UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

MAR 29 2007

In reply refer to:
SWR/2002/01708:APS

Ruth Villalobos
Chief, Planning Division
U.S. Army Corps of Engineers
Los Angeles District
P.O. Box 532711
Los Angeles, California 90053-2325

Dear Ms. Villalobos

Enclosed with this letter is NOAA's National Marine Fisheries Service's (NMFS) biological opinion for the Army Corps of Engineers' Matilija Dam Removal Project. This biological opinion addresses the effects of the proposed action on the Southern California Distinct Population Segment (DPS) of endangered steelhead (*Oncorhynchus mykiss*) and critical habitat for this species in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The biological opinion concludes that the proposed action is not likely to jeopardize the continued existence of the endangered Southern California steelhead DPS, or destroy or adversely modify critical habitat for this species. NMFS believes the proposed action is likely to result in take of steelhead, and therefore an incidental take statement is attached to the biological opinion. The incidental take statement includes reasonable and prudent measures that NMFS believes are necessary and appropriate to minimize and monitor incidental take of steelhead. Please contact Anthony Spina at (562) 980-4045 if you have any questions concerning the biological opinion or if you would like additional information.

Sincerely,

Rodney R McInnis

Rodney R. McInnis
Regional Administrator

Enclosure

# BIOLOGICAL OPINION

**AGENCY:** U.S. Army Corps of Engineers

**ACTION:** Matilija Dam Removal and Ecosystem Restoration Project on Matilija Creek, Ventura County, California

**CONSULTATION CONDUCTED BY:** National Marine Fisheries Service, Southwest Region

**TRACKING NUMBER:** SWR/2002/01708

**DATE ISSUED:** MAR 29 2007

## I. CONSULTATION HISTORY

On July 15, 2004, NOAA's National Marine Fisheries Service (NMFS) received a letter requesting formal consultation with the U. S. Army Corps of Engineers' (Corps) planning branch in the Los Angeles district office. The request concerned the Matilija Dam Ecosystem Restoration Project proposed for the Ventura River watershed. When the Corps requested the formal consultation, important features about the proposed action had not been defined or were in the early phases of planning and design. Consequently, how the action would affect the Southern California Distinct Population Segment (DPS) of endangered steelhead (*Oncorhynchus mykiss*) and critical habitat for this species could not be adequately evaluated. Therefore, NMFS was unable to initiate formal consultation, and instead requested additional clarification and information of the Corps by letter dated December 8, 2004. NMFS' letter indicated support for the proposed action and identified the specific information needed to initiate formal consultation. In May 2006, NMFS met with the Corps to reaffirm the information needs to undertake a formal consultation and to discuss measures for minimizing adverse effects of the proposed action (including uncertainties) on steelhead and their critical habitat. Additional meetings and letter exchanges followed, and on August 15, 2006, NMFS concluded it had received sufficient information to initiate formal consultation. Accordingly, NMFS prepared a biological opinion for the proposed action. A preliminary draft biological opinion was provided to the Corps at the end of January 2007, and the Corps provided NMFS with comments on the draft shortly thereafter. Following a February 26, 2007, meeting between the Corps and NMFS to discuss the comments, and after NMFS received additional information from the Corps (Corps 2007), NMFS prepared this final biological opinion. This biological opinion is based on the best scientific and commercial data available, including descriptions of the proposed action (Corps 2004a, b, c, d, Corps 2006a, b, Corps 2007), NMFS' observations of the river system, expected effects of the proposed action on endangered steelhead, and the relevant ecological literature. A complete administrative record for this consultation is maintained on file at NMFS' Southwest Regional Office (501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802).

The U. S. Endangered Species Act (ESA) requires NMFS to reach conclusions based on the best scientific and commercial data available. There is only partial information available at this time for our analysis of the effects of the proposed action on endangered steelhead and their critical habitat. This is due to the ongoing nature of the complex planning, design, and implementation

process for the proposed action and to the limited information available on the effects of large-scale dam removals. As part of the proposed action, the Corps has included measures and objectives that are intended to avoid, minimize or mitigate the potential effects of the action on endangered steelhead and designated critical habitat for this species, but the empirical basis currently available to NMFS for concluding that the measures and objectives will be effective at avoiding or reducing the adverse effects of the action is limited. To address the uncertainties remaining in the potential effects of the proposed action, NMFS has developed a series of key assumptions for assessing effects of the proposed action on endangered steelhead and critical habitat. These assumptions derive from (1) discussions with, and written correspondence from, the Corps, (2) NMFS' understanding of the proposed action, and (3) NMFS' experience evaluating effects of projects on steelhead, and developing measures for minimizing such effects.

NMFS has proceeded to write this biological opinion with the understanding that more information would be forthcoming during the next phase of the project planning and design. NMFS and the Corps will continue to collaborate on the proposed action, including after issuance of this biological opinion. In this regard, NMFS expects to continue to provide input, review design drawings, and participate in the development of monitoring and mitigation procedures for the purpose of ensuring that the final design and implementation of various project elements are executed in a manner that will not jeopardize the endangered Southern California DPS of steelhead or destroy or adversely modify critical habitat for this species, and to make certain the goals and objectives of the proposed action are met. As project designs and plans develop, or if key assumptions are found to be invalid, NMFS and the Corps may need to re-initiate section 7 consultation to incorporate new information and re-assess project effects.

## II. DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

The Corps proposes to remove Matilija Dam (dam) on Matilija Creek, a major tributary to the Ventura River (Figure 1) for the purpose of (1) promoting ecosystem restoration of terrestrial and aquatic habitat to benefit native fish and wildlife (including the endangered steelhead) in the Ventura River watershed, (2) improving the natural hydrologic and sediment transport regime to restore and sustain local coastal beach sand replenishment, and (3) enhance recreational opportunities along Matilija Creek (including U. S. Forest Service land) and the downstream Ventura River system consistent with ecosystem recovery objectives. The recommended restoration alternative to be carried out by the Corps is known as the "Recommended Plan" (Corps 2004a). The specific features of this alternative form the basis of this biological opinion and are summarized on Page 4 (a generalized schedule for the individual project elements can be found in Appendix B). Readers wishing additional information about the proposed action are referred to the supporting documents (Corps 2004a, b, c, d, Corps 2006a, b, Corps 2007).

The action area involves a portion of Matilija Creek (a tributary to the Ventura River), the mainstem Ventura River, and the Ventura River estuary. Within Matilija Creek, the action area begins about 1.5 miles upstream of the dam and extends 0.6 miles downstream to the confluence with the Ventura River. Within the Ventura River, the action area extends from the confluence with the North Fork Matilija Creek downstream for approximately 15.5 miles within and along the mainstem of the Ventura River to the Pacific Ocean, including the estuary. The action area includes a freshwater rearing, spawning, and migration sites, and an estuarine area, for adult and juvenile steelhead, and designated critical habitat for the Southern California DPS of endangered steelhead (Figures 1-40 in Appendix A).

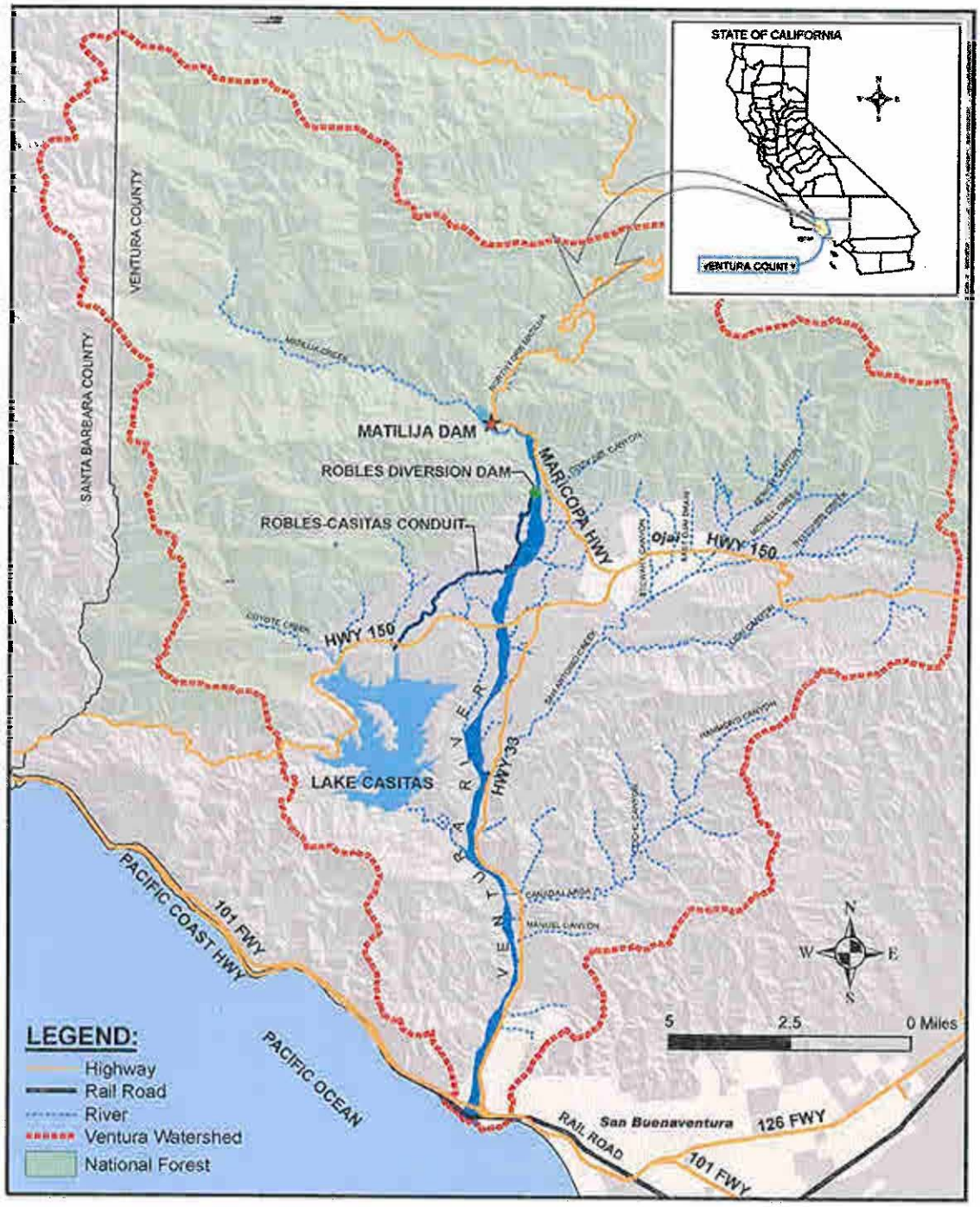


**Figure 1.—Map of the action area showing the Ventura River Watershed and location of Matilija Dam.**

## A. Removal of Fine Sediments from the Reservoir Area

Demolition of Matilija Dam will begin with removal of sediment from the reservoir. Two 12-inch cutter-head suction dredges working 24 hours a day, 7 days a week (for about 9 months) will remove the 2.1 million cubic yards of fine sediment within the existing lake behind Matilija Dam. The extracted slurry will be transported by pipeline downstream to disposal areas (either a single or multiple disposal sites) near the Highway 150 (Baldwin Road) Bridge. The potential sites, comprising about 118 acres in the floodplain, are both upstream and downstream of the bridge and are 3.6 to 6.3 miles downstream of Matilija Dam. Earthen containment dikes (10 to 20 feet in height) will be constructed to contain the slurry. The dikes will be constructed of sands and gravels obtained from the on-site excavation and grading performed as part of the overall project. Interior dikes will be constructed during slurry placement to enhance stability and separation of the fines from water. The disposal areas will be cleared of vegetation to enhance percolation. For the upstream-most slurry disposal site located just north of the Highway 150 Bridge, rock-slope protection will be required to protect the site from periodic high flows. The three other disposal areas, downstream of the bridge, are located on low floodplain terraces and would be subjected to less frequent flows. Rock protection for these areas will likely consist of boulders obtained during construction of the containment dikes. Slope protection at the slurry disposal site will consist of willows planted on the outside slopes of the basin to provide additional soil stabilization during large storm events. Additional revegetation of the fine-sediment disposal site(s) using native plants will be developed for the plan (Figures 7-9 in Appendix A).

**B. Dam Demolition and Removal**

Demolition of the dam will occur in one phase and is expected to take about 36 months (while crews are not expected to work within the creek and lake bed during the winter, some work will continually occur in the area behind the dam during the 3-year period.). Following dredging of the reservoir area, the dam structure will be slowly removed in sections by controlled blasting in approximately 15-foot vertical increments. Concrete rubble will be reduced and processed in designated areas behind the dam and transported to a commercial concrete recycling plant. Heavy equipment to be used for dam demolition, deconstruction, and concrete hauling, as well as other activities includes cranes, front end loaders, dump trucks, scrapers, bulldozers, graders, backhoe, hoe-rams, water trucks, excavators, and rollers (Figure 10 in Appendix A).

The reach of Matilija Creek extending 500 to 1000 feet downstream of the dam will be dewatered to allow workers and equipment to remove fallen debris and concrete footings, and to align and reconnect the upstream and downstream portions of the creek channel to their historical configuration. Because planning and design is not complete for this phase, this dewatering is assumed for the third season of construction and will be complete before the following winter. Prior to dewatering the creek, qualified fishery biologists will inspect the area for steelhead and relocate individuals to suitable habitats upstream or downstream of the water-diversion outlet. Inspections and relocations will continue during, and after the water diversion process to minimize impacts to steelhead. Impacts to the riparian zone will be monitored, and some revegetation of the riparian zone may be needed to supplement the natural recolonization of riparian vegetation.

## C. Temporary Stabilization of Remaining Sediments

The remaining reservoir sediments will be stabilized once fine sediment removal activities (and dewatering activities) allow workers to access the lake bed. Each year, following the spring runoff, the affected portion of Matilija Creek upstream of the dam will be placed in a 36-inch diameter corrugated pipe and then released at a designated point in Matilija Creek downstream of the dam. A new creek channel (about 100-feet wide) will be excavated in the sediment remaining behind (upstream of) the dam, and the excavated material will be placed in several storage sites within the reservoir basin (or alternate sites as necessary). The storage sites will be located adjacent to the newly engineered creek channel and some, but not all, will be stabilized with soil cement (using on-site aggregate), which is expected to allow the sites to erode "naturally" downstream during higher flow events into the Ventura River (in the case of upstream storage sites consisting of mostly coarse-grained sediments) or flood events (mid-basin storage sites with mid-grain sediment). With regard to the excavated channel, certain segments of the channel within the lower half of the reservoir basin will be protected with soil cement bank revetment. The revetment will facilitate gradual erosion of the remaining delta area sediments whenever the revetment is overtopped and (or) eroded by larger flows. The height of the revetment will extend 7 feet above the engineered channel invert and 5 feet below the invert to prevent undermining of the structure. The revetment height is designed to be overtopped by flows exceeding a 10-year storm event (estimated at 12,500 cfs). Unstabilized sediments above the revetment will be placed at a slope similar to the revetment to reduce the likelihood of steelhead becoming stranded when high flows overtop the revetments. All soil cement revetment would be removed from the site following sufficient evacuation of stored sediment from within the original reservoir limits. The removal will occur in stages, and will be dependent on criteria established in the Monitoring and Adaptive Management Plan (MAMP, discussed further on page 8), though complete removal of the sediments and a return to sediment supply equilibrium is expected to occur only after 10 to 20 years (Figure 9 Appendix A).

## D. Foster Park Groundwater Wells

Two groundwater wells will be constructed in the vicinity of the City of Ventura's (City) Foster Park well-field facility about 5 miles upstream from the river mouth. These wells will be drilled into the shallow Ventura River alluvium and then operated by the City and only as a substitute water source when surface diversions are not possible due to high turbidity (owing to the release of sediments from the removal of the dam and related activities). Consequently, these new wells will not operate when surface water is diverted (Corps 2004a). While the design and operation for the wells have not been fully defined, preliminary information indicates the wells would be placed approximately 1000-1500 feet from the active channel, and would extend about 50 feet deep into the shallow aquifer. This shallow aquifer provides rising groundwater during low-flow periods in the vicinity of Casitas Springs and Foster Park. The two wells would have a combined capacity of 3 cfs. In addition to the restriction on surface-water diversion noted above, the Corps proposes the following specific provision to guide well operation: "the operation of the new wells at Foster Park will not begin until flows measured at Foster Park gauging station (USGS gauge No. 11118500) equal or exceed 15 cfs" (Corps 2007). This provision applies only to the two new wells and does not extend to the City's existing wells (currently operable or inoperable), existing surface water diversion, and subsurface water diversion (i.e., the subsurface perforated pipe, or "Ranney Collector") (Figures 35-37 in Appendix A).

## E. Downstream Flood Control Protection Improvements

Existing public road, utility, and flood-control structures will be improved or modified to compensate for the temporarily increased sediment loads and aggradation of river reaches resulting from the removal of the dam and the release of stored sediments. Improvements involve raising the elevation of two existing levees several feet along the Ventura River in the communities of Live Oak Acres and Casitas Springs, the construction of one new levee (approximately 5000 feet long and 10 to 17 feet high) near Meiners Oaks, the removal and relocation of the Camino Cielo bridge and construction of a new (wider) bridge to replace the existing Santa Ana Road Bridge. If work in or around flowing water is necessary for any of the improvements, steelhead surveys will be performed, and any steelhead found within construction areas will be captured and relocated to the nearest suitable habitat. Best management practices (BMPs), including water diversions and sediment control devices, will be followed where work in flowing water cannot be avoided (Figures 15, 29, 30, 33, 34 in Appendix A).

## F. High-Flow Sediment Bypass

A high-flow sediment bypass is proposed for construction on the east side of the existing sediment basin overflow timber weir (which is currently buried underneath river rock), about 300 feet to the east of the Robles Diversion (Appendix C). The purpose of the bypass is to direct sediment-laden flow away from the diversion intakes, thereby reducing the amount of potential sediment deposition in, and impacts on, the forebay. While the high-flow sediment bypass has not been fully designed, existing designs indicate the bypass would be a radial gate structure (140-ft wide) with four gates, a concrete spillway and downstream concrete apron, and a bypass capacity of 10,000 cfs. The current sluice gate structure (three radial gates) adjacent to the Robles Diversion and Fish Passage Facility would remain in place and would continue to operate consistent with the terms and conditions of the biological opinion issued for the facility (NMFS 2003). Construction of a fishway, or a design and operational program, to allow for migrating steelhead is currently being considered (e.g., fish ladders, rock ramp, at-grade passage, etc), but has not yet been fully designed. The Corps proposes that "the high-flow sediment bypass would be operated in a manner that would not interfere with steelhead migration" (Corps 2006b), and will seek input from NMFS steelhead biologists and fish-passage engineers on the design and operation of this project feature during the upcoming detailed design phase of the dam removal. Additionally, "design and construction of fish passage capability or feasibility will be incorporated into the project feature" (Corps 2007) (Figures 17-24 in Appendix A).

## G. Desilting Basin

This basin will be constructed within the Robles Diversion canal, which delivers water to Lake Casitas. The desilting basin will be an off-line structure to the Robles-Casitas canal (i.e., not within the existing canal), and will filter sediment from water diverted from the Ventura River prior to delivery to Lake Casitas. The proposed basin will be off the mainstem river and will not affect flows or habitat in the Ventura River. For this reason, NMFS determined this specific project element is unlikely to affect steelhead or critical habitat for this species. Accordingly, this element is not considered further in this biological opinion.

## H. Arundo Removal Plan.

Invasive exotic plants, primarily Arundo (*Arundo donax*) (hereafter *giant reed*), will be removed from the reservoir area and upstream reaches in Matilija Creek behind the dam and from areas in lower Matilija Creek and the mainstem of the Ventura River downstream of the dam. Current estimates of the extent of giant reed infestation throughout the action area are about 250 acres, with the highest concentrations of giant reed in the areas behind Matilija Dam (but with substantial amounts also in the mainstem of the lower Ventura River). Because steelhead and critical habitat for this species are not currently present in areas upstream of the dam, only the giant reed removal proposed for reaches downstream of the dam (where steelhead and critical habitat are currently present) is considered in this biological opinion. The giant reed removal plan is scheduled to begin in fall 2007, and will be accomplished using an EPA-approved foliar herbicide (i.e., glyphosate) or similar compound, such as Aquamaster™, sprayed over the selected areas, as well as mechanical equipment or hand crews in some locations. Exclusive use of herbicides is not expected. Treated plants may be removed with mechanical equipment or hand crews. Periodic follow-up treatment will be required for at least five years, and additional monitoring and eradication efforts will be necessary to prevent reestablishment and reinfestation (Figures 5, 6, 11 in Appendix A).

## I. Recreation Plan and Components

A conceptual recreation plan, comprising interpretive areas, trails and rest stops located near the dam removal site on upper Matilija Creek, is planned as part of the proposed action. The location for the recreational facilities is based on access requirements, suitability of staging areas, safety of access routes, and connectivity with existing recreational areas. The alignments for slurry pipelines and freshwater lines as well as any haul roads and other access routes will be considered for future recreation potential. Recreation facilities outside the immediate project area will be considered if such areas would connect to and enhance other regional recreation resources. The plan would include a network of trails and interpretive areas and would greatly enhance the public educational and recreational value of the project. Two trails, one on an existing access road, and three interpretive areas are proposed for the project site (Corps 2004a). Based on NMFS' current understanding of the conceptual recreation plan, the recreation elements (trails and interpretative areas) are not expected to create conditions that adversely affect endangered steelhead or critical habitat for this species. Therefore, the conceptual recreation plan is not considered further in this biological opinion, though NMFS expects to be involved in the development of the interpretative material for this component of the proposed action, particularly the material relating to endangered steelhead.

## J. Monitoring and Adaptive Management Plan

The MAMP will be implemented to manage contingencies, to evaluate the effectiveness of the project's implemented restoration measures and to make adaptive changes, if necessary, to achieve overall project objectives (Corps 2006b). A group of experts from the Corps, County of Ventura (i.e., Ventura County Watershed Protection District), City of Ventura, NMFS, U. S. Fish and Wildlife Service, California Department of Fish and Game, and other appropriate agencies or organizations, would be assembled to aid in the development and implementation of the MAMP and to address project-related uncertainties. The plan would identify and address project

uncertainties related to potential effects to steelhead and critical habitat for this species as a result of project implementation, as well as identify a monitoring program (Corps 2006b). The MAMP, once implemented would provide the necessary information to answer questions for resolving the identified uncertainties, and would also define a protocol that will respond to new information or changing conditions detected through the monitoring program (Corps 2006b). Additional objectives of the MAMP include:

1) Monitor deposition and erosion in the riverine system and at the estuary and to take necessary actions to reduce any adverse impacts including blockage to fish passage, spawning and rearing habitat, and increase to flooding risks;

2) Monitor erosion of trapped sediment from the reservoir basin, performance of the soil cement protection, and plan and execute staged removal of soil cement;

3) Monitor turbidity levels and suspended sediment concentrations with the intent to minimize impacts to water supply;

4) Monitor water quality for regulated substances potentially transferred to the water by trapped sediments associated with Matilija Dam, and negotiate any necessary mitigation measures in accordance with consultations with the Regional Water Quality Control Board; and,

5) Monitor the effects of sediment bypass to sediment deposition and diversion operations at the Robles Diversion Facility, and monitor the effects to the fish passage facility function and operation, with the intent to minimize any impacts to current operating criteria of the diversion facility, and to ensure that the fish passage facility functions as designed.

The Corps in conjunction with local agencies will be responsible for collecting monitoring data and preparing annual monitoring reports for a 10-year monitoring period, but the MAMP is not limited to 10 years[1]. A technical committee consisting of, at least, U.S. Fish and Wildlife Service, NMFS, California Department of Fish and Game, and possibly other agencies or organizations, will assist in collection of monitoring data, review monitoring data results, and provide recommendations of possible adaptive management measures. The technical committee will recommend adaptive management measures to the existing project designs should the project components not achieve the identified goal and objectives. For example, if designed revegetation species compositions are not achieved, replanting, additional irrigation, and/or removal of vegetation (especially exotics) may be necessary. Annual monitoring reports and any adaptive management measures recommended by the technical committee will be forwarded to an executive committee that will consist of, at least, a representative of the County of Ventura, the Corps, the California Department of Fish and Game, and NMFS. The executive committee (consisting of representatives of the County of Ventura and NMFS) will decide whether to adopt adaptive management measures recommended by the technical committee.

[1] The Corps and Ventura County Watershed Protection District (VCWPD) is responsible for the MAMP for the first 10 years after initial construction, thereafter the MAMP becomes the responsibility of the VCWPD. With regard to sediment-related effects due to removal of the dam, no time limit for the MAMP is specified. The time horizon for the MAMP is at the discretion of the executive committee, which will make decisions based on recommendations of the technical committee (i.e., USFWS, NMFS, and California Department of Fish and Game) (Kayama 2007).

## III. STATUS OF THE SPECIES AND CRITICAL HABITAT

Because this biological opinion considers effects of the proposed action on the Southern California steelhead DPS and critical habitat for this species, the status of the DPS and steelhead critical habitat is described as follows.

### A. Description of the Species and Critical Habitat

Steelhead are a short-lived species native to Pacific Coast streams extending from Alaska south to northwestern Mexico (Moyle 2002, NMFS 1997, Good *et al.* 2005). Like other steelhead populations, the Southern California steelhead DPS reproduce, spawn, and rear in freshwater coastal streams along the southern California coast. The geographic range of this coastal steelhead DPS was determined to extend from the Santa Maria River, near Santa Maria, California, to the U.S.–Mexico border (NMFS 1997, 2002). Adult steelhead have been known to spawn in river mainstem and upstream reaches (including tributaries) within coastal watersheds, and the progeny rear in freshwater or estuary for a period of one to three years prior to emigrating to sea where they reach maturity before returning to natal streams for spawning. The species exhibits a polymorphic life history with some individuals not returning to the ocean before maturing and reproducing, and some individuals residing, maturing and reproducing entirely in freshwater (or an estuary), giving rise to progeny that resume an anadromous reproductive cycle.

Critical habitat for the Southern California steelhead DPS was designated on September 2, 2005 (NMFS 2005). The designation identifies primary constituent elements that include sites necessary to support one or more steelhead life stages and, in turn, these sites contain the physical or biological features essential for conservation of the DPS. Specific sites include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, and estuarine areas. The physical or biological features that characterize these sites include water quality, quantity, depth, and velocity, shelter/cover, living space, and passage conditions. Activities with the potential to affect critical habitat for the Southern California steelhead DPS include: (1) forestry, (2) grazing and related rangeland activities, (3) agriculture and associated water withdrawals for agriculture, (4) road building or maintenance, (5) modifications of the creek channel or bank, (6) urbanization, (7) sand and gravel mining, (8) mineral mining, (9) dams, (10) irrigation impoundments and water withdrawals, (11) wetland (including estuaries) loss or removal, (12) introduction of exotic or invasive species, and (13) impediments to fish passage (NMFS 2005). In the Ventura River watershed, the mainstem of the river from the estuary to the confluence of Matilija Creek, the North Fork Matilija Creek, the Matilija Creek from its confluence with the North Fork Matilija Creek upstream to the base of Matilija Dam, are designated critical habitat for the endangered Southern California DPS of steelhead (NMFS 2005) (Figures 11-40 in Appendix A).

### B. Life History and Habitat Requirements

The life history of steelhead generally involves rearing in freshwater for one to three years before migrating to the ocean, usually in the spring and fall, where they may remain for up to four years. The timing of emigration appears to be influenced by photoperiod, streamflow, and temperature. In some drainages, immature steelhead may rear in lagoon or estuary for several weeks prior to entering the ocean. Steelhead grow and reach maturity at age two to four while in

the ocean. Adults generally immigrate to natal streams for spawning (but may also enter non-natal streams) during winter; some adults may not enter coastal streams until spring. Adults may migrate several miles, hundreds of miles in some watersheds, to reach their spawning grounds. Although spawning may occur in late winter and early spring, the specific timing of spawning may vary a month or more among streams within a region. Steelhead do not necessarily die after spawning and may return to the ocean, sometimes repeating their spawning migration one or more years. Female steelhead excavate a nest in the streambed and then deposit their eggs. After fertilization by the male, the female covers the nest with a layer of gravel, and the embryos incubate within this gravel pocket. Hatching time varies from about three weeks to two months depending on water temperature. The young fish emerge from the nest two to six weeks after hatching. Additional details regarding steelhead life history can be found in Shapovalov and Taft (1954), Barnhart (1991), Bjornn and Reiser (1991), and Quinn (2005).

Habitat requirements of steelhead in streams generally depend on the life history stage (Cederholm and Martin 1983, Bjornn and Reiser 1991). Generally, discharge, water temperature, and water chemistry must be appropriate for adult and juvenile migration. Passage of adults to upstream spawning areas should not be impeded because evidence suggests delays in arrival times at spawning areas can reduce fitness and ultimately production of young. Low discharge, high water temperature, physical barriers, low dissolved oxygen, and turbidity (high levels, see Bjornn and Reiser 1991) may delay or halt upstream migration of adults and timing of spawning, and downstream migration of juveniles and subsequent entry into the estuary, lagoon, or ocean. Suitable water depth and velocity, and substrate composition are the primary requirements for spawning, but water temperature and turbidity are also important. Dissolved oxygen concentration, pH, and water temperature are factors affecting survival of incubating embryos. Fine sediment, sand and smaller particles, can fill interstitial spaces between large substrate particle types, thereby reducing waterflow through and dissolved oxygen levels within a nest. Juvenile steelhead require living space (different combinations of water depth and velocity), shelter from predators and harsh environmental conditions, food resources, and suitable water quality and quantity, for growth and survival during summer and winter. Young-of-the-year and yearling steelhead generally use riffles, runs and pools (*e.g.*, Roper *et al.* 1994) during much of a given year where these habitats exist. Young-of-the-year and older juveniles may seek cover and cool water in pools during summer (Nielsen *et al.* 1994) particularly as discharge and therefore space declines in summer and fall (Kraft 1972). Juvenile steelhead have specific habitat requirements as indicated by the similarity of microhabitat use despite changes in microhabitat availability, as observed in some streams (Spina 2003).

## C. Population Dynamics

The number of steelhead in the Southern California steelhead DPS is small (Busby *et al.* 1996, Good *et al.* 2005) (see these source documents for information regarding the study streams). Recent total run size of adults for the DPS (based on combined estimates for the Santa Ynez, Ventura, and Santa Clara rivers, and Malibu Creek) is estimated at less than 500 adults. The small estimated run sizes suggest the Southern California steelhead DPS is not likely to be viable over lengthy temporal scales because the risk of extinction increases with decreasing population size and the extinction factors affecting population dynamics have more effect on small populations as compared to large populations (Pimm *et al.* 1988, McElhany *et al.* 2000). Evidence suggests that production of juvenile steelhead (i.e., numbers of individuals) is relatively low, with fewer than 5000 age-1 and older individuals noted within selected areas of

the watershed (Appendix D).

Although no long-term data set is available that would allow an adequate assessment of population variability, observations of species presence and distribution since 1997 indicate the variability of the Southern California steelhead DPS is high. For instance, since this species was listed in 1997, NMFS has periodically observed steelhead in drainages, with abundance ranging from no fish to numerous fish (A. Spina, NMFS, pers. obs.). These observations corresponded with years in which rainfall was more or less at or above normal for the region, which provided increased attraction flows and migration for adult and juvenile steelhead. Because population abundance depends, in part, on the availability of suitable freshwater habitat, and the frequency and magnitude of annual rainfall (which creates and sustains living space for steelhead) fluctuates greatly in southern California, steelhead abundance is likely to vary substantially over time. Such population variability is expected to increase the risk of species' extinction because risk increases with variation (fluctuation) in population size (Pimm *et al.* 1988). Steelhead populations in southern California exhibit sub-populations of residualized fish (i.e., fish which complete their life-cycle in freshwater without returning to the ocean to mature). These fish have the ability to produce progeny which may revert to a fully anadromous life-cycle. Genetic investigations of southern California steelhead (including those from the Ventura River drainage) provide evidence that residualized *O. mykiss* above Matilija Casitas Dams are more closely related to anadromous fish below the dams than to other populations (including hatchery derived populations), and that they are most likely derived from native anadromous populations of *O. mykiss* (Nielsen *et al.* 2005, Girman and Garza 2006)

## D. Status and Distribution

Wild steelhead populations in California have decreased from their historic levels (Swift *et al.* 1993, Busby *et al.* 1996, Good *et al.* 2005). Reasons for the decline of steelhead include past and present destruction, modification or curtailment of the species habitat; over-utilization for commercial, recreational and educational purposes; disease and predation; and inadequacy of existing regulatory mechanisms (NMFS 1997, 2006a). In many watersheds throughout the Southern California steelhead DPS, steelhead have been cut off from historical spawning and rearing habitats due to the damming of streams for creation of water-storage and diversion facilities (*e.g.*, Twitchell Reservoir within the Santa Maria River watershed, Bradbury Dam within the Santa Ynez River watershed, Matilija and Casitas dams within the Ventura River watershed, Rindge Dam within the Malibu Creek watershed). Such facilities have resulted in both physical barriers and hydrological impediments for adults and juveniles migrating to and from prime spawning and rearing habitats. Within stream reaches that are accessible to this species, diversion and storage of surface waters and groundwater pumping have in many watersheds eliminated or dramatically reduced the quality and amount of living space for juvenile steelhead, based on NMFS' observations (A. Spina, NMFS, pers. obs.). Urbanization has contributed to declines in the quality and quantity of suitable habitat for this species. The decline in the abundance of steelhead prompted listing of the Southern California steelhead DPS as endangered on August 18, 1997 (NMFS 1997) and the endangered status was reaffirmed on January 5, 2006 (NMFS 2006a).

Reviews of the DPS status (Busby *et al.* 1996, Good *et al.* 2005) note that the number of individuals throughout much of the species' historical geographic range has declined and have concluded (and reaffirmed) the species is at risk of extinction. The historical run size of adults within the Southern California steelhead DPS (based on combined estimates for the Santa Ynez,

Ventura, and Santa Clara rivers, and Malibu Creek) was roughly estimated to be at least 32,000 to 46,000. In contrast, recent total run sizes for the same four waterways was estimated at less than 500 adults. While the estimates of historical run sizes have been criticized for lacking adequate support (Good *et al.* 2005), there is recent evidence indicating that the number of streams currently supporting the Southern California steelhead DPS (46 drainages) has been reduced to less than 50 % and may be as low as 37 % of streams that historically supported steelhead (Good *et al.* 2005). The NMFS Technical Recovery Team identified the Ventura River steelhead population as one of the "core" populations essential for the successful recovery of endangered steelhead. Of the core populations, the Ventura River was ranked as having the third highest intrinsic potential to support a viable steelhead population if restored to an unimpaired state. This ranking is due, in part, to the watershed's large size, spawning and rearing habitat quality, relatively reliable winter river discharge, and greater potential for being independently viable (Boughton *et al.* 2006).

### E. Analysis of the Species and Critical Habitat Likely to be Affected

The proposed action is expected to adversely affect the Southern California steelhead DPS of steelhead and elements of this species' critical habitat (see the foregoing description of the distribution of this species' critical habitat within the Ventura River watershed). With regard to the species, the wet season (Nov-June) is considered the "migratory season" for adults and juvenile steelhead (Shapovalov and Taft 1954), and finding parr, presmolt, and smolt steelhead in the winter-spring emigration is not uncommon (Spina *et al.* 2005). Adults spawn during this time as well. During the dry season (June-Nov), juvenile steelhead are often found in streams. Because various elements of the proposed action will be occurring throughout the year, and will create impacts such as sedimentation and loss of habitat, these specific steelhead life stages are expected to be affected. With regard to critical habitat (NMFS 2005), the proposed action is expected to affect the following essential habitat features: water quantity and quality, space, water velocity, water depth, cover/shelter, passage conditions, food, and riparian vegetation. Other anthropogenic activities have contributed to the decline in the quality and quantity of steelhead critical habitat.

The NMFS Technical Recovery Team identified the Ventura River steelhead population as one of the "core" populations essential for the successful recovery of endangered steelhead due, in part, to the watershed's large size, spawning and rearing habitat quality, relatively reliable winter river discharge, and greater potential for being independently viable (Boughton *et al.* 2006). There are many streams within designated critical habitat areas, including Matilija Creeks and the Ventura River, which have been given high conservation values by the Critical Habitat Analysis Review Teams and have healthy habitat which has allowed steelhead to persist, and will facilitate the future recovery of steelhead populations within the DPS (Good *et al.* 2005). Contemporary juvenile steelhead use in the mainstem of the Ventura River, particularly in the Casitas Springs/Foster Park and upper Ventura River reaches, have been documented (Capelli 1995). Additionally, steelhead productivity of portions of the Ventura River has been investigated and has documented high growth and survival rates of juvenile steelhead in the Casitas Springs reach of the river (Moore 1980) where two municipal wells are proposed.

## IV. ENVIRONMENTAL BASELINE

This section describes the status of steelhead and critical habitat in the action area and past and ongoing factors affecting steelhead abundance and distribution.

## A. Status of Critical Habitat and Steelhead in the Action Area

Critical habitat within the action area begins at the base of Matilija Dam and extends downstream several miles to the estuary, and represents a substantial proportion of critical habitat within the Southern California DPS of endangered steelhead (NMFS 2005). Matilija Dam and the Robles Diversion have blocked steelhead access to historical habitat in the tributaries of the Ventura River (though a fish-passage facility was constructed at the diversion in 2004). Anthropogenic factors, such as agricultural activities, urbanization, and water withdrawals, have reduced the quality and quantity of habitat for steelhead in the action area. The amount and extent of surface flow during the dry season (i.e., habitat used as sites of freshwater rearing) is affected by diversion of surface water and groundwater pumping. The Robles Diversion removes a variable amount of surface water throughout any given year, depending on natural rainfall and runoff. Riffles, runs, and many pools (depth range from a few feet to over 6 feet) are present and appear to provide suitable sites of spawning and rearing for adult and juvenile steelhead, based on NMFS' observations. Portions of the habitat in the lower reaches are noticeably impaired by development along the river, or development in the watershed such as roads, residences, and agriculture located on steep, highly erosive soils. Surface flow in the middle reaches of the lower river (e.g., from the Robles Diversion extending downstream to San Antonio Creek) often ceases during the dry season, particularly in years with limited precipitation. Downstream of San Antonio Creek, surface water is supported by tributary inflow, rising groundwater, and tertiary-treated discharge from the Ojai Valley Sanitary District's wastewater-treatment facility.

The number of adult steelhead returning to the Ventura River has declined over the past several decades, with only a small number of adult steelhead being observed annually since the mid 1970. NMFS' estimated run size of less than 200 adults (Busby *et al.* 1996) is the most recent published estimate of the Ventura River steelhead population. Recent abundance surveys were performed in summer of 2006 and showed a large number of juvenile steelhead in the upper portions of the action area above the Robles Diversion compared to the lower portions of the action area, but few if any ocean reared steelhead (Appendix C). Steelhead utilization of the Ventura River watershed is currently limited to the mainstem of the Ventura River, San Antonio Creek, the lower reaches of Coyote Creek below Casitas Dam, Matilija Creek below Matilija Dam and the North Fork Matilija Creek. Spawning and rearing currently occurs primarily in the Casitas Springs/Foster Park reach and upper reaches of the mainstem of the Ventura, San Antonio Creek, and the lower reaches of Matilija Creek and the North Fork of Matilija Creek, when adequate water conditions exists (Figures 11-40 in Appendix A).

## B. Factors Affecting Species Environment within the Action Area

Matilija and Robles Dams

Matilija Dam has blocked passage of steelhead to historical spawning and rearing habitats upstream (for about the last 50 years), and reduced the amount of sediment that would otherwise be transported to downstream reaches and the estuary (Corps 2004d). The reduction in sediment has deprived downstream reaches of substrates that are necessary to provide a suitable substrate for steelhead spawning. The dam has interfered with the natural hydrology and hydraulics of Matilija Creek and the Ventura River, which contributes to the formation and maintenance of channel diversity and complexity. Additionally, water that has been impounded and subsequently released downstream is typically of poorer quality, affected by higher temperature, lower dissolved oxygen, and potentially higher nutrient loads (Corps 2004d) (Figures 9 and 10 in Appendix A).

Operation of the Robles Diversion has impacted the natural flow regime of the lower Ventura River, and thus steelhead migration, spawning, and rearing within this area. The historic 20 cfs downstream bypass flow from the Robles Diversion is insufficient to provide the depth necessary for successful upstream migration, and for adequately maintaining available spawning and rearing habitat in the lower river, particularly within the Casitas Springs/Foster Park area below San Antonio Creek. Recently, since the construction of the Robles Diversion fish-passage facility in 2004, a new plan to allow more of the Ventura River's natural flow to remain in the river channel for adult and smolt migration in and out of the watershed, and to support downstream spawning and rearing is now being implemented and flows of 30-50 cfs are allowed to pass downstream through the Robles Diversion fish-passage facility during diversion operations for the period of the January through July when natural upstream surface flows are available during wet and average rainfall years. NMFS consulted with the Bureau of Reclamation on operation of the diversion and concluded that the fish-passage facility is not likely to jeopardize the continued existence of the endangered Southern California steelhead DPS (NMFS 2003) (Figures 17-21 in Appendix A).

Flood Control

Levees & rip rap flood-control measures are present on the Ventura River. These are mostly in the lower reaches and are usually near developments, namely the Live Oak Acres and Casitas Springs area, and adjacent to Highway 33 in the lower reaches in the vicinity of the City of Ventura. The levees are usually only on one side of the river where human infrastructure is present, generally on the east side (except for Live Oak Acres). Levees do affect the fluvial geomorphology of the Ventura River and also recruitment of riparian vegetation by concentrating flow and increasing velocities and scouring riparian vegetation, and disrupting the natural meandering and fluvial geomorphology of the river. The County of Ventura (Watershed Protection District) also keeps the riverside of most levee reaches (i.e., the levee structure plus 10 feet from the toe) free of vegetation by herbicide spraying or mechanical removal. Impacts to steelhead and steelhead critical habitat from these facilities include loss of riparian vegetation and cover, loss of undercut bank (undercut banks have been observed in the action area, including the mainstem Ventura River, A. Spina, NMFS, pers. obs.) and pool habitats next to the banks and loss of sediment inputs some of which would provide spawning gravel size substrates.

Repeated emergency actions undertaken by various agencies of the county of Ventura (Public Works, Road Department, Parks Department), Ventura County Watershed Protection District, and the City of Ventura, have had a detrimental effect on significant portions of the middle and lower reaches of the mainstem of the Ventura River. These periodic flood-control activities disrupt instream habitat, increase and prolong turbidity, alter the natural distribution of plant propagules (e.g., seeds, stems) by disrupting the natural patterns of soil deposition, and prevent the natural maturation and succession of riparian habitats. Such activities also facilitate the spread of non-native species such as giant reed (Capelli and Stanley 1984, Lockard and Burgess 1984) (Figures 29, 30, 33 and 34 in Appendix A).

Non-Native Plant Species

Giant reed has become the dominant vegetation type within extensive portions of the Matilija Reservoir basin, and is continuing to spread into the remaining areas, including some portions of the Matilija Creek riparian habitat upstream of the reservoir basin. This plant displaces native vegetation and can degrade habitat quality within localized areas. Downstream of Matilija Dam, giant reed have colonized in parts of the floodplain of the Ventura River (Figures 5, 23, 24, 35 – 40 in Appendix A).

Urbanization, Agriculture, and Industrial Impacts

Although not heavily urbanized in its upper reaches (which are within the Los Padres National Forest), the Ventura River Watershed is affected by the cities of Ojai, and Ventura, and several unincorporated residential areas, including Matilija Canyon, Hawthorne Acres, Live Oak Acres, Meiners Oaks, and Foster Park. There are also industrial complexes that were built next to the river in the 1940s through 1970s (and now no longer operate) as well as extensive oil development within the highly erosive unconsolidated marine sediments characteristic of the lower reaches of the watershed. Discharges into the Ventura River, including point source contributions from a wastewater-treatment facility, and non-point source contributions from agricultural and urban development, have affected the water quality, particularly of the lower river. The California Regional Water Quality Control Board has classified the Ventura River as a Category I (impaired) watershed and has approved the river's status on the 303(d) list and TMDL priority schedule for pollutants including DDT, copper, silver, zinc, algae (eutrophication) and trash. Impacts to steelhead and steelhead critical habitat from these impairments within the Ventura River itself have not been adequately studied. Urbanization around streams can increase runoff severity and can lower water quality in the creeks (Spence *et al.* 1996). Increased impervious surfaces, such as that due to roads and urbanization in the action area, can increase runoff and peak flood flows (Florsheim and Goodwin 1993). The subsequent increase in peak flow volume and velocity, due to urbanization, can increase streambank erosion, turbidity, channel downcutting, and the extent that gravels are surrounded or covered by sand and smaller particles (Spence *et al.* 1996) (Figures 29, 30, 33, 34, and 39 in Appendix A).

Stream pollution from runoff is expected to have increased in response to higher human density along the Ventura River (Florsheim and Goodwin 1993, Bowen and Valiela 2001). Runoff from road surfaces can have oils, antifreeze, gasoline residue and other pollutants from vehicles, while runoff from urban development can include pesticides, herbicides, fertilizers, sewage, antibiotics, and other chemicals, all of which drain into creeks from storm drains and degrade water quality

for both people and wildlife (Florsheim and Goodwin 1993, Bowen and Valiela 2001). Agricultural activities can degrade water quality in the action area via stream bank erosion, sedimentation, and runoff from fields (Spence *et al.* 1996). Agricultural runoff can transfer nutrients and pesticides to the creek, which lowers dissolved oxygen levels by increasing algae growth in streams, and kills macroinvertebrates which salmonids use for food (Warren 1971, Spence *et al.* 1996). Given the existing impacts to water quality from a variety of point and non-point sources, additional impacts from more sediments, particularly fine sediments (sand and smaller particles) originating from the project, pose an increased risk to the currently depressed steelhead populations in the Ventura River watershed below Matilija Dam.

Water Withdrawals

Besides the diversion, and therefore removal, of several hundred acre-feet of water by Matilija Dam and the Robles Diversion (average annual diversion for the period 1959 to 2005 = 12,137 acre feet, Wickstrum 2005), pumping of subsurface alluvial groundwater within or near to the Ventura River occurs along much of the 11 miles directly below the Robles Diversion. The City of Ventura operates a well field and subsurface diversion in the Foster Park area, which diverted an annual average of 6,800 acre-feet (AF) of water between 1980 and 1990. Several smaller water districts and individual water extractors also take water from the alluvial aquifer in the downstream reaches of the Ventura River. Approximately 18,000 AF of water is withdrawn annually from the Ventura River basin, a majority as a result of the operation of the Casitas Municipal Water District facilities, including the Robles Diversion. The substantial amount of water extracted from the Ventura River aquifer combined with Robles Diversion operations substantially abbreviates the duration and magnitude of river flows necessary for successful steelhead migration, both upstream and downstream (NMFS 2003). Aquatic habitat in the lower Ventura River is especially vulnerable to water extractions in the summer and fall periods when base flows in the Ventura River are low (Rogers 2004). The reduction in the amount and extent of surface flows is expected to translate into reductions in water-dependent features of steelhead critical habitat. Such features include freshwater rearing sites, freshwater migration corridors, and freshwater spawning sites (and their constituent elements). While the Ojai Valley Sanitary District wastewater treatment plant releases an average of 2 million gallons/day (~ 3.0 cfs) of tertiary treated effluent to the river (Ojai Valley Sanitary District 2007), the functional value of the release of treated water for creating and maintaining suitable habitat for steelhead is poorly understood (Figures 25-37 in Appendix A).

## V. EFFECTS OF THE PROPOSED ACTION

### A. Methodology for Determining Effects

NMFS reviewed the supporting environmental documents (e.g., the Matilija Dam Feasibility Study Final Report, final EIR/EIS) to develop an understanding of the type, amount, and extent of impacts that were expected to result from the dam-removal project. These impacts were integrated with a review of the ecological literature concerning the effects of habitat changes on fish and the aquatic environment to predict the possible effects of the impacts on steelhead and critical habitat for this species. This review was supplemented with information acquired from federal and state agency websites, and a general knowledge of physical and biological processes, population dynamics, and the life history and habitat requirements of steelhead. With regard to

determining effects of the proposed action on critical habitat, this biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR §402.02. Instead, NMFS has relied on the statutory provisions of the ESA to complete the foregoing analysis with respect to critical habitat. Therefore, destruction or adverse modification involves direct or indirect alteration that appreciably reduces the conservation value of critical habitat. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.

## B. Important Assumptions of this Effects Analysis and Biological Opinion

NMFS relied on certain assumptions when assessing effects of the proposed action on endangered steelhead and critical habitat (Table 1). While other assumptions, though of no less importance, can be found elsewhere in this biological opinion, the assumptions listed here relate to elements of the proposed action that possess a heightened potential of creating (or influencing) conditions that harm steelhead. These assumptions derived from (1) discussions with, and written correspondence from, the Corps (e.g., Corps 2006b, Corps 2007), (2) NMFS' understanding of the proposed action, (3) the habitat and life history requirements of steelhead, and (4) NMFS' experience evaluating effects of projects on steelhead, and developing measures for minimizing such effects. If new information indicates an assumption in the following table (or elsewhere in this biological opinion) is invalid, the Corps and NMFS may be required to re-initiate section 7 consultation to consider the new information and then re-assess effects of the proposed action on endangered steelhead and critical habitat.

## C. Effects on Critical Habitat

Removing Fine Sediments from the Reservoir Area

Removing fine sediment from the reservoir with subsequent placement in protected locations outside the normally active river channel is not expected to diminish the functional value of critical habitat downstream of the dam. Sediment-water slurry will be contained in a temporary pipeline and transported downstream to disposal sites. The pipeline is generally expected to be placed out of the river (or creek) channel and riparian areas, so location (placement) effects due to the pipeline footprint are not expected. In narrow canyon areas, the pipeline will overlap with riparian areas, but because placing the pipeline does not appear to require removal of streamside

**Table 1. List of important assumptions NMFS relied on to predict the effects of the dam-removal project on endangered steelhead and critical habitat for this species.**

| Project Element | Assumption |
|---|---|
| Foster Park Groundwater Wells | • The new wells will be operated only when surface flows in the Ventura River (measured at the Foster Park Gauging Station, USGS 11118500, or similar device), equal or exceed 15 $ft^3$/sec (cfs). When surface flows in the river, as above, fall below 12 cfs, operation of the subject wells will cease.<br>• The operation of said wells will not reduce surface flows more than 3 cfs, leaving a minimum discharge of 12 cfs in the river.<br>• Through application of reliable monitoring techniques, the Corps will verify the foregoing assumptions. Evidence of this verification (i.e., field data obtained from the monitoring) will be provided to NMFS within a reasonable time after such data become available. |
| High-Flow Sediment Bypass | • The high-flow sediment bypass will be designed and operated in a manner that will not interfere with passage of adult or juvenile steelhead during operation of the facility. Design and construction of fish-passage capability or facility will be incorporated into this project feature.<br>• The Corps will convene a panel of NMFS (and other) technical experts (e.g., steelhead ecologists and fish-passage engineers) and seek expert recommendations for the purpose of designing a high-flow sediment bypass that is commensurate with the life history and habitat requirements of steelhead. The Corps will receive NMFS' recommendations and make mutually agreeable revisions to the subject design.<br>• Prior to constructing the high-flow sediment bypass, the Corps will develop design drawings for the high-flow sediment bypass, as well as a description of how the bypass will be operated, and NMFS will find these designs agreeable.<br>• Prior to constructing the high-flow sediment bypass, the Corps will prepare a plan for validating post-construction performance and ensuring long-term maintenance of the high-flow sediment bypass, and NMFS will find this plan to be agreeable. This validation plan will be implemented according to a schedule defined in the plan.<br>• Operation of the high-flow sediment bypass will not affect operation of the Robles fish-passage facility, or steelhead attempting to enter or migrate through said facility. |
| Removal of the dam | • Steelhead will access and use historical spawning and rearing habitat upstream of the dam location; adults will reproduce and progeny will rear upstream of the dam location, and successfully emigrate from the dam site; as a result the steelhead population in the Ventura River watershed will increase beyond current levels. |
| Removal of sediment from reservoir | • An accidental rupture of the transport pipeline and release or spill of the sediment-water slurry will be avoided. |
| Monitoring and Adaptive Management Plan | • The Corps will develop a program (e.g., a monitoring and adaptive management plan) to address NMFS project-related uncertainties (identified in the enclosure to NMFS' October 25, 2006, letter to the Corps). The Corps' program will accomplish the following: (a) Within each general category of uncertainty (as identified in NMFS' letter of October 25, 2006), identify specific uncertainties and the questions that need to be addressed to resolve each uncertainty; (b) Identify biological goals and objectives for each specific uncertainty; (c) Implement a monitoring program that is able to provide the necessary information to answer questions related to resolving each uncertainty (e.g., define a process for measuring the spatial and temporal changes in habitat quantity and quality due to the proposed action, and the related biological responses to these changes); (d) Outline the compensatory mitigation program that will be implemented to offset impacts of the proposed action on instream and riparian habitat, as currently identified, and as may be experienced as a result of unforeseen project impacts; (e) Define a protocol that will respond to new information or changing conditions, and detect and effectively address deficiencies in the mitigation program or other project related issues in a timely manner; (f) Incorporate feedback loops that link implementation and monitoring to a decision-making process that result in appropriate changes in project features or operations; and, (g) Define a protocol that will track performance of the mitigation program, respond to new information or changing conditions, and detect and address deficiencies in the mitigation program or other project-related issues in a timely manner.<br>• The MAMP as well as the program for addressing NMFS project-related uncertainties will be adequately funded. |

trees or vegetation, the pipeline is not expected to create conditions that reduce the functional value of the streamside area (e.g., to provide shade). While an accidental rupture of the pipeline and release of sediment-water slurry are possible, NMFS believes such an incident is speculative (and difficult to meaningfully analyze effects because they are dependent on a variety of unknown factors such as location and duration) and therefore is not specifically evaluated in this biological opinion. A NMFS-approved contingency plan will be implemented if an accidental release of sediment occurs (Corps 2004b, Corps 2006b). The pipeline will be dismantled and removed and the area restored following completion of this project element.

With regard to the sediment disposal sites, these sites lie in upland or floodplain areas; with only a few exceptions inundation of these sites during high-flow events is not expected to be a frequent occurrence (Corps 2004a, Corps 2004d). The upstream-most disposal site, located near the Highway 150 bridge, is designed to gradually release stored sediments over time (during 5 to 10-year flow events). Other slurry disposal sites are farther away from the river, but inundation from flood events greater than a 10-year event is possible. The effects of sediment releases (sand and smaller particles are the principal substrate types of concern to NMFS, given the reported effects of these substrate particle types on the aquatic environment, e.g., Cordone and Kelley 1961) could range from discountable (e.g., a few discrete accumulations of surficial fine sediment, i.e., sand and smaller particles) to catastrophic (extensive accumulations of surficial fine sediment throughout the action area and widespread alteration of freshwater rearing, spawning, and migration sites, and the estuary). The latter effects do not seem likely given that elaborate controls have been incorporated into the proposed action for the purpose of reducing the likelihood of such an event. These controls include (1) the design and intended function of the sites, which are projected to erode only during less frequent higher flow events, >10-yr return frequency, (2) the soil cement on the downstream storage sites, which is expected to increase the potential that fine sediment will erode only during the high-flow events (and subsequently evacuated latitudinally and longitudinally from the active river), and (3) removing one-third of the total volume of material from behind the dam, which will reduce the total volume of fine sediment that could adversely affect downstream habitats. Consequently, effects related to the release of sediment from the disposal sites are expected to be near discountable. The actual effects will depend, in part, on the type, amount, and extent of sediments that are released into the water column, the magnitude and duration of discharge, the performance of the disposal sites, and background turbidity concentrations. Because the magnitude and extent of effects are to some extent uncertain, implementation of a reliable MAMP, in combination with the Corps' commitment to implement a program that will address the uncertainties that NMFS has identified (including effects due to sedimentation, NMFS 2006b; see also Corps 2006b), becomes increasingly important for detecting and then reconciling sediment-related effects on critical habitat (Figures 27 and 28 in Appendix A).

Dam Removal and Release of Sediments from Behind the Dam

Habitats that were historically available to steelhead, but rendered inaccessible due to the dam, will become accessible to this species. The actual degree of accessibility is governed largely by the effective operation of the downstream Robles Diversion fish-passage facilities and whether steelhead can pass the high-flow sediment bypass. Removing the dam will increase the amount and extent of suitable habitat available for the local (watershed specific) population of steelhead as well as the Southern California DPS of endangered steelhead. Although dam-removal

activities will temporarily create considerable and extensive physical disturbance to the channel immediately upstream and downstream of the dam, when the dam is fully removed and the stored sediments flushed from the reservoir site, the affected area will be restored to historical conditions. The channel that was present prior to construction of the dam will be restored in the former reservoir area, and several hundred feet of the existing creek channel downstream of the dam will be re-configured, aligned and graded. The new channel will be designed to allow steelhead passage to upstream reaches of Matilija Creek for the first time since 1947. The natural fluvial processes after dam removal are expected to form meanders and other essential features of critical habitat over time. As part of the MAMP, this area will be monitored for an extended period of about 10 years (or possibly longer if necessary) to ensure irreparable and undesirable changes to steelhead habitat (*i.e.*, development of steelhead migration barriers) in this reach of Matilija Creek do not occur, or are adequately mitigated (Corps 2004a) (Figures 7 and 8 in Appendix A).

During construction, the reach of Matilija Creek extending about 500 to 1000 feet downstream of the dam will be dewatered during late spring through fall for 6 to 9 months to allow work in the dry. Work or use of heavy equipment in creek and flowing water during winter will not occur (Corps 2004b). The diversion of surface water and dewatering to facilitate construction in the dry are expected to cause loss of a freshwater rearing site for steelhead, and loss of food-producing areas. The loss of these features of critical habitat will be temporary because the affected area will be rewatered following completion of the in-channel work activities, though full restoration of those features may require several seasons of normal or above normal rainfall and runoff. All contractors will be required to follow a set of best management practices (Corps 2004a, b) to reduce the likelihood of water-quality alterations and therefore effects on critical habitat.

Dam-removal activities will expose extensive areas of fine and coarse sediments, thereby increasing the potential for erosion, turbidity and sediment-related effects on critical habitat. An understanding of the type, magnitude, and degree of probable sediment releases is necessary to develop a basis for predicting the possible effects on critical habitat. Therefore, the following discussion briefly summarizes what sorts of sediment releases, and increases in turbidity, are expected. The discussion of the sediment releases is taken directly from the supporting environmental documents (e.g., Corps 2004b, d) as well as supplemental information (Corps 2007), where additional information and specific details can be found. Although a substantial effort was undertaken to assess potential sediment impacts, the variable southern California climate challenges the development of a reliable prediction of the effects on critical habitat (and steelhead).

With regard to fine sediments, "large" releases into flowing water are not expected until the first rains after the dam is completely removed and the flows are reintroduced into the reconfigured channel (Shuman 1995, Pizzuto 2002, Cluer 2006a). At this time, the area of the former reservoir will have been converted to a new channel and temporary sediment-storage sites. Because most of the fine sediments from the lake bed will have been removed through the sediment-slurry operation, and the fraction of silt and clay particles in the remaining delta-area sediments is relatively small, the turbidity impact from the first few rainfall events is expected to be of short duration, though this period could be extended depending on rainfall and runoff patterns in the watershed. NMFS expects 1 to 3 rainfall events each of 1 to 2 days in duration will be required to flush residual unstabilized fines from the new channel (Cluer 2006a). After

flood peaks have passed, the concentrations of fine materials are expected to quickly decrease to background levels. Concentrations will still be approximately 2 to 3 times higher during smaller rainstorms than if the dam had not been removed, and this condition could persist for 3 to 10 years depending on rainfall patterns. After the initial flushes of fine sediment from areas upstream of the dam, the release of fine sediments and turbidity increases will occur again many times over the next 10 to 20 years as the sediment-storage sites are inundated by large floods. Because the Corps estimates four separate removals of revetment along the sediment-storage sites as they erode (due to discharges above the 2 to 5-year range, or 3000 to 7100 cfs) and sediments are transported downstream, there will be at least four episodic impacts from fine sediments released into downstream reaches during the 10 to 20 years. As each revetment is removed, the turbidity concentrations and suspended sediment levels are expected to increase by a factor of 2 to 10 times the background conditions within the Matilija Creek and Ventura River depending on the severity of the flood event and hydrologic conditions (i.e., if there is a 2 versus a 10-year flood event). After the final revetment is removed, the turbidity levels should stabilize at equilibrium levels after one or two floods of average size pass through the historic reservoir area above the dam. Estimates indicate that 10 to 20 years will be needed for all the sediments within the storage sites to be transported downstream.

With regard to coarse sediments, these will be released at a much slower rate, depending on their size, and they will take a decade or more to distribute through the downstream reaches of Matilija Creek and the Ventura River. The main short-term effect of renewed coarse sediment mobilization will be sediment deposition and aggradation of the Matilija Creek and Ventura River channels (Shuman 1995, Pizzuto 2002, Corps 2004a, Corps 2004d). The project is also expected to restore sediment-transport function. The elevation of the channel bed will rise while the sediments migrate through the downstream reaches, in some areas by several feet, with extensive deposits of sediment observed in localized areas. Specific changes in channel geomorphology and channel bed elevation were modeled on a reach scale throughout the action area in an attempt to predict the effects of the dam removal with more confidence. The modeling of future sediment flows was made with past hydrology; one key assumption of the model involved the future hydrology of the region. Recent computer modeling of precipitation for Southern California over the next hundred years shows slight to modest decreases in annual precipitation ranging from 5 to 15% occurring by the year 2100 (Hayhoe *et al.* 2004). In this context, the evacuation of sediment from the storage sites and corresponding changes in channel bed elevation may take longer if the climate becomes drier in the next 20 years, or the channel bed elevation could change abruptly if a major 50-year flood event occurs during the project life. These channel changes over the project life (20 years) are illustrated in Table 2, with the 10-year modeling results corresponding to a drier climate, and the 50-year modeling results corresponding to a severe flood. In either scenario, the channel bed is expected to aggrade, but the rate of aggradation will result in differing amounts of deposition (Table 2) (Figures 11, 12, 15, and 25-30 in Appendix A).

**Table 2. Two possible scenarios in average reach-specific aggradation of the channel bed during the 20-year project life: one scenario based on a drier climate, and the second based on a severe flood event. Reach number increases in proximity to the dam, with reach 6b being closest to the dam. Values in the table represent the predicted average deposition (feet) of sediment, and are obtained from modeling.**

| Location | Dry climate 10-year | Flood event 50-year |
|---|---|---|
| Reach 2 | 1.2 | 3.6 |
| Reach 3 | 2.0 | 4.2 |
| Reach 4 | 0.8 | 2.3 |
| Reach 5 | 1.4 | 2.2 |
| Reach 6a | 2.3 | 6.4 |
| Reach 6b | 1.0 | 0.9 |

In regard to critical habitat, the release of fine and coarse sediment into Matilija Creek and the Ventura River is expected to alter freshwater rearing and spawning sites and the estuary, despite the actions taken to limit the adverse effects (e.g., the design of the sediment storage sites, the use of soil cement, among others). Given the expected magnitude, frequency, and duration of sediment releases, and predicted increases in channel-bed elevations throughout the action area, a reduction in water-column depth and filling and loss of habitats (such as pools, and runs, which serve as freshwater rearing sites and freshwater spawning sites) throughout the action area is expected (cf. Cordone and Kelley 1961, Eaglin and Hubert 1993). Such effects are likely to persist for several years until the increased sediment loads are buffered by fluvial processes and scour, and the sediment equilibrium becomes reestablished (Pizzuto 2002, Cluer 2006b). The additional amount of sediments in the channel bed could also be susceptible to "clumping" in some areas and may migrate downstream as "waves" (Pizzuto 2002); these clumps of sediment could become stalled in locations for years and impair long-existing pools (Cluer 2006b) or other areas that may support freshwater rearing and spawning. Given the highly variable hydrology of coastal streams in southern California, freshwater rearing and spawning sites could remain largely filled or impaired for several years between large storm flows. Input of gravel, cobble, and boulder may enhance existing critical habitat because these substrate types support freshwater spawning and rearing sites. Deposition of sands and finer materials along the channel margins is expected to benefit establishment and growth of riparian vegetation (Shafroth *et al.* 2002, Cluer 2006a), which can provide shade over freshwater rearing sites. Overall, the foregoing effects largely do not favor maintenance of critical habitat for endangered steelhead in the short and medium time frame (2 to 10 years). However, the projected sediment-related effects on critical habitat are not expected to persist indefinitely and to be offset by anticipated project benefits, such as restored steelhead access to historical spawning and rearing habitats.

Sediment-related effects of the proposed action are expected to extend downstream to the estuary. The loss or alteration of estuarine habitat within the Ventura River watershed, should such effects in fact occur, would be of major ecological concern because such habitats provide numerous values to anadromous salmonids (Smith 1990, Thorpe 1994, Bond 2006), and possess features that are essential to the conservation of adult and juvenile steelhead (NMFS 2005). For instance, essential features of estuarine areas include (1) water quality, water quantity, and salinity conditions that are capable of supporting adult and juvenile physiological transitions between fresh and saltwater, (2) natural submerged and overhanging cover, and (3) forage for adults and juveniles, which supports growth and maturation. According to the source documents for the proposed action (i.e., the feasibility report), the estuary is not expected to incur more than

1 foot of deposition due to sand. Whether this level of aggradation would result in an alteration or loss of essential features of the estuary to conserve the species is not clear at this time because the information needed to inform such an assessment is not available. Accordingly, reliable implementation of the proposed MAMP, in combination with the Corps' commitment to implement a program that will address the uncertainties NMFS has identified (which included effects due to sedimentation, NMFS 2006b; see also Corps 2006b), will be necessary to detect and then reconcile sediment-related effects on critical habitat (Figures 39 and 40 in Appendix A).

Foster Park Groundwater Wells

Information on the design and operation for the two new wells is incomplete at this time, and therefore only a general assessment of the effects on critical habitat can be made. The construction and operation of the Foster Park wells will preserve the City of Ventura's ability to extract water. The proposed operation of the new Foster Park groundwater wells is expected to reduce surface flows in the Ventura River in the vicinity of Foster Park no more than 3 cfs (Corps 2006b). While the maximum flow reduction can be assumed from the information provided, the geographic extent of the reduction cannot because the distance between the groundwater elevation and the elevation of the bottom of the sloped river channel fluctuates, causing a change in the intersection of the groundwater with the river channel. Therefore, the downstream extent that surface flow throughout the Casitas/Foster Park reach of river (which encompasses freshwater rearing and spawning sites) would be reduced is unknown at this time. The Corps' proposal to confine operation of the new wells to periods when discharge is 15 cfs or greater and no other surface diversion occurs, and to not reduce discharge by more than 3 cfs, will ensure that discharge will not fall below 12 cfs due to operation of the new wells.

The manner in which a reduction in discharge of 3 cfs will affect the quality and quantity of freshwater rearing or spawning sites cannot be determined from the available information. Given NMFS' examination of recent hydrology records for the Foster Park area, daily mean discharge appears to rarely exceed 15 cfs during the dry season (May 1 to Nov 1). Assuming these discharge records accurately represent discharge for the local area, operation of the new wells during the dry season is not expected, and effects on critical habitat are unlikely within this period. Water extractions outside the dry season by the new wells do possess the potential to reduce the amount and extent of surface flow because annual droughts or extended rain-free periods can result in dry season surface-flow conditions even during winter, as was observed during a February 8, 2007, inspection of the action area (A. Spina, NMFS, pers. obs., Appendix E). However, the Corps' proposal to confine pumping of the new wells to periods when discharge is 15 cfs or greater is expected to reduce the amount and extent of pumping-related effects on surface flows (and therefore critical habitat) during the wet season. The proposed MAMP, in combination with the Corps' program for addressing uncertainties NMFS has identified (NMFS 2006b; see also Corps 2006b, Corps 2007), is expected to provide the information necessary for determining the actual effects of well operation on critical habitat. Developing a clearer understanding of how wells will be operated would further NMFS' ability to assess effects of well operation on critical habitat for endangered steelhead. While specific provisions are expected to minimize adverse effects due to operation of the new wells, other wells, which are not the subject of this consultation, may continue to operate, thereby causing surface flows to decline beyond the level defined for operation of the new wells (Figures 35-37 in Appendix A).

High-Flow Sediment Bypass

The design and operating criteria for the high-flow sediment bypass are only preliminary at this time, and therefore only a general assessment of the effects on critical habitat can be made.

Construction of the high-flow sediment bypass (with the incorporation of fish-passage capability or feasibility) is expected to reduce effects of the existing earthen berm (i.e., the timber crib wall that is currently buried under accumulated channel bed substrates) on the freshwater migration site for endangered steelhead. Preliminary plans for the sediment bypass include a fishway on the left bank of the high-flow sediment bypass, and a rock fishway with boulder weirs on the downstream dam slope adjacent to the right wall of the sediment bypass (Corps 2006a). While these plans are conceptual, the Corps proposes to (1) design and operate the bypass to avoid interfering with migration of adult and juvenile steelhead at the bypass, (2) design and construct fish-passage capability or feasibility for incorporation into the bypass, and (3) work with NMFS steelhead biologists and NMFS fish-passage engineers on the design and operation of this project feature during the upcoming detailed design phase of the dam removal (Corps 2006a, Corps 2007). Accordingly, NMFS expects the bypass will be designed, constructed, and operated in a manner that will not impede migration of steelhead at the bypass (i.e., over the range of hydrologic events the structure is designed to operate). The bypass has the potential to extend the operational range of fish passage in the localized area and therefore more fully realize the potential benefits of the removal of the Matilija Dam. A description of how the incorporation of fish-passage capability or feasibility into the high-flow sediment bypass will minimize effects on steelhead is as follows.

Incorporating an ecologically meaningful fish-passage element into the high-flow sediment bypass is critically important for reducing the effects of this project feature on endangered steelhead. The existing earthen berm spans the entire mainstem of the Ventura River and represents an obstruction to passage of steelhead. Although a fish-passage facility was recently constructed at the Robles Diversion Dam on the west bank of the river adjacent to the earthen berm, passage of steelhead through the ladder has not been corroborated. Additionally, operation of this facility is confined to relatively low flows (50 to 1,500 cfs) and limits the average number of fish-passage days per year (44 days under the existing terms of NMFS' 2003 biological opinion versus 150 fish-passage days prior to the construction of the Robles Diversion facilities). The physical characteristics of the local area and the behavior and migratory ecology of steelhead represent other reasons why incorporation of fish passage into the sediment bypass is needed. In this context, the preliminary design for the high-flow sediment bypass specifies placement on the east bank of the river channel and would discharge high flows (in excess of 1,500 cfs and the operating range of the existing fish-passage facility) to a separate eastern channel, which connects to the western active channel about 1000 feet downstream (Appendix B). Adult steelhead migrate during periods of elevated streamflow (Shapovalov and Taft 1954) and are attracted to areas of "heavy" turbulent water (Bunt *et al.* 1999, Bunt 2001, Rivinoja *et al.* 2001). The high flows released through the bypass are therefore expected to lure steelhead into the eastern channel, toward the water apex just downstream of the bypass and away from the westerly channel and the entrance to the existing fish-passage facility. Any steelhead remaining in the eastern channel when operation of the bypass ends would be exposed to lethal conditions created when the water releases subside or cease (e.g., Cushman 1985). Consequently,

incorporation of a proper fish-passage facility or capability into the high-flow sediment bypass is necessary to reduce the likelihood that migrating steelhead would be delayed (because they cannot locate the entrance of the existing fish-passage facility) or stranded and killed (due to being trapped in the eastern channel following cessation of flows from the bypass) (Figures 17-24 in Appendix A).

With regard to construction of the bypass, effects to critical habitat are expected to be discountable. Short-term impacts from the construction of the bypass and fish-passage facility (or fish-passage capability) are expected to be those related to temporary channel disturbance (from heavy equipment), excavation, compaction, and the loss of native channel bed material where the dam and the bypass structure would be located. Some exposed soils may result from construction activities, thereby increasing the potential of erosion and sedimentation in freshwater rearing and spawning sites. The type, amount, and extent of the effects are expected to be minimized through implementation of best management practices during construction activities.

Downstream Flood Control Improvement Projects (Levees/Floodwall, and Bridges)

Raising the existing levees will preserve the levees and perpetuate existing effects on critical habitat into the future. The existing levees prevent natural lateral migration of the river channel, confine the river within an artificially defined corridor, and propagate the existing fragmentation of the active river channel and the historical floodplain. Freshwater rearing sites for steelhead include floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility. Therefore, the existing levees (and the proposed raising) increase the likelihood that adverse effects to critical habitat will continue into the future. The new levee and floodwall proposed in the Meiners Oaks area is expected to produce effects similar to the foregoing effects on critical habitat. Activities to construct or raise levees and floodwalls will take place in upland areas, where riparian plant species, and flowing water, are not expected. Therefore, construction activities are not expected to affect critical habitat.

Designs for the new and improved bridges are only preliminary at this time, and therefore only a general assessment of the effects on critical habitat can be made. Removal and relocation of the Camino Cielo Bridge and the widening and elevation of the Santa Ana Road Bridge are expected to require workspace dewatering, excavation, and slope and channel alterations. These activities can lead to temporary loss of freshwater rearing sites (dewatering), loss of shade, decreased bank stability (where streambanks are disturbed and then not adequately protected), and increased erosion. Best management practices will be implemented as part of the construction activities, which is expected to minimize adverse effects on critical habitat. Long-term effects due to the new and improved bridges are expected to include bank stabilization (rock riprap) in the vicinity of the bridges, and loss of riparian habitat. The river channel beneath both bridges will be widened to improve flow and sediment conveyance, and to allow for the passage of a 100-year flood event (but not at the Camino Cielo Bridge) with the increased sediment loads expected after dam removal. Replacing the Camino Cielo Bridge is expected to improve the freshwater migration site because the box culverts under the current bridge appear to represent an obstruction within the migratory corridor (Corps 2004a) (Figures 15, 29, 30, 33 and 34 in Appendix A).

Giant reed Removal Plan

The removal of non-native plants (chiefly giant reed) downstream of the dam in Matilija Creek and the Ventura River is expected to result in discountable effects to critical habitat (because steelhead and critical habitat for this species are not currently present in areas upstream of the dam, only the giant reed removal proposed for reaches downstream of the dam, where steelhead and critical habitat are currently present, is considered in this biological opinion). The removal will use mechanical means, hand laborers, and herbicides. Minor localized releases of fine sediments during mechanical removal of plants are possible, but should such releases occur, they are not expected to diminish the functional value of freshwater rearing and spawning sites. Removal activities will take place largely during the dry season, however. The herbicides are not expected to alter water quality; NMFS' experience indicates Glyphosate is immobile in the soil, becomes inactive over several weeks, and is not likely to create toxic instream conditions. Much of the removal activities will be far removed from the active channel where surface water would be present. Best management practices will be implemented (e.g., avoid spraying herbicides in or near flowing water, using hand dispensers to directly apply herbicides to plants) to further minimize the likelihood of adverse effects (Figures 5-8, 11, 23-25, and 35-40 in Appendix A).

## D. Effects on Steelhead

Removal of Reservoir Area Fine Sediments

Because the effects of sediment releases from the disposal sites on critical habitat (and primary constituent elements) are to some degree uncertain, only a general characterization of the possible effects on steelhead can be made. While steelhead in the Ventura River are expected to be affected when high flows contact the sediment-disposal sites causing the release of fines, the release of fine sediment from the sites is expected to be infrequent (once every 5 to 10 years), short lived (2 to 3 days) and create low turbidity concentrations. The sites themselves will be designed to minimize contact of fine sediment with flowing water. Background turbidity concentrations are expected to be elevated during periods of increased flows, therefore the potential exists that background levels could mask turbidity concentrations resulting from the release of sediment from the disposal sites. The severity of the effects on steelhead will depend on both suspended sediment concentration and duration of exposure (Newcombe and Macdonald 1991, Newcombe and Jensen 1996), but are expected to be discountable based on the foregoing. With regard to effects due to sedimentation, once mobilized, the fine sediments released from the disposal sites are not expected to settle, and therefore eggs, incubating embryos, and alevins in nests are not expected to be harmed. A NMFS-approved contingency plan will be implemented in the event of an accidental release of sediment (Corps 2004b, Corps 2006b) (Figures 27 and 28 in Appendix A).

Dam Removal and Release of Sediments behind Matilija Dam

Dewatering the reach of creek immediately downstream of the dam is expected to be problematic for steelhead because the temporary loss of water, and therefore habitat, would disrupt steelhead behavioral patterns. Steelhead need suitable living space for ontogeny and survival; living space absent surface water is not suitable. Streamflow diversion could harm individual steelhead by

concentrating or stranding them in residual wetted areas (Cushman 1985) or by causing them to migrate to adjacent habitats (Kraft 1972; Campbell and Scott 1984). Dewatering the workspace may cause harm, injury and mortality to steelhead by confining them to areas that are predisposed to dewatering or desiccation, increased water temperature, decreased dissolved oxygen concentration and predation (Cushman 1985). The number of steelhead that may be affected by isolating workspaces from flowing water is expected to be relatively low, based on the number of juvenile steelhead recently observed in the action area (Appendix D). Monitoring biologists would relocate steelhead from work areas (i.e., net steelhead and move them a short distance to instream areas outside the work area) thereby reducing the number of steelhead that could be killed or harmed by dewatering activities. Effects to steelhead resulting from dewatering activities, including relocation of stranded individuals, are expected to be largely non-lethal and temporary (Figures 7-9 in Appendix A).

The effects on steelhead that may result from the release of fine and coarse sediments from the former reservoir area (during high-flow events) are of concern to NMFS. Given the expected effects of the releases on critical habitat (e.g., increased turbidity, and some alteration of instream and estuarine habitat, filling or alteration of freshwater rearing and spawning sites, and channel aggradation), the potential exists that extensive portions of action area could be rendered unsuitable for spawning and rearing steelhead for several months or years. Increased turbidity levels may increase "coughing" and gill flaring in fish (Berg and Northcote 1985), and increase respiration and reduce oxygen uptake by the gills (Cordone and Kelley 1961, Herbert and Merkins 1961). Juvenile steelhead may experience a reduced ability to forage when turbidity increases (Berg and Northcote 1985, Gregory and Northcote 1993, Suttle *et al.* 2004). With regard to physical alteration of the channel bed due to sedimentation, the increased coarse sediment load is expected to affect all life stages of steelhead within the action area since the sequence and locations of pools, riffles and runs will likely be changed (Pizzuto 2002). The filling of freshwater rearing sites (e.g., pools) is expected to reduce, if not eliminate, the quality of such sites for juvenile steelhead. A reduction in the availability of suitable rearing sites increases the potential that the abundance of juvenile steelhead would decrease within the action area. Additionally, the timing of such sediment releases could influence the type and degree of impacts. For example, if sediment deposition occurs after steelhead have spawned in the lower river (Casitas Springs/Foster Park reach), there is an increased risk that deposition of fine sediments would adversely affect the incubation and emergence of any steelhead embryos and fry (and alevins). By contrast, the riparian area is expected to benefit from deposits of sediment in river margins and the floodplains (Shafroth *et al.* 2002, Cluer 2006a). NMFS presumes that through implementation of the MAMP, as well as the Corps' program for addressing the uncertainties NMFS has identified, sediment-related effects on steelhead (based on impacts to habitat) can be detected and will be remedied as appropriate and necessary. The foregoing projected sediment-related effects on steelhead are expected to be offset by the ecological benefits due to removal of the dam, which are described as follows.

While the process of removing the dam is expected to create temporary instream conditions that are not entirely agreeable with the habitat requirements of steelhead, after the dam is gone the Ventura River population of endangered steelhead and the entire Southern California DPS of endangered steelhead is expected to experience an increased potential of being viable over time (this expectation is predicated on the population gaining access to the upstream spawning and rearing tributaries above Matilija Dam, which in turn is governed largely by the effective

operation of the downstream Robles Diversion fish-passage facilities and the degree to which steelhead can effectively pass the high-flow sediment bypass). After the dam has been removed, habitat connectivity will have been achieved and steelhead will once again have access to historical spawning and rearing habitats. The elimination of habitat fragmentation and restoration of bi-directional gene flow (i.e., movement of steelhead to and from the reaches upstream of the former dam) is expected to decrease the risk of species extinction (Rieman and McIntyre 1995, Rieman and Allendorf 2001). This favors conservation of the local population of endangered steelhead and the entire Southern California DPS. Further, the Ventura River is one of the relatively few inland populations within the Southern California DPS that has historically produced the largest run sizes in the study area, and has a high priority for protection (Boughton *et al.* 2006). While historical habitat will be accessible to steelhead following dam removal, the proposed action includes no monitoring to determine whether steelhead are using the historical habitats and the type, magnitude, and degree of the use. Therefore, no mechanism exists, related to the proposed action, for determining whether steelhead will be able to migrate to and then spawn and rear in the subject area. The anticipated benefits of removing the dam for steelhead are currently tentative (Figures 1-6 in Appendix A).

Foster Park Groundwater Wells

Because specific information on the design and operation for the two new wells is not available, only a general understanding of the effects on steelhead can be developed at this time. Confining operation of the new wells to river flows of 15 cfs or more (and ceasing pumping when surface flows fall below 12 cfs) is expected to minimize the amount and extent adverse effects that steelhead may incur as a result of operating the new wells. This expectation assumes that (1) surface flows of 12 cfs are in fact sufficient to create and maintain essential habitat features that are needed for growth and survival of adult and juvenile steelhead, and (2) the 3 cfs reduction in surface flow does not have a consequence for the survival or growth of steelhead (i.e., the essential features of critical habitat and growth and survival conditions for steelhead are the same at 15 cfs and 12 cfs regardless of season). The information needed to validate these assumptions is not currently available, however. While the flow-related precautionary measure governs operation of the new wells, operation of existing wells in the Foster Park area is apparently not controlled by a similar precautionary measure. As a result, pumping of existing wells may cause surface flows to decline beyond those "protective" flows defined to guide operation of the new wells. The proposed MAMP, in combination with the Corps' program for addressing uncertainties NMFS has identified (NMFS 2006b; see also Corps 2006b), will contribute to determining the true effects of operating the new wells on critical habitat. Developing a clear understanding of the manner in which the new wells would be operated would further NMFS' ability to assess effects of operating the new wells on endangered steelhead (Figures 35-37 in Appendix A).

High-Flow Sediment Bypass

Activities related to the construction of the bypass are not expected to affect steelhead individuals because NMFS presumes construction will occur when the channel is dry. If flowing water is present, no dewatering of the workspace is believed necessary because river discharge is likely to be diverted away from the workspace through the Robles Fishway on the west side of the river (Figures 19-24 in Appendix A).

Because the design and operating criteria for the high-flow sediment bypass are preliminary at this time, only a general assessment of the effects on steelhead can be made. Construction of the high-flow sediment bypass with incorporation of ecologically meaningful fish-passage capability or feasibility is expected to improve migration of adult and juvenile steelhead through the river channel (and high-flow sediment bypass) in the localized area, within a range of operating discharge. A fish-passage facility was recently constructed at the Robles Diversion Dam, adjacent to the earthen berm; steelhead may be able to migrate upstream past the berm using the fish ladder, though passage of steelhead, as such, through the ladder has not been corroborated and has an inherent limitation on the operation range (50 to 1,500 cfs). The Corps proposes to design and operate the bypass to benefit passage of steelhead at the bypass and to work with NMFS' steelhead ecologists and fish-passage engineers on the design and operation of this project feature during the upcoming detailed design phase of the dam removal (Corps 2006b). Moreover, NMFS has defined some assumptions regarding the outcome of the final design and operation of this structure (Table 1); under these assumptions, the bypass has the potential to extend the operational range of the fish passage and therefore more fully realize the potential benefits of the removal of the Matilija Dam. Consequently, NMFS expects the bypass will be designed, constructed, and operated in a manner that will not stop or delay migration of adult or juvenile steelhead over the bypass (or those individual steelhead attempting to migrate through the Robles fish-passage facility), within the range of hydrologic events during which the structure is designed to operate (i.e., NMFS presumes the bypass will operate under a specified range of discharges, and therefore when the structure is not operated, the bypass will represent an obstruction in the species freshwater migration).

Downstream Flood Control Projects

The levees and floodwall do not provide the ecological role of floodplains for maintaining the productivity and diversity of riverine communities; raising the levees will increase the likelihood that these structures will be preserved into the future. Evidence provided in the ecological literature indicates that floodplains can impart an elevated level of biotic diversity, fish and invertebrate production, and habitat area and diversity. Precluding the Ventura River from entering the available historical floodplain during the wet season is expected to be unfavorable for the aquatic environment in general and the local population of steelhead in particular. However, NMFS does not possess the specific information needed to reliably predict how the levees and floodwall would in fact affect steelhead at the individual and population level. Activities to construct or raise levees and floodwalls will take place in or near upland and floodplain areas, where riparian plant species, and flowing water, are not expected. Therefore, construction activities are not expected to affect steelhead.

Designs for the proposed bridges are incomplete at this time; only a general evaluation of the effects on steelhead can be performed. Construction activities, such as dewatering, excavation, slope and channel alterations, are expected to create conditions that affect adult and juvenile steelhead. Should dewatering of workspaces be needed, this would be expected to displace juvenile steelhead, presuming individuals are present in the workspace at the time of the dewatering. Currently, the Camino Cielo Bridge lies in an area where surface flow is perennial and therefore appears to represent the only case where dewatering may be necessary. Since the area of water diversion in the vicinity of the bridge is likely not more that 100-200 feet, the numbers of steelhead that are expected to be captured during the removal and reconstruction of this bridge are likely less than 100, based on NMFS' knowledge of steelhead abundance in the action area. With regard to excavation, bank-slope protection, and access routes, these activities are likely to expose soils, thereby increasing the potential for sediment input into flowing water. Best management practices will be implemented as part of the construction activities, which is expected to reduce the likelihood that exposed soils will create instream conditions that adversely affect steelhead. The bank stabilization (through use of rock riprap) may result in the permanent loss of riparian habitat, but the amount and extent of the loss, should one occur, is unknown at this time. Replacement of the Camino Cielo Bridge is expected to favor migration of adult steelhead because the culverts under the existing bridge represents an obstruction within the migratory corridor for adult steelhead (Corps 2004a). Overall, the effects of the flood-control improvements on adult and juvenile steelhead are expected to be largely discountable and non-lethal, presuming best management practices are effective and the MAMP and the Corps' program for addressing the uncertainties NMFS has identified can resolve effects on steelhead (Figures 29, 30, 33 and 34 in Appendix A).

Giant reed Removal Plan

Based on NMFS current understanding of the proposed plan to remove non-native plant species, and anticipated effects on critical habitat (as described previously), effects to steelhead are expected to be confined to juveniles and discountable (Figures 5-8, 11, 23-25, and 35-40 in Appendix A).

## VI. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act. Based on NMFS' review of the supporting documents (i.e., the draft EIS), there does not appear to be at this time any actions or activities that would be reasonably certain to occur that would not require section 7 consultation.

## VII. INTEGRATION AND SYNTHESIS OF EFFECTS

This section combines the effects of past and present activities (*i.e.*, environmental baseline) that are projected to extend into the future with effects of the proposed action and cumulative effects (*i.e.*, those future actions that are reasonably certain to occur). The purpose of this assessment is

to develop an understanding of how the combined effects might affect steelhead and critical habitat for this species. The methodology for this assessment involved identifying potential environmental effects associated with reasonably certain actions, integrating potential effects of these actions with the environmental baseline and expected effects of the proposed action, and qualitatively evaluating the combined effects of future actions, past and present activities, and the proposed action on steelhead and critical habitat.

The larger river systems are believed to have been the historical foundation for the Southern California steelhead DPS. The Ventura River watershed is one such system because the drainage is one of the largest steelhead-bearing watersheds within the Southern California DPS. However, the abundance of steelhead in the Ventura River, like other drainages throughout the DPS, has been dramatically reduced due to a variety of anthropogenic alterations to the watershed and waterways. Presently, the number of steelhead in the Ventura River watershed is extremely small. Likewise, the number of steelhead comprising the DPS is small, less than 1% of the estimate historical run size. Because the viability of small populations is especially tenuous, and such populations are susceptible to prompt decreases in abundance and possess a greater risk of extinction relative to large populations (Pimm *et al.* 1988, Berger 1990, Primack 2004), activities that reduce the quality and quantity of habitats, or that preclude formation of "new" populations, are expected to compel the population toward extinction as individual populations become extinct (McElhany *et al.* 2000). The Ventura River is one of the core populations that NMFS has identified as essential for the recovery of the endangered southern California steelhead. This river is one of the few populations within the Southern California DPS that have historically produced the largest run sizes in the study area, and have a high priority for protection (Boughton *et al.* 2006). Consequently, activities harming steelhead or destroying habitat, including critical habitat, with this population has implications for the recovery and ultimately delisting of the DPS under the ESA.

## A. Summary of Effects of Past and Present Activities

Evidence indicates past and present activities have reduced the quality and quantity of spawning, migration, and rearing habitat for the Southern California DPS within action area (and Ventura River watershed). Anthropogenic activities, including urbanization, are believed to have contributed to declines in steelhead abundance within the action area and the watershed. The Ventura River watershed is a highly altered, manipulated, and managed ecosystem, and in its present state is considerably different from its historical natural condition. Water is removed annually via surface diversions and groundwater pumping, which has reduced the quantity and quality of freshwater rearing, spawning and migration sites in the action. The existing wells and surface diversions (including the subsurface water diversion) in the Foster Park area can substantially reduce, if not eliminate, surface flows within the action area. Because existing dams (e.g., Casitas, Matilija) block steelhead from accessing historical spawning and rearing habitat upstream of the dams, abundance of this species in the upstream areas is expected to have decreased. Effects of past and present activities are expected to extend into the future. As a result, the Ventura river population of steelhead is expected to continue to experience a risk of extinction in the foreseeable future.

## B. Summary of Effects of the Proposed Action

The removal of Matilija Dam is expected to restore habitat connectivity, restore steelhead access to about 10 miles of spawning and rearing areas within Matilija Creek, and increase the amount and extent of freshwater spawning and rearing sites available to steelhead, though the actual amount is controlled largely by the Robles Diversion Dam (i.e., the effectiveness of the fish-passage facility) and whether steelhead can pass the high-flow sediment bypass. These consequences of the dam removal are expected to favor conservation of the local population of endangered steelhead and the DPS of endangered steelhead. Release of sand and smaller particles, due to a variety of features related to the proposed action, is expected to diminish the functional value of freshwater rearing and spawning sites for endangered steelhead over extensive areas of the action area. Instream habitats are likely to be altered and some areas necessary for steelhead ontogeny and survival may be lost. Sediment-related effects are not expected to persist indefinitely (beyond 20 years), however. Input of coarse sediments (such as gravel, cobble and boulder) may favor essential features of steelhead critical habitat, e.g., in the formation of extensive instream accumulations of gravel for spawning or a buildup of boulders and cobble, which juveniles can use as shelter, and as a colonization substrate for macroinvertebrates, which serve as food for rearing steelhead. The expected benefits that the local population of steelhead (and Southern California DPS) is expected to incur from removal of the dam are expected to offset the transient adverse effects of the proposed action.

## C. Combined effects

With regard to effects on critical habitat, the aggregate continuing effects of past and present activities and the effects due to the proposed action are expected to have mixed influences on the quality and quantity of critical habitat for endangered steelhead. On one hand, the aggregate effects seem likely to reduce the amount and extent of essential features of critical habitat in certain areas within the action area, particularly while the former reservoir area is contributing fine and coarse sediments at unnatural accelerated rates (i.e., widespread loss and alteration of instream and estuarine habitat throughout the action area). NMFS assumes that the MAMP in combination with the Corps' program for addressing the uncertainties NMFS has identified, will contribute to reducing the amount, extent, and duration of effects. On the other hand, an increase in accessibility to spawning and rearing areas (about 10 miles) is expected due to removal of the dam. Given that the effects of urbanization are expected to extend into the future, it is possible that areas of the Ventura River watershed that are susceptible to the effects of urbanization will experience a decline in the functional value of steelhead critical habitat. The increased access to historical spawning and rearing habitat, which lies upstream of the principal urban area, may therefore serve to compensate, to some degree, the future effects of urbanization on downstream steelhead habitat, though the unique role of the estuary cannot be similarly compensated by opening stream habitats.

With regard to effects on steelhead, based on the perceived aggregate effects of past and present activities and the effects due to the proposed action on critical habitat, the local steelhead population may show increased reliance on habitats upstream of urban influences. Such habitats include those that are expected to be made accessible to steelhead following dam removal. While re-establishing steelhead access to historical spawning and rearing habitats (and the anticipated benefits to endangered steelhead) is expected to favor the viability of the Southern

California steelhead DPS, the dam removal is not projected to fully ameliorate the continuing effects of past and present activities on this species.

## VIII. CONCLUSION

After reviewing the best available scientific and commercial information, the recent status of the Southern California steelhead DPS, the environmental baseline, expected effects of the proposed action, cumulative effects, and the combined effects of past and present activities, the proposed action, and actions that are reasonably certain to occur, NMFS concludes the proposed action is not likely to jeopardize the continued existence of the Federally endangered Southern California steelhead DPS, and is not likely to destroy or adversely modify critical habitat for this species.

## IX. INCIDENTAL TAKE STATEMENT

Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not the purpose of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be undertaken by the Corps for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of this incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to NMFS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

### A. Amount or Extent of Take

NMFS believes the proposed action that will occur in Matilija Creek and the Ventura River, Ventura County, California, may result in the incidental take of steelhead. Incidental take would be in the form of harassment, harm, or mortality, and the principal sources of take involve (1) the relocation effort to remove juvenile steelhead from workspaces that are dewatered, and (2) the release of sediments from the reservoir area on adult and juvenile steelhead. With regard to #1 above, NMFS anticipates that no more than 350 juvenile steelhead will be captured and then relocated, based on NMFS' experience in the Ventura River watershed as well as recent information regarding the number of juvenile steelhead in the action area. Of these, no more than 5% will be killed. With regard to the release of sediments (#2 above), NMFS expects that the river channel and instream habitats throughout the action area downstream of the dam to the estuary (a distance of about 15 miles), will experience the magnitude of deposition identified in

Table 2 (also presented below) (the estuary is expected to experience no more than 1 foot of sediment deposition, as considered in pages 22-23 of this biological opinion).

**Table 2. Two possible scenarios in average reach-specific aggradation of the channel bed during the 20-year project life: one scenario based on a drier climate, and the second based on a severe flood event. Reach number increases in proximity to the dam, with reach 6b being closest to the dam. Values in the table represent the predicted average deposition (feet) of sediment, and are obtained from modeling.**

| Location | Dry climate 10-year | Flood event 50-year |
|---|---|---|
| Reach 2 | 1.2 | 3.6 |
| Reach 3 | 2.0 | 4.2 |
| Reach 4 | 0.8 | 2.3 |
| Reach 5 | 1.4 | 2.2 |
| Reach 6a | 2.3 | 6.4 |
| Reach 6b | 1.0 | 0.9 |

No other incidental take of steelhead (or its habitat) is anticipated as a result of the proposed action, and at this time NMFS does not have information indicating the new wells will cause take of steelhead. The accompanying biological opinion does not anticipate any form of take that is not incidental to the proposed action.

## B. Effect of Take

In the Biological Opinion, NMFS concluded that the anticipated level of take associated with the proposed action is not likely to jeopardize the continued existence of the federally endangered Southern California steelhead DPS.

## C. Reasonable and Prudent Measures

NMFS believes Reasonable and Prudent Measures are necessary and appropriate to minimize and monitor incidental take of steelhead. The results of the effects analysis provide the basis for the following Reasonable and Prudent Measures:

1. Avoid working in flowing water within the action area.
2. Minimize the amount and extent of temporary and permanent changes to the quality and quantity of instream, riparian, and estuarine habitat within the action area.
3. Employ a fisheries biologist(s) for the purposes of monitoring the affected area, and for removing and relocating steelhead from the affected area within the action area.
4. Implement effective sediment and turbidity control measures within the action area.
5. Minimize the amount and extent of sediment-related effects on the type, amount, extent, and quality of instream and estuarine habitat within the action area.
6. Minimize the type and amount of adverse effects associated with operating the high-flow sediment bypass on migration of steelhead at the bypass.
7. Minimize the amount and extent of changes in discharge, and alterations in the quality and quantity of instream habitat, due to operation of the new Foster Park wells within the action area.
8. Minimize the effects of specifically identified project-related uncertainties on steelhead

and the quality and quantity of habitat for this species within the action area.

9. Monitor and assess steelhead migration, abundance, distribution, and habitat use within the action area.

10. Provide written reports to NMFS describing the activities associated with minimizing and monitoring project action effects within the action area.

## X. TERMS AND CONDITIONS

In order to be exempt from take prohibitions of section 9 of the ESA, the Corps and its contractors, associates, and partners in the proposed action is responsible for ensuring compliance with the following Terms and Conditions, which implement the Reasonable and Prudent Measures described above and outline required reporting/monitoring conditions. These Terms and Conditions are non-discretionary:

1. The following terms and conditions implement reasonable and prudent measure #1.

   A. The Corps, or their authorized designee, shall isolate the workspace from flowing water when such isolation is necessary for avoiding heavy equipment or other activities in flowing water, sedimentation, turbidity and direct effects to steelhead or their critical habitat. Prior to construction activities, sandbags, cofferdams, straw bales, visqueen, or culvert (hereafter referred to as *diversion*) shall be installed to divert streamflow around the workspace (i.e., isolate the workspace from flowing water). The diversion shall remain in place during the project, then removed immediately after work is completed.

   B. Wherever feasible, the Corps, or their authorized designee, shall use existing ingress or egress points, or perform work from the top of the creek banks, for the purposes of avoiding work and heavy equipment or other activities in flowing water, and disturbing creekbank, vegetation and instream habitat.

   C. The Corps, or their authorized designee, shall ensure and certify that the selected contractor(s) and monitoring biologist(s) have read and understand each term and condition of this biological opinion prior to implementation of the proposed action.

2. The following terms and conditions implement reasonable and prudent measure #2.

   A. The Corps, or their authorized designee, shall photograph the action area during and immediately before and after construction activities are completed for developing a reference library of instream and riparian habitat characteristics.

   B. Channel excavation for isolating the workspace from flowing water is prohibited.

   C. The Corps, or their authorized designee, shall minimize disturbance to existing native instream, riparian and upland vegetation. Native vegetation affected by the proposed action shall be replaced and a revegetation success ratio (in terms of area) of no less than 2:1 (for streamside vegetation and riparian species) or 1:1 (upland areas) shall be ensured for a minimum of 5 years following completion of the proposed action.

D. The Corps, or their authorized designee, shall revegetate soil exposed as a result of construction related activities using seed casting, hydroseeding, or live planting methods, ~~no~~ later than the first November following the completion of the proposed action. Only native plant species shall be used for revegetation.

E. The Corps, or their authorized designee, may collaborate with NMFS as necessary for the purpose of identifying an area(s) and conditions where natural revegetation of disturbed areas can proceed in the absence of full or partial vegetative plantings. The Corps shall obtain written NMFS agreement for each subject area no later than 30 days following completion of the activities that caused the vegetation disturbance (including vegetation loss or alteration) for the subject area.

F. The Corps, or their authorized designee, shall inspect revegetated area(s) one year after the subject area was revegetated (or planted or seeded), and every year thereafter for a period of no more than four years (total of five years of monitoring). The first year of monitoring shall commence in fall (November). The purpose of the monitoring is to qualitatively assess growth of the plantings or seedlings and the presence of exposed soil. The presence of native and non-native vegetation and extent (percent area) of exposed soil shall be noted, and the subject area shall be photographed during each inspection.

G. Woody debris or large native rock removed from the channel shall be retained and later returned to the creek in functional form immediately following completion of the dam removal.

H. All equipment shall be refueled in upland areas and in accordance with a spill and pollution-control plan.

3. The following terms and conditions implement reasonable and prudent measure #3.

A. The Corps, or their authorized designee, shall retain a fishery biologist(s) with expertise in the areas of resident or anadromous salmonid biology and ecology; fish/habitat relationships; biological monitoring; and, handling, collecting, and relocating salmonid species. The biologist(s) will monitor installation and removal of the diversion, the workspace, and construction activities (monitoring biologist).

B. The monitoring biologist(s) shall continuously monitor placement and removal of the diversion for removing any steelhead. The biologist(s) shall capture steelhead stranded in residual wetted areas as a result of streamflow diversion and workspace dewatering, and relocate steelhead to a suitable instream location outside of the workspace. The biologist(s) shall note the number of steelhead, condition, and size of steelhead observed in the affected area, the number of steelhead relocated, and the date and time of the collection and relocation. Photo-documentation of any captured or relocated steelhead shall be filed as part of written reports of such monitoring, capture and relocation activities to be submitted to NMFS on an annual basis (or as defined in term and condition 10B). One or more of the following methods shall be used to capture steelhead: dip net, seine, throw net, minnow trap, hand. Electrofishing is prohibited. Once the diversion is in place, the biologist shall monitor periodically, based on a

monitoring schedule and protocol that is mutually agreeable to the Corps and NMFS. The Corps shall obtain written NMFS agreement for this schedule and protocol prior to undertaking activities that are necessary to begin isolating the workspace(s) from flowing water.

C. The monitoring biologist(s) shall periodically monitor (based on a schedule and protocol that is mutually agreeable to the Corps and NMFS) construction activities, instream habitat, and performance of sediment control/detention devices (see Term and Condition No. 4A) for the purpose of identifying and reconciling any condition that could adversely affect steelhead or their habitat. The biologist shall be empowered to halt work activity and to recommend measures for avoiding adverse effects to steelhead and their habitat. The Corps shall obtain written NMFS agreement for this schedule and protocol prior to undertaking activities that are necessary to begin removing Matilija Dam.

D. The monitoring biologist(s) shall contact NMFS (Anthony Spina, 562-980-4045) immediately if one or more steelhead are found dead or injured. The purposes of the contact shall be to review the activities resulting in take, to determine if additional protective measures are required, and to discuss handling procedures for injured or dead steelhead.

4. The following terms and conditions implement reasonable and prudent measure #4.

A. Erosion control and (or) sediment-detention devices (e.g., straw bales, silt fencing) shall be installed outside flowing water and at the time of construction within the action area. These devices shall be in place during construction activities, and after if necessary, for minimizing fine sediment and sediment-water slurry input to flowing water. The devices shall be placed at all locations where the likelihood of sediment input exists.

B. Placement of any soil-sediment berm in direct contact with flowing water for the purpose of isolating any workspace from flowing water is prohibited within the action area.

C. When dewatering any area, methods shall be employed to collect then return clear water to the creek or river for avoiding input of sediment-water slurry to flowing water within the action area.

5. The following Terms and Conditions implement Reasonable and Prudent Measure #5.

A. The Corps, or their authorized designee, shall develop and then implement a mutually agreeable (to NMFS and the Corps) written study plan to detect sediment-related effects within instream and estuarine habitats within the action area and remedy the identified effects (note that this plan may be included in the MAMP). This will require the collection of baseline (pre-dam removal) data both upstream and downstream of the reservoir (behind Matilija Dam). The plan shall include (1) a description of the study objectives, (2) a description of the field methods and equipment that will be used to quantify sediment-related effects, (3) proposed locations to monitor channel-bed characteristics, or a suggested protocol that would allow for the random selection of monitoring locations, (4) a clearly defined schedule to guide implementation and field sampling (monitoring)

activities over time and space, (5) a description of the types of actions that will be taken to resolve a particular sediment-related effect, (6) a schedule for resolving effects, whereby the effects shall be remedied within a reasonable period of time, but in no case later than 30 days after the subject effect was detected, and (7) reporting requirements. This plan shall be prepared in collaboration with a qualified quantitative steelhead biologist with prior experience performing studies of steelhead (abundance, distribution, habitat use) within the action area. The Corps shall obtain written NMFS agreement for this plan prior to undertaking activities that are necessary to begin removing Matilija Dam.

6. The following Terms and Conditions implement Reasonable and Prudent Measure #6.

   A. With regard to the Corps' proposal to collaborate with NMFS on the design of the high-flow sediment bypass, this collaboration shall involve working with NMFS for the purpose of designing and then constructing a fish-passage facility or fish-passage capability that will be physically integrated with the high-flow sediment bypass. The fish-passage facility shall be designed, constructed, and operated such that the operation of the bypass shall not interfere with the migration of any adult or juvenile steelhead attempting to migrate over, through, or around the bypass. The Corps shall provide to NMFS engineered design drawings (at 30 %, 60 %, and 90 % completion) of the fish-passage facility and high-flow sediment bypass for review and potential approval. The guidance NMFS provides to the Corps shall be used to make mutually agreeable revisions to the design drawings. The Corps shall obtain written NMFS agreement for the final engineered design drawings for the fish-passage facility and the high-flow sediment bypass prior to undertaking activities that are necessary to begin removing Matilija Dam.

   B. The Corps, or their authorized designee, shall prepare and then implement a mutually agreeable (to NMFS and the Corps) written plan to validate post-construction performance of the high-flow sediment bypass and fish-passage facility, as described in term and condition 6A (note that this plan may be included in the MAMP). The plan shall adopt a specific protocol for validating post-construction performance, and shall include measurement of water depth and velocity within the fish-passage facility over a range of river discharge representing those magnitudes experienced by migrating adult and juvenile steelhead (or measurement of other variables determined by NMFS). The measured values of depth and velocity (or other variables) shall be compared with the migration requirements of adult and juvenile steelhead, and the results of the hydraulic design analyses (i.e., predicted depths and velocities) for the as-built condition. A summary report describing the results of the validation task shall be prepared and then submitted to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California, 90802) no later than 30 days following completion of the validation task. The Corps shall obtain written NMFS agreement for the plan to validate post-construction performance of the high-flow sediment bypass and fish-passage facility or fish-passage capability prior to constructing the high-flow sediment bypass and fish-passage facility.

C. The Corps, or their authorized designee, shall prepare and then implement a mutually agreeable (to NMFS and the Corps) written plan to maintain the high-flow sediment bypass and the fish-passage facility or fish-passage capability, as described in term and condition 6A. The maintenance plan shall ensure long-term maintenance of the fish-passage facility or fish-passage capability and include a clearly defined schedule requiring timely inspection and removal of debris (both sediment and wood). Although an inspection of the subject structure is warranted during wet and dry seasons, greater visit frequency shall be allocated to the wet season (e.g., immediately after rainfall events). To guide field personnel, the plan shall clearly define the type and magnitude of debris requiring removal and the physical methods of removal. The fish-passage facility or fish-passage capability shall be inspected at least once annually for the life of the structure. The inspection shall include visual evaluation of the structure, along with measurements of water depth and velocity, performed similar to those conducted for validation. The Corps shall submit an annual summary report describing the results of the maintenance task to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California, 90802) no later than 30 days following completion of the subject year's maintenance evaluation. The Corps shall obtain written NMFS agreement for this maintenance plan prior to constructing the high-flow sediment bypass.

7. The following Terms and Conditions implement Reasonable and Prudent Measure #7.

A. The Corps, or their authorized designee, shall prepare and then implement a mutually agreeable (to NMFS and the Corps) written plan describing how the new wells at Foster Park will be operated (note that this plan may be included in the MAMP). The plan shall include (1) a description of the operating criteria for the wells, (2) a schedule directing the operation of the wells, (3) the proposed protocol for minimizing reductions in the amount and extent of surface flow due to operation of the wells, (4) the proposed protocol for minimizing effects due to operation of the wells on endangered steelhead and the amount and extent of habitat for this species, (5) a description of the methods that will be used to evaluate whether the actual operation of the wells comports with the operating criteria (#1 above), the schedule (#2), and the protocols for minimizing effects on surface flow and steelhead (#3 and #4), (6) a description of the methods that will be used to assess the effectiveness of the minimization measures (#3 and #4 above), and (7) reporting requirements. This plan shall be prepared in collaboration with a qualified steelhead biologist who has prior experience performing field studies of steelhead (abundance, habitat use, distribution) within the Ventura River watershed. The Corps shall submit this plan to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California, 90802) for review. The Corps shall obtain written NMFS agreement for this plan prior to initiating operation of the subject wells.

B. The Corps, or their authorized designee, shall prepare and then implement a written plan for the purpose of assessing effects of operating the new wells at Foster Park on steelhead and critical habitat for this species in the Ventura River for a period of no less than 12 years following completion of the proposed action.

The plan shall include (1) a proposed protocol to monitoring discharge, (2) a description of the field methods that will be used to quantify steelhead abundance in the Ventura River upstream, adjacent to, and downstream of the new Foster Park wells over time, (3) a description of the field methods that will be used to quantify instream habitat characteristics in the Ventura River upstream, adjacent to, and downstream of the new Foster Park wells over time, (4) a clear description of the methods that will be used to assess effects of operation of the wells on steelhead and critical habitat for this species, (5) identification of the response variables, inferential models, and sample size requirements, (6) a schedule for the field studies, and (7) reporting requirements. This plan shall be prepared by a qualified quantitative steelhead biologist who has prior experience performing field studies of steelhead (abundance, habitat use, distribution), preferably within the Ventura River watershed. The Corps shall submit this plan to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California, 90802) for review. The Corps shall obtain written NMFS agreement for this plan prior to initiating operation of the subject wells.

8. The following Terms and Conditions implement Reasonable and Prudent Measure #8.

   A. With regard to the Corps' program to address uncertainties, the Corps, or their authorized designee, shall prepare and then implement a mutually agreeable (to NMFS and the Corps) written plan to address steelhead related uncertainties (note that this plan may be included in the MAMP). This plan shall be submitted to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California, 90802) for review and comment on the adequacy of the plan. The Corps shall obtain written NMFS agreement for this plan prior to undertaking activities that are necessary to begin removing Matilija Dam.

9. The following Terms and Conditions implement Reasonable and Prudent Measure #9.

   A. The Corps, or their authorized designee, shall prepare and then implement a mutually agreeable (to NMFS and the Corps) written plan to quantify adult and juvenile steelhead abundance, distribution, and use of the habitats within creek reaches (both the north fork and south fork of Matilija Creek) upstream of the former location of Matilija Dam for a period of no less than 8 years (two years dedicated to collection of pre-dam removal data) for the purpose of assessing the benefits the dam-removal project on this species (note that this plan may be included in the MAMP). This plan shall be prepared by a qualified quantitative steelhead biologist who has prior experience performing field studies of steelhead (abundance, distribution, habitat use), preferably in the Ventura River watershed. The selected biologist will consult with NMFS prior to preparing the plan for the purpose of identifying the study elements, objectives, work tasks for inclusion into the plan, and reporting requirements. The Corps will submit this plan to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California, 90802) for review and comment. The selected biologist will make mutually agreeable revisions to the draft plan, based on NMFS' comments on the adequacy of the study plan, to produce the final study plan. The Corps shall obtain written NMFS agreement for this plan prior to undertaking activities that are necessary to begin removing Matilija Dam.

B. The Corps, or their authorized designee, shall prepare and then implement a written plan to quantify steelhead abundance and distribution within the Ventura River watershed for a period of no less than 8 years (two years dedicated to collection of pre-dam removal data) for the purpose of assessing benefits of the dam-removal project on this species. This plan shall be prepared by a qualified quantitative steelhead biologist who has prior experience performing field studies of steelhead (abundance, distribution, habitat use), preferably in the Ventura River watershed. The selected biologist will consult with NMFS prior to preparing the plan for the purpose of identifying the study elements, objectives, work tasks for inclusion into the plan, and reporting requirements. The Corps will submit this plan to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California, 90802) for review and comment. The selected biologist(s) will make mutually agreeable revisions to the draft plan, based on NMFS' comments on the adequacy of the study plan, to produce the final study plan. The Corps shall obtain written NMFS agreement for this plan prior to undertaking activities that are necessary to begin removing Matilija Dam.

10. The following Terms and Conditions implement Reasonable and Prudent Measure #10.

A. The Corps, or their authorized designee, shall provide written evidence to NMFS demonstrating compliance with Term and Conditions 1C.

B. The Corps, or their authorized designee, shall provide a written monitoring report to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802) within 15-working days following completion of any activity that requires the dewatering of a workspace (e.g., bridge replacements, levee improvements, removal of dam debris from the base of the dam or channel restoration). The report shall include the number of steelhead killed or injured during the proposed action and biological monitoring; the number and size of steelhead removed and relocated; any effect of the proposed action on steelhead that was not previously considered (reinitiation of consultation would be required, see section XI (2) of the Biological Opinion); and, photographs taken during, before and after work activity.

C. The Corps, or their authorized designee, shall provide a written report describing results of any project-related revegetation task to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802) within 15-working days following completion of any revegetation effort (e.g., those related to bridge replacements, restoration of the creek channel, bank stabilization). The report shall include a description of the locations planted or seeded, the area ($ft^2$) revegetated, a plant palette, planting or seeding methods, proposed methods to monitor and maintain the revegetated area, performance or success criteria, and pre- and post-planting color photographs of the revegetated area.

D. The Corps, or their authorized designee, shall provide a written report describing the results of vegetation monitoring to NMFS (501 W. Ocean Blvd., Suite 4200, Long Beach, California 90802) within 15-working days following completion of any vegetation monitoring inspection conducted during fall as required for a particular activity related to the proposed action. The report shall include color photographs taken of the project area during each inspection and before and after implementation of the project, and estimated percent of exposed soil remaining within each area affected by the project.

E. The Corps, or their authorized designee, shall document and notify NMFS of any dispute or problem encountered with achieving compliance with any of the Reasonable and Prudent Measures and Terms and Conditions in this biological opinion. Such notification shall be made to NMFS within a reasonable period of time, but in no case later than ten days after the Corps' discovery of any such problem or dispute.

## XI. REINITIATION OF CONSULTATION

This concludes formal Section 7 consultation on the actions outlined in the project proposal. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in this opinion, (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.. In instances where the amount or extent of incidental take is exceeded, formal consultation shall be reinitiated immediately. As project designs and plans develop, or if key assumptions are found to be invalid, NMFS and the Corps may need to re-initiate section 7 consultation to incorporate new information and re-assess project effects.

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# Appendix A
# Photographic Reference Library`

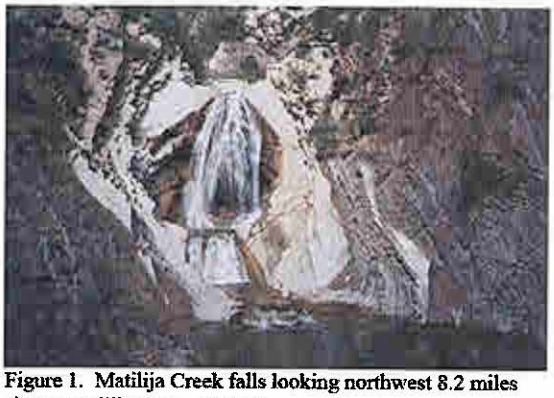


Figure 1. Matilija Creek falls looking northwest 8.2 miles above Matilija Dam. 4-10-03

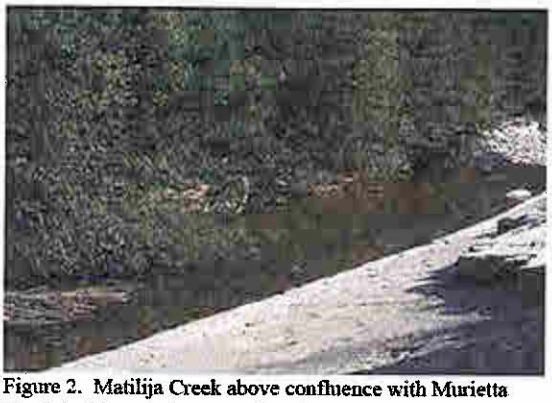


Figure 2. Matilija Creek above confluence with Murietta Creek looking southeast 6 miles above Matilija Dam. 4-15-95

Figure 3. Matilija Creek looking west 2 miles above Matilija Dam. 2-23-07

Figure 4. Matilija Creek looking southwest 1.5 miles above Matilija Dam. 2-23-07

Figure 5. *Arundo donax* stands in Matilija Creek looking southwest 1.0 miles above Matilija Dam. 2-23-07

Figure 6. Matilija Creek looking southwest 0.5 mile above Matilija Dam. 2-23-07

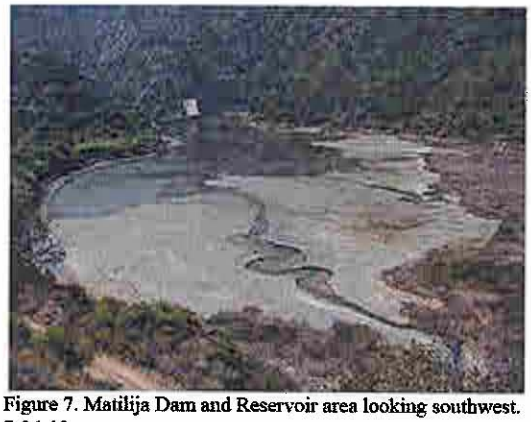


Figure 7. Matilija Dam and Reservoir area looking southwest. 7-26-03

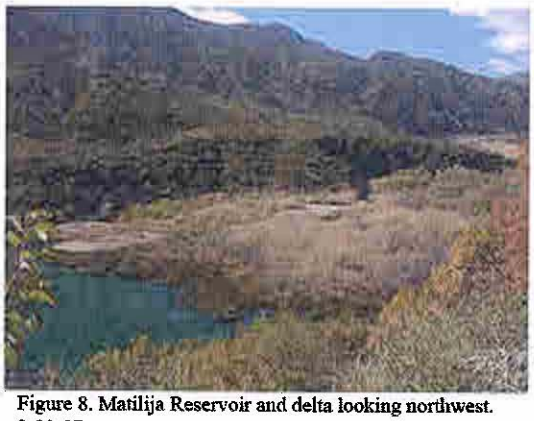


Figure 8. Matilija Reservoir and delta looking northwest. 2-23-07

Figure 9. Aerial view of Matilija Dam and Reservoir. 9-7-01

Figure 10. Matilija Dam. 2-08-07

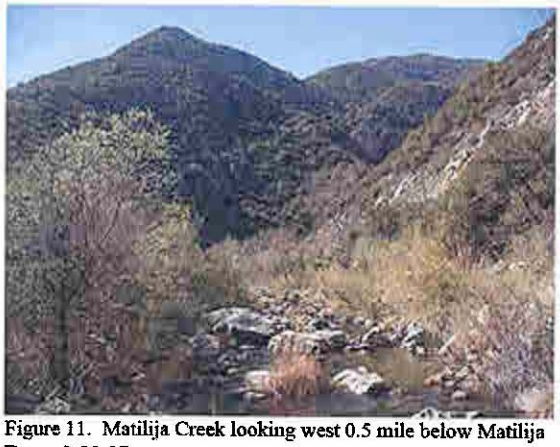


Figure 11. Matilija Creek looking west 0.5 mile below Matilija Dam. 2-23-07

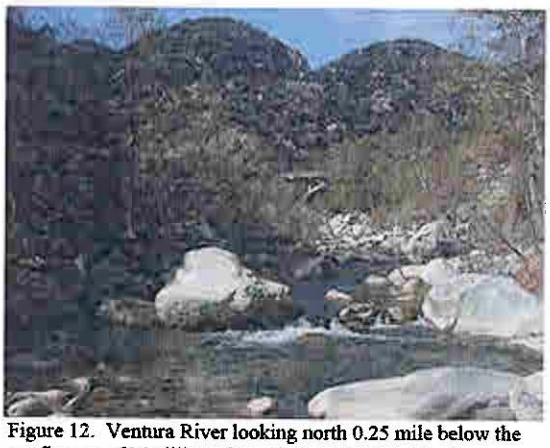


Figure 12. Ventura River looking north 0.25 mile below the confluence of Matilija and North Fork Matilija Creeks. 2-23-07

Figure 13. North Fork Matilija Creek looking southwest 0.5 mile above confluence with Matilija Creek. 2-23-07

Figure 14. North Fork Matilija Creek looking northeast 0.5 above confluence with Matilija Creek. 2-23-07

Figure 15. Camino Cielo Crossing looking north 0.75 miles below Matilija Dam. 2-23-07

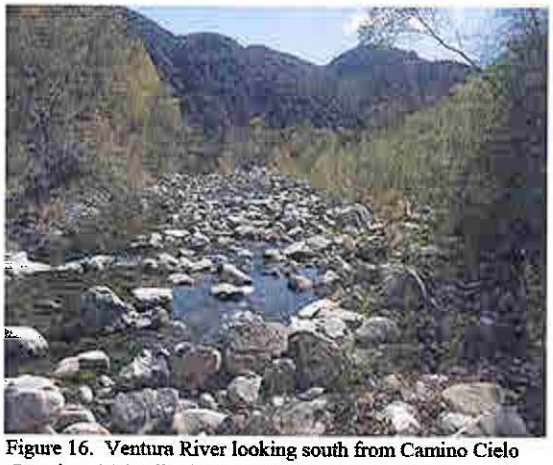


Figure 16. Ventura River looking south from Camino Cielo Crossing 0.75 miles below Matilija Dam. 2-23-07

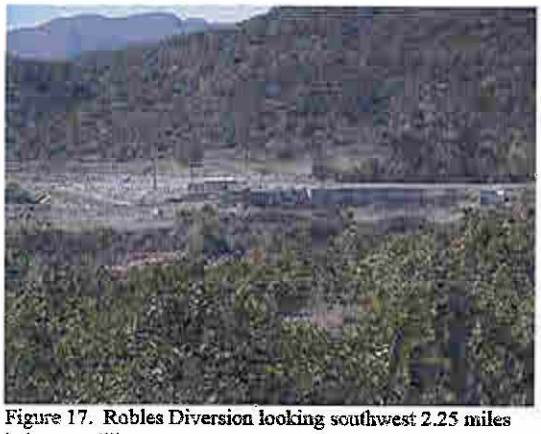


Figure 17. Robles Diversion looking southwest 2.25 miles below Matilija Dam. 2-23-07

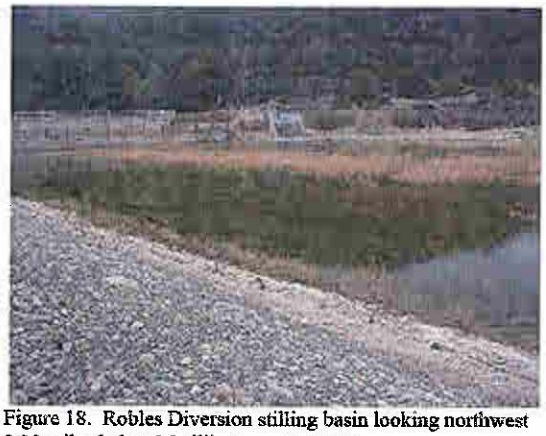


Figure 18. Robles Diversion stilling basin looking northwest 2.25 miles below Matilija Dam. 2-08-07

Figure 19. Robles Diversion (and east channel) looking north 2.25 miles below Matilija Dam. 2-08-07

Figure 20. Robles Diversion access road/wier (over east channel) looking west 650 feet below Robles Diversion. 2-08-07

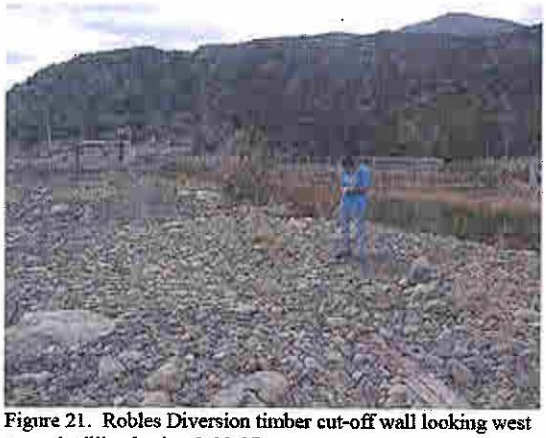


Figure 21. Robles Diversion timber cut-off wall looking west toward stilling basin. 2-08-07

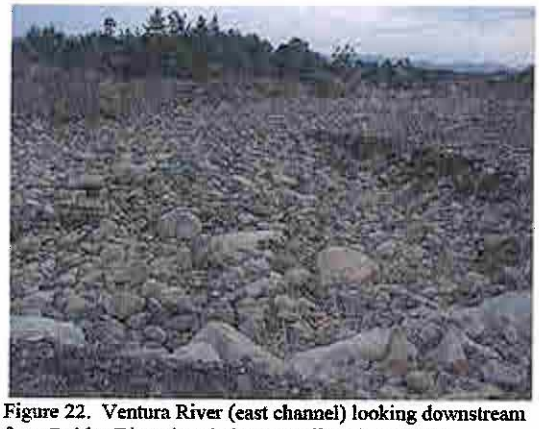


Figure 22. Ventura River (east channel) looking downstream from Robles Diversion timber cut-off wall. 2-08-07

Figure 23. Ventura River (west channel) looking north approximately 1000 feet below Robles Diversion (in left background). 2-08-07

Figure 24. Ventura River (confluence of west and east channel) looking north approximately 1000 feet below Robles Diversion (in left background). 2-08-07

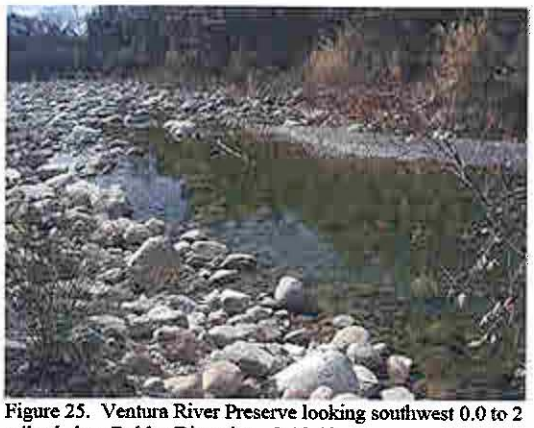
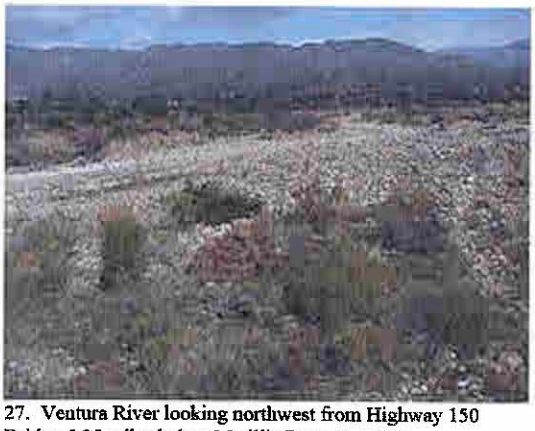


Figure 25. Ventura River Preserve looking southwest 0.0 to 2 miles below Robles Diversion. 2-08-07

Figure 26. Ventura River Preserve looking northwest 0.75 mile below Robles Diversion. 3-23-03



27. Ventura River looking northwest from Highway 150 Bridge 5.25 miles below Matilija Dam. 2-23-07

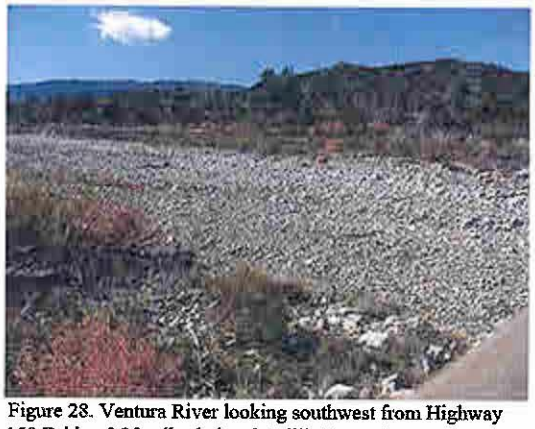


Figure 28. Ventura River looking southwest from Highway 150 Bridge 5.25 miles below Matilija Dam. 2-23-07

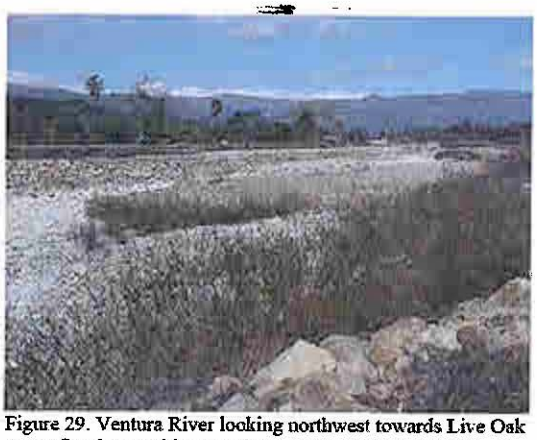


Figure 29. Ventura River looking northwest towards Live Oak Acres flood control levee at Sana Ana Blvd. Bridge 7.25 miles below Matilija Dam. 2-23.07

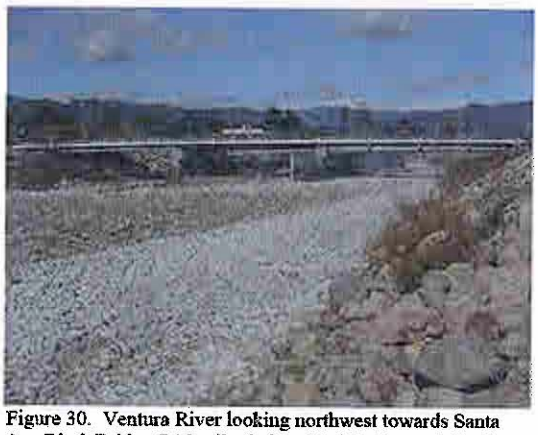


Figure 30. Ventura River looking northwest towards Santa Ana Blvd. Bridge 7.25 miles below Matilija Dam. 2-23-07

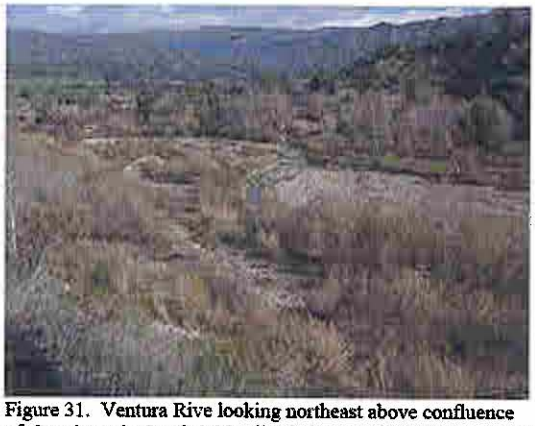


Figure 31. Ventura Rive looking northeast above confluence of San Antonio Creek 8.25 miles below Matilija Dam. 2-23-07

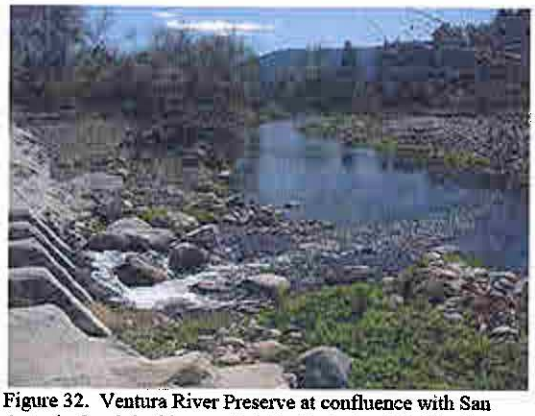


Figure 32. Ventura River Preserve at confluence with San Antonio Creek looking south 8.5 miles below Matilija Dam. 2-23-07

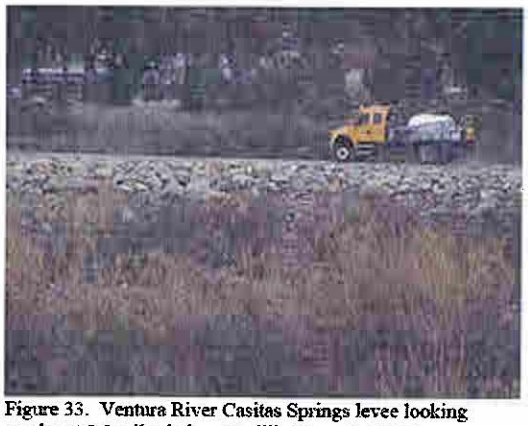


Figure 33. Ventura River Casitas Springs levee looking southeast 9.0 miles below Matilija Dam. 2-08-07

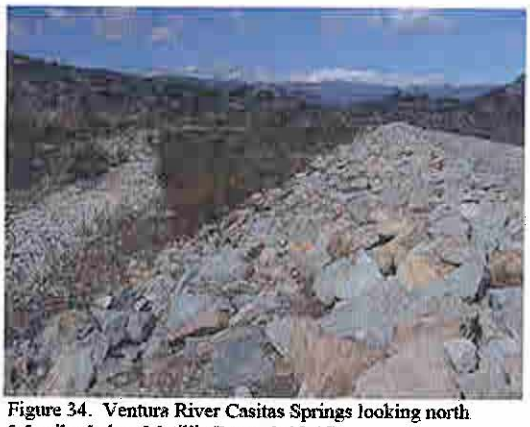


Figure 34. Ventura River Casitas Springs looking north 9.5 miles below Matilija Dam. 2-23-07

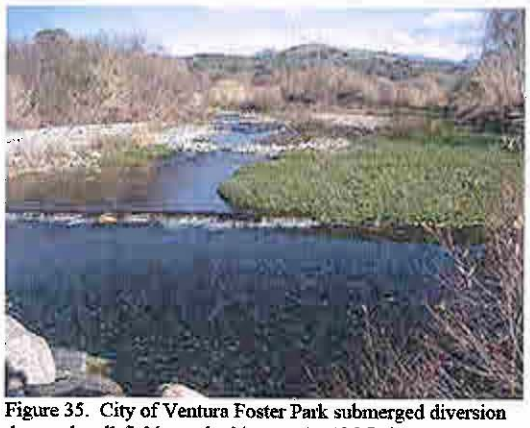


Figure 35. City of Ventura Foster Park submerged diversion dam and well-field area looking north 10025miles below Matilija Dam. 2-23-07

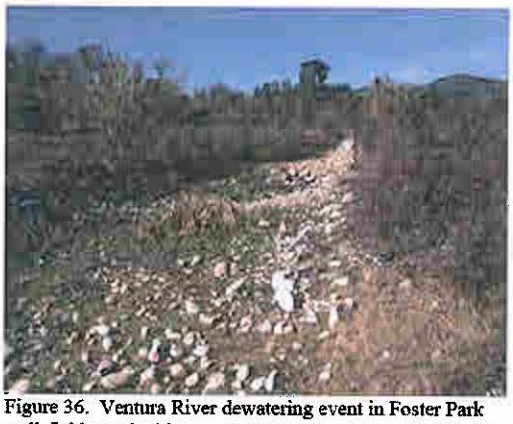


Figure 36. Ventura River dewatering event in Foster Park well-field area looking north 10.25 miles below Matilija Dam. 1-09-88

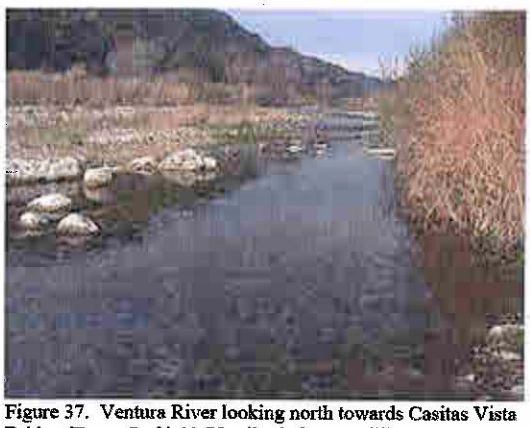


Figure 37. Ventura River looking north towards Casitas Vista Bridge (Foster Park) 10.75 miles below Matilija Dam. 2-08-07

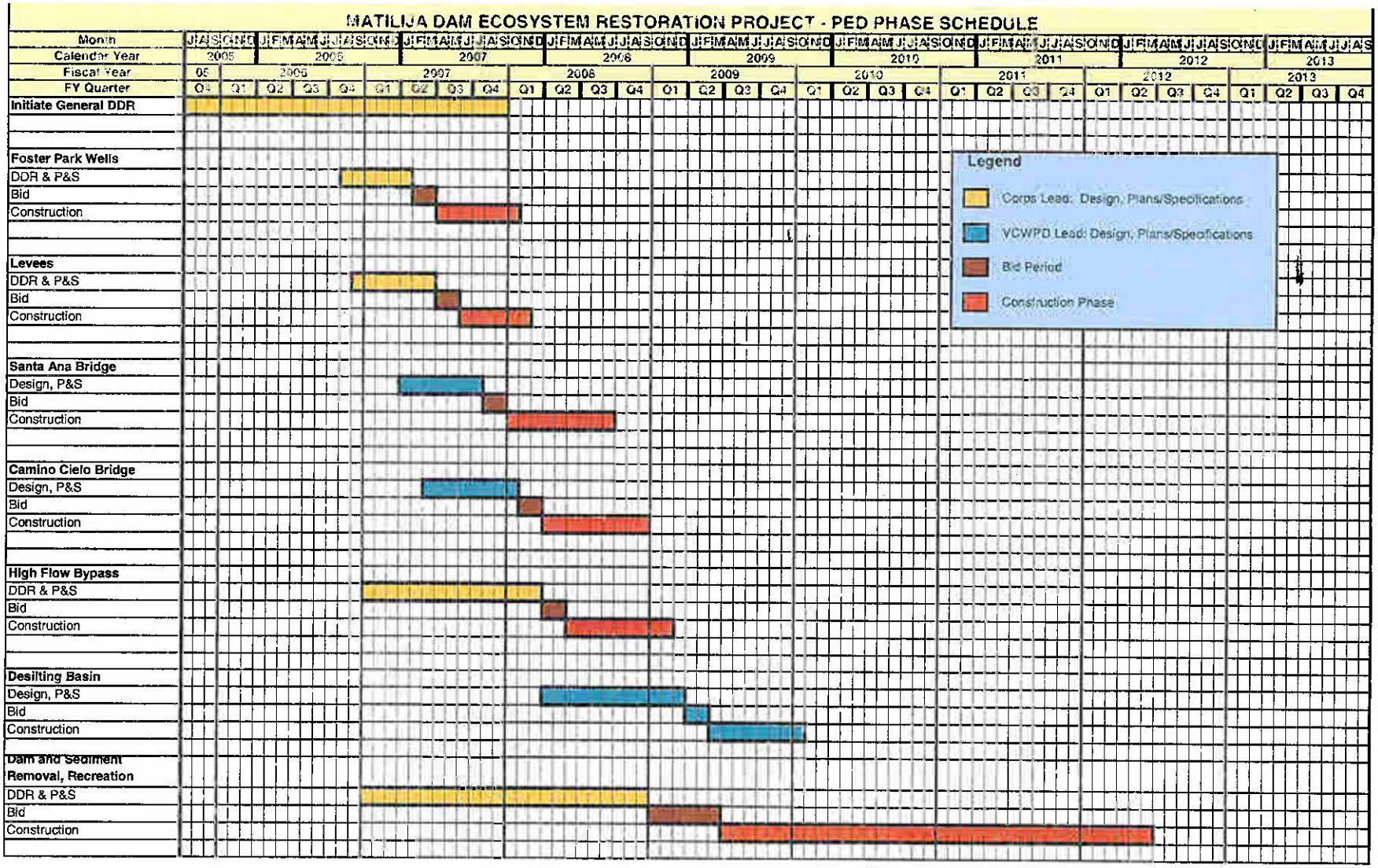
Figure 38. Ventura River looking northwest at Shell Hole 12.0 miles below Matilija Dam. 4-10-03

Figure 39. Ventura River looking north from Main Street Bridge 15.75 miles below Matilija Dam 2-23-07

Figure 40. Ventura River Estuary looking northeast from sand bar 6.25 miles below Matilija Dam. 2-23-07

# Appendix B

## Generalized Schedule for Elements of the Proposed Action


MATILIJA DAM ECOSYSTEM RESTORATION PROJECT - PED PHASE SCHEDULE
Month
Calendar Year
Fiscal Year
FY Quarter
Initiate General DDR
Foster Park Wells
DDR & P&S
Bid
Construction
Levees
DDR & P&S
Bid
Construction
Santa Ana Bridge
Design, P&S
Bid
Construction
Camino Cielo Bridge
Design, P&S
Bid
Construction
High Flow Bypass
DDR & P&S
Bid
Construction
Desilting Basin
Design, P&S
Bid
Construction
Dam and Sediment Removal, Recreation
DDR & P&S
Bid
Construction
Legend
Corps Lead: Design, Plans/Specifications
VCWPD Lead: Design, Plans/Specifications
Bid Period
Construction Phase

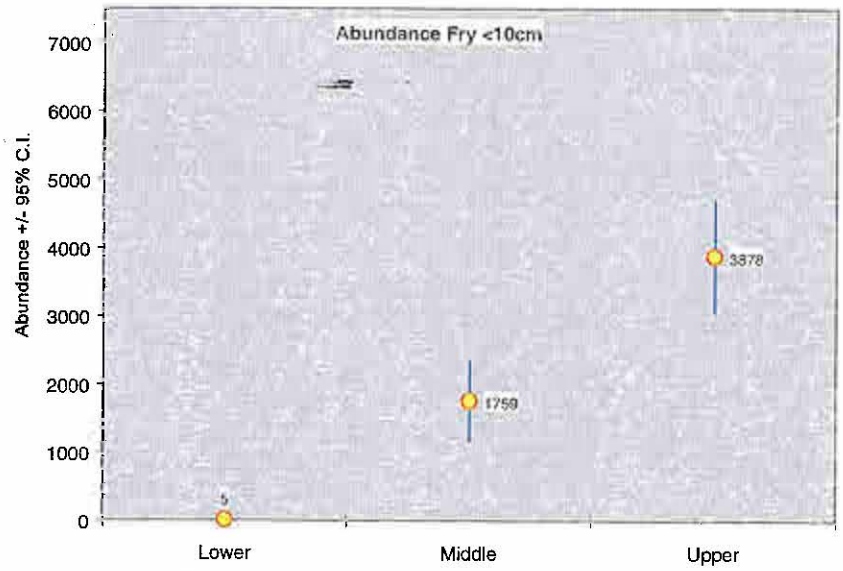
# Appendix C

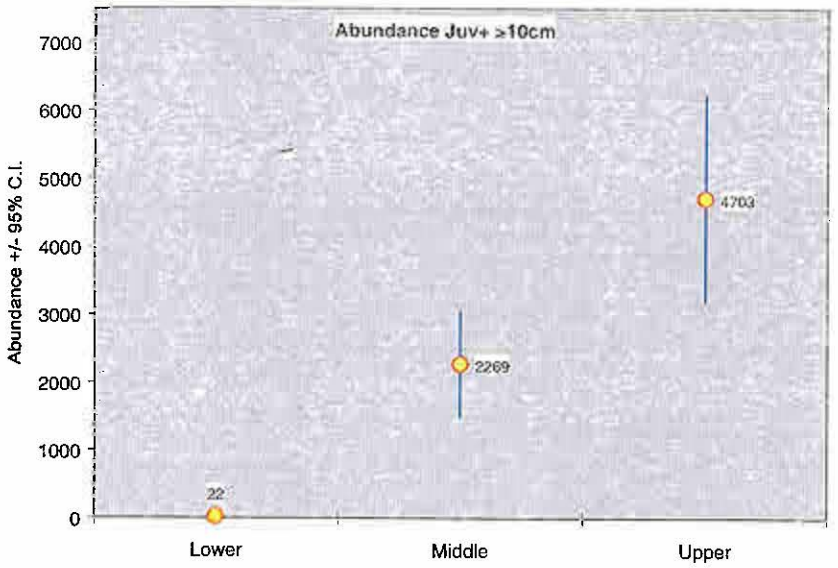
## Aerial Photograph of the Proposed Construction Site on the Ventura River for the High-Flow Sediment Bypass


Present Robles Diversion Dam and location of proposed high flow by-pass
Robles Canal
Sluice Gates

## Appendix D

**Results of seelhead (*Oncorhynchus mykiss*) abundance surveys performed in Matilija Creek and Ventura River, summer 2006. Provided by M. Allen, Thomas R. Payne & Associates, Arcata, California**




**Lower** = Ventura River from lagoon up to Robles Diversion Dam
**Middle** = Ventura River from Robles Diversion Dam up to Matilija Dam and Lower NF Matilija Creek up to Wheeler Gorge CG
**Upper** = Matilija Creek above Matilija Dam and Upper NF Matilija Creek (both to first impassable barriers) - NOT incl Murietta or Old Man Creeks

# Appendix E

## Photographs of the "Foster Park Reach" of the Mainstem Ventura River, February 8, 2007

**Ventura River (looking south from Foster Park Bridge) 2-8-07**

**Ventura River (looking north 0.25 mile below Foster Park Bridge) 2-8-07**