shasta Reservoir and result in a modified flow regime. This modification would reduce the frequency, duration, and magnitude of intermediate to large flows downstream from Shasta Dam during winter and spring in some water years, and would increase the volume of flows from spring through fall of some water year types. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and reduce the formation of off-channel habitats, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP3 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

This impact would be similar to Impact Wild-17 (CP1). The goal of CP3 is to increase agricultural water supply reliability, as is evident in the CalSim-II modeling results. As modeled, in dry and critical water years, flows are generally higher – substantially so in several months – for the entire growing season, extending into November (Table 13-46). This additional water is

available during the growing season because of the increase in reservoir storage. Similar to results for CP1 and CP2, flows are shown to be substantially lower in winter and early spring as the larger reservoir captures more runoff. As discussed in Impact Wild-17 (CP1), the increased storage capacity reduces the frequency of channel-forming flows that create habitat for sensitive species like western pond turtle. This reduction in flows would also lead to a long-term reduction in early successional stage riparian habitat used by many species of riparian-dependent sensitive species of birds. The change in flow regimes would substantially reduce habitat for sensitive species of riparian-dependent wildlife. For this reason, 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 Implementing CP3 would cause a reduction in the magnitude, duration, and frequency of intermediate to large flows in the Sacramento River in the primary study area. This reduction also would alter the river's geomorphic processes, including the rate of bank erosion. However, the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not decline substantially. High flows during the nesting season that may cause localized nest failure would not increase. The impact on habitat for bank swallow nesting colonies would be less than significant.

This impact would be similar to Impact Wild-18 (CP1). Generally installed to protect upland land uses, bank revetment has been preferentially applied to actively eroding and migrating bends that otherwise would be among the most suitable sites for bank swallow nests. The reduction in intermediate to large flows by CP3 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. The increase in water surface elevation is modeled to average about 2 inches or less during the breeding season (April–July) in all water year types. Although the flow increase exceeds the ±2 percent threshold that is used to discriminate between conditions essentially equivalent to existing conditions, the actual increase in elevation is not likely to result in additional flooding of bank swallow colonies. Because CP3 would not result in a substantial reduction in available habitat or in nesting colonies, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

Table 13-46. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP3

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick												
Wet	1.0%	2.7%	-10.2%	-6.2%	-1.4%	0.3%	0.3%	0.6%	0.7%	0.7%	0.8%	2.7%
Above Normal	5.9%	1.1%	-4.3%	-3.5%	-6.8%	-8.0%	0.8%	-2.2%	-3.0%	0.4%	1.2%	10.4%
Below Normal	1.7%	-0.2%	-1.8%	-1.5%	0.5%	-2.1%	2.0%	-1.8%	1.2%	1.2%	1.9%	3.0%
Dry	6.6%	7.0%	-2.6%	-3.3%	-1.2%	-0.1%	2.6%	4.3%	3.4%	2.2%	6.3%	3.5%
Critical	1.1%	7.2%	2.8%	-1.8%	1.0%	0.3%	1.9%	2.0%	1.0%	0.8%	2.0%	6.2%
Bend Bridge												
Wet	0.9%	2.7%	-5.4%	-2.7%	-0.8%	0.2%	0.2%	0.5%	0.6%	0.7%	0.7%	2.4%
Above Normal	4.7%	0.1%	-2.0%	-2.0%	-3.8%	-4.5%	0.6%	-1.4%	-2.2%	0.3%	1.0%	9.9%
Below Normal	1.5%	0.3%	-1.2%	-0.8%	0.4%	-1.5%	1.4%	-0.9%	1.2%	1.1%	1.7%	2.6%
Dry	5.3%	6.1%	-1.4%	-1.6%	-0.6%	0.0%	2.0%	3.4%	3.1%	2.1%	6.1%	3.0%
Critical	0.7%	5.9%	2.4%	-1.4%	0.9%	0.2%	1.5%	1.7%	0.9%	0.8%	2.0%	5.6%
Butte City												
Wet	1.1%	3.4%	-4.1%	-1.6%	-0.6%	0.2%	0.3%	0.1%	0.2%	0.3%	0.5%	2.3%
Above Normal	5.1%	0.3%	-1.7%	-1.3%	-2.9%	-3.0%	0.8%	-2.1%	-2.9%	-0.4%	0.6%	10.7%
Below Normal	1.9%	0.6%	-0.9%	-1.0%	0.5%	-1.4%	1.5%	-0.9%	1.0%	0.7%	1.3%	2.1%
Dry	5.8%	6.7%	-1.0%	-1.0%	-0.2%	-0.1%	2.6%	3.1%	3.4%	1.6%	7.6%	2.4%
Critical	0.7%	6.5%	2.7%	-1.3%	1.0%	0.1%	1.9%	2.1%	1.0%	0.7%	2.3%	5.6%
Wilkins Slough												
Wet	1.1%	3.6%	-2.3%	-0.8%	-0.1%	0.3%	0.3%	0.1%	0.2%	0.3%	0.5%	2.3%
Above Normal	5.1%	0.3%	-1.4%	-0.8%	-1.4%	-1.5%	0.8%	-2.1%	-2.9%	-0.4%	0.6%	10.7%
Below Normal	1.9%	0.6%	-0.2%	-1.0%	0.7%	-1.4%	1.5%	-0.9%	1.0%	0.7%	1.3%	2.1%
Dry	5.8%	6.7%	-1.0%	-0.9%	-0.2%	-0.1%	2.6%	3.1%	3.4%	1.6%	7.6%	2.4%
Critical	0.7%	6.5%	2.7%	-1.3%	1.0%	0.1%	1.9%	2.1%	1.0%	0.7%	2.3%	5.6%
Verona												
Wet	0.9%	2.7%	-2.3%	-0.6%	-0.1%	0.1%	0.1%	-0.1%	0.2%	0.1%	-0.1%	0.9%
Above Normal	3.6%	1.3%	-1.1%	-0.5%	-1.9%	-1.0%	0.5%	-0.7%	-1.7%	-0.1%	0.4%	4.4%
Below Normal	1.7%	0.4%	0.9%	-0.3%	0.3%	-1.4%	0.9%	0.0%	1.2%	0.5%	0.5%	0.5%
Dry	3.7%	4.7%	-0.9%	-0.4%	-0.3%	-0.1%	1.7%	2.0%	2.8%	1.6%	2.3%	2.6%
Critical	0.1%	4.8%	2.1%	-0.8%	0.8%	0.0%	1.2%	0.3%	0.9%	2.4%	2.3%	3.9%

Table 13-46. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP3 (contd.)

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Freeport												
Wet	0.5%	1.1%	-0.5%	-0.5%	0.1%	0.1%	0.1%	-0.1%	0.1%	0.0%	-0.1%	0.3%
Above Normal	1.9%	-0.6%	-0.4%	0.2%	-0.5%	-0.8%	0.4%	-0.5%	-1.4%	-0.2%	0.1%	0.8%
Below Normal	0.4%	-0.2%	1.5%	0.5%	0.4%	-1.2%	0.9%	-0.5%	0.1%	0.1%	0.2%	0.6%
Dry	2.2%	3.4%	-0.6%	-0.3%	0.1%	0.1%	1.5%	1.5%	-0.3%	0.7%	2.6%	2.0%
Critical	0.0%	3.1%	2.0%	-0.6%	0.9%	0.4%	0.9%	0.0%	-0.1%	1.7%	1.6%	1.5%

Impact Wild-19 (CP3): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Changes in Flow Regime As mentioned in Impact Wild-19 (CP1), vernal pools are generally not present within the active floodplain of the upper Sacramento River in the primary study area; vernal pools are found in upland locations outside of the main river channel and the floodplain. Thus, vernal pools are not anticipated to be affected by changes in flows that could result from implementation of CP3. Because CP3 would not affect vernal pool habitat or the species that occur within the habitat, no impact would occur. 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 more difficult to attain. Therefore, this impact would be potentially significant.

This impact would be similar to Impact Wild-20 (CP1). The alteration of flows resulting from CP3 would continue to adversely affect riparian habitat. This would make the achievement of restoration, preservation, and conservation goals under regional and local plans and policies more difficult to attain. Therefore, 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 Gravel augmentation is not included as part of CP3. Therefore, no impact would occur. 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 Projects CP3 would not include any specific restoration components. Therefore, no impact would occur. 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 Implementing 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, but generally not above the ±2 percent threshold that separates the alternative from existing conditions. Under CP3 there would be increases in lower Sacramento River flows during the growing season, especially in the drier water years, that would occur as water was delivered to agricultural diversions. Many of these increases would exceed the ±2 percent

threshold and therefore are considered substantial flow changes. Although this change in surface and subsurface hydrology would be of a smaller magnitude than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution and abundance of riparian-nesting special-status bird species. Because CP3 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

This impact would be similar to Impact Wild-23 (CP1). Implementing 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, but generally not above the ±2 percent threshold that separates the alternative from existing conditions (except at Verona in December of wet water years). Because the focus of CP3 is the delivery of water for agricultural uses, under CP3 there would be increases in lower Sacramento River flows during the growing season, especially in the drier water years, that would occur as water was delivered to agricultural diversions. As modeled, many of these increases in lower Sacramento River flows exceed the ±2 percent threshold (Table 13-46) and therefore are considered substantial flow changes. Because CP3 could substantially reduce available habitat for special-status wildlife, 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 Implementing CP3 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the lower Sacramento River. This reduction also would alter the river's geomorphic processes. The rate of bank erosion could be different than the existing rate, but the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not be decline substantially. High flows during the nesting season that may cause localized bank and nest failure would not increase substantially. The impact on habitat for bank swallow nesting colonies, and therefore bank swallows themselves, would be less than significant.

This impact would be similar to Impact Wild-24 (CP1). The factors affecting bank erosion have been discussed previously. 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 somewhat with distance downstream. The different operational goals of CP3 would actually increase average flows in the lower Sacramento River during November and December. Modeling shows only minor reductions in flows (less than 2 percent) during January and February.

The changes in flows predicted by CalSim-II are not expected to substantially alter the rate or extent of bank erosion. The maximum increase in average monthly water surface elevation predicted for the lower Sacramento River is generally less than 3 inches; this is not expected to result in a substantial increase in flooding of bank swallow nesting colonies. Because CP3 would not result in substantial changes in available habitat, 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 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). However, vernal pools are generally not present within the active floodplain of regulated rivers along the lower Sacramento River and in the Delta. Because the sensitive habitat and species are located outside of the area affected by the changes in flows, CP3 would not alter this habitat. Therefore, no impact would occur. 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 more difficult to attain. Therefore, this impact would be potentially significant.

This impact would be similar to 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 (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. 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). Modified flow regimes would change 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. The CVP and SWP are operated as an integrated system with the same downstream management targets and goals. CVP and SWP operations are constrained by the 2008 USFWS BO and the 2009 NMFS BO. Thus, this alternative is not anticipated to sufficiently alter flow to the CVP/SWP service areas to have a substantial effect on the 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.

CP4 and CP4A – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply Reliability

The primary function of CP4 and CP4A is to address survival of anadromous fish, while still improving water supply reliability. CP4 and CP4A focus 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.

CP4 and CP4A have similar reservoir operations in that they each dedicate a portion of the new storage in Shasta Lake for fisheries purposes, however, the portion of this dedicated storage varies. For CP4, about 378,000 acre-feet of the increased reservoir storage space would be dedicated to increasing the supply of cold water for anadromous fish survival purposes. Operations for the remaining portion of increased storage (approximately 256,000 acre-feet) would be the same as in CP1. For CP4A, about 191,000 acre-feet of the increased reservoir storage space would be dedicated to increasing the supply of cold water for anadromous fish survival purposes. For CP4A, operations for the remaining portion of increased storage (approximately 443,000 acre-feet) would be the same as in CP2.

In addition to the activities common to CP1–CP3, CP4 and CP4A include 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 and CP4A, riparian, floodplain, and side channel habitat restoration would be implemented at up to six potential sites on the upper Sacramento River to restore habitat for anadromous salmonids.

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 or CP4A would result in lake levels identical to those under CP3, CP4 or CP4A would require the same relocation of utilities, public service facilities, and recreational facilities as CP3, including a loss of up to 35 acres of limestone habitat and 2,870 acres of nonlimestone habitat. Because CP4 or CP4A would result in identical lake levels as CP3, CP4 or CP4A would result the same area of inundation as CP3, in turn requiring identical vegetation clearing within the inundation area as CP3. CP4 or CP4A 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 and CP4A): 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, S&M 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 for CP4 or CP4A.

This impact would be similar to Impact Wild-1 (CP3) and would be significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-1 (CP3) and would be significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-2 (CP4 and CP4A): 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 for CP4 or CP4A.

This impact would be similar to Impact Wild-2 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-2 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-3 (CP4 and CP4A): 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 for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-3 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-4 (CP4 and CP4A): Impact on the American Peregrine Falcon Construction activities and vegetation removal associated with 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 for CP4 or CP4A.

This impact would be similar to Impact Wild-4 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-4 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-5 (CP4 and CP4A): Take and Loss of Habitat for the Bald Eagle Construction activities and vegetation removal associated with 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 for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-5 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-6 (CP4 and CP4A): Loss of Dispersal Habitat for the Northern Spotted Owl Construction activities and vegetation removal associated with raising the dam, construction activities in the relocation areas, and removal of

various amounts of vegetation in the impoundment areas would result in the loss of northern spotted owl dispersal habitat, a species Federally listed as threatened and an MSCS-covered species. This impact would be potentially significant.

This impact would be similar to Impact Wild-6 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-6 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-7 (CP4 and CP4A): Impact on the Purple Martin and Its Nesting Habitat Construction activities and vegetation removal associated with 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 for CP4 or CP4A.

This impact would be similar to Impact Wild-7 (CP3) and would be significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-7 (CP3) and would be significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-8 (CP4 and CP4A): 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 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 species State listed as endangered, a 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 for CP4 or CP4A.

This impact would be similar to Impact Wild-8 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-8 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-9 (CP4 and CP4A): 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 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 for CP4 and CP4A.

This impact would be similar to Impact Wild-9 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-9 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-10 (CP4 and CP4A): Take and Loss of Habitat for the Pacific Fisher Construction activities and vegetation removal associated with 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 for CP4 or CP4A.

This impact would be similar to Impact Wild-10 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-10 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-11 (CP4 and CP4A): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, Yuma Myotis, and Fringed Myotis), the American Marten, and Ringtail and Their Habitat Construction activities and vegetation removal associated with 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 fringed myotis, a USFS 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 for CP4 and CP4A.

This impact would be similar to Impact Wild-11 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-11 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-12 (CP4 and CP4A): Impacts on Special-Status Terrestrial Mollusks (Church's sideband, Shasta Sideband, Wintu Sideband, Oregon shoulderband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat
All of these species are designated USFS sensitive and/or S&M species, and the Shasta sideband is also an MSCS-covered species. The Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian are also petitioned for Federal listing. Ground-disturbing activities and vegetation removal associated with 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 would be a significant impact for CP4 or CP4A.

This impact would be similar to Impact Wild-12 (CP3) and would be significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-12 (CP3) and would be significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-13 (CP4 and CP4A): Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat Construction activities and vegetation removal associated with 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 for CP4 or CP4A.

This impact would be similar to Impact Wild-13 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-13 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-14 (CP4 and CP4A): Impacts on Other Birds of Prey (e.g., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (e.g., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat Construction activities and vegetation removal associated with 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 could result in the loss of active nests and habitat for these species. This impact would be potentially significant for CP4 or CP4A.

This impact would be similar to Impact Wild-14 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be similar to Impact Wild-14 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-15 (CP4 and CP4A): Loss of Critical Deer Winter and Fawning Range Construction activities and vegetation removal associated with 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 for CP4 or CP4A.

This impact would be identical to Impact Wild-15 (CP3) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

This impact would be identical to Impact Wild-15 (CP3) and would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-16 (CP4 and CP4A): Take and Loss of the California Red-Legged Frog Reclamation completed California red-legged frog habitat assessments in coordination with the USFWS in the applicable impoundment and relocations areas, and the potential downstream Sacramento River restoration sites. The assessment results will enable Reclamation and the USFWS to determine if habitat for the species occurs, if impacts are anticipated, and if additional 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 discussed in Section 13.3.5.

Upper Sacramento River (Shasta Dam to Red Bluff)

Impact Wild-17 (CP4 and CP4A): Impacts on Riparian-Associated Special-Status Wildlife Resulting from Modifications to the Existing Flow Regime in the Primary Study Area Implementation of CP4 or CP4A would increase the available water storage in Shasta Reservoir and result in a modified flow regime. This modification would reduce the frequency, duration, and magnitude of intermediate to large flows downstream from Shasta Dam during winter and spring in some years, especially wet and above-normal water years. Conversely, CP4 or CP4A would increase flow volumes in summer and fall of most years, most dramatically in September and October, because more water would be available to enhance conditions for anadromous fish (the goal of both CP4 and CP4A) in the driest months. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and reduce the formation of off-channel habitats, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP4 or CP4A would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Table 13-47 shows the changes in monthly flows that would occur under CP4. Therefore, this impact would be the same as Impact Wild-17 (CP1) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

For CP4A, this impact would be similar to Impact Wild-17 (CP1). CP4A would affect habitat for sensitive species through the same pathways (alteration of off-channel habitat for western pond turtles, changes to successional patterns of vegetation) as discussed for CP1. The only difference between the two is the extent of the impact. Operation of CP4A would be identical to CP2, and the reductions in winter flows would be both more frequent and of larger magnitude than modeled to occur under CP1. In all water year types (except below-normal years and the Decembers of critical years), flows would be reduced by CP4A in December and January on average about 2.2 and 8.0 percent, respectively. In above-normal years, this would extend through February (-6.3 percent) and March (-5.2 percent) (see CP2 in Table 13-34). This impact would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-18 (CP4 and CP4A): Impacts on Bank Swallow in the Primary Study Area Resulting from Modifications of Geomorphic Processes The implementation of CP4 or CP4A would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the Sacramento River in the primary study area. This reduction also would alter the

river's geomorphic processes, including the rate of bank erosion. 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 for CP4 or CP4A.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Therefore, this impact would be the same as Impact Wild-18 (CP1) and would be less than significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

For CP4A, the impact would be similar to Impact Wild-18 (CP1), but greater as in Impact Wild-18 (CP2). The extent of the impact could be greater under CP4A than under CP1 because reductions in channel-forming flows could be more extensive than under CP1. Nonetheless, for the same reasons as discussed for CP1, this impact would be less than significant for CP4A. Mitigation for this impact is not needed, and thus not proposed.

Impact Wild-19 (CP4 and CP4A): Disturbance or Removal of Vernal Pool Habitat for Special-Status Wildlife from Dam Construction and from Changes in Flow Regime As mentioned in Impact Wild-19 (CP1), vernal pools are generally not present within the active floodplain of the upper Sacramento River in the primary study area; vernal pools are found in upland locations outside of the main river channel and the floodplain. Thus, vernal pools are not anticipated to be affected by changes in flows that could result from implementation of CP4 or CP4A.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Therefore, this impact would be the same as Impact Wild-19 (CP1). Because CP4 would not affect vernal pool habitat or the sensitive wildlife species that occur within the habitat, no impact would occur. Mitigation for this impact is not needed, and thus not proposed.

The operational rules that govern the management of reservoirs and delivery of water under CP4A are identical to those that guided the modeling for CP2. Therefore, this impact would be the same as Impact Wild-19 (CP2). Because CP4A would not affect vernal pool habitat or the sensitive wildlife species that occur within the habitat, no impact would occur. Mitigation for this impact is not needed, and thus not proposed.

Table 13-47. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP4

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick												
Wet	1.6%	0.8%	-6.0%	-2.9%	-0.5%	0.4%	0.3%	0.1%	0.2%	0.3%	0.3%	0.4%
Above Normal	5.1%	-1.5%	-1.4%	-2.2%	-5.2%	-2.2%	0.0%	-3.0%	-1.4%	0.1%	0.9%	5.9%
Below Normal	0.9%	-0.7%	0.1%	-0.9%	-0.7%	-1.1%	0.2%	-2.6%	1.1%	0.2%	0.0%	1.3%
Dry	2.4%	4.1%	-2.0%	-2.0%	-1.0%	0.0%	0.7%	1.4%	2.3%	1.5%	2.3%	3.9%
Critical	2.3%	4.8%	1.0%	-0.6%	1.7%	0.8%	1.0%	1.8%	0.6%	0.7%	-0.2%	5.6%
Bend Bridge												
Wet	1.4%	1.4%	-3.1%	-1.2%	-0.3%	0.3%	0.2%	0.1%	0.2%	0.3%	0.3%	0.4%
Above Normal	4.0%	-1.1%	-0.6%	-1.2%	-2.8%	-1.3%	0.0%	-2.1%	-1.0%	0.0%	0.8%	5.5%
Below Normal	0.8%	-0.1%	0.0%	-0.5%	-0.4%	-0.8%	0.1%	-1.6%	1.0%	0.2%	-0.1%	1.2%
Dry	2.1%	3.1%	-1.0%	-1.0%	-0.5%	0.0%	0.5%	1.1%	2.1%	1.5%	2.3%	3.6%
Critical	1.6%	3.9%	0.8%	-0.4%	1.5%	0.6%	0.8%	1.6%	0.5%	0.6%	-0.2%	5.2%
Butte City												
Wet	1.6%	2.0%	-2.3%	-0.7%	-0.2%	0.3%	0.1%	-0.1%	0.0%	0.2%	0.2%	0.4%
Above Normal	4.3%	-0.8%	-0.4%	-0.9%	-1.9%	-0.8%	0.2%	-2.4%	-1.2%	-0.3%	0.8%	5.8%
Below Normal	1.2%	0.2%	0.3%	-0.6%	-0.3%	-0.7%	-0.3%	-1.5%	1.4%	0.3%	0.0%	1.0%
Dry	2.4%	3.2%	-0.7%	-0.5%	-0.2%	0.0%	0.8%	1.0%	3.2%	2.3%	3.2%	3.8%
Critical	1.4%	4.3%	0.8%	-0.5%	1.4%	0.5%	1.1%	2.2%	0.6%	0.9%	-0.2%	4.8%
Wilkins Slough												
Wet	1.6%	2.2%	-1.6%	-0.2%	0.0%	0.3%	0.1%	-0.1%	0.0%	0.2%	0.2%	0.4%
Above Normal	4.3%	-0.8%	-0.4%	-0.6%	-1.1%	-0.4%	0.2%	-2.4%	-1.2%	-0.3%	0.8%	5.8%
Below Normal	1.2%	0.2%	0.3%	-0.6%	0.0%	-0.7%	-0.3%	-1.5%	1.4%	0.3%	0.0%	1.0%
Dry	2.4%	3.2%	-0.7%	-0.4%	-0.2%	0.0%	0.8%	1.0%	3.2%	2.3%	3.2%	3.8%
Critical	1.4%	4.3%	0.8%	-0.5%	1.4%	0.5%	1.1%	2.2%	0.6%	0.9%	-0.2%	4.8%
Verona												
Wet	1.5%	1.7%	-1.3%	-0.2%	0.0%	0.2%	0.1%	-0.2%	0.0%	0.1%	-0.1%	0.2%
Above Normal	3.2%	-0.1%	-0.3%	-0.4%	-1.3%	-0.2%	0.1%	-1.0%	-0.8%	-0.2%	0.4%	2.3%
Below Normal	0.6%	0.1%	-0.1%	0.0%	0.1%	-0.5%	-0.2%	-0.4%	1.4%	0.1%	-0.1%	-0.3%
Dry	1.3%	2.5%	-0.8%	-0.2%	-0.2%	0.0%	0.5%	0.7%	-1.0%	1.1%	1.8%	5.7%
Critical	0.5%	3.6%	0.8%	-0.2%	1.1%	0.4%	0.7%	2.0%	0.5%	0.8%	-1.5%	3.1%

Table 13-47. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP4 (contd.)

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Freeport												
Wet	0.7%	0.5%	-0.3%	-0.2%	0.1%	0.1%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%
Above Normal	1.2%	-0.5%	0.0%	0.0%	-0.5%	-0.1%	0.1%	-0.8%	-0.6%	-0.1%	0.0%	0.5%
Below Normal	-0.1%	-0.6%	0.5%	0.5%	0.3%	-0.3%	0.1%	-0.5%	0.3%	-0.1%	-0.4%	0.0%
Dry	1.2%	1.4%	-0.5%	-0.1%	-0.1%	-0.1%	0.2%	0.5%	-0.2%	0.7%	1.7%	4.3%
Critical	0.1%	1.8%	0.8%	-0.2%	0.9%	-0.1%	0.4%	0.9%	0.0%	1.4%	0.5%	2.4%

Impact Wild-20 (CP4 and CP4A): 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 more difficult to attain. Therefore, this impact would be potentially significant for CP4 or CP4A.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Therefore, this impact would be the same as Impact Wild-20 (CP1) and would be potentially significant for CP4. Mitigation for this impact is proposed in Section 13.3.5.

The operational rules that govern the management of reservoirs and delivery of water under CP4A are identical to those that guided the modeling for CP2. This impact would be similar to Impact Wild-20 (CP2). This impact would be potentially significant for CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-21 (CP4 and CP4A): Impacts on Riparian-Associated Special-Status Wildlife Resulting from the Gravel Augmentation Program CP4 and CP4A include a gravel augmentation program in the upper Sacramento River for fisheries benefit, as described in Chapter 2, "Alternatives." Implementing the gravel augmentation program could result in temporary and short-term disturbance of riparian vegetation that has the potential to support special-status wildlife. 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 removal of riparian vegetation. This impact would be potentially significant for CP4 or CP4A.

The implementation of a gravel augmentation program in the upper Sacramento River for fisheries benefit 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 three sites per year over a 10-year period, so the area of impact in a given year would be relatively small. Although a total of 15 potential augmentation sites have been identified between Keswick Dam and Shea Island, the choice of specific sites would be made annually through an agency consultation process that would minimize impacts and maximize benefits of the deposited gravel.

Gravel placement itself is not expected to result in substantial adverse effects on any wildlife species because the gravel would all be placed within the active stream channel where there are no vernal pools or other seasonal wetland habitats. The main avenue of impact for riparian-dependent species would be

construction of access roads required to allow equipment to reach the river. This would be a short-term habitat loss that 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 for CP4 or CP4A. 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, as well as 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. As currently designed, no elderberry shrub removal is required; the nearest project activity is restricted to use of the access trail. Should access routes need to be adjusted or elderberry shrubs become established in an access route between augmentation intervals, the resulting disturbance of elderberry shrubs would be a potentially significant impact.

- **Reptiles and Amphibians** – The western pond turtle has been documented within the Sacramento River and suitable habitat for the species is provided in the primary study area. Riparian vegetation that would be removed along the river corridor provides potential cover and foraging habitat for western pond turtle. Augmentation activities would take place during the western pond turtle's breeding season; thus, the potential also exists to affect nests, eggs, nesting females, or juvenile turtles during vegetation clearing, grading, and gravel placement. Therefore, loss of habitat for the western 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 1-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 while they may roost there, these species are not typically dependent on riparian habitats. The amount of potential foraging and roosting habitat would not substantially decrease, so 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 to create access routes for gravel augmentation would not substantially reduce habitat for ringtail. Therefore, impacts on special-status mammals would be less than significant.

Because creation and maintenance of access routes to gravel augmentation sites has the potential to affect valley elderberry longhorn beetle, western pond turtle, and riparian-associated special-status birds, the impact would be potentially significant for CP4 or CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-22 (CP4 and CP4A): Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration Projects CP4 and CP4A include riparian, floodplain, and side-channel habitat restoration at one or a combination of potential locations along the upper Sacramento River for fisheries benefit. Restoration actions could require removing vegetation, site grading and excavation, and planting of riparian species. This could require the construction of access routes, the use of heavy equipment to excavate side channels and restore floodplains, and the installation of native riparian plant species when earth-moving is complete. Disturbances as a result of these restoration actions would generally be related to construction-related activities, and could potentially take years for the installed plants to recover to the degree that the new community would function as high-quality riparian habitat. Overall, restoration work 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. This impact would be potentially significant for CP4 or CP4A.

CP4 and CP4A include restoration actions at up to six proposed sites. 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. Elderberry shrubs may be present at any of the six proposed sites but have been documented near the Henderson Open Space, Anderson Island, and Reading Island sites. Construction activities have the potential to directly and indirectly affect blue elderberry shrubs, as well as valley elderberry longhorn beetles potentially present in the shrubs. Disturbance of elderberry shrubs would be a potentially significant impact for CP4 or CP4A.

- **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. Riparian vegetation that would be removed along the river corridor provides potential cover and foraging habitat for western pond turtle. Pond turtles may use the historic and partially or intermittently connected side channels found at most of the restoration sites. Enhancement of these channels to provide spawning habitat for Chinook salmon could alter the channels to the extent that they are unsuitable for western pond turtles. This would primarily occur through an increase in water velocities required for spawning salmon and removal of complex cover and basking sites that turtles require. Habitat restoration activities would take place during the western pond turtle's breeding season; thus, the potential also exists to affect nests, eggs, juveniles, nesting females, and non-nesting adults during vegetation clearing, grading, and gravel placement. Therefore, loss of habitat for the western pond turtle or direct impacts on turtles themselves would be a potentially significant impact for CP4 or CP4A.

- **Birds** – The riparian habitat along the Sacramento River provides 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 (e.g., Cooper's hawk, Swainson's hawk, white-tailed kite, bald eagle, and osprey) may nest in trees in the riparian habitat along these waterways. Bald eagles have been documented nesting at Reading Island and Kapusta Island. The streambanks at Tobiasson Island and Reading Island provide nesting habitat for bank swallows. The proposed restoration activities all would require removing existing riparian vegetation to allow access to the work areas, staging equipment, removing soil, and site grading. Although riparian vegetation would be replanted after site work is complete, the 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 for CP4 or CP4A.

- **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 during restoration activities. Available riparian habitats would still be sufficient for roosting habitat, so impacts on special-status bats would be less than significant. Vegetation removal would occur at any of the sites proposed for restoration. Although ringtail are not reported in the CNDDB (2012) from any of these locations, this species is known to occur in riparian habitat. The amount of vegetation to be removed would not substantially reduce available habitat for ringtail in the vicinity of these sites. Removal of small amounts of riparian vegetation along the river corridor would not substantially reduce habitat for ringtail. Therefore, impacts on special-status mammals would be less than significant for CP4 or CP4A.

The majority of the impacts associated with special-status wildlife species in upper Sacramento River riparian areas would be for short durations during r construction, temporary impacts lasting for several years after restoration is complete. Eventually conditions at the restoration sites would likely be the same as, or higher quality than what currently exists at the sites. Because of the potential to affect valley elderberry longhorn beetle, western pond turtle, and riparian-associated special-status birds, this impact would be potentially significant for CP4 or CP4A. Mitigation for this impact is proposed in Section 13.3.5.

Lower Sacramento River and Delta

Impact Wild-23 (CP4 and CP4A): Impacts on Riparian-Associated and Aquatic Special-Status Wildlife Resulting from Modifications to Existing Flow Regimes in the Lower Sacramento River and Delta The implementation of CP4 or CP4A 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. It also would increase the volume of flows in fall of most years. Although this change in surface and subsurface hydrology would be of a smaller magnitude than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats along the lower Sacramento River, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP4 or CP4A would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant for CP4 or CP4A.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Therefore, 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.

The operational rules that govern the management of reservoirs and delivery of water under CP4A are identical to those that guided the modeling for CP2. For CP4A, this impact would be the same as Impact Wild-23 (CP2). Because CP4A could substantially reduce available habitat for special-status wildlife, this impact would be potentially significant. Mitigation for this impact is proposed in Section 13.3.5.

Impact Wild-24 (CP4 and CP4A): Impacts on Bank Swallow Along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes
Implementation of CP4 or CP4A would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the lower Sacramento River. This reduction also would alter the river's geomorphic processes. 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 decline substantially. High flows during the nesting season that may cause localized bank and nest failure would not increase. The impact on habitat for bank swallow nesting colonies, and therefore bank swallows themselves, would be less than significant for CP4 or CP4A.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. 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. Therefore, this impact would be the same as Impact Wild-24 (CP1), and would be less than significant for CP4. Mitigation for this impact is not needed, and thus not proposed.

The operational rules that govern the management of reservoirs and delivery of water under CP4A are identical to those that guided the modeling for CP2. This impact would be the same as Impact Wild-24 (CP2). The effect of CP4A 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 CP4A on river flows would attenuate with distance downstream. Because the extent of bank erosion and flooding of nesting sites is not expected to substantially change under CP4A, this impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

Impact Wild-25 (CP4 and CP4A): 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 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). However, vernal pools are generally not present within the active floodplain of regulated rivers along the lower Sacramento River and in the Delta.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Because CP4 would not affect this habitat or these species, no impact would occur. Mitigation for this impact is not needed, and thus not proposed.

The operational rules that govern the management of reservoirs and delivery of water under CP4A are identical to those that guided the modeling for CP2. Because the sensitive habitat and species are located outside of the area affected by the changes in flows, CP4A would not alter this habitat. Therefore, no impact would occur. Mitigation for this impact is not needed, and thus not proposed.

Impact Wild-26 (CP4 and CP4A): 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 more difficult to attain. Therefore, this impact would be potentially significant for CP4 or CP4A.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Therefore, 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.

The operational rules that govern the management of reservoirs and delivery of water under CP4A are identical to those that guided the modeling for CP2. Therefore, 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 and CP4A): 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 or CP4A 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. 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 for CP4 or CP4A.

The operational rules that govern the management of reservoirs and delivery of water under CP4 are identical to those that guided the modeling for CP1. Therefore, this impact would be the same as Impact Wild-27 (CP1) and would be less than significant for CP4. Mitigation for this impact is not needed, and thus not proposed.

For CP4A, this impact would be similar to Impact Wild-27 (CP2). The CVP and SWP are operated as an integrated system with the same downstream management targets and goals. CVP and SWP operations are constrained by the 2008 USFWS BO and the 2009 NMFS BO. Thus, implementation of CP4A is not anticipated to sufficiently alter flow to the CVP/SWP service areas to have a substantial effect on the riparian habitat upon which special-status wildlife species depend. For these reasons, this impact would be less than significant for CP4A. 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 Programmatic ROD, and also includes the common features described above. Affected wildlife acreages for CP5 are the same as described for CP4 and CP4A. 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 Feasibility Report.

CP5 would also include implementing the same gravel augmentation program and the same riparian, floodplain, and side channel habitat restoration at up to six locations along the upper Sacramento River as described for CP4 and CP4A.

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, S&M 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 (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.

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.

Impact Wild-4 (CP5): Impact on the American Peregrine Falcon Construction activities and vegetation removal associated with 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 (CP5): Take and Loss of Habitat for the Bald Eagle Construction activities and vegetation removal associated with 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.

Impact Wild-6 (CP5): Take and Loss of Dispersal 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 would result in the loss of northern spotted owl dispersal habitat, a species Federally listed as threatened and an MSCS-covered 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 (CP5): Impact on the Purple Martin and Its Nesting Habitat Construction activities and vegetation removal associated with 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 (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 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 species State listed as endangered, 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 (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 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 (CP5): Take and Loss of Habitat for the Pacific Fisher Construction activities and vegetation removal associated with 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 (CP5): Impacts on Special-Status Bats (Pallid Bat, Spotted Bat, Western Red Bat, Western Mastiff Bat, Townsend's Big-Eared Bat, Long-Eared Myotis, Yuma Myotis, and Fringed Myotis), the American Marten, and Ringtail and Their Habitat Construction activities and vegetation removal associated with 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 fringed myotis, a USFS 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 (CP5): Impacts on Special-Status Terrestrial Mollusks (Church's Sideband, Shasta Sideband, Wintu Sideband, Oregon Shoulderband, Shasta Chaparral, and Shasta Hesperian) and Their Habitat All of these species are designated USFS sensitive and/or S&M species, and the Shasta sideband is also an MSCS-covered species. The Shasta Sideband, Wintu Sideband, Shasta Chaparral, and Shasta Hesperian are also petitioned for Federal listing. Ground-disturbing activities and vegetation removal associated with 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 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.

Impact Wild-13 (CP5): Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat Construction activities and vegetation removal associated with 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 (CP5): Impacts on Other Birds of Prey (e.g., red-tailed hawk and red-shouldered hawk) and Migratory Bird Species (e.g., American robin, Anna's hummingbird) and their Foraging and Nesting Habitat Construction activities and vegetation removal associated with 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 could 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 (CP5): Loss of Critical Deer Winter and Fawning Range
Construction activities and vegetation removal associated with 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.

Impact Wild-16 (CP5): Take and Loss of the California Red-Legged Frog
Reclamation completed California red-legged frog habitat assessments in coordination with the USFWS in the applicable impoundment and relocations areas, and the potential downstream Sacramento River restoration sites. The assessment results will enable Reclamation and the USFWS to determine if habitat for the species occurs, if impacts are anticipated, and if additional 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 discussed 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 Implementing CP5 would increase available water storage in Shasta Reservoir and result in a modified flow regime. This modification would reduce the frequency, duration, and magnitude of intermediate to large flows downstream from Shasta Dam during winter and spring in some water years, and would increase the volume of flows in fall of most years. This change in surface and subsurface hydrology could affect habitats adjacent to the river channel and reduce the formation of off-channel habitats, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP5 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

This impact would be similar to Impact Wild-17 (CP1). The pathways by which sensitive species would be affected under CP5 are similar to those for CP1. The

differences are in the magnitude of changes. For example, implementing CP5 would result in a reduction in average monthly flow downstream from Keswick Dam of between 2 and 10 percent in December of dry through wet water year types; similar although smaller reductions extend through March (Table 13-48). Because one of the goals of CP5 is increased water supply reliability, average monthly flows in critical water years are generally increased under CP5. As modeled, average monthly flows are substantially higher in April through August of dry water years and in September and October under most types of water years. Sensitive species could be affected by these changes through flow-caused alteration of riparian habitat and altered flow regimes. Because the changes would be substantial, they could result in increased mortality or reductions in reproductive success. Therefore, this impact 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 Implementing CP5 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the Sacramento River in the primary study area. This reduction also would alter the river's geomorphic processes, including the rate of bank erosion. However, the length of eroding banks would not be substantially altered, and thus, nesting habitat for bank swallows would not decline substantially. Therefore, the impact on habitat for bank swallow nesting colonies and the colonies themselves would be less than significant.

This impact would be the same as Impact Wild-18 (CP3). Modeling for CP5 predicts that increases in water surface elevation during the bank swallow nesting season would be at most an average of about 5–6 inches. These increases are not high enough that they would be expected to substantially increase the rate of localized nest failure. Therefore, this impact 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 As mentioned in Impact Wild-19 (CP1), vernal pools are generally not present within the active floodplain of the upper Sacramento River in the primary study area; vernal pools are found in upland locations outside of the main river channel and the floodplain. Thus, vernal pools are not anticipated to be affected by changes in flows that could result from implementation of CP5. Because CP5 would not affect vernal pool habitat or the species that occur within the habitat, no impact would occur. Mitigation for this impact is not needed, and thus not proposed.

Table 13-48. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP5

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Keswick												
Wet	1.6%	1.7%	-9.9%	-6.4%	-2.0%	0.3%	0.3%	0.5%	0.7%	0.3%	0.5%	2.8%
Above Normal	5.8%	1.0%	-3.7%	-3.2%	-7.0%	-8.0%	0.2%	-2.3%	-3.1%	0.3%	0.9%	10.2%
Below Normal	1.8%	-1.1%	-2.1%	-1.5%	-1.4%	-2.3%	1.1%	-3.3%	-0.6%	0.8%	0.8%	1.9%
Dry	6.4%	6.1%	-2.7%	-3.3%	-1.8%	0.0%	2.5%	3.9%	6.0%	3.7%	8.0%	8.8%
Critical	5.1%	7.1%	2.8%	2.8%	1.4%	1.0%	0.8%	1.1%	0.9%	4.6%	-1.5%	14.1%
Bend Bridge												
Wet	1.5%	2.0%	-5.2%	-2.8%	-1.2%	0.3%	0.2%	0.4%	0.6%	0.3%	0.5%	2.4%
Above Normal	4.7%	0.0%	-1.5%	-1.8%	-4.0%	-4.5%	0.1%	-1.5%	-2.3%	0.2%	0.8%	9.7%
Below Normal	1.5%	-0.5%	-1.3%	-0.8%	-0.8%	-1.7%	0.9%	-2.1%	-0.3%	0.7%	0.7%	1.6%
Dry	5.3%	5.3%	-1.4%	-1.6%	-1.0%	0.0%	2.0%	3.2%	5.6%	3.6%	7.8%	8.1%
Critical	3.9%	5.7%	2.4%	2.4%	1.2%	0.7%	0.6%	1.0%	0.9%	4.5%	-1.5%	12.9%
Butte City												
Wet	1.8%	2.7%	-3.9%	-1.7%	-0.8%	0.2%	0.2%	0.0%	0.2%	-0.2%	0.2%	2.3%
Above Normal	5.2%	0.3%	-1.2%	-1.2%	-3.1%	-2.9%	0.2%	-2.1%	-2.9%	-0.3%	0.6%	10.5%
Below Normal	1.7%	-0.3%	-1.1%	-1.0%	-0.5%	-1.5%	0.7%	-2.2%	-0.9%	0.5%	0.0%	1.1%
Dry	5.9%	5.8%	-1.0%	-1.0%	-0.4%	-0.1%	2.7%	2.9%	7.6%	4.3%	10.4%	7.9%
Critical	3.9%	6.2%	2.7%	2.0%	1.2%	0.6%	0.8%	1.5%	1.2%	6.8%	-1.7%	12.8%
Wilkins Slough												
Wet	1.8%	2.9%	-2.3%	-0.8%	-0.2%	0.3%	0.2%	0.0%	0.2%	-0.2%	0.2%	2.3%
Above Normal	5.2%	0.3%	-1.2%	-0.8%	-1.5%	-1.5%	0.2%	-2.1%	-2.9%	-0.3%	0.6%	10.5%
Below Normal	1.7%	-0.3%	-0.4%	-1.0%	0.0%	-1.5%	0.7%	-2.2%	-0.9%	0.5%	0.0%	1.1%
Dry	5.9%	5.8%	-1.0%	-0.9%	-0.4%	-0.1%	2.7%	2.9%	7.6%	4.3%	10.4%	7.9%
Critical	3.9%	6.2%	2.7%	2.0%	1.2%	0.6%	0.8%	1.5%	1.2%	6.8%	-1.7%	12.8%
Verona												
Wet	0.5%	2.2%	-2.3%	-0.6%	-0.1%	0.2%	0.1%	-0.1%	0.2%	-0.3%	-0.3%	1.0%
Above Normal	3.5%	1.1%	-1.0%	-0.5%	-2.1%	-0.9%	0.1%	-0.7%	-1.7%	-0.1%	0.3%	4.2%
Below Normal	1.9%	0.8%	-0.3%	-0.3%	-0.1%	-1.0%	0.5%	-0.8%	-0.1%	0.3%	0.0%	0.2%
Dry	3.9%	4.4%	-1.0%	-0.5%	-0.5%	-0.1%	1.6%	1.8%	-1.2%	3.4%	6.2%	9.2%
Critical	0.9%	5.5%	2.2%	2.0%	0.7%	0.3%	0.5%	1.8%	1.5%	8.2%	-4.7%	7.9%

Table 13-48. Percent Change in Average Monthly Flows at Keswick Dam and Downstream Under CP5 (contd.)

Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Freeport												
Wet	0.8%	0.5%	-0.5%	-0.6%	0.0%	0.1%	0.0%	-0.1%	0.1%	-0.2%	-0.2%	0.4%
Above Normal	2.2%	-0.8%	-0.4%	0.2%	-0.7%	-0.7%	0.1%	-0.5%	-1.4%	-0.2%	0.1%	0.6%
Below Normal	0.8%	0.0%	0.5%	0.5%	0.1%	-0.9%	0.6%	-1.0%	-0.8%	-0.1%	-0.4%	0.7%
Dry	2.6%	3.1%	-0.7%	-0.3%	-0.2%	0.1%	1.4%	1.5%	-0.6%	2.4%	5.2%	7.5%
Critical	-0.3%	3.1%	2.1%	1.8%	0.5%	-0.1%	0.3%	0.4%	0.0%	3.9%	-0.4%	5.9%

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 more difficult to attain. Therefore, this impact would be potentially significant.

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 (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 temporary and short-term disturbance or removal of riparian vegetation that has the potential to support special-status wildlife. Gravel augmentation would occur at one to three sites per year over a 10-year period (distributed at up to 15 different sites overall), 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 disturbance or removal of riparian vegetation. This impact would be potentially significant.

This impact would be the same as Impact Wild-21 (CP4 and CP4A) 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 Projects Under CP5, riparian, floodplain, and side-channel habitat restoration would occur at one or a combination of potential locations along the upper Sacramento River. Restoration measures for the six potential restoration sites would generally involve riparian, floodplain, and side-channel restoration. Restoration actions could require removing vegetation, site grading and excavation, and planting riparian species. This could require the construction of access routes, use of heavy equipment to excavate side channels and restore floodplains, and installation of native riparian plant species when earth-moving is complete, Disturbances would generally be related to construction-related activities, but it would take years for the installed plants to recover to the degree that the new community would function as high-quality riparian habitat. Overall, restoration work 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. This impact would be potentially significant.

This impact would be the same as Impact Wild-22 (CP4 and CP4A) 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 Implementing 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. It also would increase the volume of flows in fall of most years. Although this change in surface and subsurface hydrology would be of smaller magnitude than in the upper Sacramento River, it could affect habitats adjacent to the river channel and the formation of off-channel habitats along the lower Sacramento River, which would adversely affect the habitat of western pond turtle. Although the total amount of riparian vegetation would not decline substantially, the portion in early successional stages would be reduced. These early successional stages provide habitat for some special-status wildlife species. These changes could result in substantial effects on the distribution or abundance of riparian-nesting special-status bird species. Because CP5 would substantially alter habitat for a variety of riparian-dependent special-status species, this impact would be potentially significant.

This impact would be the same as Impact Wild-23 (CP1). The pathways of the impact under CP5 would be the same as those under CP1. Because flows would be substantially altered under CP5, impacts on sensitive riparian-dependent species 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 Implementing CP5 would cause a small reduction in the magnitude, duration, and frequency of intermediate to large flows in the lower Sacramento River. This reduction also would alter the river's geomorphic processes. 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 decline substantially. High flows during the nesting season that may cause localized bank and nest failure would not increase. The impact on habitat for bank swallow nesting colonies, and therefore bank swallows themselves, would be less than significant.

This impact would be the same as Impact Wild-24 (CP1). The pathways of the impact under CP5 would be the same as those under CP1. 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 somewhat with distance downstream. This impact 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 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). However, vernal pools are generally not present within the active floodplain of regulated rivers along the lower Sacramento River and in the Delta. Because the sensitive habitat and species are located outside of the area affected by the changes in flows, CP5 would not alter this habitat. No impact would occur. 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 more difficult to attain. Therefore, this impact would be potentially significant.

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 (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. 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 is similar to Impact Wild-27 (CP1). Modified flow regimes under CP5 would reduce the frequency, duration, and magnitude of intermediate to large flows along the Sacramento River. Most potential noticeable changes in flows and stages would diminish downstream from Red Bluff, but substantial changes are predicted in the Sacramento River downstream as far as Freeport in some water years (Table 13-48). The CVP and SWP are operated as an

integrated system with the same downstream management targets and goals. CVP and SWP operations are constrained by the 2008 USFWS BO and the 2009 NMFS BO. Thus, this alternative 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.

13.3.5 Mitigation Measures

Table 13-49 presents a summary of mitigation measures for wildlife resources.

No-Action Alternative

No mitigation measures are required for this alternative.

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

No mitigation is required for Impacts Wild-18 (CP1), Wild-19 (CP1), Wild-21 (CP1), Wild-22 (CP1), Wild-24 (CP1), Wild-25 (CP1), and Wild-27 (CP1). Mitigation is provided below for the remaining impacts of CP1 on wildlife species.

Table 13-49. Summary of Mitigation Measures for Wildlife Resources

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
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

Table 13-49. Summary of Mitigation Measures for Wildlife Resources (contd.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
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
Impact Wild-6: Loss of Dispersal 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, Habitat Enhancement.				
	LOS after Mitigation	NI	LTS	LTS	LTS	LTS	LTS
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

Table 13-49. Summary of Mitigation Measures for Wildlife Resources (contd.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
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						
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
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.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
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 before Mitigation	NI	PS	PS	PS	PS	PS
	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.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU

Table 13-49. Summary of Mitigation Measures for Wildlife Resources (contd.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
Impact Wild-13: Permanent Loss of General Wildlife Habitat	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	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
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: Acquire and Preserve Mitigation Lands and 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

Table 13-49. Summary of Mitigation Measures for Wildlife Resources (contd.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
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: 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-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	NI	NI	NI	NI	NI	NI
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NI	NI	NI	NI	NI	NI
Impact Wild-20: Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-20: Implement Mitigation Measure Bot-7: 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	NI	LTS	LTS	LTS	LTS	LTS

Table 13-49. Summary of Mitigation Measures for Wildlife Resources (contd.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
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
Impact Wild-22: Impacts on Riparian-Associated Special-Status Wildlife Species Resulting from Restoration at Reading Island	LOS before Mitigation	NI	NI	NI	NI	PS	PS
	Mitigation Measure	None required.	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.	
	LOS after Mitigation	NI	NI	NI	NI	LTS	LTS
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 before Mitigation	LTS	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-23: Implement Mitigation Measure Bot-7: 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

Table 13-49. Summary of Mitigation Measures for Wildlife Resources (contd.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
Impact Wild-24: Impacts on Bank Swallow Along the Lower Sacramento River 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-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	NI	NI	NI	NI	NI	NI
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NI	NI	NI	NI	NI	NI
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 before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Wild-26: Implement Mitigation Measure Bot-7: 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	NI	LTS	LTS	LTS	LTS	LTS

Table 13-49. Summary of Mitigation Measures for Wildlife Resources (contd.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4/CP4A	CP5
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:
CP = Comprehensive Plan
LOS = level of significance
LTS = less than significant
NI = no impact
PS = potentially significant
S = significant
SU = significant and unavoidable
TBD = to be determined

Mitigation Measure Wild-1 (CP1): Avoid, Relocate, and Acquire Mitigation Lands for Shasta Salamander As described in the Preliminary Environmental Commitments and Mitigation Plan Appendix, Reclamation convened an interagency working group to enhance mitigation measures presented in the DEIS. This working group had the benefit of additional information from recent investigations of nearby private lands available for mitigation and refined analyses of potential project impacts. Using this updated information the working group developed and refined mitigation measures for wildlife resources, including land acquisition, habitat management and enhancement, and other measures.

Mitigation measure Wild-1 consists of a program to acquire nearby private lands with similar habitat attributes and species composition as those impacted by the SLWRI project. Reclamation has identified several willing private landowners and specific parcels for purchase in the SLWRI project area vicinity. Preliminary investigations of these lands have shown they contain similar and/or additional habitats and special-status species as those impacted by SLWRI. Special-status wildlife species known to occur on the lands subject to these preliminary investigations include Church's sideband, Klamath shoulderband, Shasta chaparral, Shasta sideband, Shasta hesperian, Shasta salamander, foothill yellow-legged frog, bald eagle, and Pacific fisher. Additionally, the interagency working group identified other private parcels with similar biological resources in the vicinity of the SLWRI project area, some of which have owners willing to discuss purchase agreements.

As discussed during the interagency working group meetings, mitigation measure Wild-3 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. The interagency working group also agreed that additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

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. As described above, mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-1 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-1 will mitigate for the loss of 1,195 acres of Shasta salamander habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 4,860 acres of mitigation lands containing comparable habitats. 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.

Vegetation Removal and Construction Activities

- To minimize impacts on individuals, preconstruction surveys, in consultation with CDFW and USFS, will be conducted by a qualified biologist before construction activities during the wet season. Individuals will be relocated to suitable limestone habitat in the vicinity of detection.

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. Therefore, Impact Wild-1 (CP1) would remain 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.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-2 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-2 will mitigate for the loss of 35 acres of foothill yellow-legged frog and tailed frog habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 108 acres of mitigation lands containing comparable habitats.

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 CDFW 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 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. Therefore, Impact Wild-2 (CP1) would remain 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.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-3 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value

habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-3 will mitigate for the loss of 35 acres of northwestern pond turtle habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 108 acres of mitigation lands containing comparable habitats.

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 before 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, CDFW 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. Therefore, Impact Wild-3 (CP1) would remain 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 (August 1 through March 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 during the breeding season (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 CDFW, will determine the construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, 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 would reduce Impact Wild-4 (CP1) 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 This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-5 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations. For bald eagles, emphasis will also be placed on the location of these mitigation lands relative to large water body features to ensure these lands provide potential bald eagle habitat.

Under CP1, Wild-5 will mitigate for the loss of 979 acres of bald eagle habitat in the inundation area and 393 acres in the relocation areas by acquiring a minimum of 4,116 acres of mitigation lands containing comparable habitats. Additional mitigation will be provided by implementing fuels reduction projects within and adjacent to existing bald eagle nest stands at Shasta Lake to help protect those sites from wildfire.

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 2007).

- If vegetation removal or construction occurs outside of the breeding season (August 2 through December 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 January 1 and August 1, a 660-foot to 0.5-mile buffer will be established around active nests in consultation with CDFW 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. Therefore, Impact Wild-5 (CP1) would remain significant and unavoidable.

Mitigation Measure Wild-6 (CP1): Acquire and Preserve Mitigation Lands for Northern Spotted Owl To avoid or minimize impacts on northern spotted owl dispersal habitat, the following measures will be implemented.

Inundation Area This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-6 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-6 will mitigate for the loss of 438 acres of northern spotted owl dispersal habitat in the inundation area and 341 acres in the relocation areas by acquiring a minimum of 2,337 acres of mitigation lands containing comparable habitats.

Providing compensatory mitigation by acquiring and conserving habitat mitigation lands for dispersal habitat will minimize this impact. Implementation

of this mitigation measure would reduce Impact Wild-6 (CP1) to a less-than-significant level.

Mitigation Measure Wild-7 (CP1): Conduct a Preconstruction Survey for the Purple Martin and Establish Buffers Purple martins at Shasta Lake nest in flooded snags within the existing reservoir and snags occurring in recently burned areas at nearby upland locations. To avoid or minimize impacts on nesting purple martins, implement the following mitigation measures:

- To the extent feasible, all snags in the Pit Arm will be retained. Vegetation will not be removed from the Pit Arm from Jones Valley north, with exception of Arbuckle Campground, which will provide snag recruitment from trees that will die from inundation.

- If vegetation removal or construction occurs outside of the breeding season (September 1 through March 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 CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.

In addition these measures, Reclamation will develop a purple martin management plan that details additional specific actions to minimize impacts in the inundation zone and maintain purple martin habitat in adjacent uplands. At a minimum, the management plan will include the following actions:

- Determine key upland nesting locations and identify vegetation management prescriptions, including prescribed fire and manual/mechanized techniques, which maintain open habitats and snags to preserve purple martin habitat.

- Implement vegetation management that maintains open habitats and snags to preserve purple martin habitat in the key upland locations.

- A minimum of 3 years before project construction and initial (new) inundation, develop an experimental artificial nest box program in upland nesting locations, including monitoring and adaptive management.

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. Therefore, Impact Wild-7 (CP1) would remain 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.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-8 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-8 will mitigate for the loss of 954 acres of Vaux's swift habitat in the inundation area and 390 acres in the relocation areas by acquiring a minimum of 1,344 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-8 will mitigate for the loss of 28 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 87 acres of mitigation lands containing comparable habitats.

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 (September 1 through March 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 CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, 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 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. Therefore, Impact Wild-8 (CP1) would remain 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, Great Blue Heron, and Osprey and Establish Buffers To avoid or minimize impacts to these species, the following measures will be implemented.

Inundation Area This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-9 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-9 will mitigate for the loss of 699 acres of long-eared owl and northern goshawk habitat in the inundation area and 327 acres in the relocation

areas by acquiring a minimum of 3,078 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-9 will mitigate for the loss of 1,072 acres of Cooper's hawk and great blue heron habitat in the inundation area and 402 acres in the relocation areas by acquiring a minimum of 4,422 acres of mitigation lands containing comparable habitats.

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 (March 31 through September 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 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 CDFW 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. Therefore, Impact Wild-9 (CP1) would remain significant and unavoidable.

Mitigation Measure Wild-10 (CP1): Acquire and Preserve Mitigation Lands; Conduct a Preconstruction Survey 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.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-10 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-10 will mitigate for the loss of 749 acres of Pacific fisher habitat in the inundation area and 330 acres in the relocation areas by acquiring a minimum of 3,237 acres of mitigation lands containing comparable habitats. Potential mitigation lands containing comparable habitat and where Pacific fishers are known to occur have been identified adjacent to the project.

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. Therefore, Impact Wild-10 (CP1) would remain 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, American martens, 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.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-11 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-11 will mitigate for the loss of 31 acres of pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis habitat in the inundation area and 35 acres in the relocation areas by acquiring a minimum of 198 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-11 will mitigate for the loss of 1,201 acres of western red bat and long-eared myotis habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 4,974 acres of mitigation lands containing comparable habitats.

Under CP1, Wild-11 will mitigate for the loss of 1,201 acres of ringtail habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 1,658 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-11 will mitigate for the loss of 724 acres of American marten habitat in the inundation area and 328 acres in the relocation areas by acquiring a minimum of 3,156 acres of mitigation lands containing comparable habitats.

Vegetation Removal and Construction Activities

- A preconstruction survey conducted by a qualified bat biologist for roosting bats will be conducted before 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 CDFW, 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., before 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 CDFW), 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 before 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 (May 2 through January 31), 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 CDFW 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 CDFW 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. Therefore, Impact Wild-11 (CP1) would remain 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.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). As described in Wild-1 (CP1), mitigation lands will be acquired to mitigate for the loss of habitat. Additionally, opportunities for restoration and enhancement of habitat will be explored and defined. Mitigation measure Wild-12 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. This ratio will be applied specific to each habitat type. Additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-12 will mitigate for the loss of 1,195 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 4,860 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-12 will mitigate for the loss of 28 acres of Shasta hesperian habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 87 acres of mitigation lands containing comparable habitats.

Under CP1, Wild-12 will mitigate for the loss of 5 acres of Shasta sideband habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 18 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-12 will mitigate for the loss of 1.5 acres of Wintu sideband habitat in the inundation area by acquiring a minimum of 4.5 acres of mitigation lands containing comparable habitats.

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. Therefore, Impact Wild-12 (CP1) would remain significant and unavoidable.

Mitigation Measure Wild-13 (CP1): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat Mitigation measure Wild-13 consists of a program to acquire nearby private lands with similar habitat attributes and species composition as those impacted by the SLWRI project. Reclamation has identified several willing private landowners and specific parcels for purchase in the SLWRI project area vicinity. Preliminary investigations of these lands have shown they contain similar and/or additional habitats and special-status species as those impacted by SLWRI. Additionally, the interagency working group identified other private parcels with similar biological resources in the vicinity of the SLWRI project area, some of which have owners willing to discuss purchase agreements.

As discussed during the interagency working group meetings, mitigation measure Wild-13 will begin with a 3:1 minimum replacement ratio of acquired lands to impacted lands. The interagency working group also agreed that additional considerations will be made for other replacement ratios (more or less), depending on habitat quality at a particular site. Emphasis will be placed on lands containing high-value habitats (e.g., riparian, wetland, limestone, blue oak woodlands) and/or special-status species populations.

Under CP1, Wild-13 will mitigate for the loss of 1,227 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 5,775 acres of mitigation lands containing comparable habitats.

The effectiveness of providing compensatory mitigation by acquiring and conserving habitat mitigation lands to mitigate inundation impacts cannot be accurately determined without additional details. Therefore, Impact Wild-13 (CP1) would remain significant and unavoidable.

Mitigation Measure Wild-14 (CP1): Acquire and Preserve Mitigation Lands and 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.

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 (March 31 through September 1), no further mitigation will be necessary. If the breeding season cannot be completely avoided, the following measure will be implemented.

- If project-related vegetation removal or construction will occur during the breeding season (February 1 through August 31), a qualified biologist will conduct a preconstruction survey for nesting birds. For migratory birds (non-raptors), preconstruction surveys will occur within the construction footprint and 250 feet beyond the construction footprint boundary. Surveys will be conducted no more than 2 weeks before construction. For raptors, preconstruction surveys will occur in suitable raptor nesting habitat within 0.25 mile of the construction footprint boundary. If an active nest is found, a qualified biologist, in consultation with CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, 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. Therefore, Impact Wild-14 (CP1) would remain significant and unavoidable.

Mitigation Measure Wild-15 (CP1): Acquire and Preserve Mitigation Lands for Permanent Loss of Critical Deer Wintering and Fawning Range

Inundation Area Habitats providing deer wintering and fawning range within the impoundment area would be flooded when the lake reaches maximum inundation. These potential losses cannot be mitigated. Therefore, Impact Wild-15 (CP1) would remain significant and unavoidable.

Mitigation Measure Wild-16 (CP1) Potential impacts and applicable mitigation have yet to be determined for the California red-legged frog. Impacts for each alternative will not be assessed until USFWS has determined whether suitable habitat is present and whether surveys would be required. At that time, the need for mitigation would be determined and appropriate mitigation described, if necessary.

Mitigation Measure Wild-17 (CP1): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan Reclamation will implement Mitigation Measure Bot-7 (CP1), “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): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan
Reclamation will implement Mitigation Measure Bot-7 (CP1), "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): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan Reclamation will implement Mitigation Measure Bot-7 (CP1), "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): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan Reclamation will implement Mitigation Measure Bot-7 (CP1), "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 required 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.

Under CP2, Wild-1 will mitigate for the loss of 1,678 acres of Shasta salamander habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 6,309 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-2 (CP2) is considered significant and unavoidable.

Under CP2, Wild-2 will mitigate for the loss of 47 acres of foothill yellow-legged frog and tailed frog habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 144 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-3 (CP2) is considered significant and unavoidable.

Under CP2, Wild-3 will mitigate for the loss of 47 acres of northwestern pond turtle habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 144 acres of mitigation lands containing comparable habitats.

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.

Under CP2, Wild-5 will mitigate for the loss of 1,376 acres of bald eagle habitat in the inundation area and 393 acres in the relocation areas by acquiring a minimum of 5,307 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-6 (CP2): Acquire and Preserve Mitigation Lands for Northern Spotted Owl This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts to northern spotted owl dispersal habitat.

Under CP2, Wild-6 will mitigate for the loss of 643 acres of northern spotted owl dispersal habitat in the inundation area and 341 acres in the relocation areas by acquiring a minimum of 2,952 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-8 (CP2) is considered significant and unavoidable.

Under CP2, Wild-8 will mitigate for the loss of 1,341 acres of Vaux's swift habitat in the inundation area and 390 acres in the relocation areas by acquiring a minimum of 5,193 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-8 will mitigate for the loss of 37 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 114 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-9 (CP2): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Establish Buffers This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts on these species; however, because impacts cannot be fully mitigated, Impact Wild-9 (CP2) is considered significant and unavoidable.

Under CP2, Wild-9 will mitigate for the loss of 987 acres of long-eared owl and northern goshawk habitat in the inundation area and 327 acres in the relocation areas by acquiring a minimum of 3,942 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-9 will mitigate for the loss of 1,505 acres of Cooper's hawk and great blue heron habitat in the inundation area and 402 acres in the relocation areas by acquiring a minimum of 5,721 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-10 (CP2) is considered significant and unavoidable.

Under CP2, Wild-10 will mitigate for the loss of 1,057 acres of Pacific fisher habitat in the inundation area and 330 acres in the relocation areas by acquiring a minimum of 4,161 acres of mitigation lands containing comparable habitats. Potential mitigation lands containing comparable habitat and where Pacific fishers are known to occur have been identified adjacent to the project.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-11 (CP2) is considered significant and unavoidable.

Under CP2, Wild-11 will mitigate for the loss of 45 acres of pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis habitat in the inundation area and 35 acres in the relocation areas by acquiring a minimum of 240 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-11 will mitigate for the loss of 1,687 acres of western red bat and long-eared myotis habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 6,432 acres of mitigation lands containing comparable habitats.

Under CP2, Wild-11 will mitigate for the loss of 1,687 acres of ringtail habitat in the inundation area and 457 acre in the relocation areas by acquiring a minimum of 6,432 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-11 will mitigate for the loss of 1,022 acres of American marten habitat in the inundation area and 328 acres in the relocation areas by acquiring a minimum of 4,050 acres of mitigation lands containing comparable habitats.

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.

Under CP2, Wild-12 will mitigate for the loss of 1,697 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 6,366 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 37 acres of Shasta hesperian habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 114 acres of mitigation lands containing comparable habitats.

Under CP2, Wild-12 will mitigate for the loss of 7 acres of Shasta sideband habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 24 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 2 acres of Wintu sideband habitat in the inundation area by acquiring a minimum of 6 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-13 (CP2): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce impacts on these species; however, because impacts cannot be fully mitigated, Impact Wild-13 (CP2) is considered significant and unavoidable.

Under CP2, Wild-13 will mitigate for the loss of 1,725 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 7,269 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-14 (CP2): Acquire and Preserve Mitigation Lands and 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 on these species; however, because impacts cannot

be fully mitigated, Impact Wild-14 (CP2) is considered significant and unavoidable.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Under CP2, Wild-14 will mitigate for the loss of 1,725 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 7,239 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP2) is considered significant and unavoidable.

This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Under CP2, Wild-15 will mitigate for the loss of 1,725 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 7,239 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-16 (CP2) Potential impacts and applicable mitigation has yet to be determined for the California red-legged frog. This impact is considered significant and unavoidable.

Mitigation Measure Wild-17 (CP2): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP2), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-17 (CP2) to a less-than-significant level.

Mitigation Measure Wild-20 (CP2): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP2), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-20 (CP2) to a less-than-significant level.

Mitigation Measure Wild-23 (CP2): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem

Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP2), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-23 (CP2) to a less-than-significant level.

Mitigation Measure Wild-26 (CP2): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP2), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-26 (CP2) to a less-than-significant level.

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

No mitigation is required 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.

Under CP3, Wild-1 will mitigate for the loss of 2,415 acres of Shasta salamander habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 8,520 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-2 (CP3) is considered significant and unavoidable.

Under CP3, Wild-2 will mitigate for the loss of 80 acres of foothill yellow-legged frog and tailed frog habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 243 acres of mitigation lands containing comparable habitats.

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 on these species; however, because the impacts cannot be fully mitigated, Impact Wild-3 (CP3) is considered significant and unavoidable.

Under CP3, Wild-2 will mitigate for the loss of 80 acres of northwestern pond turtle habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 243 acres of mitigation lands containing comparable habitats.

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.

Under CP3, Wild-5 will mitigate for the loss of 1,989 acres of bald eagle habitat in the inundation area and 393 acres in the relocation areas by acquiring a minimum of 7,146 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-6 (CP3): Acquire and Preserve Mitigation Lands for Northern Spotted Owl This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts on northern spotted owl dispersal habitat.

Under CP3, Wild-6 will mitigate for the loss of 976 acres of northern spotted owl dispersal habitat in the inundation area and 341 acres in the relocation areas by acquiring a minimum of 3,951 acres of mitigation lands containing comparable habitats.

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 for 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-8 (CP3) is considered significant and unavoidable.

Under CP3, Wild-8 will mitigate for the loss of 1,938 acres of Vaux's swift habitat in the inundation area and 390 acres in the relocation areas by acquiring a minimum of 6,984 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-8 will mitigate for the loss of 58 acres of willow flycatcher, yellow warbler, and yellow-breasted chat habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 177 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-9 (CP3): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Establish Buffers This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts on these species; however, because impacts cannot be fully mitigated, Impact Wild-9 (CP3) is considered significant and unavoidable.

Under CP3, Wild-9 will mitigate for the loss of 1,428 acres of long-eared owl and northern goshawk habitat in the inundation area and 327 acres in the relocation areas by acquiring a minimum of 5,265 acres of mitigation lands containing comparable habitats. Also under CP1, Wild-9 will mitigate for the loss of 2,167 acres of Cooper's hawk and great blue heron habitat in the inundation area and 402 acres in the relocation areas by acquiring a minimum of 7,707 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-10 (CP3) is considered significant and unavoidable.

Under CP2, Wild-10 will mitigate for the loss of 1,533 acres of Pacific fisher habitat in the inundation area and 330 acres in the relocation areas by acquiring a minimum of 5,589 acres of mitigation lands containing comparable habitats. Potential mitigation lands containing comparable habitat and where Pacific fishers are known to occur have been identified adjacent to the project.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-11 (CP3) is considered significant and unavoidable.

Under CP3, Wild-11 will mitigate for the loss of 69 acres of pallid bat, spotted bat, western mastiff bat, Townsend's big-eared bat, Yuma myotis, and fringed myotis habitat in the inundation area and 35 acres in the relocation areas by acquiring a minimum of 312 acres of mitigation lands containing comparable habitats. Also under CP3, Wild-11 will mitigate for the loss of 2,431 acres of western red bat and long-eared myotis habitat in the inundation area and 457 acres in the relocation areas by acquiring a minimum of 8,664 acres of mitigation lands containing comparable habitats.

Under CP3, Wild-11 will mitigate for the loss of 2,431 acres of ringtail habitat in the inundation area and 457 acre in the relocation areas by acquiring a minimum of 8,664 acres of mitigation lands containing comparable habitats. Also under CP3, Wild-11 will mitigate for the loss of 1,482 acres of American marten habitat in the inundation area and 328 acres in the relocation areas by acquiring a minimum of 5,430 acres of mitigation lands containing comparable habitats.

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.

Under CP2, Wild-12 will mitigate for the loss of 2,415 acres of Church's sideband, Oregon shoulderband, and Shasta chaparral habitat in the inundation area and 425 acres in the relocation areas by acquiring a minimum of 8,520 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 58 acres of Shasta hesperian habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 177 acres of mitigation lands containing comparable habitats.

Under CP2, Wild-12 will mitigate for the loss of 11 acres of Shasta sideband habitat in the inundation area and 1 acre in the relocation areas by acquiring a minimum of 36 acres of mitigation lands containing comparable habitats. Also under CP2, Wild-12 will mitigate for the loss of 3 acres of Wintu sideband habitat in the inundation area by acquiring a minimum of 9 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-13 (CP3): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce

impacts on these species; however, because the impacts cannot be fully mitigated, Impact Wild-13 (CP3) is considered significant and unavoidable.

Under CP3, Wild-13 will mitigate for the loss of 2,492 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 9,570 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-14 (CP3): Acquire and Preserve Mitigation Lands and 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-14 (CP3) is considered significant and unavoidable.

This mitigation measure is identical to Mitigation Measure Wild-1 (CP1). Under CP3, Wild-14 will mitigate for the loss of 2,492 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 9,570 acres of mitigation lands containing comparable habitats.

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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP3) is considered significant and unavoidable.

This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Under CP3, Wild-15 will mitigate for the loss of 2,492 acres of overall habitats and western bumble bee habitat in the inundation area and 698 acres in the relocation areas by acquiring a minimum of 9,570 acres of mitigation lands containing comparable habitats.

Mitigation Measure Wild-16 (CP3): Potential impacts and applicable mitigation has yet to be determined for the California red-legged frog. This impact is considered significant and unavoidable.

Mitigation Measure Wild-17 (CP3): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP3), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-17 (CP3) to a less-than-significant level.

Mitigation Measure Wild-20 (CP3): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP3), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-20 (CP3) to a less-than-significant level.

Mitigation Measure Wild-23 (CP3): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP3), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-23 (CP3) to a less-than-significant level.

Mitigation Measure Wild-26 (CP3): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP3), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-26 (CP3) to a less-than-significant level.

CP4 and CP4A – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply Reliability

No mitigation is needed for Impacts Wild-18 (CP4 and CP4A), Wild-19 (CP4 and CP4A), Wild-24 (CP4 and CP4A), Wild-25 (CP4 and CP4A), and Wild-27 (CP4 and CP4A). Mitigation is provided below for the remaining impacts of CP4 or CP4A on wildlife species.

Mitigation Measure Wild-1 (CP4 and CP4A): 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 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-2 (CP4 and CP4A): 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-2 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-3 (CP4 and CP4A): 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-3 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-4 (CP4 and CP4A): 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 and CP4A) to a less-than- significant level.

Mitigation Measure Wild-5 (CP4 and CP4A): 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 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-6 (CP4 and CP4A): Acquire and Preserve Mitigation Lands for Northern Spotted Owl This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts on northern spotted owl dispersal habitat.

Mitigation Measure Wild-7 (CP4 and CP4A): 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 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-8 (CP4 and CP4A): 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-8 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-9 (CP4 and CP4A): Acquire and Preserve Mitigation Lands; Conduct Preconstruction Surveys for the Long-Eared Owl, Northern Goshawk, Cooper's Hawk, Great Blue Heron, and Osprey and Establish Buffers This mitigation measure is identical to Mitigation

Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts on these species; however, because impacts cannot be fully mitigated, Impact Wild-9 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-10 (CP4 and CP4A): 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-10 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-11 (CP4 and CP4A): 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-11 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-12 (CP4 and CP4A): 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 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-13 (CP4 and CP4A): Acquire and Preserve Mitigation Lands for Permanent Loss of General Wildlife Habitat and Western Bumble Bee Habitat This mitigation measure is identical to Mitigation Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce impacts on these species; however, because impacts cannot be fully mitigated, Impact Wild-13 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-14 (CP4 and CP4A): Acquire and Preserve Mitigation Lands and 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-14 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-15 (CP4 and CP4A): 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

on these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP4 and CP4A) is considered significant and unavoidable.

Mitigation Measure Wild-16 (CP4 and CP4A): Potential impacts and applicable mitigation has yet to be determined for the California red-legged frog. This impact is considered significant and unavoidable.

Mitigation Measure Wild-17 (CP4 and CP4A): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-17 (CP4 and CP4A) to a less-than-significant level.

Mitigation Measure Wild-20 (CP4 and CP4A): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-20 (CP4 and CP4A) to a less-than-significant level.

Mitigation Measure Wild-21 (CP4 and CP4A): Conduct Preconstruction Surveys for Elderberry Shrubs, Western 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, western pond turtle, and nesting raptors, and other nesting birds, Reclamation will implement the following measures at gravel augmentation sites with the potential to affect these species:

Valley Elderberry Longhorn Beetle

- 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 where they occur along any access routes. 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. Fencing and signs will be maintained at gravel recruitment sites during construction activities.

- If removal of elderberry shrubs during construction of access routes is unavoidable, Reclamation will consult with USFWS as required under Section 7 of the ESA as appropriate. No project construction will 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.

- Elderberry shrubs will be mitigated for according to the transplantation guidelines outlined in the Beetle Conservation Guidelines (USFWS 1999). These transplantation guidelines dictate the necessary timing and details of the transplanting. At the discretion of USFWS, shrubs that are unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, compensation ratios would be increased to offset the additional habitat loss.

- Relocation of existing elderberry shrubs and planting of new elderberry seedlings will be implemented on a no-net-loss basis. Compensatory mitigation for elderberry shrubs that would be removed from their current locations will 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 or purchasing credits at an approved mitigation bank, or a combination thereof. Relocated and replacement shrubs and associated native plantings will be placed in conservation areas providing a minimum of 1,800 square feet per transplanted shrub.

- 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.

Western Pond Turtle

- When construction activities are to occur within suitable western pond turtle habitat as defined in Impact Wild-3 (CP1), a qualified biologist will conduct a minimum of one preconstruction survey for western

pond turtles and their nests. The survey will be conducted no more than 1 week before 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, CDFW 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.

- When feasible, work areas will be surrounded by exclusion fencing consisting of silt fence securely staked into the ground, with the bottom edge buried at least 6 inches to prevent turtles from accessing the work sites from upland locations.

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 CDFW 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 CDFW, will determine a construction-free buffer zone to be established around the nest until the young have fledged. In consultation with CDFW, a plan will be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged.

Implementation of this mitigation measure would reduce Impact Wild-21 (CP4 and CP4A) to a less-than-significant level.

Mitigation Measure Wild-22 (CP4 and CP4A): Implement Mitigation Measure Wild-21: Conduct Preconstruction Surveys for Elderberry Shrubs, Western 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, western pond turtle, nesting raptors, and other nesting birds, Reclamation will implement the following measures as part of the

gravel augmentation activities project at augmentation sites with the potential to affect these species:

Valley Elderberry Longhorn Beetle This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A) for valley elderberry longhorn beetle, except that the following additional measures will be implemented:

- Before implementation of any vegetation improvements or other activities associated with gravel augmentation, including constructing access routes, a survey will be conducted to identify and map all elderberry shrubs.

- New roads, trails, and staging areas will be constructed a minimum of 100 feet from elderberry shrubs.

- Removal and disturbance of elderberry shrubs will be avoided, to the extent feasible.

Western Pond Turtle This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A) for western pond turtles.

Birds This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A) for birds.

Implementation of this mitigation measure would reduce Impact Wild-22 (CP4 and CP4A) to a less-than-significant level.

Mitigation Measure Wild-23 (CP4 and CP4A): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-23 (CP4 and CP4A) to a less-than-significant level.

Mitigation Measure Wild-26 (CP4 and CP4A): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP4 and CP4A), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-26 (CP4 and CP4A) to a less-than-significant level.

CP5 – 18.5-Foot Dam Raise, Combination Plan

No mitigation is required for Impacts 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 on 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 on 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 for Northern Spotted Owl This mitigation measure is identical to Mitigation Measure Wild-6 (CP1). Implementation of this mitigation measure will reduce impacts on northern spotted owl dispersal habitat.

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 on 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, Great Blue Heron, and Osprey and Establish Buffers This mitigation measure is identical to Mitigation Measure Wild-9 (CP1). Implementation of this mitigation measure will reduce impacts on 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 on 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 on 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 and Western Bumble Bee Habitat This mitigation measure is identical to Mitigation

Measure Wild-13 (CP1). Implementation of this mitigation measure will reduce impacts on these species; however, because impacts cannot be fully mitigated, Impact Wild-13 (CP5) is considered significant and unavoidable.

Mitigation Measure Wild-14 (CP5): Acquire and Preserve Mitigation Lands and 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 on 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 on these species; however, because impacts cannot be fully mitigated, Impact Wild-15 (CP5) is considered significant and unavoidable.

Mitigation Measure Wild-16 (CP5) Potential impacts and applicable mitigation has yet to be determined for the California red-legged frog. This impact is considered significant and unavoidable.

Mitigation Measure Wild-17 (CP5): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP5), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-17 (CP5) to a less-than-significant level.

Mitigation Measure Wild-20 (CP5): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat in the Primary Study Area, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP5), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-20 (CP5) to a less-than-significant level.

Mitigation Measure Wild-21 (CP5): Conduct Preconstruction Surveys for Elderberry Shrubs, Western 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 This mitigation measure is identical to Mitigation Measure Wild-21 (CP4 and CP4A). Implementation of this mitigation measure would reduce Impact Wild-21 (CP5) to a less-than-significant level.

Mitigation Measure Wild-22 (CP5): Implement Mitigation Measure Wild-21: Conduct Preconstruction Surveys for Elderberry Shrubs, Western 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 This mitigation measure is identical to Mitigation Measure Wild-22 (CP4 and CP4A). Implementation of this mitigation measure would reduce Impact Wild-22 (CP5) to a less-than-significant level.

Mitigation Measure Wild-23 (CP5): To Reduce Impacts on Riparian-Associated and Aquatic Special-Status Wildlife along the Lower Sacramento River Resulting from Modifications of Geomorphic Processes, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP5), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-23 (CP5) to a less-than-significant level.

Mitigation Measure Wild-26 (CP5): To Promote Consistency with Local and Regional Plans with Goals of Promoting Riparian Habitat along the Lower Sacramento River and in the Delta, Implement Mitigation Measure Bot-7: Implement a Riverine Ecosystem Mitigation and Adaptive Management Plan This mitigation measure is identical to Mitigation Measure Bot-7 (CP5), described in Chapter 12, "Botanical Resources and Wetlands." Implementation of this mitigation measure would reduce Impact Wild-26 (CP5) to a less-than-significant level.

13.3.6 Cumulative Effects

Chapter 3, "Considerations for Describing the Affected Environment and Environmental Consequences," discusses overall cumulative impacts methodology related to the action alternatives, including the relationship to the CALFED Bay-Delta Program Programmatic EIS/EIR cumulative impacts analysis, qualitative and quantitative assessment, past and future actions in the study area, and significance criteria. Table 3-1, "Present and Reasonably Foreseeable Future Actions Included in the Analysis of Cumulative Impacts, by Resource Area," in Chapter 3, lists the present and reasonably foreseeable future projects considered quantitatively and qualitatively within the cumulative impacts analysis. This cumulative impacts analysis accounts for potential project impacts combined with the impacts of existing facilities, conditions, land uses, and reasonably foreseeable actions expected to occur in the study area on a qualitative and quantitative level. None of the projects listed in Table 3-1 under Quantitative Analysis would have impacts on wildlife resources in the primary study area, nor would they have overlapping cumulative effects on wildlife resources with any of the action alternatives. Therefore, the following analysis is based on the programs and projects listed in the Qualitative Analysis section of Table 3-1. Projects listed in Table 3-1 that may have cumulative effects in the primary and extended study area include, but are not limited to,

the CALFED Ecosystem Restoration Program, Bay-Delta Conservation Plan, Sacramento River Conservation Area Forum Program, Central Valley Flood Protection Plan, PG&E and DWR Hydropower Relicensing Programs, Antlers Bridge Replacement, Moody Flats Quarry, and the Mountain Gate at Shasta Mixed Use Area Plan.

A large number of past actions have occurred in the study area. These past actions have substantially degraded wildlife resources in the primary and extended study areas. This degradation is in part 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 CDFW.

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 agricultural, road, dam, 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 (or entirely eliminating) 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 Modeling 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 before 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, the same as CP4A, and 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), the same as CP4A, and 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 adverse effects from CP1

would be a cumulatively considerable incremental contribution to significant cumulative effects on vegetation, wildlife habitats, and special-status wildlife species. With implementation of Mitigation Measure Bot-7, "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 effects 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 cumulatively considerable incremental contribution to a 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 a cumulatively considerable incremental contribution to significant cumulative effects on vegetation, wildlife habitats, and special-status wildlife species. With implementation of Mitigation Measure Bot-7, "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 effects 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 cumulatively considerable incremental contribution to a significant cumulative effect.

CP3 – 18.5-Foot Dam Raise, Agricultural Water Supply Reliability and Anadromous Fish Survival 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 a cumulatively considerable incremental

contribution to significant cumulative effects on vegetation, wildlife habitats, and special-status wildlife species. With implementation of Mitigation Measure Bot-7, "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 effects 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 cumulatively considerable incremental contribution to a significant cumulative effect.

CP4 and CP4A – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply Reliability The cumulative effects of CP4 or CP4A 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 or CP4A would be a cumulatively considerable incremental contribution to significant cumulative effects on vegetation, wildlife habitats, and special-status wildlife species. With implementation of Mitigation Measure Bot-7, "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 or CP4A 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 or CP4A could contribute to potentially significant effects of climate change on habitat acreages and distribution. However, with implementation of the mitigation measures listed above to reduce project-related impacts of CP4 or CP4A, there would not be a cumulatively considerable incremental 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 a cumulatively considerable incremental contribution to significant cumulative effects on vegetation, wildlife habitats, and special-status wildlife species. With implementation of Mitigation Measure Bot-7, "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 effects 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 cumulatively considerable incremental contribution to a significant cumulative effect.