Appendix E

Special-Status Species Accounts

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This appendix describes the legal status, distribution, habitat association, and reasons for decline for the following special-status species that are evaluated in the Battle Creek Action Specific Implementation Plan (ASIP): Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, valley elderberry longhorn beetle (VELB), northwestern pond turtle, osprey, and yellow breasted chat.

Sacramento River Winter-Run Chinook Salmon

Legal Status

The Sacramento River winter-run Chinook salmon is listed as endangered under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA). Battle Creek is also Essential Fish Habitat (Section 305(b)(2)–(4) of the Magnuson-Stevens Act) for winter-run Chinook salmon.

Description

Spawning adults are olive brown to dark maroon without conspicuous streaking or blotches on the sides. Spawning males are darker than females and have hooked jaws and slightly humped backs. There are numerous small black spots on the back, dorsal fin, and both lobes of the tail in both sexes. They can be distinguished from other spawning salmon by color pattern, particularly spotting on the caudal fin and black gums of the lower jaw.

During spawning, the female digs a redd (gravel nest) in which she deposits her eggs, which are then fertilized by the male. Newly emerged fry remain in shallow, lower-velocity edgewaters, particularly where debris congregates and makes the fish less visible to predators (California Department of Fish and Game 1998). Juveniles are distinguished by parr marks during freshwater residence (Moyle 2002). Prior to entering the ocean, juveniles loose their parr marks and become silvery.

Distribution

Historically, winter-run Chinook salmon spawned in the upper reaches of the Sacramento River and its major tributaries, the McCloud and Pit Rivers. Shasta and Keswick Dams block access to historical spawning and rearing areas and restrict spawning and rearing to the Sacramento River downstream of Keswick Dam. Based on counts at Red Bluff Diversion Dam (RBDD), habitat downstream of Keswick Dam apparently maintained relatively high abundance of winter-run Chinook salmon, with spawning populations averaging tens of thousands of adult salmon. Since 1970, winter-run adult abundance has declined to current levels of generally less than 1,000 and, in some years, less than 500. Impedance of migration by RBDD, deterioration of water temperature conditions below Keswick Dam, and other factors contributed to the decline.

Adult winter-run Chinook salmon enter the Battle Creek watershed between January and July, with the peak of the migration occurring at the Coleman National Fish Hatchery (CNFH) barrier dam in late April (U.S. Fish and Wildlife Service 1996). The peak of the winter-run Chinook salmon spawning period is mid-June, when erratic winter flows stabilize and subsequent offspring can take advantage of the cooling effects of headwater springs. Most juvenile winter-run Chinook salmon leave the Sacramento River watershed by mid-March of the following year (U.S. Fish and Wildlife Service 1993).

The winter-run Chinook salmon population presently exists in the Restoration Project area at remnant levels; few, if any, naturally spawned adult winter-run Chinook salmon have been documented in recent years (U.S. Fish and Wildlife Service 2002).

Winter-run Chinook salmon are indigenous to Battle Creek (Kier Associates 1999). However, no reliable records exist that document the size of the population prior to 1995. Historically, systematic counts of adult winter-run Chinook salmon had not been made because of unfavorable environmental conditions during the high-flow winter months when these fish migrate upstream.

The occurrence of successfully reproducing winter-run Chinook salmon in Battle Creek was first documented in 1898 and again in 1900, when the U.S. Fish Commission collected salmon fry in specially designed nets (Rutter 1902, 1903). Small, newly emerged salmon fry (of a size that could only have been winter-run Chinook salmon) were captured in Battle Creek in September and early October (Rutter 1902, 1903; U.S. Fish and Wildlife Service 1992).

A spawning run of adult winter-run Chinook salmon in Battle Creek was documented during the late 1940s and early 1950s, when the CNFH began late fall–run Chinook salmon egg-taking operations (U.S. Fish and Wildlife Service 1987). From the 1950s to the early 1960s, the California Department of Fish and Game (DFG) (1965) reported the existence of winter-run Chinook salmon in Battle Creek during a statewide inventory of steelhead and salmon resources, but provided no estimate of the size of the population in Battle Creek. The CNFH trapped winter-run Chinook salmon in Battle Creek during the late 1950s, including 309 winter-run Chinook salmon in 1958 (U.S. Fish and Wildlife Service 1963), suggesting that winter-run Chinook salmon populations in Battle Creek reached a level of at least 300 adults during this period. Documentation of 24 adult winter-run Chinook salmon in South Fork Battle Creek in 1965 (California Department of Fish and Game 1966) indicates that winter-run Chinook salmon populations persisted in Battle Creek during the mid-1960s. No records exist that document the size of winter-run Chinook salmon populations in Battle Creek from the mid-1960s to the mid-1990s.

Since 1995, as part of its brood stock collection efforts, the U.S. Fish and Wildlife Service (USFWS) has counted winter-run Chinook salmon in Battle Creek at the CNFH during the September-through-February portion of the winter-run Chinook salmon migration period. Winter-run Chinook salmon are also counted from March through June at the CNFH barrier weir, using trapping and videography. Altogether, these monitoring techniques account for most of the December-to-August spawning and migration period of the winter-run Chinook salmon, but several sources of error associated with each of these counting methods suggest that recent counts may underestimate the number of winter-run Chinook salmon in Battle Creek.

Partial counts, derived from the methods used since 1995, have indicated that hatchery-origin winter-run Chinook salmon from past artificial propagation efforts at the CNFH (U.S. Fish and Wildlife Service 1995, 1996; Smith pers. comm.) have returned to Battle Creek or that Battle Creek receives stray winter-run Chinook salmon from other artificial propagation efforts. The catch of nonhatchery-origin winter-run Chinook salmon in 1998 (U.S. Fish and Wildlife Service 1998) and 2000 indicates that Battle Creek still supported a remnant population (fewer than 10 documented fish) of naturally produced winter-run Chinook salmon. Winter-run Chinook salmon may not currently occur in Battle Creek (U.S. Fish and Wildlife Service 2002).

Habitat Association

Winter-run adults migrate through the Delta and into the Sacramento River in winter and early spring and spawn in the mainstem Sacramento River and Battle Creek during late spring and early summer (Moyle et al. 1995). Chinook salmon require cold, freshwater streams with suitable gravel for reproduction. Females deposit their eggs in nests in gravel-bottom areas of relatively swift water. For maximum survival of incubating eggs and larvae, water temperatures must be between 39°F and 57°F. After emerging, many Chinook salmon fry tend to seek shallow, nearshore habitat with slow water velocities and move to progressively deeper, faster water as they grow. Juvenile salmon rear in the Sacramento River in summer and fall, gradually moving downstream before entering the Delta from November to March. Some emerging fry are transported downstream into lower portions of the Sacramento River and lower tributaries, where they rear in shallow marsh and streamside habitats. Juveniles typically rear in fresh water for up to 5 months before migrating to sea when they reach a length of 4 to 6 inches. They migrate out of the Delta to the Bay from February through April. Chinook salmon spend 2–4 years maturing in the ocean before returning to their natal streams to spawn. All adult salmon die after spawning (Moyle 2002, Allen and Hassler 1986).

Reasons for Decline

The winter-run Chinook salmon decline has been related to a variety of factors, including loss of spawning and rearing habitat and high summer water temperatures below Keswick Dam; blockage of adult migration at RBDD; predation on juveniles at RBDD; and loss of juveniles to entrainment into unscreened or poorly screened diversions, including Anderson-Cottonwood Irrigation District (ACID), Glenn-Colusa Irrigation District (GCID), and RBDD diversions, and south-Delta Central Valley Project (CVP) and State Water Project (SWP) pumping plants. Overharvest in sport and commercial fisheries may have contributed to depressed populations.

Within Battle Creek, the decline of salmon and steelhead in the Sacramento River and its tributaries is attributed to a number of factors that have acted upon the populations in a cumulative fashion over decades. These factors include reduced key habitat quantity, reduced migration habitat, warm water temperature, increased contaminants, entrainment in diversions, increased predation, reduced food, hatchery effects, and harvest.

Key Habitat Quantity

Battle Creek is a high-gradient, headwater stream with an elevation change in excess of 5,000 feet over 50 miles. The creek flows through remote, deep-shaded canyons and riparian corridors with little development near its banks. Battle Creek flow consists of rainfall and snowmelt from the western slope of the Cascade Mountain Range, complemented by the year-round flow of natural springs.

Substrate size ranges from sand to boulder with predominantly gravel and cobble throughout the system. The total estimated area of spawning gravel is 57,000 square feet in the mainstem above Coleman Powerhouse; 81,000 square feet in the North Fork up to the barrier waterfall; and 28,000 square feet in the South Fork up to Panther Creek (Thomas R. Payne and Associates 1994). Concentration and types of gravel deposits are directly correlated to stream gradient. Mobility studies imply that gravel in Battle Creek moves with enough frequency to keep it clean of fine sediment and loose enough to support spawning. The Battle Creek channel is characterized by alternating pools and riffles. The channel form, along with boulders, ledges, and turbulence, provides key elements of rearing habitat for fish species.

The primary factor affecting spawning and rearing habitat area in Battle Creek is streamflow. Habitat quality is also significantly affected by temperature as influenced by diversion of cold spring water accretions away from adjacent stream sections and reduced flows in the stream below dams. Diversion for power generation have substantially reduced streamflow in all the reaches of Battle Creek downstream of Keswick Diversion Dam and South Diversion Dam. Although minimum flows are maintained, reduced streamflow has substantially reduced spawning and rearing habitat area available to Chinook salmon, steelhead, and other fish species.

Limited information is available for flow-habitat relationships on Soap, Ripley, and Baldwin Creeks. However, the Federal Energy Regulatory Commission (FERC) license–required minimum flow of 0 cubic feet per second (cfs) would not provide sufficient water to sustain fish. Occurrence of fish in the reaches below the existing diversion dams is limited under the No Action Alternative.

Spawning habitat area may limit the production of juveniles and subsequent adult abundance of some species. Spawning habitat area for fall-/late fall–run Chinook salmon, which compose more than 90% of the Chinook salmon returning to the Central Valley streams, has been identified as limiting their population abundance. Spawning habitat area has not been identified as a limiting factor for the less-abundant winter-run and spring-run Chinook salmon (National Marine Fisheries Service 1997; U.S. Fish and Wildlife Service 1996), although habitat may be limiting in some streams (e.g., Battle Creek), especially during years of high adult abundance.

Spawning habitat area is defined by a number of factors, such as gravel size and quality and water depth and velocity. Although maximum usable gravel size depends on fish size, a number of studies have determined that Chinook salmon require gravel ranging from approximately 0.3 cm (0.1 inch) to 15 cm (5.9 inches) in diameter (Raleigh et al. 1986). Steelhead prefer substrate no larger than 10 cm (3.9 inches) (Reiser and Bjornn 1979). Salmonids spawn in water depths that range from a few inches to several feet. A minimum depth of 0.8 foot for Chinook salmon and steelhead spawning has been widely used in the literature and is within the range observed in some Central Valley rivers (California Department of Fish and Game 1991). Velocity that supports spawning ranges from 0.8 foot per second to 3.8 feet per second (U.S. Fish and Wildlife Service 1994).

Rearing habitat area may limit the production of juveniles and subsequent adult abundance of some species. Rearing habitat for salmonids is defined by environmental conditions such as water temperature, dissolved oxygen, turbidity, substrate, water velocity, water depth, and cover (Healey 1993; Jackson 1992; Reiser and Bjornn 1979).

Rearing area varies with flow. High flow increases the area available to juvenile Chinook salmon because they extensively use submerged terrestrial vegetation on the channel edge and the floodplain. Deeper inundation provides more overhead cover and protection from avian and terrestrial predators than shallow water (Everest and Chapman 1972). In broad, low-gradient rivers, change in flow can greatly increase or decrease the lateral area available to juvenile Chinook salmon, particularly in riffles and shallow glides (Jackson 1992).

Water Temperature

Fish species have different responses to water temperature conditions depending on their physiological adaptations. Salmonids in general have evolved under conditions in which water temperatures are fairly cool. In addition to species-specific thresholds, different life stages have different water temperature requirements. Eggs and larval fish are the most sensitive to changes in water temperature.

Warm water temperature can limit the amount of habitat available and cause mortality of Chinook salmon, steelhead, and other fish species in the Battle Creek system. Primarily weather, channel form and dimension, shade, and flow determine water temperature. Diversion of flow, including spring water accretions, from Battle Creek substantially warms water temperature, especially from March through October. Flow diversion and subsequent warming substantially reduce the habitat area that can support migration, holding, spawning, and rearing of Chinook salmon and steelhead in Battle Creek (Kier Associates 1999a). Transbasin water diversions from the North Fork of Battle Creek to the South Fork tend to warm North Fork Battle Creek and cool South Fork Battle Creek. Additional information on water temperature is provided in Section 4.4, “Water Quality.”

Unsuitable water temperatures for adult salmonids, such as Chinook salmon and steelhead, during upstream migration lead to delayed migration and potential lower reproduction. Elevated summer water temperature in holding areas of Battle Creek causes mortality of spring-run Chinook salmon (U.S. Fish and Wildlife Service 1996). Warm water temperature and low dissolved oxygen also result in an increase of egg and fry mortality. USFWS (no date) cited elevated water temperatures as limiting factors for fall- and late fall–run Chinook salmon in Battle Creek.

Juvenile salmonid survival, growth, and vulnerability to disease are affected by water temperature. In addition, water temperature affects prey species abundance and predator occurrence and activity. Juvenile salmonids alter their behavior depending on water temperature, including movement to take advantage of local water temperature refugia (e.g., movement into stratified pools, shaded habitat, and subsurface flow) and to improve feeding efficiency (e.g., movement into riffles).

Water temperature in Central Valley rivers frequently exceeds the tolerance of Chinook salmon and steelhead life stages. Based on a literature review, conditions supporting adult Chinook salmon migration are reported to deteriorate as temperature warms between 54ºF and 70ºF (Hallock 1970 as cited in McCullough 1999). For Chinook salmon eggs and larvae, survival during incubation is assumed to decline with warming temperature between 54ºF and

63ºF (Myrick and Cech 2001; Seymour 1956). For juvenile Chinook salmon, survival is assumed to decline as temperature warms from 64ºF to 75ºF (Myrick and Cech 2001; Rich 1997). Relative to rearing, Chinook salmon require cooler temperatures to complete the parr-smolt transformation and to maximize their saltwater survival. Successful smolt transformation is assumed to deteriorate at temperatures ranging from 63ºF to 73ºF (Baker et al. 1995; Marine 1997).

For steelhead, successful adult migration and holding are assumed to deteriorate as water temperature warms between 52ºF and 70ºF. Adult steelhead appear to be much more sensitive to thermal extremes than are juveniles (McCullough 1999). Conditions supporting steelhead spawning and incubation are assumed to deteriorate as temperature warms between 52ºF and 59ºF (Myrick and Cech 2001). Juvenile rearing success is assumed to deteriorate at water temperatures ranging from 63ºF to 77ºF (Myrick and Cech 2001; Raleigh et al. 1984). Relative to rearing, smolt transformation requires cooler temperatures, and successful transformation occurs at temperatures ranging from 42.8ºF to 50ºF. Juvenile steelhead have, however, been captured at Chipps Island in June and July at water temperatures exceeding 68ºF (Nobriega and Cadrett 2001). Juvenile Chinook salmon have also been observed to migrate at water temperatures warmer than expected based on laboratory experimental results (Baker et al. 1995).

Migration Habitat Conditions

Migration habitat is the specific conditions that support migration of individuals to habitat required for activities essential to survival, growth, and reproduction. Migration habitat is supported by streamflows that provide suitable water velocities and depths.

Absolute barriers mark the terminus of the Project on North Fork and South Fork Battle Creek at all times. In the steep, high-elevation stream reaches there are natural features in the channel, such as boulders and logs, that can impede passage depending on vertical drop, flow depth, and flow velocity. Seven diversion dams block passage of Chinook salmon, steelhead, and other fish species; a fish barrier at CNFH blocks passage 6 months of the year.

Passage conditions that support migration of Chinook salmon, steelhead, and other fish species in Battle Creek also have been affected by the reduction in streamflow attributable to diversions for power production. Streamflow affects passage conditions, both flows within the range that can be controlled by the Hydroelectric Project, and the high, uncontrolled flows that spill. Natural events, such as floods, can alter physical characteristics of the channel, including depth of pools from which the fish jump, height that must be jumped, water velocity, slope of the streambed, and the length of the slope, all factors affecting passage. An on-site survey identified transitory barriers in 18 locations on North Fork Battle Creek and five locations on South Fork Battle Creek. Passage of all or some adult Chinook salmon and steelhead could be impaired under streamflow conditions in the range controlled by the hydroelectric diversions. Based on the conditions observed at the time of the survey, a general estimate was made of the streamflow allowing passage through the entire reach for all adult salmon and steelhead. On North Fork Battle Creek, obstacles required greater amounts of streamflow for unimpaired passage than on South Fork Battle Creek. In one extreme case on North Fork Battle Creek (river mile 5.14), an especially steep transitory barrier was modified by DFG in 1997 (Warner pers. comm.) to provide numerous ascent routes at more gradual slopes (Kier Associates 1999a).

The North Battle Creek Feeder, Eagle Canyon, Wildcat, Coleman, Inskip, and South Diversion Dams potentially block approximately 55 miles of upstream habitat. The fish ladders at Eagle Canyon, Wildcat, and Coleman Diversion Dams are considered ineffective under most flow conditions (California Department of Water Resources 1997, 1998). The fish ladder effective flow range for each diversion dam is between 2 and 7 cfs. The ladder at the South Diversion Dam has an effective flow range between 3 and 35 cfs. The ladders proved impossible to maintain during high flows. During average or wet water years, fish ladders at North Battle Creek Feeder, Eagle Canyon, Wildcat, Inskip, and Coleman Diversion Dams could be ineffective for 3 to 8 months because flow exceeds the maximum effective capacity of the ladders by a factor of 10 or more. Fish ladders at Eagle Canyon and Coleman Diversion Dams were intentionally closed to fish passage under the 1998 Interim Agreement.

In addition to the barriers discussed above, CNFH operates a barrier weir along with a fish ladder 5.5 miles upstream of Battle Creek's confluence with the Sacramento River (U.S. Fish and Wildlife Service 2001a). When the fish ladder is closed, the barrier weir extends across the full width of Battle Creek and obstructs passage of adult steelhead and Chinook salmon to Battle Creek above the hatchery. The barrier is not completely effective and some adult Chinook salmon and steelhead pass the barrier, especially at flow in excess of 350 cfs. The number of adult Chinook salmon passing over the barrier weir has been substantial (several thousand fish). The barrier weir is being redesigned to improve the ability to block upstream migration under all flow conditions. A fish ladder at the barrier weir is operated to manage and monitor passage of adult Chinook salmon into Battle Creek upstream of the weir. The objectives of management currently are to:

- minimize the potential for hybridization between co-occurring, naturally-reproducing runs of Chinook salmon in Battle Creek upstream of the barrier weir;
- minimize the risk of infectious hematopoietic necrosis (IHN) virus being shed into CNFH water supply; and
- monitor passage of salmonids.

Contaminants

In the Sacramento River, industrial and municipal discharge and agricultural runoff introduce contaminants. Organophosphate insecticides, such as carbofuran, chlorpyrifos, and diazinon, are present throughout the Central Valley and are dispersed in agricultural and urban runoff. Contaminants enter rivers in winter runoff and enter the estuary in concentrations that can be toxic to invertebrates (CALFED Bay-Delta Program 2000). Because they accumulate in living organisms, they may become toxic to fish species, especially those life stages that remain in the system year-round and spend considerable time during the early stages of development, such as Chinook salmon and steelhead.

Water samples were collected at eight sites in the Battle Creek watershed and analyzed for metal, total suspended solids (TSS), and oil and grease. The results revealed that each of these parameters was within the U.S. Environmental Protection Agency's (EPA's) recommended levels for aquatic life. Contaminant levels in Battle Creek are relatively low and adverse effects are not currently documented.

Entrainment in Diversions

All fish species are entrained to varying degrees by diversions throughout the Sacramento River system. Fish entrainment and subsequent mortality are a function of the size of the diversion, the location of the diversion, the behavior of the fish, and other factors, such as fish screens, presence of predatory species, and water temperature. Low approach velocities and fish screens are assumed to minimize stress and protect fish from entrainment.

Given that most of the flow is diverted from Battle Creek for power production and that fish screens are absent from all of the diversions, most downstream migrant fish, including steelhead and Chinook salmon, would be entrained. Survival of passage through the power turbines would likely be minimal and entrained fish would be lost from the population.

Predation and Pathogens

Native and nonnative species may cause substantial predation mortality on salmonids and other species. Nonnative fish predators in Battle Creek include brown trout, smallmouth bass, green sunfish, and other species. Although the contribution to mortality is uncertain, predation mortality may reduce survival of juvenile Chinook salmon and steelhead and other species, especially where the stream or river channel has been altered from natural conditions (California Department of Water Resources 1995). The existing diversion dams in the Restoration Project area may create environmental conditions that increase the probability that predator species will capture juvenile Chinook salmon, steelhead, and other species during downstream movement. Water turbulence in the vicinity of the dams and other structures may disorient migrating juvenile Chinook salmon and steelhead, increasing their vulnerability to predators. In addition, changes in flow velocity and depth affect the quality of habitat and potentially increase vulnerability of fish species to predation by other fish species and by birds and mammals.

Steelhead and Chinook salmon that are present in Battle Creek carry pathogens, including IHN. Currently the potential for occurrence of fish pathogens associated with anadromous fishes is likely low because the abundance of Chinook salmon and steelhead is relatively low. Rainbow trout (i.e., the resident form of steelhead) are susceptible to pathogens carried by stocked trout, Chinook salmon, and steelhead. Rainbow trout are relatively abundant in the reaches of Battle Creek upstream of the diversion dams and in the canals conveying flow diverted from Battle Creek. Existing flows and fish ladder design and operation, including the operation of the fish barrier at CNFH, control the migration and abundance of anadromous fish in Battle Creek and in reaches upstream of the diversion dams. Although data on the incidence of pathogens in wild populations of rainbow trout are not available, the low abundance of Chinook salmon and steelhead in upstream reaches may minimize the incidence of pathogens upstream of diversion dams and in the canals conveying diversions.

Food

Food availability and type affect survival of fish species. Flow affects stream surface area and production of food. A primary factor affecting food production in Battle Creek is streamflow. Diversion for power generation has substantially reduced streamflow in all the reaches of Battle Creek downstream of Keswick Diversion Dam and South Diversion Dam. Although minimum flows are maintained, reduced streamflow has substantially reduced stream area. In addition, diversions entrain food organisms, exporting nutrients from segments of Battle Creek.

The density of adult salmon carcasses has been shown to increase nutrient input to stream systems and contribute to increased growth rates of juvenile salmonids (Wipfli et al. 2002). The historical reduction of Chinook salmon populations also may have reduced food availability and productivity of Battle Creek.

Hatchery

The primary objective of the CNFH is to serve as mitigation for the habitat lost when the upper Sacramento River and its tributaries were blocked by the construction of Shasta Dam in the 1940s. CNFH propagates three salmonid stocks: fall-run Chinook salmon, late fall–run Chinook salmon, and steelhead trout (U.S. Fish and Wildlife Service 2001a). The fall- and late fall–run Chinook salmon and steelhead hatchery programs are considered to be integrated with naturally spawning fall Chinook salmon in the upper Sacramento River and Battle Creek (U.S. Fish and Wildlife Service 2001a). Risks that hatchery operations and augmentation may pose to natural populations of steelhead and Chinook salmon include: introduction, spread, or amplification of fish pathogens; deleterious genetic effects of hatchery fish on natural stocks; impedance of migrating fish at the hatchery barrier weir and water intake structures; and exceeding the carrying capacity of riverine, estuarine, and marine habitat.

Harvest

Sport and commercial fishing affects the abundance of adult Chinook salmon and steelhead (sport fishing only) returning to the Sacramento River system, including Battle Creek. Ocean survival may be reduced by 35–85% (Pacific Fishery Management Council 2001). Ocean and river regulations have been implemented to minimize effects of sport and commercial fishing, especially on winter-run Chinook salmon and steelhead. Sport fishing in Battle Creek may have local effects on anadromous and resident fish species that are currently unknown; however, Battle Creek is closed to the legal harvest of naturally produced anadromous fish.

Designated Critical Habitat

The portion of the Sacramento River from Keswick Dam to Chipps Island, all waters westward from Chipps Island to the Carquinez Strait bridge, all waters of San Pablo Bay, and all waters of San Francisco Bay north of the San Francisco–Oakland Bay Bridge have been designated as critical habitat (58 Federal Register [FR] 33212, June 16, 1993). Battle Creek is not included within the designated critical habitat.

Central Valley Spring-Run Chinook Salmon

Legal Status

The Central Valley spring-run Chinook salmon is listed as threatened under the ESA and CESA. Battle Creek is also Essential Fish Habitat (Section 305(b)(2)–(4) of the Magnuson-Stevens Act) for spring-run Chinook salmon.

Description

See the description for Sacramento River winter-run Chinook salmon above.

Distribution

Historically, the Central Valley spring-run Chinook salmon was one of the most abundant and widely distributed salmon races. Gold mining and agricultural diversions caused the first major declines in spring-run Chinook salmon populations (Moyle et al. 1995). Further extirpations followed construction of major water storage and flood control reservoirs on the Sacramento and San Joaquin Rivers and their major tributaries in the 1940s and 1950s (Moyle et al. 1995; 63 FR 11841, March 9, 1998). Spring-run Chinook salmon have been completely extirpated in the San Joaquin drainage. Wild spring-run Chinook salmon are consistently found in Deer, Mill, and Butte Creeks, which are tributaries to the Sacramento River (Campbell and Moyle 1991; 63 FR 11841, March 9, 1998).

Naturally spawning, spring-run Chinook salmon enter the watershed as adults from mid-March to mid-October, although no specific peak has been observed in the run at the CNFH barrier dam (U.S. Fish and Wildlife Service 1996). In general, adult spring-run Chinook salmon inhabit cool pools until they spawn from late August to mid-October (California Department of Fish and Game 1996c, 1998a). Emigration of juvenile spring-run Chinook salmon is highly variable, with observations ranging between spring outmigration of juveniles and fall outmigration of either yearlings or fingerlings (California Department of Fish and Game 1998a).

The spring-run Chinook salmon population presently exists in the Project area at low levels; probably between 50 and 100 adult spring-run Chinook salmon have used the Restoration Project area annually during the past several years, although these population estimates are not precise (U.S. Fish and Wildlife Service 2002). Current populations of spring-run Chinook salmon appear to be severely depressed when compared to populations that existed in the 1940s and 1950s.

Surveys conducted by the USFWS (1940) in the late 1930s and early 1940s reported a small population of spring-run Chinook salmon and a larger run of fall-run Chinook salmon. At the beginning of CNFH operations, from 1943 to 1946, the hatchery collected 227, 1,181, 468, and 2,450 spring-run Chinook salmon from Battle Creek, respectively, indicating that a relatively large population was present in the creek (U.S. Fish and Wildlife Service 1949). From 1952 to 1956, annual estimates of adult spring-run Chinook salmon in Battle Creek ranged from 1,700 to 2,200 (California Department of Fish and Game 1961).

Stream surveys in the early 1960s indicated that spring-run Chinook salmon utilized various areas of the Project area including Eagle Canyon and South Fork Battle Creek upstream of Panther Creek, but these studies did not provide population estimates (California Department of Fish and Game 1966; Tehama County Community Development Group 1983). Spring-run Chinook salmon (i.e., 40 to 50 adult fish) were again observed in Eagle Canyon in 1970, but no systematic population estimate was provided (California Department of Fish and Game 1970; Warner 1998).

From 1995 to 1998, the USFWS estimated the number of spring-run Chinook salmon located in holding habitat upstream of the CNFH barrier dam. These population estimates ranged from about 50 to 100 spring-run Chinook salmon (California Department of Fish and Game 1996a; U.S. Fish and Wildlife Service 1996, 1997, 2000, 2002). From 1998 to 2001, the USFWS has counted Chinook salmon in Battle Creek during part of the spring-run Chinook salmon migration period. Although these partial counts have not definitively identified the number of spring-run Chinook salmon that use Battle Creek, it is likely that some fish identified as "nonwinter -run" were indeed spring-run Chinook salmon. These partial counts indicate that perhaps as many as 71 to 100 spring-run Chinook salmon passed the CNFH barrier weir into the Project area from 1998 to 2001, but the actual number could be much lower.

Habitat Association

Naturally spawning, spring-run Chinook salmon enter the watershed as adults from mid-March to mid-October, although no specific peak has been observed in the run at the CNFH barrier dam (U.S. Fish and Wildlife Service 1996). In general, adult spring-run Chinook salmon hold through the summer in cool pools until they spawn from late August to mid-October (California Department of Fish and Game 1996c, 1998a). Emigration of juvenile spring-run Chinook salmon is highly variable, with observations ranging between spring outmigration of juveniles and fall outmigration of either yearlings or fingerlings (California Department of Fish and Game 1998a).

Reasons for Decline

Factors related to the decline of spring-run Chinook salmon include loss of habitat in river reaches blocked by dams, degradation of habitat conditions (e.g., water temperature), entrainment in water diversions, and overharvest. The human-caused factor that has had the greatest effect on the abundance of spring-run Chinook salmon runs is loss of habitat, primarily in the rivers upstream of the Delta. Major dams have blocked upstream access to most Chinook salmon habitat in Central Valley rivers and streams, and smaller dams contribute to migration delay. On most Central Valley streams, spring-run Chinook salmon are restricted to habitats with marginal water temperature conditions and limited deep holding areas. Water diversions and reservoir operations affect streamflow, which influences the quantity, quality, and distribution of Chinook salmon spawning and rearing habitat. Water diversions also reduce survival of emigrating juvenile salmonids through direct entrainment losses in unscreened or inadequately screened diversions. Predation on emigrating salmonids at diversion dams, such as Red Bluff Diversion Dam, may also be an important survival factor (Bureau of Reclamation 1983).

For factors affecting decline in Battle Creek, see the description for Sacramento River winter-run Chinook salmon above.

Central Valley Fall/Late Fall–Run Chinook Salmon

Legal Status

The Central Valley fall/late fall–run Chinook salmon is a candidate for listing under the ESA. Battle Creek is Essential Fish Habitat (Section 305(b)(2)–(4) of the Magnuson-Stevens Act) for fall/late fall–run Chinook salmon.

Description

See the general description for Sacramento River winter-run Chinook salmon above.

Distribution

Fall/late fall–run Chinook salmon are the most abundant and widely distributed of the extant runs of Chinook salmon in the Central Valley, occurring in all of the major tributaries of the Sacramento and San Joaquin Rivers and in may small tributaries (California Department of Fish and Game 1994). The most abundant populations are in the main stem of the Sacramento, Feather, Yuba, and American Rivers. Populations also occur in the Cosumnes, Mokelumne, Stanislaus, Tuolumne, and Merced Rivers.

Fall-run Chinook salmon comprise the largest population of Chinook salmon in Battle Creek, but they have been intentionally restricted from entering the Project area since 1989. During the past 5 years of record, an average of about 95,000 adult fall-run Chinook salmon returned to Battle Creek, of which an average of nearly 34,000 were allowed to enter the CNFH. The remaining fish were excluded from the hatchery and were mostly confined downstream of the CNFH barrier weir and outside the Restoration Project area (CAMP 1998, U.S. Fish and Wildlife Service 2001b). The abundance of fall-run Chinook salmon in the Battle Creek watershed has increased since about 1993. Fisheries managers have conventionally believed that most of these fall-run Chinook salmon are products of CNFH operations (Kier Associates 1999a). However, recent research suggests that as many as one-third of the fall-run Chinook salmon were the product of hatchery fish that spawn naturally in Battle Creek (U.S. Fish and Wildlife Service 2001b).

From 1985 to 1989, fall-run Chinook salmon were intentionally allowed to pass over the barrier dam. However, from 1986 to 1989, they were intentionally confined downstream of Wildcat and Coleman Diversion Dams by the closure of the fish ladders at these dams. In 1986, these fish were located in the Wildcat, Coleman, and Inskip reaches, in numbers decreasing with distance upstream (Hoopaugh 1998).

Late fall–run Chinook salmon comprise the second largest population of Chinook salmon in Battle Creek. During the past 5 years, an average of 3,276 adult late fall–run Chinook salmon returned to the CNFH. Only a small number of unmarked, possibly natural-origin, late fall–run Chinook salmon utilized Battle Creek, and all of these fish (18 in 1998, six in 1999, four in 2000) were intentionally restricted to waters downstream of the Project area (CAMP 1998; U.S. Fish and Wildlife Service 2001b).

Late fall–run Chinook salmon are restricted from passing upstream of the CNFH barrier weir, similar to restrictions placed on fall-run Chinook salmon. An unknown, but small number of late fall–run Chinook salmon presumably have been able to pass upstream at the CNFH barrier weir. The number of late fall–run Chinook salmon spawning naturally below the CNFH barrier weir is unknown, but is presumed to be small (U.S. Fish and Wildlife Service 2001b).

Habitat Association

The fall/late fall–run Chinook salmon evolutionarily significant unit (ESU) is composed of a fall run and a late fall run. Adult fall-run Chinook salmon of both hatchery and naturally spawned origin migrate into the Battle Creek watershed from July through December, with a peak in migration usually occurring at the CNFH barrier dam during October (Parker 1998). Natural spawning peaks in early November (California Department of Fish and Game 1996c), and most of the subsequent offspring leave Battle Creek by the end of June of the following year (California Department of Fish and Game 1990; Vogel and Marine 1991). Naturally spawning late fall–run Chinook salmon enter Battle Creek as adults from mid-October to mid-April and spawn from January through April with a peak in February. The offspring of these fish leave the watershed by mid-December (California Department of Fish and Game 1990, Vogel and Marine 1991).

Reasons for Decline

For factors affecting decline in Battle Creek, see the description for Sacramento River winter-run Chinook salmon above.

Central Valley Steelhead

Legal Status

The Central Valley steelhead is listed as threatened under the ESA.

Description

Adults can usually be recognized as silvery with numerous black spots on the tail, adipose fin, dorsal fin, and back, with an iridescent pink to red lateral band. The spots on the tail are typically in radiating lines. The cheeks are also pinkish, the back iridescent blue to nearly brown, and the sides and belly silver, white, or yellowish.

Steelhead are generally classified into two races, depending on whether they begin their upstream migration in winter or summer. Winter steelhead typically begin their spawning migration in fall and winter and spawn within a few weeks to a few months from the time they enter fresh water. Summer steelhead typically enter fresh water in spring and early summer, hold over in deep pools until mature, and spawn in late fall and winter.

During spawning, the female deposits her eggs in a redd, where they are fertilized by the male. Egg incubation time in the gravel is determined by water temperature, varying from approximately 19 days at an average water temperature of 15.5°C to approximately 80 days at an average temperature of 4.5°C.

Steelhead fry usually emerge from the gravel 2 to 8 weeks after hatching (Barnhart 1986, Reynolds et al. 1993). Newly emerged steelhead fry move to shallow, protected areas along streambanks but move to faster, deeper areas of the river as they grow. Though most occupy riffles in their first year of life, some of the larger steelhead live in deeper, faster runs or pools. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juveniles emigrate downstream to the ocean in November through May (Schafter 1980); however, most Sacramento River steelhead emigrate in spring and early summer (Reynolds et al. 1993). Sacramento River steelhead generally migrate as 1-year-olds at a length of 6 to 8 inches (Barnhart 1986, Reynolds et al. 1993).

Distribution

Central Valley steelhead historically inhabited large and small streams throughout the Sacramento–San Joaquin watershed. Current distribution in the watershed is limited primarily by dams that block access to upstream reaches of main rivers and their tributary streams. Central Valley steelhead populations are found in the Sacramento River and its tributaries, including the Feather, Yuba, and American Rivers, and many small tributaries, such as Mill, Deer, Cottonwood, and Butte Creeks. The Cosumnes and Mokelumne Rivers also support steelhead. In the San Joaquin River basin, the best available information suggests that the current range of steelhead is limited to reaches below major dams on the Stanislaus, Tuolumne, and Merced Rivers and to the mainstem San Joaquin River downstream of its confluence with the Merced River.

The annual average population of adult steelhead in the Battle Creek watershed, including fish managed at the CNFH, is currently about 2,100 fish. About 880 adult steelhead, on average, have been documented migrating into the Project area each year; however in most years previous to 1996 steelhead were not allowed upstream of the CNFH barrier weir (U.S. Fish and Wildlife Service 2001c). Despite periods of relatively low abundance from the 1980s through the early 1990s, steelhead populations in Battle Creek, including CNFH, have fluctuated steadily around the level of about 2,000 adults since 1967.

Steelhead spawn in almost every tributary of the upper Sacramento River and appear to do so in numbers proportionate to a given tributary's runoff; that is, the larger streams (Mill, Deer, and Battle Creeks) have the larger runs (Hallock 1989; Hallock et al. 1961). Actual numbers of naturally spawning steelhead in these streams are generally unknown. However, an average of 1,160 steelhead per year migrated into Mill Creek between 1954 and 1963 (California Department of Fish and Game no date), suggesting that populations in Battle Creek may have had a similar level of abundance.

From 1967 to 1993, the estimated number of steelhead passing Red Bluff Diversion Dam ranged from a low of 470 to a high of 19,615 (California Department of Fish and Game 1994, 1996b). While estimates vary, perhaps 10% of these fish spawned in Battle Creek and about 28% were believed to have spawned at the CNFH (U.S. Fish and Wildlife Service 1984b).

Steelhead returning to Battle Creek and/or the CNFH in recent years have been directly counted at the hatchery, where all steelhead, except an unknown number of fish that can swim over the CNFH barrier weir at high flows, are captured from September through February (U.S. Fish and Wildlife Service 2001b). Since 1991, from zero to as many as 1,469 steelhead each year have been intentionally allowed to pass upstream of the CNFH (U.S. Fish and Wildlife Service 2001c). About 1,600 steelhead, including 1,382 marked as hatchery fish, were released above CNFH barrier weir in 2001 (U.S. Fish and Wildlife Service 2002). An unknown number of fish swim over the CNFH barrier weir at high flows.

Habitat Association

Steelhead return to natal streams to spawn as 2- to 4-year-old adults. The fish migrate upstream from July through February and usually spawn between late December and March. Although many steelhead die after spawning, a small proportion return to the sea between April and June (Mills and Fisher 1993).

The typical spawning period for steelhead populations in the upper Sacramento River, including, presumably, the Battle Creek population, begins in December and continues through April (California Department of Fish and Game 1990; Schafter 1980). Steelhead eggs hatch by late May.

Following emergence, fry live in small schools in shallow water along streambanks. As steelhead grow, they establish individual feeding territories;

juveniles typically rear for 1–2 years in streams before emigration. In the Sacramento River, juvenile steelhead migrate to the ocean in spring and early summer, with peak migration through the Delta in March and April (Reynolds et al. 1993). The juveniles likely spend a year or more in Battle Creek before migrating to the Pacific Ocean. Steelhead may remain in the ocean from 1 to 4 years, growing rapidly as they feed in the highly productive currents along the continental shelf (Barnhart 1986).

Reasons for Decline

Factors related to the decline of Central Valley steelhead include loss of habitat in river reaches blocked by dams, degradation of habitat conditions (e.g., water temperature), and entrainment in water diversions. Loss of habitat has the greatest effect on steelhead abundance. Major dams are the primary barriers to steelhead access to Central Valley rivers and streams. Dams at low elevations on all major tributaries block access to an estimated 95% of historical spawning habitat in the Central Valley (Reynolds et al. 1993). Below dams, remnant steelhead populations are affected by varying flow conditions and high summer and fall water temperature. Unscreened agricultural, municipal, and industrial diversions in the Delta and rivers cause entrainment losses of emigrating juvenile steelhead.

More than 90% of the adult steelhead in the Central Valley are produced in hatcheries (Reynolds et al. 1990). Hatchery-produced fish may substantially affect the genetic integrity of wild populations. Adult and juvenile steelhead are harvested by sport anglers within the Central Valley watershed. There is no commercial or sport fishery for steelhead in the ocean and, for unknown reasons, steelhead are rarely taken by commercial or sport salmon trollers (Skinner 1962).

For factors affecting decline in Battle Creek, see the description for Sacramento River winter-run Chinook salmon above.

Valley Elderberry Longhorn Beetle

Legal Status

The VELB is federally listed as threatened (45 FR 52803, August 8, 1980); it is not listed by the state. The USFWS developed a recovery plan in 1984 (U.S. Fish and Wildlife Service 1984a) with the interim objectives of protecting three known localities, surveying riparian areas in the Central Valley to detect other VELB populations, and protecting the riparian habitats within the VELB’s historical distribution. As more information becomes available, USFWS will determine the number of sites and populations of VELB required before it considers delisting the species (U.S. Fish and Wildlife Service 1984a).

Description

The VELB is a medium-sized beetle (0.8 inch long) in the long-horned wood-boring family Cerambycidae. The Latin term *dimorphus* in the beetle's scientific name (*Desmocerus californicus dimorphus*) refers to differences in appearance by gender. The forewings of the female are dark metallic green with red margins, whereas those of the male are primarily red with dark green spots.

The VELB's life history characteristics are assumed to follow a sequence of events similar to those of related taxa (U.S. Fish and Wildlife Service 1984a). Females deposit eggs in crevices in the bark of living blue elderberry shrubs, primarily in valley foothill riparian habitats. Presumably, the eggs hatch shortly after they are laid and larvae bore into the pith of the trunk or stem. When larvae are ready to pupate, they work their way through the pith of the shrub, open an emergence hole through the bark, and return to the pith for pupation. Adults exit through the emergence holes and can be found on elderberry foliage, flowers, or stems or on adjacent vegetation. The entire life cycle of the VELB is thought to take 2 years from the time eggs are laid and hatch until adults emerge and die (U.S. Fish and Wildlife Service 1984a).

The presence of exit holes in blue elderberry stems is an indication of previous VELB use. The distinctive oval exit holes are approximately 0.25 inch in diameter and can be found from a few inches above the ground to about 10 feet up on stems ranging from 1 to 8 inches in diameter (Barr 1991).

Distribution

Information on the historical distribution and abundance of VELB is scarce. The VELB may have always been a rare species; however, the substantial reduction in Central Valley riparian vegetation in the past 100 years probably has further reduced the beetle's range and isolated the remaining populations (U.S. Fish and Wildlife Service 1984a).

In 1984, the VELB was known to occur in only three Central Valley drainages: the Merced River, Putah Creek, and the American River (U.S. Fish and Wildlife Service 1984a). However, additional field surveys in subsequent years detected new locations of VELB along the Yuba, American, Cosumnes, Sacramento, Mokelumne, Calaveras, San Joaquin, Tuolumne, Stanislaus, and Merced Rivers (Barr 1991).

The current range of the VELB extends from the northern end of the Central Valley at Redding to the Bakersfield area. In the foothills of the Sierra Nevada, adult beetles have been found in elevations up to 2,220 feet and exit holes in elevations up to 2,940 feet. Along the Coast Ranges, adult beetles have been found up to 500 feet elevation, and exit holes have been detected up to 730 feet elevation (Barr 1991).

Habitat Association

The beetle’s entire life cycle is associated with blue elderberry shrubs in creeks and riparian areas connected to California’s Central Valley and in the surrounding foothills up to 3,000 feet in elevation in the east and the entire watershed to the west (U.S. Fish and Wildlife Service 1984a).

Reasons for Decline

Although its historical distribution is unknown, the extensive loss of riparian forests in the Central Valley during the past 100 years probably resulted in a decrease and fragmentation of the VELB’s range (Barr 1991; U.S. Fish and Wildlife Service 1984a). Insecticide from cultivated fields and orchards adjacent to blue elderberry shrubs could affect VELB populations if it drifts when adults are present on the shrubs (Barr 1991). Herbicide drift from agricultural fields and orchards could also negatively affect blue elderberry shrubs and reduce VELB habitat.

Northwestern Pond Turtle

Legal Status

The northwestern pond turtle is designated as a species of concern by Region 1 of the USFWS and as a species of special concern by the DFG. The species currently receives no statutory protection under CESA (Fish and Game Code §§2050–2068) or the ESA (16 U.S. Code [USC] 1531–1544).

Description

The northwestern pond turtle is an aquatic turtle of medium size (up to 7 inches long). It is the only native turtle in northern California and is unlikely to be misidentified. The carapace is olive brown to blackish, often with darker spots or lines radiating out from the centers of the shields on the plastron. The newly hatched young are 1 inch long, with the tail nearly as long as the shell. These turtles are dietary generalists that feed primarily on small aquatic invertebrates, such as crustaceans and insects, but they also will feed on carrion. Frogs, small fish, and ducklings have been reported prey items, but it is unknown if they were captured while alive or taken as carrion (Holland 1994).

Distribution

The northwestern pond turtle is endemic to the Pacific Northwest. Two subspecies of western pond turtle are currently recognized, the northwestern and southwestern pond turtles. The former is found in northern California from the Oregon border south to the American River and the latter in the coastal areas south of San Francisco. The two subspecies intergrade in the Central and San Joaquin Valleys, but not within the Restoration Project area. It has been suggested that a third undescribed subspecies occurs near the Columbia River Gorge and that the three forms may actually represent different species (Holland 1994). Genetic studies are currently underway to resolve this question.

Movements of up to 3 miles across terrestrial habitats have been documented in all size classes of northwestern pond turtles. Reasons for such movements are generally unknown, but the movements may be responses to environmental stress such as drought, or regular movements among a series of ponds (Holland 1994). Male and female home ranges have been estimated at approximately 2.5 acres and 0.6 acre, respectively (Bury 1972).

Habitat Association

The northwestern pond turtle inhabits a wide range of freshwater or brackish rivers, streams, lakes, ponds, and permanent or ephemeral wetlands and is often seen basking on logs, rocks, and mud banks. The species typically occurs in slow-moving streams, pools, and ponds. In most cases, emergent basking sites, such as rocks, logs, or vegetation, are present. Although northwestern pond turtles are occasionally observed in reservoirs, abandoned gravel pits, stock ponds, and sewage treatment plants, most such sightings are of displaced individuals and do not represent viable populations (Holland 1994; Jennings and Hayes 1994).

The species typically nests on gentle slopes in compact soils with a large proportion of silt or clay. Vegetation is usually sparse and consists of grass or forbs. Nests can be from about 10 feet to more than 1,300 feet away from aquatic habitats (Holland 1994). Rathbun et al. (1992) recommended a 1,600-foot buffer zone around aquatic habitats to protect nesting habitat.

The characteristics of overwintering habitat and terrestrial habitats used at other times of the year are highly variable. The presence of a duff layer seems to be a general characteristic of such habitats. The species sometimes overwinters in aquatic environments, such as on mud bottoms, beneath undercut banks or logs, or in areas of emergent vegetation. Movement between overwintering sites does occur, and turtles have been observed swimming under ice in water with temperatures as low as 34ºF (Holland 1994).

Northwestern pond turtles may be either largely inactive during the winter or active throughout the year, depending on location and environmental conditions.

In some areas, turtles overwinter communally in either aquatic or terrestrial sites. Terrestrial overwintering sites may be up to about 1,600 feet from aquatic habitats and usually consist of burrows in leaf litter or soil (Holland 1994; Jennings and Hayes 1994).

Reasons for Decline

Holland (1994) estimated a 96% to 98% decline in northwestern pond turtle populations in Oregon, but specific causes were not identified. Habitat destruction from agricultural activities, urbanization, and flood control and water diversion projects are considered primary causes of population decline (Jennings et al. 1992). Jennings and Hayes (1994) hypothesized that observed changes in age-class distribution suggest a lack of recruitment that may indicate that the destruction of nesting habitat is a significant factor in declines. They identified agricultural or livestock activity as probable causes. However, introduced exotic fish and bullfrogs that prey on young turtles may also be causing decreases in recruitment. In addition, disease and mortality from ingestion of baited hooks could be contributing factors. Although logging activities can affect the quality of aquatic habitats, no evidence exists to suggest that timber harvesting has contributed to regional or statewide population declines.

Bald Eagle

Legal Status

The bald eagle is federally listed as threatened and state listed as endangered and is protected under the federal Bald and Golden Eagle Protection Act (16 USC 668–668d).

Description

The sharp contrast between the adult bald eagle’s distinctive white-feathered head and tail and its dark brown body and wings make this species clearly identifiable. The heads and tails of younger birds are mostly brown, and these birds are often mistaken for golden eagles. When fully grown, bald eagles measure 2.5 to 3.5 feet long, with a wingspan of more than 6.5 feet. Females typically are larger than males. Bald eagles tend to be more vocal than most raptors and emit a variety of high-pitched calls (Thelander 1994).

Distribution

Bald eagles winter throughout most of California at lakes, reservoirs, river systems, and some rangelands and coastal wetlands (Zeiner et al. 1990). Almost half of the state's population winters in the Klamath Basin, but this species is also an uncommon visitor to the Central Valley. The breeding range of bald eagles is primarily in mountainous habitats near reservoirs, lakes, and rivers in the northwest corner of the state (California Department of Fish and Game 1989). Fish constitute most of the bald eagle's diet, but wintering birds frequent Central Valley wetlands in search of dead and dying waterfowl and other water birds.

Habitat Association

Bald eagle nesting territories are associated primarily with young or mature forests of varying canopy closure of ponderosa and mixed conifer types, but can be found in all forest types from blue oak savanna to lodgepole pine types (Verner and Boss 1980). Bald eagles usually nest in overstory ponderosa or sugar pine with foliage shading the nests, within 0.5 mile of a large body of water and with low human disturbance (Verner and Boss 1980). Total canopy closure in stands that support bald eagle nests is usually less than 40% (Verner and Boss 1980).

Reasons for Decline

Historically, bald eagle populations have declined as a result of eggshell-thinning from the ingestion of dichlorodiphenyltrichloroethane (DDT), shooting, and disturbance of nest sites. However, because of their protection under the CESA, the federal ESA, and the Bald and Golden Eagle Protection Act, their populations have recovered across most of North America and they may soon be delisted from the Federal list.

Occurrence in the Restoration Project Area

Bald eagles hunt for fish within the Restoration Project area; however, no active or inactive nest sites were identified. Bald eagles likely nest outside the Restoration Project area. Adults were seen flying high over both forks of Battle Creek on several occasions during the spring field surveys. An adult bald eagle was observed flying over the Eagle Canyon Diversion Dam site in mid-June 2000, and in mid-April 2001, an adult was seen flying high about 1 mile east of Wildcat Diversion Dam. An immature bald eagle was observed at Coleman Diversion Dam in mid-June 2000. Information on the adult bald eagle observations is presented in Table II-3 in Volume II of the Summary Report (Jones & Stokes 2001).

Cooper's Hawk

Legal Status

The Cooper's hawk is designated as a state species of special concern by the DFG. This species is not considered to be a state species of special concern in the *Draft List of California Bird Species of Special Concern* (California Department of Fish and Game and Point Reyes Bird Observatory 2001), which is currently under review by the DFG and the Point Reyes Bird Observatory Advisory Committee. The species currently receives no statutory protection under the CESA or the ESA.

Description

This medium-sized *Accipiter* is larger than the sharp-shinned hawk. Its rounded tail, longer undertail coverts, and larger head and neck help in its identification. Cooper's hawks are smaller than northern goshawks, and adults are easily identified by the reddish barring on their underparts and their lack of a white eye stripe. Immature Cooper's hawks are much more similar to northern goshawks, but often have straight, even white barring on the tail and are smaller and not as broad-winged. Cooper's hawks can be found in a variety of habitats and elevations; however, they are not as closely tied to montane coniferous forests as are sharp-shinned hawks or northern goshawks.

Distribution

The historical range of the Cooper's hawk is similar to its current range, although the species is less common in the Central Valley than it was historically. Cooper's hawks are found throughout most of the United States, southern Canada, and northern Mexico. Northern populations are said to be migratory and southern populations, resident; however, some southern populations apparently migrate as well (Rosenfield and Bielefeldt 1993). Cooper's hawks breed throughout most of California in a variety of woodland habitats (Garrett and Dunn 1981; Grinnell and Miller 1944). They are uncommon breeders in much of California; the highest densities probably occur in the foothill oak woodlands of the Sierra Nevada and Transverse Ranges (Asay 1987). Cooper's hawks are found in greater numbers during migration and winter, when they can be found in all habitats throughout California (Grinnell and Miller 1944).

Habitat Association

The Cooper's hawk nests in deciduous, conifer, and mixed woodlands (Garrett and Dunn 1981), but will also nest in urban areas and seems to tolerate human disturbance near the nest (Palmer 1988). The hawks nest and forage near open water or riparian vegetation. Prey comprises small birds, a variety of small mammals, reptiles, and amphibians (Zeiner et al. 1990). The species usually breeds after 2 years (Asay 1987; Henny et al. 1985; Rosenfield 1982), and pairs generally return to the same territory year after year and will often build a new nest in the vicinity of the existing one (Reynolds and Wright 1978).

Reasons for Decline

The decline of eastern United States populations of Cooper's hawk is attributed to pesticide contamination. Declines in the West are less documented, but in California, they have been attributed to destruction of habitat, particularly of lowland riparian areas (Remsen 1978). Pesticides may also play a role in declines in western populations.

Occurrence in the Restoration Project Area

An immature Cooper's hawk was seen during field surveys performed in July 2000 and was probably dispersing from its natal territory. An adult Cooper's hawk was seen in April 2001 on the road to South Diversion Dam and was probably a migrating bird not breeding locally. Information on these Cooper's hawk observations have not been presented in Table II-3 in Volume II of the Summary Report (Jones & Stokes 2001) because neither is considered to signify breeding within the Restoration Project area.

Osprey

Legal Status

The osprey is a California species of special concern. This species is not considered to be a state species of special concern in the *Draft List of California Bird Species of Special Concern* (California Department of Fish and Game and Point Reyes Bird Observatory 2001), which is currently under review by the DFG and the Point Reyes Bird Observatory Advisory Committee. The species currently receives no statutory protection under CESA or the ESA.

Description

The osprey is a very large raptor with bowed and angled wings in flight that give it a characteristic profile. Ospreys are largely white below and brown above. They often perch prominently close to water bodies. The osprey is not closely related to any other raptor and is placed in its own subfamily.

Distribution

In the western hemisphere, ospreys breed in the United States, Canada, and Mexico. While a portion of their population migrates to spend the winter in Mexico south to the Amazon Basin, some birds winter in California, especially along the coast. Often seen during migration soaring at great heights, ospreys are widely distributed throughout most of the world.

Historically, ospreys bred along the entire length of California, with population centers along the north interior, Channel Islands, and north, central, and south coasts (Grinnell 1915). Within this range, the distribution was spotty, as evidenced by the rarity of ospreys in the San Francisco Bay area (Grinnell and Wythe 1927). By the 1940s, Grinnell and Miller (1944) reported declines and range contraction, particularly in the southern half of the state, including the Channel Islands and the central and south coasts, and along the Sacramento and San Joaquin Rivers.

Currently, the osprey breeds in northern California from the Cascade Range south to Lake Tahoe and along the north coast south to Marin County. Regular breeding sites include Shasta Lake, Eagle Lake, Lake Almanor, Lake Oroville, New Bullards Bar Reservoir, Camanche Reservoir, other inland lakes and reservoirs, and river systems (e.g., the Pit River, Sacramento River, Yuba River, and Cache Creek) (Zeiner et al. 1990). Ospreys winter in small numbers along the entire coast and large inland bodies of water, such as the Feather River, Putah and Cache Creeks, American River, Camanche Reservoir, Turlock Reservoir, New Melones Reservoir, and Lake San Antonio (Roberson 1985).

Habitat Association

The osprey is associated strictly with large, fish-bearing waters primarily in ponderosa pine and mixed conifer habitats. Nests are platforms of sticks constructed on the top of large snags, in dead-topped trees, on cliffs, or on human-made structures in open forest habitats. The location of nests requires tall, open-branched “pilot trees” nearby where the osprey can land before approaching the nest and where young osprey can practice flying. The osprey preys mainly on fish and, therefore, requires open waters for foraging (Zeiner et al. 1990).

Reasons for Decline

Factors leading to the decline of osprey populations include pesticide contamination, nest-tree removal, degradation of the environmental quality of rivers and lakes, boating and other human disturbances in nesting areas, and illegal shooting (Henny et al. 1978). Osprey populations declined through the 1960s, especially in the eastern United States, because of eggshell thinning caused by pesticide contamination (Henny and Ogden 1970), which led to reproductive failure (Garber 1972); however, reproductive success has increased since the early 1970s (Airola and Shubert 1981).

American Peregrine Falcon

Legal Status

The American peregrine falcon is state-listed as endangered under the CESA and is currently fully protected under the California Fish and Game Code. The peregrine falcon was formerly listed as federally endangered, but the population has recently recovered to the extent that it was delisted in August 1999 (64 FR 46541-46558, August 25, 1999).

Description

A large and powerful predator, the peregrine falcon is the fastest bird in North America, capable of reaching speeds up to 200 mph in a dive. The adult male is blue-gray on the back, with a streaked breast. The crown and nape are black, with a black wedge that extends below the eyes, forming a distinctive helmeted appearance.

Distribution

Historically, resident American peregrine falcons occurred throughout most of California (California Department of Fish and Game 1980; U.S. Fish and Wildlife Service 1982). The population increased during winter, when migrating birds arrived from the north. Peregrine falcons nested throughout the state, with breeding pairs concentrated along the coast and around the Channel Islands. Interior nesting locations included Tule Lake in Siskiyou County, Mono Lake in Mono County, and the inner Coast Ranges in Kern County (Grinnell and Miller 1944). The population of California peregrine falcons began to seriously decline in the 1950s. Based on a conservative historical estimate, there were 100 pairs breeding in California before 1947. By 1969, fewer than 10 nesting sites were believed to be active (Herman et al. 1970). In 1992, there were approximately 140 breeding pairs of American peregrine falcons in California, primarily in mountains of the central and northern Coast Ranges and the Cascade Range (California Department of Fish and Game 1997).

Habitat Association

American peregrine falcons nest on protected ledges of high cliffs, primarily in woodland, forest, and coastal habitats (California Department of Fish and Game 1980; U.S. Fish and Wildlife Service 1982). They have been known to nest at elevations as high as 10,000 feet, but most occupied nest sites are below 4,000 feet (Shimamoto and Airola 1981). Falcons prefer to nest near marshes, lakes, and rivers that support an abundance of birds, but they may travel several miles from their nesting grounds to forage on pigeons, shorebirds, waterfowl, and songbirds (California Department of Fish and Game 1980; Grinnell and Miller 1944). Coastal and inland marsh habitats are especially important in fall and winter, when they attract large concentrations of water birds (California Department of Fish and Game 1980).

Reasons for Decline

The widespread use of organochloride pesticides, especially DDT, was a primary cause of the decline in peregrine falcon populations (U.S. Fish and Wildlife Service 1982). High levels of these pesticides and their metabolites (i.e., by-products of organic decompositions) have been found in the tissues of peregrine falcons, leading to thin eggshells, aberrant reproductive behavior, and reproductive failure. Other causes of decline include illegal shooting, illegal falconry activities, and habitat destruction (California Department of Fish and Game 1980).

Occurrence in the Restoration Project Area

One adult peregrine falcon was observed circling high over the road at South Diversion Dam during raptor surveys on April 13, 2001.

Willow Flycatcher

Legal Status

The willow flycatcher is state-listed as endangered. One subspecies occurring in California, the southwestern willow flycatcher (*Empidonax traillii extimus*), is federally listed as endangered.

Description

The willow flycatcher is in the genus *Empidonax*, a group of small, dull-plumaged flycatchers. It can be distinguished from other members of its genus by its loud song, “fitz-bew,” and by its lack of a white eye ring. The species includes four or five subspecies, three of which breed in California: *extimus* (southwestern) in southern California, *brewsteri* (little) in the Sierra Nevada, and *adastus* east of the Sierra Nevada (Sedgwick 2000). The willow flycatchers seen in the Restoration Project area are likely to be *brewsteri*, based on range, although *adastus* could also occur in migration.

The willow flycatcher differs from the similar western wood-pewee in its song and “whit” call note; its habit of flicking its tail (shared by other *Empidonax* species); its lack of dark coloring or vested look on its breast; and its brighter yellow belly, longer tail, paler and greener head and back, and broader, more prominent white wing-bars.

Distribution

Historically, the little willow flycatcher was a common nesting species in the Sierra Nevada, Central Valley, and the central and northern Coast Ranges. Now it is found only in isolated populations in mountain meadow systems in the Sierra Nevada and the Cascade Range (California Department of Fish and Game 1997; Harris et al. 1988).

Habitat Association

The little willow flycatcher breeds and forages almost exclusively in wet mountain meadow systems with standing water for at least part of the breeding season (May to July) and with ample numbers of willow and other associated trees and shrubs (Harris et al. 1987). It arrives on the breeding grounds in May and June and departs for South America in August (Harris et al. 1988; Zeiner et al. 1990).

Reasons for Decline

This species has declined for a variety of reasons, including nest parasitism by brown-headed cowbirds, loss and degradation of riparian and meadow habitats, and disturbance of nest sites by cattle (California Department of Fish and Game 1997; Zeiner et al. 1990).

Occurrence in the Restoration Project Area

During 2000, willow flycatchers were seen at Eagle Canyon Diversion Dam and in the riparian habitat at the Lower Ripley Creek Feeder during their peak spring migration period. Although birds were observed singing in appropriate nesting habitat, they are presumed to have been migrants because follow-up searches of these sites in July did not detect nesting willow flycatchers. Information on both willow flycatcher occurrences is presented in Table II-3 in Volume II of the Summary Report (Jones & Stokes 2001).

Yellow-Breasted Chat

Legal Status

The yellow-breasted chat is designated as a species of special concern by the DFG. The species currently receives no statutory protection under the CESA or the ESA.

Description

The yellow-breasted chat is the largest of the New World warblers. It has a very large head with bright white "spectacles," bright yellow breast, white belly, and undertail coverts. The head, back, and wings are medium gray. Throughout the year, the yellow-breasted chat feeds on insects and spiders, berries, and other fruits.

Distribution

The yellow-breasted chat was once common throughout riparian woodland and scrub habitats in California. It is now an uncommon breeder along the coast of California and in the foothills of the central and southern Sierra Nevada, and breeding populations have declined over much of its former range in southern California (Garrett and Dunn 1981). It is increasingly rare in the Sacramento Valley and rare in the San Joaquin Valley and Mojave Desert (Garrett and Dunn 1981; Small 1994). The midelevation western slope of the northern Sierra Nevada is one of the strongholds for this species in California. Yellow-breasted chats are fairly common throughout the riparian habitats in the Restoration Project vicinity.

The breeding season for the yellow-breasted chat is from early May to early August, peaking in June. A migratory species, the yellow-breasted chat leaves for wintering grounds in Mexico and Guatemala in September and returns in April (Dunn and Garrett 1997).

Habitat Association

Although generally associated with riparian habitats, chats in the foothills of the Sierra Nevada are very closely tied to blackberry brambles for cover and for foraging (fruit). Yellow-breasted chats build nests in dense riparian habitats, often consisting of willow thickets and tangles of California wild grape and blackberry brambles (Dunn and Garrett 1997; Grinnell and Miller 1944).

Reasons for Decline

The loss and fragmentation of riparian habitats are major causes of the decline of the yellow-breasted chat (Dunn and Garrett 1997; Garrett and Dunn 1981). Brood parasitism by the brown-headed cowbird has caused the decline of this species, even in areas with intact riparian habitat (Remsen 1978).

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