Chapter 10

Alternatives to Take Considered and Rejected

This chapter describes alternatives to take of each federally listed species that were considered and rejected. Take is discussed for Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Central Valley steelhead, and valley elderberry longhorn beetle. This chapter also explains why alternatives to take were rejected.

Spring-Run Chinook Salmon

Potential Take Associated with Accidental Spill of Petroleum Products

Accidental spills of petroleum products and other construction-related materials could cause mortality and lowered growth rates and reproductive success of spring-run Chinook salmon. Construction activities associated with removing the five dams would include dismantling and removing Wildcat, South, Coleman, Soap Creek Feeder, and Lower Ripley Creek Feeder Diversion Dams and their appurtenant facilities. Heavy equipment would be used in the creek channel to remove the concrete structure, gravel, rock, and other materials from the dam footprint. Construction of the fish screens and ladders would involve blasting and dismantling the existing structures and constructing new facilities.

The Restoration Project would include implementation of mitigation measure EFISH1, which will minimize the effects associated with the accidental spill of petroleum products.

An alternative to take could include not performing construction activities in and near the stream channel. The alternative was rejected because the removal of dams and the construction of fish ladders, connectors, fish screens, and other project components will substantially benefit spring-run Chinook salmon. Benefits of construction under the Restoration Project greatly exceed any adverse effects of take that could occur with accidental spill of petroleum products.

Potential Take Associated with Increased Sedimentation of North Fork and South Fork Battle Creek

Vegetation would be removed and the soil graded in order to construct staging areas and new access roads and to expand existing roads in the project area. Construction and demolition activities adjacent to or in the flowing waters of Battle Creek and its tributaries would disturb soils and the streambed, potentially leading to erosion and input of fine sediment. The input of fine sediment would increase turbidity and sedimentation of gravel substrates. Take would include adverse effects on feeding efficiency of juvenile spring-run Chinook salmon. In addition, infiltration of fine sediment into gravel substrates could kill eggs, larvae, and early juveniles, resulting in take of spring-run Chinook salmon.

The Restoration Project would include implementation of mitigation measure EFISH2, which will minimize the effects associated with mobilization of fine sediment associated with construction activities.

An alternative to take could include not performing construction activities in and near the stream channel. The alternative was rejected because the benefits of implementing the Restoration Project greatly exceed any adverse effects of take that could occur with mobilization of fine sediment by construction activities.

Take Associated with Release of Currently Stored Fine Sediment to the Stream Channel

Removal of Wildcat, Coleman, and South Diversion Dams would release currently stored fine sediment to the stream channel. The input of fine sediment would increase turbidity and sedimentation of gravel substrates. Take would include adverse effects on feeding efficiency of juvenile spring-run Chinook salmon. In addition, infiltration of fine sediment into gravel substrates could kill eggs, larvae, and early juveniles, resulting in take of spring-run Chinook salmon.

The Restoration Project would include implementation of mitigation measure EFISH3, which will minimize the effects associated with mobilization of fine sediment associated with dam removal.

An alternative to take could include not removing Wildcat, Coleman, and South Diversion Dams. The alternative was rejected because the benefits of dam removal under the Restoration Project greatly exceed any adverse effects of take that could occur with mobilization of fine sediment by dam removal activities.

Another alternative that could reduce take relative to implementing the Restoration Project is removal of existing stored sediment prior to dam removal. The alternative, however, was rejected because removal of sediment may not

substantially reduce mobilization of fine sediment and could result in loss of potential spawning gravel. The two dams impounding the most significant amounts of fine sediment, Coleman and South Diversion Dams, will have the fine sediment removed from the summer flow section of what will be the stream channel once the dam is removed. The high flows of winter will remove additional materials during high flow conditions when there is greater stream power capable of avoiding sedimentation in the thalweg and spawning riffles.

Take Associated with Disturbing Spawning and Rearing Habitat

Construction activities associated with removing the five dams would include dismantling and removing Wildcat, Coleman, Lower Ripley Creek Feeder, Soap Creek Feeder, and South Diversion Dams and their appurtenant facilities. Heavy equipment would be used in the stream channel to remove the concrete structure, gravel, rock, and other materials from the dam footprint or to prepare the site for construction of facilities. The disturbance of the channel bottom and bank would alter the channel dimensions and form and the existing substrate. The changes in the channel within the construction footprint may adversely affect conditions supporting spawning and rearing habitat, resulting in take of spring-run Chinook salmon.

The affected spawning and rearing habitat area is small relative to total spawning and rearing habitat in Battle Creek. In addition, effects are short-term and some of the affected areas would provide additional spawning and rearing habitat after construction and dam removal are complete.

An alternative to take could include not performing construction and dam removal activities in and near the stream channel. The alternative was rejected because the benefits of construction and dam removal under the Restoration Project greatly exceed any adverse effects of take associated with the relatively restricted change in habitat during and after construction.

Take Associated with Dewatering Portions of the Stream Channel and Temporarily Removing Fish Ladders

Construction activities within the stream channel may include placement of cofferdams to isolate constructed elements from the streamflow, and temporary removal of existing fish ladders. Depth and velocity conditions that support movement and migration of fish species may be temporarily interrupted, resulting in take of spring-run Chinook salmon.

Upstream passage of spring-run Chinook salmon is currently blocked at Eagle Canyon and Coleman Diversion Dams. Although in-channel work will also occur at Wildcat Diversion Dam, which is downstream of Eagle Canyon Diversion Dam, removal of the existing dam is not expected to affect a substantial proportion of the migration period. The effect on migration of adult and juvenile life, therefore, would be minimal.

An alternative to take could include not performing construction and dam removal activities in and near the stream channel. The alternative was rejected because the benefits of construction and dam removal under the Restoration Project greatly exceed any adverse effects of take associated with the relatively restricted change in habitat during and after construction.

Another alternative to take would be to construct temporary facilities that provide upstream passage around the construction areas. The alternative was rejected because construction of temporary facilities would result in take and effects on spring-run Chinook salmon that would not be substantially different from the temporary effects of constructing the Restoration Project elements.

Take Associated with Percussion-Related Energy Shock Waves, Operation of Equipment, and Becoming Trapped in Isolated Pockets of Water

Construction activities include operating equipment in the stream channel, blasting the bedrock in the channel and adjacent to the stream, and installing cofferdams. Injury or death from percussion-related energy shock waves, contact with operating equipment, and entrapment in pockets of water isolated by cofferdams during construction activities would constitute take of spring-run Chinook salmon.

Measures will be implemented to exclude spawning within the construction footprint (see the environmental commitments listed in Chapter 2 of this document). In addition, salmon and steelhead access is currently being confined to the project area downstream of Coleman and Eagle Canyon Diversion Dams (National Marine Fisheries Service, California Department of Fish and Game, U.S. Fish and Wildlife Service pers. comm.).

An alternative to take could include not performing construction and dam removal activities in and near the stream channel. The alternative was rejected because the benefits of construction and dam removal under the Restoration Project greatly exceed any adverse effects of direct injury or death associated with construction and dam removal.

Take Associated with New Fish Ladders

New fish ladders would facilitate passage of Chinook salmon and steelhead. Compared to migration through the natural channel segments, fish ladders may cause some ongoing level of delay and injury that is considered take. The fish ladders, however, will be designed to convey 110% of the streamflow at average spill conditions for each diversion dam and would facilitate migration of spring-run Chinook salmon under a broad range of flow conditions. The resulting take would be minimal, and adverse effects on life stage survival and subsequent population abundance would not occur.

An alternative to take associated with the new ladders could include maintenance of existing ladders. The existing ladders, however, impede migration under most flow conditions. The alternative was rejected because new ladders would have at least 10 times the capacity of existing ladders, substantially benefiting migration and survival of adult spring-run Chinook salmon. The ladders would reduce the potential for injury and exhaustion related to multiple attempts at passing the existing dams. Improved passage would also facilitate distribution of adults to available upstream spawning habitat, which could increase survival of eggs and production of juveniles.

Take Associated with Fish Screens at the Remaining Diversions

Fish screens would be constructed on all remaining diversions at Inskip, North Battle Creek Feeder, and Eagle Canyon Diversion Dams. Compared to migrating through the natural channel segments, fish encountering the fish screens may incur some ongoing level of injury associated with abrasion or exposure to predation. Injury of juvenile spring-run Chinook salmon is considered take. Diversions, however, would be screened using designs that meet or exceed criteria established by NOAA Fisheries and DFG. Proposed fish screens would include features that continuously monitor screen performance and, in the case of a malfunction, would automatically stop the diversion. The operation of the failsafe fish screens will prevent entrainment of juvenile spring-run Chinook salmon into the canals. The resulting take would be minimal, and ongoing adverse effects on life stage survival and subsequent population abundance would not occur.

An alternative to take associated with the new fish screens includes maintenance of existing diversion facilities. The alternative was rejected because the existing diversions divert a substantial proportion of the streamflow and would entrain a substantial proportion of the juvenile production. Entrainment losses could substantially affect life stage survival and subsequent population abundance of spring-run Chinook salmon. Under the Restoration Project, entrainment losses would be reduced, and the increased survival of the juvenile life stages would be expected to increase the abundance of steelhead and Chinook salmon.

Winter-Run Chinook Salmon

The alternatives to take considered and rejected for winter-run Chinook salmon are the same as described for spring-run Chinook salmon.

Steelhead

The alternatives to take considered and rejected for steelhead are the same as described for spring-run Chinook salmon.

Valley Elderberry Longhorn Beetle

Take Associated with Construction of New Fish Facilities at Eagle Canyon Diversion Dam

A new fish screen and fish ladder would be constructed at Eagle Canyon Diversion Dam to facilitate passage of Chinook salmon and steelhead in North Fork Battle Creek. One elderberry shrub is located in the construction footprint for the proposed fish facilities on the south bank of Battle Creek. Construction of the fish screen and fish ladder would require the removal of the elderberry shrub. The loss of this shrub could result in the injury or death of valley elderberry longhorn beetles that may be living within the stems of the shrub or the loss of habitat for the beetles, resulting in the take of this species.

The Restoration Project would include implementation of mitigation measure EVELB1 to compensate for the loss of the elderberry shrub at Eagle Canyon Diversion Dam.

An alternative to take associated with construction of the new fish facilities could include moving the construction footprint to the opposite side (north bank) of Battle Creek, which would avoid the elderberry shrub. The alternative was rejected because the Eagle Canyon Canal originates on the south bank, and supplying the canal with diverted flow constrains the design of the fish screen and fish ladder.

An additional alternative to take associated with construction of the new fish facilities at Eagle Canyon Diversion Dam could include maintenance of existing ladders. The existing ladders, however, impede migration of anadromous fish under most flow conditions and would not meet the goals and objectives of the Restoration Project. In addition, the existing diversion at Eagle Canyon Diversion Dam does not have a fish screen. A substantial proportion of the streamflow is diverted to Eagle Canyon Canal and would entrain a substantial proportion of juvenile fish. This alternative was rejected because the existing

fish facilities would impair meeting the Restoration Project goals and objectives to restore anadromous fish populations.

Take Associated with Dewatering of South Canal

Eight elderberry shrubs are located along South Canal. Implementing the Restoration Project would include removing South Diversion Dam and dewatering South Canal. South Canal may provide a critical water source for the shrubs, and dewatering the canal may cause the shrubs to die. The loss of these shrubs could result in the injury or death of valley elderberry longhorn beetles that may be living in the stems of these shrubs and loss of beetle habitat, resulting in the take of this species.

The Restoration Project would include implementation of mitigation measure EVELB1 to compensate for the loss of the elderberry shrubs along South Canal.

An alternative to take associated with the dewatering of South Canal could be not to remove South Diversion Dam and to continue to divert water along the canal. This alternative was rejected because it would not meet the goals and objectives of the Restoration Project. Removing South Diversion Dam and returning water to South Fork Battle Creek would greatly improve anadromous fish spawning habitat.