DRAFT PROGRAM AND PROJECT SPECIFIC ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT

Lower Santa Ynez River Fish Management Plan and Cachuma Project Biological Opinion for Southern Steelhead Trout

June 2003

Cachuma Operation and Maintenance Board
Santa Barbara County, California

Department of the Interior
Bureau of Reclamation

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Prepared by the Following Lead Agencies:

Cachuma Operation and Maintenance Board
3301 Laurel Canyon Road
Santa Barbara, California 93105
Contact: Ms. Kate Rees
805-569-1391

Department of the Interior
Bureau of Reclamation
South-Central California Area Office
1243 N Street
Fresno, California 93721
Contact: Mr. David Young
559-487-5127

EIR/EIS Consultant:

URS Corporation
130 Robin Hill Road, Suite 100
Goleta, Californian 93117
Contact: Dr. John Gray 805-964-6010

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EXECUTIVE SUMMARY

The Cachuma Operation and Maintenance Board (COMB) and the Bureau of Reclamation (Reclamation) have proposed various management actions and projects to improve habitat conditions for the endangered southern steelhead and other aquatic species on the Santa Ynez River below Bradbury Dam in northern Santa Barbara County. The proposed management actions and projects were developed and/or identified in the following reports: (1) Lower Santa Ynez River Fish Management Plan (FMP) prepared by Reclamation and other agencies and parties involved in the Cachuma Project; and (2) Biological Opinion (BO) prepared by the National Marine Fisheries Service (NMFS) regarding the effect of the Cachuma Project operations on steelhead.

Management actions in the FMP and BO are designed to improve habitat for the steelhead along the river downstream of Lake Cachuma through flow, habitat, and passage improvements. COMB and Reclamation would implement the actions through joint and separate, but coordinated efforts over many years.

COMB is the lead agency under the California Environmental Quality Act (CEQA) and Reclamation is the lead agency under the National Environmental Policy Act (NEPA). This Environmental Impact Report/Statement (EIR/EIS) evaluates impacts of the proposed FMP/BO actions and projects and identifies mitigation measures and alternatives to reduce adverse impacts incidental to the environmental benefits of the FMP/BO actions.

The Cachuma Project consists of Bradbury Dam, Cachuma Lake, and various water conveyance facilities. The dam impounds water along the Santa Ynez River in northern Santa Barbara County. Reclamation constructed the project in the early 1950s. Water is provided to the Cachuma Project Member Units for irrigation, domestic, and municipal and industrial water uses. The current Member Units consist of the City of Santa Barbara, Goleta Water District, Montecito Water District, Carpinteria Valley Water District, and the Santa Ynez River Water Conservation District - Improvement District #1.

Reclamation owns all project facilities and operates and maintains Bradbury Dam. Operation and maintenance of the Cachuma Project facilities, other than Bradbury Dam, were transferred in 1956 to the Member Units who formed COMB to carry out these responsibilities. COMB is a Joint Powers Authority separate from the Member Units.

The goal of the FMP is to “identify, evaluate, and recommend potential management actions that will benefit fish and other aquatic resources in the lower Santa Ynez River.” The FMP management actions have been designed to benefit steelhead and other aquatic species directly and indirectly by: (1) creating new habitat and improving existing habitat in the lower river and tributaries; (2) improving access to spawning and rearing habitats in the lower river and tributaries; and (3) increasing public awareness and support for beneficial actions on private lands.

In August 1997, NMFS designated the southern steelhead (*Oncorhynchus mykiss)* as an endangered species, including the population along the lower Santa Ynez River. In April 1999, Reclamation requested initiation of formal endangered species consultation with NMFS regarding the effect of the Cachuma Project operations on the southern steelhead and its critical habitat on the lower Santa Ynez River. In late 1999, Reclamation submitted a Biological Assessment to NMFS which described downstream releases for steelhead and numerous fish passage and habitat conservation measures for tributaries and the mainstem of the river.

NMFS issued a final Biological Opinion (BO) in September 2000 that concluded that the proposed actions described in the Biological Assessment (as revised in 2000) would not jeopardize the continued existence of the southern steelhead. Furthermore, the BO included mandatory terms and conditions that require Reclamation to implement 15 specific reasonable and prudent measures to minimize "take" (i.e., harm or mortality) of the southern steelhead. To comply with the federal Endangered Species Act, Reclamation will implement actions described in the BO.

The proposed FMP/BO actions are listed below. They will be funded and implemented by Reclamation and the Cachuma Member Units (through COMB). Two proposed FMP/BO projects will be funded and implemented by the County of Santa Barbara, Department of Public Works, and Caltrans because they would occur on land or with facilities owned by these agencies.

- Modify ramp-down schedule for water rights releases
- Maintain <u>interim</u> rearing target flows by releases from active storage until surcharging is implemented
- Maintain <u>long-term</u> rearing target flows by releases after 3.0-foot surcharge is implemented
- Maintain residual pools in Alisal and Refugio reaches until 3.0 foot surcharge
- Surcharge the reservoir up to 3 feet when there is sufficient runoff to develop water for Fish Passage Account and Adaptive Management Account
- Make releases from Fish Passage Account after 3.0-foot surcharge to supplement fish passage flows
- Make releases from the Adaptive Management Account after 3.0-foot surcharge
- Remove passage impediment on lower Hilton Creek cascade and bedrock chute
- Extend lower Hilton Creek channel to provide more habitat for fish
- Remove fish passage impediment at Route 154 culvert (Caltrans project)
- Remove passage impediment on Highway 1 Bridge over Salsipuedes Creek
- Remove passage impediment on Jalama Road Bridge
- Remove passage impediments on Quiota Creek (three crossings to be completed by the County, five by COMB)
- Remove passage impediments on El Jaro Creek and Nojoqui creeks
- Stabilize banks on El Jaro Creek
- Tributary habitat enhancements for fish, including conservation easements
- Mainstem habitat enhancements for fish

Reclamation has already implemented the interim releases for rearing flows and the modified water rights ramping regime. The following projects have been fully developed and are ready for implementation upon completion of the environmental review process, final design, and acquisition of required permits: 3.0-foot surcharging and long-term rearing releases and passage releases; Hilton Creek passage impediment project on Reclamation property, Route 154 culvert modification by Caltrans on Caltrans property, Jalama Road Bridge passage impediment project on private property, Quiota Creek passage impediment projects, and El Jaro Creek Bank Stabilization Project on private property. The environmental impacts of these actions are evaluated at a project-specific level in the EIR/EIS. All other FMP/BO projects will be implemented over the next several years, and in some cases, have not been fully developed. These actions are addressed at a programmatic level in the EIR/EIS.

The environmental impacts of the proposed FMP/BO actions are summarized in Table ES-1 for near-term projects, and in Table ES-2 for other projects (programmatic assessment). The proposed FMP/BO actions would result in one significant, unmitigable impact. The combined effects of the current fish releases and the proposed FMP/BO fish releases (with a 3.0-foot surcharge) to maintain long-term rearing flows would result in a significant increase (40 percent) in the anticipated shortages in deliveries from the Cachuma Project to the Member Units in drought years. This cumulative impact cannot be avoided or lessen, as no reliable alternative water supply is available to offset these reductions in water supply.

The proposed FMP/BO actions would result in several significant, but mitigable impacts, as listed below:

- Disruptions of recreational activities and facility closures at Cachuma Lake County Park due to inundation of critical facilities by 3-foot surcharge, and/or due to temporary facility closures incurred by relocating the facilities in anticipation of surcharge.

- Loss of up to approximately 452 oak trees along the margins of Lake Cachuma over time due to 3-foot surcharge.

- Two prehistoric archaeological sites along Cachuma Lake margins would be subject to increased erosion due to surcharging. Surcharging could also expose unknown buried archeological resources by eroding the lake margins over time.

- Potential to disturb unknown buried archeological sites during relocation of the recreational facilities at Lake Cachuma County Park.

- Relocation of recreational facilities at Lake Cachuma County Park due to surcharging would remove 15 to 20 mature coast live oak trees and temporarily affect freshwater marsh habitat.

- Construction of bridges on Quiota Creek would result in the loss of several mature native riparian trees, removal of several small trees, and pruning of several others. Riparian habitat, in general, would be temporarily disturbed during construction at each crossing.

- For the Quiota Creek passage impediment project and El Jaro Creek bank stabilization project, construction activities in the creek bed could result in discharge of sediments or accidental spills to the creek.

- Temporary and permanent removal of well-developed riparian scrub and woodland habitat to create the channel extension on Lower Hilton Creek.

- Temporary and potential permanent loss of pool habitat for steelhead rearing, red-legged frog, and western pond turtle due to creek modifications associated with removal of the barriers on El Jaro and Nojoqui creeks

A wide variety of alternatives are addressed in this section to meet the CEQA and NEPA requirements noted above. The lead agencies have included broad scale alternatives to the FMP/BO (as a whole), as well as alternatives to specific FMP/BO actions. The following issues are evaluated for each alternative to provide the basis of comparison between the various alternatives and to the proposed FMP/BO:

- *To what extent does the alternative meet the project purpose and need?*
- *Do the lead agencies consider the alternative feasible based on technical, logistic, and economic considerations?*
- *Is the alternative consistent with the FMP/BO? If not, how are the objectives of the FMP/BO impeded?*
- *Does the alternative avoid or reduce one or more significant impacts associated with the proposed FMP/BO?*
- *Does the alternative result in any other significant impacts that are not associated with the proposed project, or increase the magnitude of an impact of the proposed project?*

A summary of the range of alternatives evaluated in the EIR/EIS is provided below:

- No Action/Project
- 0.75-foot Surcharge (current operations)
- 1.8-foot Surcharge
- Lower or Higher Target Flows at Highway 154
- Lower or Higher Target Flows at Alisal Road
- Reduced or Increased Passage Flows
- No Passage Flows and 1.8-foot Surcharge
- No Upper Hilton Creek Passage Impediment Removal (Highway 154)
- No Tributary Passage Impediment or Habitat Enhancement Projects

- No Mainstem Habitat Enhancement Projects
- Alternative Channel Alignments for Hilton Creek Extension
- Alternative designs for the various passage impediment projects
- Alternative designs for bank stabilization project on El Jaro Creek
- Actions in the watershed above Cachuma Lake to enhance fish production

Based on the alternatives analysis, Reclamation and COMB concluded that alternatives that do not meet, or substantially meet, the project purpose and need and CEQA objectives are not considered viable and would not be pursued. Only the following alternatives would meet, or substantially meet, the project purpose and need and CEQA objectives:

- The proposed project as described in the FMP/BO
- Lower Rearing Target Flows at Highway 154
- Higher Rearing Target Flows at Highway 154
- Higher Rearing Target Flows at Alisal Road
- No Rearing Target Flows at Alisal Road
- Reduced Passage Flows
- No Upper Hilton Creek Passage Impediment Removal Project (Caltrans project)
- Alternative Project Designs at Jalama Road, Quiota Creek, and El Jaro Creek

Based on the results of the alternatives analyses presented in this chapter of the EIR/EIS, Reclamation and COMB conclude that the proposed FMP/BO represents the "environmentally superior alternative" under CEQA, and the "least environmentally damaging, practicable alternatives" under NEPA. This conclusion is preliminary, and will be reevaluated once Reclamation and COMB have considered public comments on the Draft EIR/EIS.

TABLE ES-1
SUMMARY OF IMPACTS DUE TO THE PROPOSED FLOW RELATED PROJECTS, HILTON CREEK PASSAGE PROJECTS, QUIOTA CREEK PROJECTS, JALAMA ROAD PROJECT, AND EL JARO BANK STABILIZATION PROJECT
(All Project Level Impacts)

Impact	Mitigation Measures	Residual Impact
CLASS I IMPACT – SIGNIFICANT AND UNMITIGABLE		
Water Supply		
The combined effects of the current fish releases and the proposed fish releases (with a 3.0-foot surcharge) to maintain long-term rearing flows would result in a significant increase (40 percent) in the anticipated shortages in deliveries from the Cachuma Project to the Member Units in drought years. [This is considered a cumulative impact, taking into account the current reduction in water supply and future proposed reductions.]	No feasible mitigation measure to fully offset these cumulative shortages due to current and proposed fish releases	Significant
CLASS II IMPACT – SIGNIFICANT AND MITIGABLE		
Recreation		
Surcharging to 3.0 feet would require relocation of recreational facilities at the Lake Cachuma County Park, including water treatment plant, two sewer lift stations, a parking lot, a service road, the marina, the boat launch ramp, a foot bridge, two shops at the marina, a picnic area, and several trails. Until critical recreational facilities (water treatment plant, boat launch ramp, marina path and docks) are relocated, they could be flooded during a maximum surcharge event which would likely result in park closure for weeks to months. Surcharging effects on other non-critical facilities may not require park closure. Facility relocation could also temporarily affect recreational uses due to closure during construction.	Santa Barbara County Parks has the authority and responsibility for mitigating this impact by relocating facilities in accordance with the requirements of the Recreation Agreement with the Bureau of Reclamation. The timing of the facility relocation is unknown, and full funding has not been secured to date.	Significant until such time that the facilities are relocated

Impact	Mitigation Measures	Residual Impact
Native Vegetation, Including Lakeshore Vegetation and Oak Trees		
Surcharging to 3.0 feet would result in the loss of up to 452 oak trees (maximum amount) along the margins of Lake Cachuma over several decades.	Mitigation Measure OK-1. To mitigate for the loss of oak trees under the proposed project, Reclamation and COMB shall implement the proposed long-term oak tree restoration program at the Cachuma Lake County Park as described in Section 6.4.3. Oak trees would be replaced at a ratio that ensures a final 2:1 replacement ratio. The maximum number of new trees that would be established at the 375-acre County Park would be 1,054 coast live oak and valley oak trees, planted in proportion to their current abundance at the lake. Approximately 90 percent of the trees to be planted would be coast live oak. The exact number of trees to be replaced would be based on the surcharging level and actual tree loss over time. The restoration program would be designed to create new oak woodlands, as well as to enhance existing oak woodlands in the park, without creating conflicts with ongoing and future recreational uses. Reclamation would implement the program in a phased approach. One half of the trees to be planted would be installed immediately. Reclamation would then monitor the loss of trees during surcharge events over the next 10 years, and replace them on an annual basis. Most of the trees would be planted in the County Park area. Additional oak tree restoration sites around the lake will be required over time.	Less than significant
The relocation of recreational facilities at Lake Cachuma County Park due to surcharging would remove 15 to 20 mature coast live oak trees and temporarily affect freshwater marsh habitat (less than 0.1 acre). No sensitive species would be affected by the relocations.	Mitigation Measure R-1. Impacts to wetland habitats and oak trees shall be minimized to the extent feasible during the planning, siting, and construction of relocated recreational facilities. Wetland habitats and oak trees that would be disturbed due to facility relocation shall be replaced at the County Park. The exact acreage of wetland habitat and number of oak	Less than significant

Impact	Mitigation Measures	Residual Impact
Impacts associated with relocation of recreational facilities are considered indirect impacts caused by the proposed surcharging, that would be addressed by County Parks through their own environmental review process for facility relocation. The impact assessment and mitigation measure for indirect impacts are included for the sake of full disclosure.	trees to be replaced is anticipated to be less than 0.1 acre and 20 trees, respectively. Oak tree replacement shall follow the approach described in the EIR/EIS for mitigating impacts for trees affected by surcharging.	
For the Quiota Creek passage impediment project, riparian habitat at each crossing (consisting of scattered patches of perennial herbs and small shrubs such as mulefat, poison oak, blackberry, watercress, young willows) would be temporarily disturbed during construction.	Mitigation Measure QT-2. Temporarily disturbed areas shall be restored by grading to match natural contours, stabilizing creek banks with biotechnical methods that include riparian plants, and revegetating with riparian herbs, shrubs, and trees that occur along the creek. Reclamation, COMB, and the County shall prepare and implement a revegetation plan that includes at least a 3–year maintenance period, and a 3-year plant survival performance standard of 85 percent.	Less than significant
Construction of bridges on Quiota Creek and the modified at-grade crossings would result in the loss of several mature native riparian trees, removal of several small trees, and pruning of several others. These trees include coast live oak, alder, and willow trees.	Mitigation Measure QT-3. All large riparian trees over 12 inches in diameter that are removed shall be replaced at an appropriate initial planting ratio to ensure a 2:1 long-term replacement ratio. Replacement trees shall be planted at or near the crossings. Reclamation, COMB, and the County shall prepare and implement tree replacement programs that include at least a 3–year maintenance period, and a 3-year plant survival performance standard of 85 percent.	Less than significant
Erosion and Sedimentation		
For the Quiota Creek passage impediment project, construction activities in the creek bed and pouring concrete could result in discharge of sediments and concrete to the creek, which in turn could adversely affect aquatic life if the material is introduced to the creek after construction or during an accidental spill.	Mitigation Measure QT-1. A stream diversion and dewatering plan shall be prepared for each crossing to ensure that stream flows will by-pass the work site. In addition, an erosion control and spill contingency plan shall be prepared for each crossing, specifying best management practices to prevent erosion and sedimentation during and after construction, and procedures for containing and cleaning up spills of concrete or other materials during construction	Less than significant

Impact	Mitigation Measures	Residual Impact
For the El Jaro Creek bank stabilization project, work in El Jaro Creek will require temporary stream diversion, and could result in discharge of sediments and concrete to the creek, which in turn could adversely affect aquatic life if the material is introduced to the creek after construction or during an accidental spill.	Mitigation Measure EJ-1. A stream diversion and dewatering plan shall be prepared to ensure that stream flows will by-pass the work areas in El Jaro Creek. In addition, an erosion control and spill contingency plan shall be prepared, specifying best management practices to prevent erosion and sedimentation during and after construction, and procedures for containing and cleaning up spills during construction.	Less than significant
Cultural Resources		
Two prehistoric archaeological sites along the lake margins would be subject to increased erosion due to surcharging. Erosion of the sites could destroy their integrity and the elements of the sites that impart their historic significance.	Mitigation Measure CR-1. A data recovery study shall be conducted at sites CA-SBa-891/2105 and CA-SBa-2101 in accordance with Reclamation's final Historic Properties Treatment Plan (West, April 2002) and the Memorandum of Agreement with SHPO and the Santa Ynez Band of Mission Indians.	Less than significant
Surcharging could expose unknown buried archeological resources by eroding the lake margins over time.	Mitigation Measure CR-2. If in the future currently unknown archaeological resources are identified within the surcharge impact zone, any such find shall be evaluated by a professional archaeologist and mitigated appropriately in accordance with Section 106 of the NHPA.	Less than significant
Relocation of the recreational facilities at Lake Cachuma County Park would not occur at or near any known archeological sites in the County Park. However, there is a potential to disturb unknown buried archeological sites during construction. Impacts associated with relocation of recreational facilities are considered indirect impacts caused by the proposed surcharging, that would be addressed by County Parks through their own environmental review process for facility relocation. The impact assessment and mitigation measures for indirect impacts are included for the sake of full disclosure.	Mitigation Measure CR-3. An archeological monitor shall be present during construction work associated with facility relocation if work shall occur in a sensitive area where unknown prehistoric resources could be encountered. If such resources are encountered, earthwork shall be suspended at that location until such time that the County Parks Department has investigated the nature and significance of the resource with Reclamation's cultural resource specialist, and made a determination on appropriate treatment. This measure would be implemented by the County Parks Department when relocating facilities to accommodate the surcharge.	Less than significant

Impact	Mitigation Measures	Residual Impact
CLASS III IMPACT – ADVERSE, BUT NOT SIGNIFICANT		
Surface Water Hydrology		
Low flows downstream of Bradbury Dam would occur for a longer duration and over a larger portion of the river than under current operations (and compared to recent historic operations) due to proposed releases to maintain the long-term rearing flows. This effect would diminish with distance from the dam end near Alisal Road. The modified flows could increase instream riparian vegetation. However, no significant reduction in channel capacity and resulting flood hazard are anticipated.	None required	Less than significant
Water Supply		
The proposed releases to maintain long-term rearing flows, combined with the 3.0-foot surcharge, would have a negligible adverse effect on the average annual deliveries from the Cachuma Project, and the magnitude of shortages in drought years, compared to current operations. This is a project specific impact. [In contrast, the cumulative impact of the proposed water supply reductions, taking into account current reductions, is considered significant. See Class I impacts above]	None required.	Less than significant
Surface Water Quality		
The concentration of dissolved solids in Cachuma Lake under the proposed operations involving a 3.0-foot surcharge and long-term releases for fish would be about 5-20 mg/l higher [based on simulation modeling] than under current operations over time, which would be a negligible increase (2 %). In fact, the TDS levels under the FMP/BO operations would be less than under recent historic reservoir operations because of increased SWP water to the lake.	None required or available.	Less than significant
The placement and relocation of the sandbags to divert flows around the Jalama Road Bridge work site could cause temporary sedimentation.	None required. Project includes use of best management practices to minimize any construction related erosion and sedimentation.	Less than significant

Impact	Mitigation Measures	Residual Impact
Riparian and Lakeshore Vegetation		
Surcharging would disturb upland vegetation (chaparral and coastal sage scrub) along the margins of the lake due to inundation effects. The total upland impact acreage (excluding oak woodlands) under the 3' surcharge is 67 acres, respectively. [Impacts to oak woodlands are addressed above as impacts to oak trees]	None required or available.	Less than significant
Work in the bed of Hilton Creek for the passage impediment projects would temporarily disturb the creek substrate and riparian vegetation.	None required. Post-construction restoration of aquatic and riparian habitats is already included in the project.	Less than significant
For the El Jaro Creek bank stabilization project, equipment access and construction activities would temporarily disturb riparian vegetation along the abandoned road and along El Jaro Creek	None required. Disturbed areas expected to recover through natural processes	Less than significant
Upland Habitats		
For the Quiota Creek passage impediment project, construction of engineered fill slopes for the bridge approaches at Crossing Nos. 2, 6, and 8 will temporarily and permanently disturb adjacent annual grassland and oak woodland understory.	None required. County project includes post-construction restoration of disturbed uplands areas.	Less than significant
Aquatic Habitat and Species		
Creation of new, and expansion of existing, rearing habitat along the mainstem of the Santa Ynez River will also increase the number of steelhead predatory fish, and increase predation of steelhead making use of the expanded rearing habitat.	None required. Reclamation and COMB believe that the rate of predation will not increase above current levels, such that the proposed project will still have a net benefit for steelhead	Less than significant
Pre-construction steelhead/rainbow trout capture and relocation efforts could cause temporary effects on the fish. The procedures would be implemented in coordination with NMFS and impacts, if any, would be acceptable to NMFS. (Hilton Creek, Quiota Creek, Jalama Road, & El Jaro Creek projects)	None required. Relocation would be conducted in accordance with agency protocols and permit requirements; hence, impacts will be minimized.	Less than significant
Pre-construction capture and relocation of red-legged frogs and pond turtles could cause temporary effects on the individual animals. The procedures would be implemented in coordination with USFWS and impacts, if any, would be acceptable to USFWS. (Hilton Creek, Quiota Creek, Jalama Road, and El Jaro Creek projects)	None required. Relocation would be conducted in accordance with agency protocols and permit requirements; hence, impacts will be minimized.	Less than significant

Impact	Mitigation Measures	Residual Impact
For the Quiota Creek passage impediment removal project, construction of the bridge at Crossing No. 6 would remove a pool upstream of the at-grade crossing. This would reduce available rearing habitat for rainbow/steelhead trout, red-legged frog, and western pond turtle. Installation of the rock fishway at Crossing No. 7 would reduce the size of a deep downstream pool that could be used by the same species.	None required or available	Less than significant
For the El Jaro Creek bank stabilization project, work in the tributary to El Jaro Creek and in the creek itself would temporarily disturb common aquatic species and habitats.	None required. Disturbed areas expected to recover through natural processes	Less than significant
Terrestrial Wildlife and Habitat		
Upland wildlife habitat would be displaced along the margins of Lake Cachuma due to surcharging.	None required or available.	Less than significant
Construction activities would involve increased human presence at the project site, noise and emissions from vehicles and construction equipment, and additional vehicle travel. These construction-related impacts could discourage wildlife use near the project site during the day when construction is occurring. (Hilton Creek, Quiota Creek, Jalama Road, and El Jaro Creek projects).	None required. Impacts would be very short term and localized.	Less than significant
Construction of a trail on the east bank of the creek to allow foot traffic for construction at the Jalama Road Bridge site would temporarily disturb coyote brush scrub vegetation.	None required. Project includes post-construction restoration of the east bank with native plants.	Less than significant
Agricultural Uses and Resources		
For the Quiota Creek passage impediment project, fencing on private lands near the crossings will be temporarily relocated 5 to 20 feet to exclude cattle from the work area. Work at the crossings and temporary closures of Refugio Road could inconvenience the adjacent landowners and their cattle grazing operations.	None required or available. Reclamation, COMB, and the County will coordinate all work with affected landowners and acquire necessary construction easements to minimize effects.	Less than significant
The increased low flows in the river below Bradbury Dam on San Lucas Ranch may make it more difficult for cattle to cross the river, but would not preclude such crossings. This condition would interfere with the normal cattle operations on the ranch, causing a nuisance and possible modification of the pasture rotation.	There are no feasible mitigation measures because San Lucas Ranch will not provide access to Reclamation or COMB for the purposes of implementing a cooperative effort to modify cattle crossings to reduce the impact.	Less than significant

Impact	Mitigation Measures	Residual Impact
CLASS IV IMPACT – BENEFICIAL IMPACTS		
Alluvial Groundwater Basin		
The proposed project would increase storage in the Above Narrows Aquifer due to additional releases for fish.	Not applicable	
Lompoc Plains Groundwater Quality		
The proposed project could potentially decrease TDS levels in the Lompoc Plain over time. The magnitude of a potential improvement in water quality is small.	Not applicable	
Fish and Aquatic Habitat		
The proposed releases to maintain long-term rearing flows will increase the extent and quality of spawning and rearing habitats, and of passage opportunities for steelhead and resident fish along the lower Santa Ynez River.	Not applicable	
Riparian and Lakeshore Vegetation		
The proposed releases to maintain long-term rearing flows may slightly increase the extent and productivity of wetland and riparian vegetation along the river downstream of Cachuma Lake; this effect could extend to Alisal Road.	Not applicable	
Sensitive Aquatic Species and Terrestrial Wildlife		
The proposed releases to maintain long-term rearing flows will increase the extent and quality of aquatic habitats for any sensitive aquatic or wildlife species dependent upon these resources.	Not applicable	

TABLE ES-2
SUMMARY OF IMPACTS DUE TO THE PROPOSED HILTON CREEK CHANNEL EXTENSION, OTHER TRIBUTARY PASSAGE PROJECTS, AND TRIBUTARY AND MAINSTEM HABITAT ENHANCEMENT PROJECTS
(All Programmatic Level Impacts)

Impact	Type of Impact		
	Class I – Significant and Unmitigable	Class II – Significant, but Mitigable	Class III – Adverse, but Not Significant
Hilton Creek Channel Extension			
General construction disturbance due to increased human use, dust, noise, and equipment emissions that would discourage wildlife use in the adjacent area.			X
Temporary increase in sediments, causing downstream erosion, due to excavation and filling activities during construction.			X
Potential displacement of red-legged frogs from the channel extension alignment (if present), requiring the need for capture and relocation			X
Potential disturbance of roots of large riparian trees along the channel extension that could harm the trees.		X	
Temporary and permanent removal of riparian scrub and woodland habitat to create the channel. Creating the channel will require removal of well-established riparian vegetation.	X		
Other Tributary Passage Impediment Projects			
Disturbance of riparian and upland vegetation, including potential loss of mature trees		X	
Temporary and potential permanent loss of pool habitat for steelhead rearing, red-legged frogs, or pond turtles due to creek modifications associated with removal of the barriers	X (El Jaro & Nojoqui)		X (Quiota)
Noise, dust, and traffic impacts			X
Construction related erosion and sedimentation		X	
Temporary impacts to steelhead, red-legged frogs and western pond turtles (if present) due to relocation procedures			X
Impacts to archeological sites, particularly along new access roads to the project sites		X	
Interference with cattle grazing operations			X
Tributary and Mainstem Habitat Enhancement Projects			
Disturbance of riparian vegetation, including potential loss of mature trees			X
Construction related erosion and sedimentation		X	
Noise, dust, and traffic impacts			X
Temporary impacts to steelhead, red-legged frogs and western pond turtles (if present) due to relocation procedures			X
Impacts to archeological sites, particularly along new access roads to the project sites		X	
Interference with cattle grazing operations by relocating roads and fences			X

1.0 INTRODUCTION

The Cachuma Operation and Maintenance Board (COMB) and the Bureau of Reclamation (Reclamation) have prepared this Environmental Impact Report/Statement (EIR/EIS) to address various proposed management actions and projects to improve habitat conditions for the endangered southern steelhead and other aquatic species on the Santa Ynez River below Bradbury Dam in northern Santa Barbara County. The proposed management actions and projects were developed and/or identified in the following reports: (1) Lower Santa Ynez River Fish Management Plan (FMP) prepared by Reclamation and other agencies and parties involved in the Cachuma Project; and (2) Biological Opinion (BO) prepared by the National Marine Fisheries Service (NMFS) regarding the effect of the Cachuma Project operations on steelhead. Management actions in the FMP and BO are designed to improve habitat for the steelhead along the river downstream of Lake Cachuma through flow, habitat, and passage improvements. COMB and Reclamation would implement the actions through joint and separate, but coordinated, efforts over many years. For the convenience of the reader, the FMP and BO are referred to in this report as a single entity: “FMP/BO.” The actions included in these reports are essentially the same, as described in Section 2.0.

COMB is the lead agency under the California Environmental Quality Act (CEQA) and Reclamation is the lead agency under the National Environmental Policy Act (NEPA). The EIR/EIS evaluates impacts of the proposed actions and alternatives, and identifies mitigation measures to reduce adverse impacts incidental to the environmental benefits of the FMP/BO actions. The analyses and conclusions in the EIR/EIS will be used by COMB and Reclamation when making final decisions about the implementation of the FMP/BO projects.

1.1 OVERVIEW OF CACHUMA PROJECT

The Cachuma Project consists of Bradbury Dam, Cachuma Lake, and various water conveyance facilities. The dam impounds water along the Santa Ynez River in northern Santa Barbara County (Figure 1-1). Reclamation constructed the project in the early l950s. Water is provided to the Cachuma Project Member Units for irrigation, domestic, and municipal and industrial water uses. The current Member Units consist of the City of Santa Barbara, Goleta Water District, Montecito Water District, Carpinteria Valley Water District, and the Santa Ynez River Water Conservation District - Improvement District #1. Water is delivered to the South Coast Member Units through a tunnel in the Santa Ynez Mountains (Figure 1-2). Santa Ynez River Water Conservation District - Improvement District #1 receives its Cachuma Project entitlement as state water through an exchange agreement with the South Coast Member Units. Over the past 47 years, the project has been the principal water supply for South Coast communities and portions of the Santa Ynez Valley. Since the drought of 1987-91, the average annual deliveries from the project to the Member Units have been about 27,000 acre-feet per year.

Reclamation owns all project facilities and operates and maintains Bradbury Dam. Operation and maintenance of the Cachuma Project facilities, other than Bradbury Dam, were transferred in 1956 to the Member Units who formed COMB to carry out these responsibilities. COMB is a Joint Powers Authority separate from the Member Units. Reclamation holds the water permits from the State Water Resources Control Board (State Water Board) on behalf of the United States for diverting water from the Santa Ynez River for the Cachuma Project.

1.2 OVERVIEW OF PROPOSED PROJECT/ACTION

1.2.1 Purpose and Need, and CEQA Objectives

Reclamation has prepared the following purpose and need statement pursuant to NEPA:

> "The Purpose of the Project is for Reclamation to operate the Cachuma Project consistent with its water rights permits and to meet downstream public trust resources in an economical manner that would not affect project yield in a meaningful way.
>
> The Need for the Project is to enhance and protect summer habitat and migration habitat for Southern California steelhead and improve conditions for the native fish in the Santa Ynez River watershed below Bradbury Dam."

COMB prepared the following CEQA objectives pursuant to CEQA Guidelines Section 15124(b).:

> "The objective of the proposed FMP/BO management actions is to ensure that operation of the Cachuma Project is consistent with the federal Endangered Species Act regarding effects on the endangered southern steelhead and to improve conditions for native fish in the Santa Ynez River watershed below Bradbury Dam.
>
> The proposed FMP/BO management actions must be economically feasible and initially focused on high priority river reaches and tributaries where habitat improvements would be most effective. The actions must not substantially affect the Cachuma Project yield, nor result in significant long-term effects on other aquatic species and habitats in the lower watershed.
>
> The FMP/BO management actions are needed to comply with the federal Endangered Species Act and to continue the protection of downstream public trust resources in accordance with Reclamation's water rights permits for the project."

1.2.2 Fish Management Plan

In 1993, a cooperative program to investigate native fisheries along the lower Santa Ynez River below Bradbury Dam was initiated amongst various public agencies and non-governmental organizations in response to concerns about balancing the allocation of Santa Ynez River water for public trust resources and consumptive uses. In June 1994, a Memorandum of Understanding for Cooperation in Research and Fish Maintenance (Fish MOU) was executed among various parties (see below) with interests in the Santa Ynez River, and is currently being continued through the 2002 Fish MOU. The original MOU provided water for fish studies; however, over time, water provided for under the MOU has also been used for the maintenance of fish habitat.

Since 1993, the MOU studies and releases have been directed by the Santa Ynez River Technical Advisory Committee (SYRTAC). This committee is composed of various biologists, hydrologists, and resource agency personnel. Signatories to the 1994 MOU include the Bureau of Reclamation, the Santa Barbara County Water Agency, California Department of Fish and Game (CDFG), US Fish and Wildlife Service (USFWS), Santa Ynez River Water Conservation District - Improvement District #1 (SYRWCD ID#1), Cachuma Conservation Release Board (CCRB), City of Lompoc, and Santa Ynez River Water Conservation District (SYRWCD). The 2002 Fish MOU provides for the management of the fish releases through an Adaptive Management Committee comprised of biologists from most of the signatories to the MOU as well as NMFS. The signatories to the 2002 Fish MOU are the same as those for the 1994 Fish MOU.

In 1994, the State Water Board issued WR 94-5, which requires that Reclamation continue the releases under the 1994 Fish MOU or its successor until the State Water Board takes action on the WR 94-5 hearings, which will occur in 2003. Reclamation believes that the current downstream releases for southern steelhead initiated in 2000 pursuant to the Biological Opinion (see below) exceed the amounts under the 1994 Fish MOU, and as such, meet the requirements of WR 94-5.

One of the primary objectives of the Fish MOU is to identify management actions to improve conditions for native fish and other aquatic resources, including southern steelhead. To that end, the SYRTAC, on behalf of the MOU signatories, prepared the Draft Fish Management Plan (FMP). A Draft FMP was issued for public comment in April 1999. These comments were considered by the SYRTAC, which issued a Final FMP in October 2000. A copy of the FMP is available for inspection or copying at the offices of COMB, Reclamation, and all Member Units. The FMP is incorporated into the EIR/EIS by reference because it represents the basis of the proposed project, in combination with the Biological Assessment and Biological Opinion (see below).

The goal of the FMP is to "identify, evaluate, and recommend potential management actions that will benefit fish and other aquatic resources in the lower Santa Ynez River." The FMP management actions have been designed to benefit steelhead and other aquatic species directly and indirectly by: (1) creating new habitat and improving existing habitat in the lower river and tributaries; (2) improving access to spawning and rearing habitats in the lower river and tributaries; and (3) increasing public awareness and support for beneficial actions on private lands. Many management actions can be implemented independent of others, and as such, can be considered individual "projects."

In 1958, the State Water Board adopted Decision 886 as a part of water rights permits issued to Reclamation for the Cachuma Project. Under conditions of the permits, Reclamation was to make releases to the downstream areas to maintain, in effect, groundwater conditions which would have existed in the absence of the project. Decision 886 reserved jurisdiction which was continued through a series of subsequent water rights orders (in 1973, 1978, 1988, and 1989, and 1994) designed to further protect downstream water rights and public trust resources affected by the Project. Since the issuance of Water Rights Order 89-18 (WR 89-18), Reclamation and the Cachuma Member Units have been engaged in various studies related to vegetation and fish habitat along the Santa Ynez River below Bradbury Dam. The fish studies were initiated, in part, by concerns expressed by the public concerning the effect of the Cachuma Project operations on fish. The execution of the 1994 Fish MOU was a culmination of efforts by Reclamation and the Cachuma Project Member Units to address these concerns. Based on the MOU fish studies, Reclamation and the Cachuma Member Units prepared the FMP. The FMP has been submitted to the State Water Board to fulfill a requirement of WR 94-5 (the most recent water rights order) to provide all results of studies originating from the 1994 Fish MOU. This historical account is provided to explain the origins of the FMP, which were independent of, and prior to, the listing of the southern steelhead along the Santa Ynez River as an endangered species, and to describe the relationship of the FMP to WR 94-5.

1.2.3 Biological Opinion

In August 1997, NMFS designated the southern steelhead (*Oncorhynchus mykiss)* as an endangered species, including the population along the lower Santa Ynez River. In February 2000, the lower Santa Ynez River was designated critical habitat for this species [Note: critical habitat designation has been set aside by a federal court action in 2002; resolution of the designation is pending]. In a letter dated April 7, 1999, Reclamation requested initiation of formal endangered species consultation with NMFS regarding the effect of the Cachuma Project operations on the southern steelhead and its critical habitat on the lower Santa Ynez River. In 1999, Reclamation submitted a Biological Assessment to NMFS which described downstream releases for steelhead and numerous fish passage and habitat conservation measures for tributaries and the mainstem of the river.

NMFS had several concerns with the project as proposed in the 1999 Biological Assessment, including the potential adverse effect on steelhead migration opportunity in the mainstem attributable to storage of water in Lake Cachuma. NMFS was concerned that passage opportunities were substantially reduced, relative to no project conditions, in normal water year types. The need to balance water supply and provide opportunities for fish passage were examined in a series of technical meetings between Reclamation and NMFS. It was acknowledged that the behavioral response of adult steelhead to hydraulic cues stimulating upstream migration within the Santa Ynez River, and other systems, had not been clearly identified and quantified. In addition, the water cost for fish passage releases was potentially substantial. Therefore, consideration of a surcharge of Lake Cachuma to 3.0 feet was considered.

It was agreed that the additional volume of water provided by surcharging the lake an additional 1.2 feet (from 1.8 feet to 3 feet; or 3,700 AF) would be dedicated to fish passage supplementation (3,200 AF) and adaptive management (500 AF). Fisheries biologists for Reclamation and NMFS then established an experimental fish passage supplementation protocol based on the best available information for use with Cachuma Project and the water supply available. A substantial monitoring and adaptive management component was built into the program to address the uncertainties inherent in the experimental nature of this program. The existing program provides a substantial amount of water to enhance fish passage opportunities and creates the Adaptive Management Committee to oversee release of this water for the benefit of steelhead migration.

Formal consultation began in June 2000 when Reclamation submitted a revised description of the proposed actions. NMFS issued a final Biological Opinion (BO) on the southern steelhead on September 11, 2000. The BO concluded that the proposed actions described in the Biological Assessment (as revised in 2000) would not jeopardize the continued existence of the southern steelhead. Furthermore, the BO included mandatory terms and conditions that require Reclamation to implement 15 specific reasonable and prudent measures to minimize "take" (i.e., harm or mortality) of the southern steelhead. Copies of the Biological Assessment and BO are available for inspection or copying at the offices of COMB, Reclamation, and all Member Units. The Biological Assessment and BO are incorporated into the EIR/EIS by reference because they represent the basis of the proposed project, in combination with the FMP (see above).

To comply with the federal Endangered Species Act, Reclamation would implement actions described in the BO. The BO incorporates the management actions and projects in the FMP with only slight modifications which are described in Section 2.3.7.

1.2.4 Implementation

The FMP/BO actions would be funded and implemented by Reclamation and the Cachuma Member Units (through COMB). However, in some instances, implementation of the proposed FMP/BO actions may require separate approvals and efforts by CCRB (a separate Joint Powers Agency composed of the Member Units on the South Coast) and SYRWCD ID #1. The determination on which agencies or combination of agencies that would fund or implement a management action will be based in part on the funding sources and the location of a project.

Two proposed FMP/BO projects would be funded and implemented by the County of Santa Barbara, Department of Public Works, and Caltrans because they would occur on land or with facilities owned by these agencies. These projects are included in the EIR/EIS because they are integral to the BO and FMP.

Since 2000, Reclamation, in coordination with COMB, has implemented several actions described in the Biological Assessment, FMP, and the terms and conditions in the BO. These actions are described in Sections 2.3.2 and 3.4. Reclamation and COMB have determined that these actions are not subject to NEPA or CEQA environmental review because they are within the normal range of operations of the Cachuma Project and the provisions of the water rights permits. Furthermore, these actions and downstream release would not cause adverse environmental impacts.

The proposed releases for fish under the FMP/BO do not affect the release requirements under the current water rights permits for the Cachuma Project. Hence, implementation of the FMP/BO projects will not require modification of Reclamation's current water rights permits from the State Water Board as the proposed flow-related projects (i.e., release ramping, and releases from Bradbury Dam for fish purposes) and reservoir surcharging are allowable under the current water rights permits. Implementation of non-flow FMP/BO projects, such as passage impediment removal projects, does not require permits or approvals by the State Water Board.

1.3 LEAD AGENCY STATUS

1.3.1 NEPA Lead Agency

The FMP/BO federal actions are subject to the environmental review requirements of NEPA. Reclamation is the only federal agency implementing the FMP/BO projects, and as such, is the proper NEPA lead agency. Several FMP/BO projects involve work that will require a 404 permit from the Corps of Engineers for the discharge of dredge or fill material to “waters of the United States.” The Corps of Engineers will utilize this EIR/EIS for their NEPA compliance, either adopting the conclusions directly, or conducting a more focused NEPA impact assessment, tiering from this EIR/EIS in order to avoid duplication of effort.

1.3.2 CEQA Lead Agency

COMB is a California joint powers agency which was formed by agreement of the Montecito Water District, Carpinteria Valley Water District, City of Santa Barbara, Goleta Water District, and SYRWCD ID #1 (Member Units). Under the terms of the Joint Exercise of Powers Agreement forming COMB, COMB would undertake many of the FMP/BO projects. COMB would seek state and federal grants to assist in the funding of the FMP/BO projects. COMB is the first state or local agency to take action to fund, design, and implement FMP/BO projects. As such, COMB is the proper CEQA lead agency to conduct the environmental review of the FMP/BO projects.

As noted earlier, there may be instances when CCRB and/or SYRWCD ID#1 take a lead role in implementing a FMP/BO project; however, they are not considered proper CEQA lead agencies because their role in implementation is uncertain at this time. In addition, SYRWCD ID#1 and the agencies comprising CCRB also comprise COMB, and as such, are already involved in the CEQA review.

1.3.3 CEQA Responsible Agencies

There are is only one CEQA responsible agency (Caltrans) associated with the FMP/BO projects that would have a role in implementing one of the FMP/BO projects independent of Reclamation or COMB. Caltrans plans to complete the Route 154 culvert project in 2003 using the EIR/EIS for their environmental review. Caltrans will consider adopting the certified final document and CEQA findings. No additional environmental review is anticipated because the Route 154 project is fully evaluated in this document on behalf of Caltrans. Caltrans did not conduct a separate environmental review of their project by itself in order to make use of this document that provides an impact assessment of their project in the context of all other actions on Hilton Creek and in the lower watershed.

The California Department of Fish and Game (CDFG) will require Streambed Alteration Agreements under Fish and Game Code Section 1601 for FMP/BO projects involving physical work in the mainstem or tributaries. CDFG will act as both a trustee and CEQA responsible agency. CDFG can issue Agreements only for projects that have a certified or adopted CEQA document, or for projects that are exempt from CEQA. CDFG will require certification of the EIR/EIS by COMB prior to issuing any agreements to implement the FMP/BO projects.

The County of Santa Barbara will be removing three fish passage impediment projects in 2003 along Quiota Creek. The County has issued a separate Negative Declaration for these bridge projects. The County project is included in this EIR/EIS for the sake of completeness, and to evaluate potential cumulative impacts.

1.4 TYPE OF ENVIRONMENTAL DOCUMENT AND LEVEL OF DETAIL

The FMP/BO projects range from specific, well-defined projects ready for final design and implementation, to long-term projects or programs that will require additional planning, funding, final design, and cooperation from private landowners. The EIR/EIS evaluates at a programmatic level the environmental impacts of projects that have not been fully developed. For these projects, the EIR/EIS is considered a "program" environmental document under CEQA and NEPA. Additional environmental review will be required for these projects once further design work has been completed. The subsequent environmental review will tier from this document to the extent feasible, using resource information and impact analyses that are appropriate. Additional site-specific environmental analysis may be required for these projects. The subsequent environmental documents would likely include Negative Declarations by COMB and Environmental Assessments by Reclamation.

This EIR/EIS also evaluates the environmental impacts of well-defined projects at a "project" level, such that no additional CEQA or NEPA environmental review is required. Sufficient design and site information for these projects is available to conduct a full environmental review.

As noted above, the EIR/EIS represents a combination of a program-level document and a project-level document. Program level documents are allowed under CEQA (Guidelines Section 15168) and NEPA (40 CFR 1502.4 (c)), and encouraged by both laws in order to provide a comprehensive analysis of all connected actions and potential cumulative impacts. Similarly, the use of the program-level documents for subsequent focused environmental documents (i.e., tiering) is encouraged by CEQA (Guidelines Section 15168) and NEPA (40 CFR 1502.2).

1.5 PUBLIC SCOPING

COMB issued a Notice of Preparation (NOP) for the EIR/EIS on October 8, 2001 to involved local, state, and federal agencies, as well as to environmental groups, landowners, and other parties with interests in the Santa Ynez River watershed. Reclamation published a Notice of Intent (NOI) in the October 10, 2001 Federal Register, notifying the public that a joint EIR/EIS would be prepared.

Written letters of comment were received by the following parties and are included in Appendix D:

- State Water Resources Control Board (November 9, 2001)
- California Department of Transportation (October 29, 2001)
- County of Santa Barbara (November 8, 2001)
- Environmental Defense Center [EDC] (November 8, 2001)
- Environmental Defense [separate organization from EDC] (October 16, 2001)
- Morrison and Foerster, representing San Lucas Ranch (October 31, 2001)

1.6 RELATIONSHIP TO FUTURE WATER RIGHTS EIR

In December 1994, the State Water Board issued Water Rights Order 94-5 (WR 94-5) that required a future hearing to determine if any modifications of the terms and conditions of Reclamation's permits are necessary to provide for downstream water rights and public trust resources affected by the Cachuma Project. In May 1999, the State Water Board issued a Notice of Preparation (NOP) for an EIR on the Cachuma Project water rights permits. It is anticipated that the Draft EIR will be issued in early summer 2003.

The State Water Board will use the EIR in its determination as to whether any modification is required in Reclamation’s permits. The EIR will address operational elements of the Cachuma Project for the purpose of protecting downstream water rights and public trust resources. The EIR will evaluate the effects of releases on public trust resources, including water quality, to assist the State Water Board in determining if any modifications to the permits are required. The alternatives in the State Water Board EIR will include the same release requirements for steelhead from the FMP/BO.

The purpose and focus of this environmental document and the State Water Board EIR are distinctly different. This EIR/EIS is focused on environmental effects of the FMP/BO projects to determine if there are any incidental, unintended adverse impacts to the environment. It includes both flow and non-flow related projects. This EIR/EIS will be used to identify mitigation measures to reduce any incidental impacts created by the need to protect an endangered species. In contrast, the State Water Board EIR will address the adequacy of current water rights releases, in combination with new releases for steelhead pursuant to the FMP/BO, in protecting downstream water rights and public trust resources.

Reclamation has submitted a technical study by Stetson Engineers (2001) to the State Water Board for use in their EIR. The study evaluates the effects of Cachuma Project operations on lake water quality and surface water quality in the alluvial basins and groundwater quality in the Lompoc Basin. Reclamation and COMB have used the Stetson Engineers (2001) study to address these same issues in this EIR/EIS.

Reclamation and COMB recognize the State Water Board’s primary jurisdiction on the question of minimum releases from the Cachuma Project to protect downstream water rights and public trust resources. At the WR 94-5 water rights hearing in 2003, Reclamation and COMB will request that the State Water Board adopt the FMP/BO releases for the protection of public trust resources, as those release criteria are the product of years of study and the best scientific evidence available to date.

2.0 PROPOSED PROJECT/ACTION

2.1 OVERVIEW OF THE FISH MANAGEMENT PLAN

The Fish Management Plan (FMP) originated from the 1994 Fish MOU as part of a voluntary program to study and enhance native fish below Bradbury Dam. The objective of the FMP is to "*…identify, evaluate, and recommend potential management actions that will benefit fish and other aquatic resources in the lower Santa Ynez River. Improving conditions for native fishes in general, and rainbow trout/steelhead in particular, while avoiding adverse impacts to other species of special concern or habitat values, is a management priority in the lower Santa Ynez River* (FMP, p.1-3)." The Final FMP also states that "*The long term goal of this Fish Management Plan is the protection and recovery of southern steelhead in the Lower Santa Ynez River.*"

A draft Fish Management Plan was prepared by the SYRTAC on behalf of the Fish MOU signatories (see Section 1.2), and issued for public comment in April 1999. Public meetings to accept comments were conducted in Santa Barbara and Santa Ynez. A final FMP was issued in October 2000. It incorporates the requirements in the Biological Opinion (BO) for the Cachuma Project issued by NMFS in September 2000 (see Section 3.2). The FMP was submitted to the State Water Board at that time in compliance with Condition 3(b) of WR Order 94-5.

The FMP management actions were developed to benefit steelhead and other aquatic species directly and indirectly by: (1) creating new habitat and improving existing habitat in the lower river and tributaries; (2) improving access to spawning and rearing habitats in the lower river and tributaries; and (3) increasing public awareness and support for beneficial actions on private lands. Many management actions can be implemented independent of others, and as such, can be considered individual "projects."

The FMP identifies specific reaches of the mainstem and tributaries for habitat protection and improvement. The highest priority has been assigned to lower Hilton Creek, which is located on Reclamation property, and the mainstem of the river between Bradbury Dam and Highway 154 (Figure 1-3). Habitat conditions in these areas are relatively good, and water releases have the highest potential to benefit aquatic habitat. A high priority is also assigned to enhancing habitats on the following tributaries which have favorable flows and habitat conditions for aquatic resources: Quiota, El Jaro, and Salsipuedes creeks (Figure 1-3).

The FMP management actions are focused on steelhead trout. However, all actions have been designed to either have no adverse impact on other native aquatic species along the river, or to result in incidental beneficial impacts to these native species which include the tidewater goby, three-spine stickleback, prickly sculpin, Pacific lamprey, arroyo chub, southwestern pond turtle, and red-legged frog.

As described in Section 1.2, the FMP management actions and projects originated as voluntary efforts by the involved agencies that began in 1993, prior to the designation of the southern steelhead as an endangered species. However, once the steelhead was listed as endangered and Reclamation initiated an endangered species consultation, the FMP was designed to be consistent with the Biological Assessment and BO. The final FMP was completed in October 2000 after the issuance of the BO. The final FMP was then revised to incorporate and/or acknowledge the BO requirements.

2.2 OVERVIEW OF THE BIOLOGICAL OPINION

In August 1997, the National Marine Fisheries Service (NMFS) designated the anadromous steelhead inhabiting the Southern Evolutionarily Significant Unit (ESU), which includes the lower Santa Ynez River below Bradbury Dam, as an endangered species under the Federal Endangered Species Act. In April 1999, Reclamation requested initiation of consultation with NMFS regarding ongoing operations of the Cachuma Project under the provisions of Section 7 of the federal Endangered Species Act.

The request for consultation included a Biological Assessment dated April 1999, which proposed downstream releases for steelhead and numerous fish passage and habitat conservation measures for tributaries and the mainstem of the river to protect the southern steelhead. The proposed actions described in the Biological Assessment were designed to improve the availability and quality of habitat for the steelhead in the lower river. The project description portion of the Biological Assessment was revised in June 2000 and re-submitted to NMFS to formally initiate the consultation process.

NMFS issued a final BO in September 2000. The BO concluded that the proposed actions described in the Biological Assessment would not jeopardize the continued existence of the Southern ESU, nor destroy or adversely modify critical habitat. The BO included mandatory terms and conditions that require Reclamation to implement 15 specific reasonable and prudent measures to minimize "take" of the southern steelhead. Reclamation would implement the management actions and projects in the BO to ensure compliance with the Federal Endangered Species Act. Since 2000, Reclamation has already implemented several of the actions described in the Biological Assessment and included in the terms and conditions in the BO which do not require NEPA review (see Sections 2.3.2 and 3.4).

The BO concluded that the proposed management actions and projects described in the Biological Assessment and incorporated into the BO "*…if carried forward for many years into the future, will provide the small Santa Ynez River steelhead population with improved critical habitat conditions in the form of increased migration opportunity and better access to spawning and rearing areas in the watershed below Bradbury Dam, allowing the population to increase in size. Therefore, the proposed project is likely to appreciably increase the likelihood of survival and recovery of the ESU by increasing its numbers and distribution*"(p. 63 of the BO).

After issuance of the BO, the SYRTAC revised the draft FMP to ensure consistency with the BO and issued the final FMP in October 2000. The BO and FMP contain essentially the same primary management actions and projects.

2.3 SUMMARY OF PROPOSED FMP/BO PROJECTS

The proposed project/action addressed in this EIR/EIS consists of the management actions and projects described in the Biological Assessment, Final FMP, and BO. They are referred to collectively in the EIR/EIS as the "FMP/BO" projects. A listing of the FMP/BO projects is provided in Table 2-1.

2.3.1 Implementing Agencies and Funding Sources

Reclamation and the Cachuma Member Units (through COMB) would fund and implement the FMP/BO projects. The Consensus and Adaptive Management committees, formed through the 1994 Fish MOU, would provide advice on the administration of the projects. The Consensus Committee membership includes Reclamation, the County Water Agency, California Department of Fish and Game (CDFG), US Fish and Wildlife Service (USFWS), SYRWCD ID#1, Cachuma Conservation Release Board (CCRB, comprised of the South Coast Member Units), City of Lompoc, and SYRWCD. The Consensus Committee has responsibility for prioritizing projects and resolving conflicts. The Committee meets twice a year at public meetings.

The Adaptive Management Committee (AMC) is composed of Reclamation, NMFS, CDFG, CCRB, SYRWCD, USFWS, SYRWCD ID#1, and the City of Lompoc (an ad hoc non-voting member). The AMC reviews all reports and studies related to the FMP/BO projects in order to develop information to guide implementation of the FMP/BO projects. The AMC also manages uses of the Adaptive Management Account, releases from the Fish Passage Account, and how water is divided amongst the three release points in Hilton Creek.

COMB (on behalf of Reclamation and the Cachuma Project Member Units) would administer the day-to-day management of FMP/BO projects, conduct the required monitoring, and prepare necessary reports. A full time project COMB biologist is responsible for day-to-day activities related to the implementation of the projects and monitoring activities under the FMP/BO.

The Consensus and Adaptive Management committees are not separate public agencies or a joint powers agencies (although they include members of public agencies). These committees are advisory bodies that manage certain aspects of the FMP/BO projects. Other public agencies would implement specific projects depending upon funding sources, location of the project, and facilities affected. Agencies that may implement projects separately or jointly include Reclamation, COMB, CCRB, SYRWCD ID#1, County of Santa Barbara, and Caltrans.

TABLE 2-1
SUMMARY OF FMP/BO PROJECTS

	Included in the Fish Management Plan	Included in the Bio. Assessment and/or Bio. Opinion	Currently Being Implemented or has Been Completed	Requires Cooperation by Others	Current Level of Project Development and Design	Programmatic or Project Specific Impact Analysis
Releases For Fish						
1. Modified ramp-down schedule for water rights releases	X	X	Implemented beginning in July 2000		Fully developed	Not applicable
2. Maintain interim rearing target flows by releases from active storage	X	X	Implemented in 2000		Fully developed	Not applicable
3. Maintain long-term rearing target flows by releases after 3.0-foot surcharge	X	X			Fully developed	**Project**
4. Maintain residual pools in Alisal and Refugio reaches until 3.0 foot surcharge	X	X	Not yet required but will be implemented when needed		Fully developed	Not applicable
5. 3.0-ft surcharge to develop water for Fish Passage Account and Adaptive Management Account	X	X			Fully developed	**Project**
6. Releases from Fish Passage Account after 3.0-foot surcharge	X	X			Fully developed	**Project**
7. Releases from the Adaptive Management Account after 3.0-foot surcharge	X	X			Fully developed	**Project**
Hilton Creek Projects						
8. Hilton Creek cascade and bedrock chute passage project	X	X			Preliminary cons. plans	**Project**
9. Hilton Creek channel extension	X	X			Concept plan only	Program
10. Route 154 culvert modifications	X	X		Caltrans project only	Preliminary cons. plans	Project
Passage Impediment Removal Projects						
11. Passage impediment on Highway 1 Bridge over Salsipuedes Creek	X	X	Completed in 2002			Not applicable
12. Passage impediment on Jalama Road Bridge	New			County access provided; cooperative	Preliminary cons. plans	**Project**

	Included in the Fish Management Plan	Included in the Bio. Assessment and/or Bio. Opinion	Currently Being Implemented or has Been Completed	Requires Cooperation by Others	Current Level of Project Development and Design	Programmatic or Project Specific Impact Analysis
				landowner		
13. Quiota Creek passage impediment projects (3 crossings to be completed by County)	X			County access provided; cooperative landowner	Preliminary cons. plans	**Project**
14. Quiota Creek passage impediment projects (5 crossings not included in County plans)	X	X		County access provided; cooperative landowner	Preliminary cons. plans	**Project**
15. Passage impediment on El Jaro Creek (abandoned at-grade crossing)	X	X		County access provided; cooperative landowner	Concept only – site not examined yet	Program
16. Modification of culvert under Highway 101 along Nojoqui Creek **(will not be pursued due to infeasibility)**	X	X		Need Caltrans and private landowner	Determined to be infeasible; See Section 9.0 for basis of infeasibility	Not studied
17. Passage impediment due to Alisal Reservoir and dam **(will not be pursued due to infeasibility)**	X			Need landowner access	Determined to be infeasible; See Section 9.0 for basis of infeasibility	Not studied
18. Four passage impediments along San Miguelito Creek **(will not be pursued due to infeasibility)**	X			Unknown at this time	Determined to be infeasible. See Section 9.0 for basis of infeasibility	Not studied
19. Passage impediment on Nojoqui Creek (grade control structure)	New			Need landowner access	Concept only – site not examined yet	Program
Tributary and Mainstem Habitat Enhancements						
20. El Jaro Creek bank stabilization project	X	X		Cooperative Landowner	Preliminary cons. plans	**Project**
21. Tributary habitat enhancements, including conservation easements	X	X		Need landowner cooperation	No plans yet	Program
22. Mainstem habitat enhancements	X	X		Need landowner cooperation	No plans yet	Program
Other Conservation Actions						
23. Fish rescues	X	X	Not yet required but will be implemented	Private landowners in some cases	Fully developed	**Project**

	Included in the Fish Management Plan	Included in the Bio. Assessment and/or Bio. Opinion	Currently Being Implemented or has Been Completed	Requires Cooperation by Others	Current Level of Project Development and Design	Programmatic or Project Specific Impact Analysis
			when needed			
24. Public Education	X	X			In progress	Program
25. Address genetic impacts of stocking the lake with non-local stock – create hatchery or use sterile fish for stocking **(determined to be infeasible)**	X				Determined to be infeasible in the FMP; See Section 9.0 for basis of infeasibility	Not studied
26. Passage upstream of Bradbury Dam by fish ladder, passage channel, or trap and truck **(determined to be infeasible)**	X				Determined to be infeasible in the FMP; See Section 9.0 for basis of infeasibility	Not studied
27. Passage downstream of Bradbury dam by trap and truck of juveniles **(determined to be infeasible)**	X				Determined to be infeasible in the FMP; See Section 9.0 for basis of infeasibility	Not studied
Other Actions						
28. Monitoring	X	X	Currently being implemented			**Project**

Note: Reclamation installed the first phase of the Hilton Creek Supplemental Watering System in 1999, and will install the second phase in 2003. This project is independent of the FMP/BO, and was mitigation for the Bradbury Dam Seismic Modification Project. However, the BO requires that Reclamation to maintain flows in lower Hilton Creek at levels no lower than 2 cfs once the pump system under Phase 2 of the Hilton Creek Supplemental Watering System has been installed, unless the AMC decides otherwise and NMFS approves.

The responsibility for permitting and any subsequent environmental review for each FMP/BO project would rest with the implementing agency. Certain projects may require a 404 permit from the Corps of Engineers, Streambed Alteration Agreement from the CDFG, and/or 401 water quality certification from the Regional Water Quality Control Board. Subsequent CEQA and NEPA environmental review would be required for the FMP/BO projects described in this EIR/EIS at a programmatic level.

The FMP/BO projects would be implemented by Reclamation and COMB using funds from the Cachuma Contract Renewal Fund (Renewal Fund), the Warren Act Trust Fund (Trust Fund), and grant funding from other sources. The Renewal Fund was established in 1996 as part of the renewed Master Contract between Reclamation and Santa Barbara County Water Agency on behalf of the Member Units to support studies required under WR 94-5 (including fish studies, Member Unit-Lompoc negotiations regarding water quality, and hydrology studies), and restoration of fish habitat along the lower river. The Trust Fund was created through a contract among Reclamation, the Member Units, and the Central Coast Water Authority (which includes the Cachuma Project Member Units) to allow State Water Project water to be transported through the Cachuma Project facilities to the South Coast. The Trust Fund is available for both environmental restoration and water management projects. The annual amount in the Renewal Fund and Trust Fund will vary each year, generally ranging from $200,000 to $300,000. In addition to these funds, Reclamation, COMB, and CCRB are seeking funds from other sources such as the CDFG Fishery Restoration Grants Program, California Coastal Salmon Recovery Program, National Fish and Wildlife Foundation, and California Coastal Conservancy.

2.3.2 FMP/BO Projects that Have Been Completed or Are Now Operative

One FMP/BO project has been completed -- the removal of a passage impediment at the Highway 1 bridge over Salsipuedes Creek (Project No.11, Table 2-1). That project was completed in January 2002. COMB designed the project, completed a CEQA process (Negative Declaration), acquired state and federal permits to work in the creek, and managed the construction. The project was funded by state grants.

Two other FMP/BO management actions involving flow-related measures have also been implemented as required under the BO. Since July 2000, Reclamation has used a modified flow schedule when ramping down water rights releases to the Santa Ynez River. This action is included in the BO and listed in Table 2-1 as Project No. 1. Reclamation voluntarily initiated a similar ramp-down regime in 1994.

In September 2000, Reclamation began releases from Bradbury Dam to meet interim target flows for steelhead rearing at Highway 154 bridge (Project No. 2, Table 2-1). These releases have continued since that date in accordance with the BO, and continue until surcharging (Project Nos. 3 and 6, Table 2-1) is approved and implemented, at such time, long-term rearing flows would be maintained as required by the BO.

Reclamation is prepared to maintain residual pools along the Refugio and Alisal reaches (Project No. 4, Table 2-1), if lake storage conditions are appropriate, as required in the BO. Reclamation also has the resources to implement fish rescue operations (Project No. 23, Table 2-1) if circumstances require it per the BO.

All other FMP/BO projects cannot be implemented without additional design, detailed environmental review, landowner cooperation, funding, and/or acquisition of state and local permits.

It should be noted that Reclamation installed the first phase of the Hilton Creek Supplemental Watering System in 1999, which is a project to mitigate impacts of the Bradbury Dam Seismic Modification Project also completed in 1999. Phase 1 of the project consists of a gravity feed from the reservoir through existing pipes in the dam that provides water to lower Hilton Creek to enhance steelhead habitat conditions in the summer. The second phase of the system, a flexible intake and pump system, would be completed by 2004. Reclamation is solely responsible for implementing the project, which is restricted to federal lands. Reclamation completed a NEPA Categorical Exemption for the second phase of the project in April 2002.

2.3.3 Projects Deemed Infeasible and Not Included in the EIR/EIS

The following project were deemed infeasible by SYRTAC in the Final FMP (SYRTAC, 2000) and were not addressed or otherwise included in the consultation with NMFS or included in the BO:

Project 25. Genetic Protection of Southern Steelhead Populations

Project 26. Access for Adult Steelhead to the Upper Watershed

Project 27. Downstream Passage for Outmigrating Juveniles from the Upper Watershed

Both Reclamation and COMB agreed with the determination of infeasibility by SYRTAC (2000), which include (among others), CDFG, USFWS, and NMFS. Reclamation and COMB would study these alternatives in the future to determine if their feasibility status has changed over time. The environmental impacts of these projects are not evaluated as part of the proposed project. A description of the basis for concluding that these projects were infeasible is presented in the Section 10 of the EIR/EIS. In addition, a program level impact analysis is provided for these infeasible alternatives in Section 10.

The following projects were included in the FMP, but have been determined to be infeasible based on recent investigations by COMB. As such, these projects would not be pursued further by Reclamation or COMB. A description of the COMB's basis for concluding that these projects were infeasible is presented in the Section 10 of the EIR/EIS.

- Project 16. Modification of culvert under Highway 101 along Nojoqui Creek
- Project 17. Passage impediment due to Alisal Reservoir and dam
- Project 18. Four passage impediments along San Miguelito Creek

Project No. 16 was also included in the BO as Passage Impediment Project No. 6 (page 14 of the BO). Reclamation now considers this project to be infeasible and would not implement it.

Terms and Conditions No. 4 of the BO states that "*Reclamation will reinitiate consultation with NMFS if information is available indicating that the planned tributary passage impediment and barrier fixes will not be completed by 2005. Reclamation will provide the following information, at minimum: (1) Explanation of the delay in completing this aspect of the proposed action; and (2) steps Reclamation will take to complete this aspect of the proposed action and a new anticipated date of completion.*" At this time, Reclamation has not formally requested reinitiation of the endangered species consultation with NMFS, pending final decisions on all passage impediment projects addressed in the EIR/EIS.

2.3.4 Implementation Schedule and Near-Term Funding

The various FMP/BO projects would be completed individually based on funding, approvals, and landowner cooperation. The estimated completion dates of the projects are shown in Table 2-2, including the completion dates specified in the BO. The first priority for implementation will be projects and actions on federal lands and under the jurisdiction of Reclamation such as surcharging, downstream releases (already initiated), and the Hilton Creek projects.

TABLE 2-2
FUNDING SOURCE AND TARGET COMPLETION DATES FOR FMP/BO PROJECTS*

Project/Action	Funding Source	Target Completion Date
Releases For Fish		
1. Modified ramp-down schedule for water rights releases	N/A	Currently Operative
2. Maintain interim rearing target flows by releases from active storage	N/A	Currently Operative
3. Maintain long-term rearing target flows by releases after 3.0-foot surcharge	N/A	2004** (BO: 2005)
4. Maintain residual pools in Alisal and Refugio reaches until 3.0 foot surcharge	N/A	Currently Available
5. 3.0-ft surcharge to develop water for Fish Passage Account and Adaptive Management Account	Flashboards funded by grants acquired by COMB	2003-04** winter (BO: 2005)
6. Releases from Fish Passage Account after 3.0-foot surcharge	N/A	2004** (BO: 2005)
7. Releases from the Adaptive Management Account after 3.0-foot surcharge	N/A	2004** (BO: 2005)
Hilton Creek Projects		
8. Hilton Creek cascade and bedrock chute passage project	State grants and COMB staff resources	2004 (BO: 2000)
9. Hilton Creek channel extension	Unknown	2005 (BO: 2004)

Project/Action	Funding Source	Target Completion Date
10. Route 154 culvert modifications	Caltrans	2003 (BO: 2003)
Passage Impediment Removal Projects		
11. Passage impediment on Highway 1 Bridge over Salsipuedes Creek	State grants and COMB staff resources	Completed
12. Passage impediment on Jalama Road Bridge	State grants and COMB staff resources	2003
13. Quiota Creek passage impediment projects (3 crossings to be completed by County)	Santa Barbara County	2003
14. Quiota Creek passage impediment projects (5 crossings not included in County plans)	State grants and COMB staff resources	2004 (BO: 2003)
15. Passage impediment on El Jaro Creek (abandoned at-grade crossing)	State grants and COMB staff resources	2005 (BO: 2005)
19. Passage impediment on Nojoqui Creek (grade control structure)	Unknown	Not scheduled
Tributary and Mainstem Habitat Enhancements		
20. El Jaro Creek bank stabilization project	State grants and COMB staff resources	2003
21. Tributary habitat enhancements, including conservation easements	Unknown	Not scheduled
22. Mainstem habitat enhancements	Unknown	Not scheduled
Other Conservation Actions		
23. Fish rescues	COMB	As needed
24. Public Education	COMB	To be initiated in late 2003
Other Actions		
28. Long-term monitoring	COMB	In progress

* Only feasible projects are listed above. ** Pending sufficient inflow to the lake to cause surcharging.

As noted earlier, Reclamation has already implemented the interim release for rearing flows and water rights ramping regime. The following projects have been fully developed and are ready for implementation upon completion of the environmental review process, final design, and acquisition of required permits: 3.0-foot surcharging and long-term rearing releases and passage releases; Hilton Creek passage impediment project on Reclamation property, Route 154 culvert modification by Caltrans on Caltrans property, Jalama Road Bridge passage impediment project on private property (landowner access already acquired), Quiota Creek passage impediment projects (including the County's project) on private property (landowner access already acquired), and El Jaro Creek Bank Stabilization Project on private property (landowner access already acquired). These projects are described in detail in this section of the EIR/EIS. All other projects are described at a conceptual level.

Based on available funding, Reclamation and COMB would be able to implement the following projects after the completion of the EIR/EIS process and acquisition of required permits: Hilton Creek passage removal project, installation of flashboards for surcharging, releases for long-term rearing and passage (if the reservoir surcharges), passage impediment project along Quiota Creek (five crossings), and some or all of the El Jaro Creek bank stabilization project. It is anticipated that Caltrans would modify the Route 154 culvert in 2004 and that the County of Santa Barbara would complete three passage impediment projects along Quiota Creek in 2003.

In the event that Reclamation and COMB cannot complete a project in accordance with the schedule in the BO, Reclamation would contact NMFS to determine if the endangered species consultation must be reinitiated, and to establish a new deadline for completion of the project. The BO only requires reinitiation of formal consultation under the following circumstances:

- The amount of take specified in the BO is exceeded
- 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 the BO
- The proposed action (i.e., Cachuma Project operations) is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in the BO
- A new species is listed or critical habitat designated that may be affected by the action (i.e., Cachuma Project operations)
- The tributary passage projects on Hilton Creek (2), Salsipuedes Creek, Quiota Creek, El Jaro Creek, and Nojoqui Creek would not be completed by 2005
- If upgrading the Hilton Creek Supplemental Watering System (Phase 2 of the project) requires shutting down flows to the creek
- If Reclamation is unable to implement the 3.0-foot surcharge in Spring 2005 (i.e., flashboards are not installed or approval to proceed is still forthcoming)

2.3.5 Role of Private Landowners

The FMP and BO acknowledge that most of the rainbow trout/steelhead habitat in the lower watershed occurs on private property. Hence, all recommended management actions on private property would be implemented only through voluntary participation by the affected private landowners. The projects that require landowner approval are shown in Table 2-1. Landowner approval will range from temporary construction access to acquisition of a permanent easement for installation of a structure. The projects that will require the greatest amount of landowner coordination are the projects on Quiota, Nojoqui, and El Jaro creeks. The extent and type of landowner cooperation is described for each individual project below. Landowner permission has been acquired for the El Jaro Bank Stabilization Project. COMB has met with landowners affected by the Quiota Creek passage impediment projects and received positive responses about the projects.

Reclamation and COMB have been discussing the Hilton Creek passage impediment projects (on Reclamation and Caltrans properties) with representatives of the San Lucas Ranch. The Ranch includes property above the Hilton Creek impediments to be removed, as well as the reach of the Santa Ynez River between Bradbury Dam and Highway 154. The purpose of the communications is to address concerns by the property owner about the potential effect of the Hilton Creek projects and the releases from Bradbury Dam (for fish purposes) on their property. Reclamation and COMB seek to resolve any concerns and work cooperatively with the landowner.

2.3.6 Implications of Adaptive Management Approach

The FMP/BO is based on an adaptive management strategy in which a long-term monitoring would be implemented to observe trends in habitat conditions and steelhead populations. The performance of each management action would be monitored and modified to improve its effectiveness and/or to respond to annual variations in hydrologic conditions. In the event that project or management action that was included in the BO needs to be substantially modified or is determined to be infeasible or ineffective, Reclamation would need to contact NMFS to determine if the endangered species consultation must be reinitiated, and what, if any, additional actions must be taken.

2.3.7 Differences Between FMP and BO

Reclamation and COMB have attempted to ensure that the BO and FMP contain the same suite of management actions and projects to create consistency and reduce confusion. This goal has been mostly achieved. However, there are some minor differences in specific actions and projects described in the BO and FMP. Despite these differences, Reclamation and COMB consider the proposed management actions and projects to be a single, integrated strategy for protecting steelhead and other aquatic species on the Lower Santa Ynez River. Differences in the FMP and BO are noted below.

The FMP contains one feasible action and project that was not included in the BO – Project 13 (Table 2-1). This project is the removal of three passage impediments (at-grade road crossings) along Quiota Creek in addition to the five to be removed by Reclamation and COMB as part of Project 14 (Table 2-1). This project would be funded and implemented by the County of Santa Barbara Public Works Department.

Two additional fish passage impediment removal projects have been recently identified by COMB and tentatively approved by the SYRTAC for consideration as part of the FMP. These projects were not included in the Final FMP. They were identified after issuance of the Final FMP and include: (1) Project 12 - modification of the passage impediment associated with the Jalama Road Bridge over Salsipuedes Creek; and (2) Project 19 - modification of a possible passage impediment along Nojoqui Creek about 4 miles upstream of its confluence with the Santa Ynez River, consisting of a rock grade control structure. The addition of other projects is evidence of the flexibility inherent in the adaptive management approach used in the FMP.

The BO includes the following management actions, approvals, studies, and monitoring actions not formally included in the FMP as management actions. Several of these items were acknowledged in the FMP as actions required under the BO.

- Condition 2 of the BO requires Reclamation to maintain flows in lower Hilton Creek at levels no lower than 2 cfs once the pump system under Phase 2 of the Hilton Creek

Supplemental Watering System has been installed, unless the AMC decides otherwise and NMFS approves.

- Condition 3 of the BO requires Reclamation to design a strategy within six months of the issuance of the Biological Opinion to further refine the supplemental passage flow releases. Such a strategy shall include shifting supplementing passage releases from dry years when releases may not be helpful to the steelhead population in the Santa Ynez and review of storm flow decay curves (mean, median, etc.,) and other methodologies for providing increased migration availability. The Adaptive Management Committee is currently evaluating alternative passage flow criteria, and determining whether alternative flow releases would have greater benefits than the approach included in the BO.

- Condition 4 requires that Reclamation re-initiate consultation with NMFS if the planned tributary passage projects would not be completed by 2005. Reclamation must explain the delay and provide an action plan and schedule for completion.

- Condition 5 prohibits mixing State Water Project water with releases from the lake during the months of December through June unless there is discontinuous flow along the river downstream of the dam.

- Condition 6 requires that Reclamation monitor steelhead downstream of the dam during the next three years to confirm that they are not encouraged to move downstream by water rights releases where they could be stranded after releases end.

- Condition 8 requires that NMFS approve final design for the tributary passage impediment projects, the El Jaro Creek sediment management demonstration project, and mainstem and tributary habitat enhancement projects.

- Condition 10 requires that all decisions by the Adaptive Management Committee that could affect steelhead must be approved by NMFS before they are implemented.

- Condition 14 requires that Reclamation reinitiate consultation with NMFS if the water supply line to Hilton Creek must be temporarily shut down during the upgrading of the water supply line.

- Condition 15 requires that Reclamation design and implement a strategy with NMFS to verify the predicted benefits of the releases for rearing and passage along the mainstem.

2.4 FMP/BO PROJECTS INVOLVING DOWNSTREAM RELEASES FOR FISH

2.4.1 Ramping Schedule for Water Rights Releases

Releases are made from Bradbury Dam to meet downstream water rights requirements under WR 89-18 and any future modification of Reclamation's water rights permit that could occur at the upcoming WR 94-5 hearings. These releases are typically made between the late spring and early fall, with flow patterns designed to recharge the alluvium between the dam and the Lompoc Narrows as well as in the Lompoc Plain. Water releases do not occur in wet years when the alluvial and the Narrows aquifers are full. They occur in years with average or less than average runoff. The releases typically occur, on average, every 3 years. Releases are only made when flows in the river are discontinuous between the dam and the Pacific Ocean. Releases are managed to ensure that water does not discharge to the ocean.

The ramping down of water rights releases would be managed to avoid stranding of steelhead and other fish along the lower Santa Ynez River below Bradbury Dam as water rights releases are returned to the rearing target flows at Highway 154 (described below). The new ramping schedule is shown below in Table 2-3 and applies to all water rights releases. By ramping down flows in these prescribed increments, fish will have greater opportunity to move to deeper water and avoid being stranded.

TABLE 2-3
RAMP DOWN SCHEDULE FOR DOWNSTREAM WATER RIGHTS RELEASES FROM THE DAM OUTLET WORKS

Water Rights Release Rate (cfs)	Maximum Ramp Down Increment (cfs)	Minimum Ramp Down Interval (hours)
> 90	25	4
90 – 30	10	4
30 – 10	5	4
10 – 5	2.5	4
5 – 3.5	1.5	4
3.5 – 2.5	1	4

Reclamation began a modified ramp-down schedule in 1994 as part of the MOU fish studies and releases. The above schedule was implemented as part of the water rights releases in July 2000, and has been used since that time. The ramp-down schedule is consistent with, and allowable under, Reclamation's water rights permit from the State Water Board.

2.4.2 Maintain Residual Pool Depth

Description of the Action

The BO requires that until the 3.0-foot surcharge is achieved and the 11 passage impediments along the mainstem and tributaries are completed, Reclamation must maintain pools in the Alisal and Refugio reaches of the Santa Ynez River mainstem in spill years and the first year after spill years, if steelhead are present. The Refugio Reach along the Lower Santa Ynez River is 4.8 miles long and extends from Highway 154 to Refugio Road. The Alisal Reach is 2.6 miles long and extends from Refugio Road to Alisal Road in Solvang.

This action would be accomplished by maintaining residual pool depth using releases from Bradbury Dam or by providing water from nearby SYRWCD ID#1 groundwater wells (which will have cooler water). Residual pool depth is the difference between the elevation of the deepest point in the pool and the elevation of the lowest point of the crest (outlet depth) that forms the hydraulic control in the pool. The number and location of pools varies considerably from year to year due to hydrologic changes in the river.

Implementation

Each spill year or year following a spill, Reclamation and COMB would determine the presence of steelhead along the Alisal and Refugio reaches by conducting routine bank and snorkel surveys of the likely pool, run, and riffle habitats. For those reaches where landowner permission is granted, bank and snorkel surveys would be conducted in May/June, August and October. The May/June survey would document the number and locations of oversummer steelhead/rainbow trout. The August survey would evaluate the in-stream rearing conditions and survival during the critical summer period. The October survey would indicate the overall oversummering success.

In years when residual pool depth must be maintained, Reclamation would make releases from Bradbury Dam or, through an agreement with SYRWCD ID#1, provide water from nearby SYRWCD ID#1 wells, as necessary, to maintain residual pool depth in the Alisal and/or Refugio reaches, wherever steelhead are determined to be present. The amount, month, and duration of water to be released from the dam or discharged from wells cannot be predicted at this time.

Reclamation and COMB would monitor water depth in pools during releases to determine if the minimum pool depth is being achieved by the releases. Residual pool depths would be monitored in both the Alisal and Refugio reaches. During the June snorkel surveys, those pools with oversummering steelhead/rainbow trout would be monitored for depth using visual observations at the pool tail crest located at the bottom of the pool habitat and in the region between where the pool ends and the next habitat begins. Monitoring would occur on a weekly basis. As long as water flows over the pool tail crest, residual pool depth would be maintained.

2.4.3 Mainstem Rearing Releases

Objective and Benefits

The objective of this management action is to improve and increase summer rearing habitat conditions for steelhead in the upper mainstem below Bradbury Dam, as well as in lower Hilton Creek. A description of the benefit on steelhead rearing habitat along the river downstream of Bradbury Dam is provided in the Biological Assessment (Reclamation, 2000).

To establish additional rearing habitat along the river, *long-term* target flows would be maintained at two locations on the mainstem below the dam. The target flows would be produced by a combination of natural runoff and releases from Cachuma Lake. Releases made to meet the target flows would be conjunctively operated with the downstream water rights releases described above. That is, when releases are being made for water rights, the water from this account would be used to meet the mainstem target flows.

Long-term Rearing Target Flows

The long-term rearing flows under various reservoir conditions are summarized in Table 2-4. There are two target locations – at the bridges for Highway 154 and Alisal Road. The target flows vary with reservoir storage. Under the proposed release regime, continuous flows would be provided in all but the driest years to Highway 154 (a distance of 2.9 miles).

In spill years and the year following a spill, flow would be maintained between the dam and Alisal Road (a distance of 10.5 miles). This action would result in year-round flows with good quality steelhead rearing habitat in the upper mainstem and Hilton Creek during and after wet periods.

TABLE 2-4
LONG TERM MAINSTEM REARING TARGET FLOWS

Lake Storage Conditions (acre-feet)	Reservoir Spill? (AF = acre-feet)	Long Term Target Flow (cfs)	Long Term Target Site
> 120,000	Spill is greater than 20,000 AF	10	Highway 154
> 120,000	Spill is greater than 20,000 AF	1.5 (if steelhead present)*	Alisal Road
> 120,000	No spill or spill is less than 20,000 AF	5	Highway 154
> 120,000	If spill is greater than 20,000 AF in previous year	1.5 (if steelhead present)*	Alisal Road
30,000 - 120,000	No spill	2.5	Highway 154
< 30,000	No spill	Periodic release; < or = 30 AF/month**	Stilling basin & long pool

* Only if steelhead are present in the Alisal Reach.
** Reclamation must also consult with NMFS in this situation.

In years when Cachuma Lake spills 20,000 acre-feet or more, release would be made to maintain flows between the dam and Highway 154 Bridge at 10 cfs. In years when the lake has a small spill (less than 20,000 acre-feet) or does not spill but has at least 120,000 acre-feet of storage, the target flow at Highway 154 would be 5 cfs. When Cachuma Lake storage is below 120,000 acre-feet but greater than 30,000 acre-feet, the target flow at Highway 154 would be 2.5 cfs. If storage recedes to less than 30,000 acre-feet (as during a drought), 30 acre-feet per month would be released to maintain cool temperatures in the stilling basin and long pool below Bradbury Dam. The SYRTAC (2000) estimates that flows at Highway 154 would meet or exceed 2.5 cfs about 98 percent of the time under the proposed release regime for long-term rearing flows.

Target flows at Alisal Road Bridge are also shown in Table 2-4. In years when the Cachuma Lake spill exceeds 20,000 acre-feet and steelhead are present in the Alisal Reach, the target flow to be maintained by releases is 1.5 cfs. The same target flow would apply in a year following a spill of this amount if steelhead are present. The SYRTAC (2000) estimates that flows at Alisal Road Bridge would meet or exceed 1.5 cfs about 75 percent of the time.

Release Points

Releases for rearing habitat would be made primarily through the Hilton Creek supplemental watering system (described below) designed to deliver water to three release points: two along Hilton Creek and one in the stilling basin (Figure 2-1). The capacity of this system would be 10 cfs upon completion of Phase 2 of the project. The system is currently operating by gravity, and as such, its capacity is limited by the reservoir level. A flexible intake and pump system to provide the full 10 cfs capacity and to ensure operations when the reservoir level is low would be installed in 2003. Releases for the rearing target flows would only occur from the Hilton Creek supplemental watering system (once it has been completed in 2003) and would not exceed 10 cfs. This maximum release would not be sufficient to meet the downstream target flows (see Table 2-4) in all years that such flows are required, as described in the Biological Assessment (page 3-13).

Releases for downstream water rights would continue to be made from the dam outlet works. Releases for fish were purposely designed to occur from the Hilton Creek supplemental watering system to avoid conflicts with delivery of SWP water to the same outlet works.

2.4.4 Fish Passage Supplementation

Objectives and Benefits

The objective of this management action is to create additional migration opportunities in the river for steelhead to reach: (1) tributaries downstream of Bradbury Dam, particularly those tributaries where the proposed FMP/BO management actions have eliminated passage impediments (e.g., Hilton Creek, Quiota Creek, Salsipuedes Creek); and (2) the mainstem reach of the Santa Ynez River upstream of Highway 154 where FMP/BO management actions are proposed to maintain existing steelhead rearing and spawning habitat. A description of the benefit of improving steelhead passage to the river below Bradbury Dam and on tributaries to the river is provided in the

Biological Assessment (Reclamation, 2000). To improve passage conditions, Reclamation would dedicate a specific amount of water to a Fish Passage Account (3,200 acre-feet; see Table 2-5) that would be used to provide additional upstream and downstream migration. The account would not be subject to evaporation or seepage losses, and can be carried over to subsequent years, provided there are no spills. In the event of a spill, the account would be reset.

TABLE 2-5
ALLOCATION OF SURCHARGED WATER

Surcharge Level (feet)	Purpose and Account, if Applicable	Total Amount of Water Developed for Fish Releases in Surcharge Years (acre-feet)	Surcharge Allocation for Releases Limited by Accounts (acre-feet)
0.75 (current)	Interim rearing target flows	2,300	Not applicable*
3.0 (proposed)	Long-term rearing target flows	9,200	Not applicable*
	Fish Passage Account (to supplement migration flows)**		3,200
	Adaptive Management Account (for rearing or passage flows)**		500

* Rearing flows are not limited by the amount of water developed by surcharging. These flows are established by release requirements shown in Table 2-4 independent of surcharging.
**A description of these accounts is provided in Section 2.4.

Proposed Releases

Under this management action, water would be released from Bradbury Dam during the period January through May to extend the receding limb of naturally occurring storm hydrographs once the sandbar at the mouth of the river has been naturally breached. Releases would be made after a storm has ended and flows have receded to 150 cfs at Solvang. A specified release regime has been developed that was designed to create a flow recession downstream of Bradbury Dam. The shape of the recession curve was based on measured flows upstream of Lake Cachuma.

The combination of natural flows and the Fish Passage Account releases would provide 14 days or more of passable flows on the storm recession to facilitate steelhead migration to the mainstem and tributaries above Alisal Road (Reclamation, 2000). In the event that storms do not produce 150 cfs at Solvang, releases (up to 150 cfs) would be made to reach this flow level through the outlet works at Bradbury Dam. Flows would be monitored at the USGS gage at Solvang to determine if the targeted recession flows are being attained.

Water would be released to supplement passage beginning in the year following a surcharge year, and in subsequent years until the account has been depleted. The Fish Passage Account would be allocated 3,200 acre-feet in years when the reservoir surcharges to 3 feet (see Table 2-5). The release regime would be monitored closely to provide information to the Adaptive Management Committee to determine if adjustments are needed. The Adaptive Management Committee is currently evaluating the proposed release regime, pursuant to Terms and Condition No. 3 of the BO, to ensure its effectiveness.

Relationship to Surcharging

The Fish Passage Account and associated passage releases would not be implemented until there is a 3.0-foot surcharge (see Section 2.5). If the proposed surcharge is not implemented by 2005, Reclamation would reinitiate endangered species consultation with NMFS, as described in Section 2.3.4.

2.4.5 Adaptive Management Account

The objective of this management action is to provide additional releases for future habitat needs that would be identified under the adaptive management program. A 500-acre-foot Adaptive Management Account would be established in years when the reservoir surcharges 3 feet (Table 2-5). The account would not be subject to evaporation or seepage losses, and can be carried over to subsequent years, provided there is no spill. In the event of a spill, the account would be reset.

The account would be used at the discretion of the Adaptive Management Committee to benefit steelhead and their habitat as determined by the committee. The account water can be used to increase releases for mainstem rearing, provide additional flows to Hilton Creek, or provide additional water for passage flows. The Committee is composed of Reclamation, CCRB, SYRWCD ID#1, SYRWCD, NMFS, CDFG, and USFWS. This action would only be implemented after the 3.0-foot surcharge project (Section 2.5) has been completed.

2.5 RESERVOIR SURCHARGING

2.5.1 Relationship to Releases for Fish Rearing and Passage

Reclamation would implement the long-term target flows once a 3.0-foot surcharge has been implemented in order to provide additional water in the reservoir to support the various proposed releases for fish included in the FMP and BO. A surcharge is created by increasing the heights of the gates on the spillway, and therefore raising the water level and increasing the volume in Cachuma Lake. In the FMP and Biological Assessment, Reclamation proposed to surcharge in two phases: a 1.8-foot surcharge and a 3.0-foot surcharge. Since the issuance of the BO and completion of the Final FMP, Reclamation and COMB have decided to pursue a 3.0-foot surcharge without an interim surcharging at 1.8 feet, as described below. The 0.75-foot surcharge is part of current operations and would continue until a 3.0-foot surcharge is implemented.

The amount of water stored in the lake during when a 3.0-foot surcharge occurs is shown in Table 2-5. In addition, the amount of water stored during the current 0.75-foot surcharge is presented. The current surcharge was initiated in 1993 to provide water for downstream releases for fish pursuant to the 1994 Fish MOU.

When the reservoir spills, the accounts shown in Table 2-5 are deemed to spill and the accounts would receive a new allocation based on the amount of surcharge. Otherwise, unused water from each account is carried over to the next year.

The BO required that Reclamation implement the conjunctive water rights release program for rearing target flows following the issuance of the BO, which occurred in September 2000. The BO required that <u>interim</u> target flows be made until the 3.0-foot surcharge occurs, at which time the long-term target flows (shown in Table 2-4) must be implemented. The interim rearing target flows are described in Section 3.4 and summarized in Table 3-5. Reclamation began releases to meet interim target flows in the fall of 2000 and would continue such releases until a 3.0-foot surcharge is implemented. The interim target flows are less than the long-term target flows, and only need to be met at Highway 154.

2.5.2 Method and Schedule of Surcharging

Temporary surcharging currently occurs when the lake fills and water is spilled through the outlet works and/or four radial gates at the spillway. By manipulating the openings below the gates, the elevation of the water in the lake can be modified. When the gates are raised, water passes under them in a controlled manner, depending upon the height of the openings below the gates. If the gates are fully opened, the reservoir could temporarily surcharge up to a maximum water elevation of 760 feet under an extreme flood condition (which has not occurred to date). The elevation and duration of the temporary surcharge depend upon inflow. Temporary surcharges of 3 to 4 feet for several hours have been observed during flood events of 1998 and 2001 when the lake spilled.

The normal operating water level in the lake of 750.75 feet is established when the four radial gates at the spillway are closed. The original gate elevation is 750 feet; however, a one-foot high gate height extension (called a flashboard) was installed in 1960 on each of the gates to allow Reclamation to regulate the filling of the reservoir to 750 feet, while allowing one foot of freeboard. Beginning in 1998-99 winter, Reclamation used 0.75 feet of the gate height extension to regulate the lake storage elevation to a new elevation: 750.75 feet. The remainder of the gate height extension (0.25 feet or 3 inches) is used for freeboard.

The proposed surcharge or permanent increase in the maximum operational lake level would be accomplished by replacing the current one-foot high flashboards with 4-foot high flashboards, as shown on Figure 2-2. The new flashboards would be bolted to the top of each gate and supported by a metal arm attached to the hub of the gate. The new flashboards would only be used to create a 3.0-foot high surcharge; the additional foot would only be used for freeboard, not additional surcharging.

Installation of the flashboards involves the use of small truck mounted equipment and manual labor. Prior to installing the flashboards, each of the four radial gates will be sand blasted and painted. Flashboards would be lifted by a small crane or winch and bolted to the top of each gate. This work can occur during any lake level because stop logs would be placed upstream of each gate bay to isolate the gate from the lake. The gates would be accessed from the top of the spillway using ladders and winches. The work would be completed in about 4 weeks.

A two-phased approach for surcharging was presented in the Biological Assessment, BO, and FMP – an initial 1.8-foot surcharge followed in time by a 3.0-foot surcharge. This approach was based on the assumption that the 1.8-foot surcharge could be accomplished immediately after issuance of NMFS' BO, and that implementing the 3.0-foot surcharge would require additional time to complete a new environmental review. After issuance of the BO and completion of the Final FMP, Reclamation and COMB determined that current environmental documentation was insufficient to allow a 1.8-foot surcharging.

In light of this circumstance, Reclamation and COMB decided to pursue the 3.0-foot surcharge immediately without the interim 1.8-foot surcharge. Reclamation and COMB now propose to install the flashboards in 2003, pending completion of the NEPA and CEQA environmental review processes. This would allow for a 3.0-foot surcharge in the 2003/2004 winter if there was enough runoff. In the FMP and BO, Reclamation originally anticipated that the gates would be modified to allow 3.0-foot surcharging by 2005, either during early 2005 (late runoff from 2004-2005 winter) or late 2005 (early runoff from 2005-2006 winter), if there is sufficient runoff.

In the event that Reclamation does not have the ability to surcharge 3 feet in the Spring 2005 (as proposed in the Biological Assessment), Reclamation would reinitiate their endangered species consultation with NMFS pursuant to the BO (page 6 of the BO).

2.6 HILTON CREEK PROJECTS

2.6.1 Introduction

Hilton Creek is a small intermittent stream located downstream of Bradbury Dam (Figure 2-1). The watershed encompasses about four square miles. The lower 2,980 feet of the creek are located on federal land acquired by Reclamation for the construction of Bradbury Dam (Figure 2-1). The rest of the creek and its watershed are located on private property – the San Lucas Ranch – with the exception of the Route 154 right-of-way owned by Caltrans. The reach below Route 154 is about 4,200 feet long. The upper 1,220 feet are located on San Lucas Ranch. A concrete arched culvert conveys Hilton Creek under Route 154. The portion of the creek on Reclamation property downstream of Route 154 was realigned during the construction of Bradbury Dam. The new alignment passes through bedrock formations west of the original alignment.

The lower reach of Hilton Creek is a high gradient, confined stream shaded by mature riparian trees. The SYRTAC (2000) has observed that the lower reach on Reclamation property goes dry in the early summer during both wet and average years (prior to the installation of the supplemental watering system). As such, many, if not most of the juveniles were lost as the summer progressed. These fish were either stranded or forced to move downstream to the mainstem of the Santa Ynez River where they were vulnerable to predatory fish.

The SYRTAC (2000) concluded that lower Hilton Creek on Reclamation property is suitable for steelhead spawning and rearing under pre-project conditions, but that steelhead occurrence is limited by intermittent flows and several passage impediments. The objectives of the prior and proposed projects on lower Hilton Creek are to improve spawning and rearing habitat conditions in order to increase steelhead use of this portion of the creek on federal land, as well as to increase the opportunity for steelhead to utilize the creek upstream of federal property when suitable hydrologic conditions are present. To the extent that there is increased production of fish on Hilton Creek, the entire population in the lower watershed would benefit.

Under the proposed action, Reclamation would implement the following FMP/BO actions to enhance spawning and rearing habitat on lower Hilton Creek on federal lands: (1) construct passage facilities at a passage impediment to allow movement to upper Hilton Creek; and (2) extend the lower portions of the creek 1,500 feet to provide additional habitat. In addition, Caltrans proposes to improve passage conditions in the culvert under Route 154 to provide more opportunity to upper Hilton Creek. These projects are described below.

Prior to completion of the FMP and BO, Reclamation installed a supplemental watering system on Hilton Creek to improve summer rearing habitat. This project represented a mitigation measure to address impacts of the Bradbury Dam Seismic Modification Project completed in 1999. The first phase of the supplemental watering system was completed in 1999. It consists of a gravity feed from the reservoir through existing pipes in the dam that provides cool water (when the reservoir level is high) to enhance habitat conditions in the summer along lower Hilton Creek. There are three delivery points – two on Hilton Creek and one at the Stilling Pool.

The second phase of the system, a flexible intake and pump system, would be completed by 2004. This project would be funded and constructed by Reclamation, and restricted to federal lands. It would include a submerged snorkel system (flexible intake) to access deeper and cooler water in the reservoir. A snorkel would be attached to a floating barge at the upstream side of the dam. A second barge would support the pump system and would be installed to operate at low lake elevations, thereby ensuring consistent water deliveries to Hilton Creek. Water would be discharged into an existing pipe network in the dam for delivery to the three existing discharge points on Hilton Creek. The gravity system would have a maximum capacity of 10 cfs. Reclamation completed a NEPA Categorical Exemption for the second phase of the project in April 2002.

The Hilton Creek Supplemental Watering System would be used to implement releases specified in the FMP/BO. A 2 cfs minimum year-round flow in Hilton Creek would be maintained once the pump system has been installed under Phase 2 of the project, ensuring flows in the lower reach 98 percent of the time (SYRTAC, 2000). [Note: the minimum 2 cfs flows are already being met with the current gravity system because the reservoir levels are adequate]. Releases from the watering system are currently managed by the Adaptive Management Committee, and would continue to managed by this committee under the FMP/BO.

The supplemental watering system and the proposed passage impediment and channel extension projects are part of a coordinated effort to improve conditions for steelhead along Hilton Creek, increase the amount of spawning and rearing habitat along this tributary, and increase steelhead production (SYRTAC, 2000). The various projects would benefit steelhead in several ways, as summarized in Table 2-6.

TABLE 2-6
ANTICIPATED BENEFITS TO STEELHEAD FROM THE HILTON CREEK PROJECTS

Project	Benefit to Steelhead
Supplemental watering system (first phase in place) with three release points (two on Hilton Creek, one in Long Pool)	Improve rearing habitat and oversummering habitat for adults on the lower 2,890 feet of the creek
Remove passage impediments on Reclamation property (cascade and bedrock chute)	Provide greater access for spawning and rearing, allowing access to the Route 154 culvert, 4,200 feet from the confluence with the river
Remove passage impediment in Route 154 culvert*	Provide access to upper Hilton Creek for potential spawning and rearing under favorable hydrologic conditions
Construct channel extension at the lower end of Hilton Creek	Create new spawning and rearing habitat, about 1,200 feet in length

Note: SYRTAC concluded that the culvert was a passage barrier. However, Caltrans biologists concluded that it was not an impassable barrier, and consider it to be a passage impediment only.

2.6.2 Passage Impediment Removal Project on Federal Land

Scope and Objectives

A cascade and bedrock chute is located on lower Hilton Creek about 1,380 feet upstream of its confluence with the Santa Ynez River. This feature is an artifact of the relocation of the creek during the construction of Bradbury Dam in the 1950s. A 6-foot high cascade is located at the bottom of the 140-foot bedrock chute (Figure 2-3). A shallow pool (called the chute pool or plunge pool) is located at the base of the cascade. The cascade is an impediment to steelhead passage due to its height. The bedrock chute is a passage impediment due to two factors: (1) high flow velocities in the chute inhibit fish passage; and (2) there is a lack of pools and resting areas along the chute.

The proposed project involves modifying the hydraulic conditions along the lower creek to improve passage conditions over the cascade and through the bedrock chute. The proposed instream structures would reduce the height of the cascade and lower velocities in the bedrock chute. The project would provide acceptable steelhead passage conditions at streamflows above 5 cfs, and improve passage conditions at flows above 10 cfs (SYRTAC, 2000).

It should be noted that the COMB biologist (Scott Engblom, pers. comm..) has observed steelhead migrating past the impediment during optimal hydraulic conditions, and that varying age classes of steelhead have been observed in the pool immediately downstream of Highway 154 culvert.

Modification of Cascade

The effective height of the cascade (see Figure 2-3) would be reduced by modifying the streambed upstream of the cascade to create a resting pool, and by constructing a channel obstruction at the downstream end of the plunge pool to increase water depth in the pool. A description of these elements of the project is provided below.

The channel bed upstream of the cascade would be lowered about one foot over a 15-foot long distance to create a resting pool for steelhead that have passed over the cascade. The channel bed at this location consists of Monterey shale. It would be manually excavated to a depth of one foot and a width of about 5 feet. A 5-foot wide concrete weir would be placed at the downstream end of the newly excavated pool to provide a permanent grade control. The structure would be 8 inches thick and 16 inches high. It would be placed in the streambed using 18 inch rebar. The top edge of the weir would be placed at the same elevation as the existing creek bed at the top of the cascade. The weir would have a smooth top surface without any notches.

A concrete channel obstruction would be placed at the downstream end of the plunge pool at the base of the cascade to reduce the channel conveyance capacity of the creek channel during low flows. A cross section of the channel obstruction is shown on Figure 2-4. The obstruction would reduce the channel cross section area by 70 percent for low flows (10 cfs) and 50 percent for high flows (50 cfs). In general, the improvements anticipated to reduce the height of the cascade from six to three feet at flows greater than 20 cfs. The channel obstruction would be cast in place concrete "boulder" about six feet wide, 2.5 feet thick, and about 3.5 feet in height (see Figure 2-4). It would be placed in a 6-inch deep notch cut into the creek bed which consists of bedrock. The structure would be secured with rebar placed at a depth of 1.5 feet below the creek bed. The structure would have a smooth surface, designed to replicate natural rocks.

Modification of the Bedrock Chute

The high velocities in the bedrock chute would be reduced by constructing two large channel obstructions and five in-stream boulders, as shown on Figure 2-3. The channel obstructions would consist of cast in place concrete structures, similar to the one described for the base of the cascade. A cross section of a typical channel obstruction for the bedrock chute is shown on Figure 2-5. The two channel obstructions would also have a similar size as the one described above, and would be installed in the same manner. The channel obstructions would reduce the low flow channel conveyance capacity 67 to 90 percent. They would reduce flow velocities, increase the water surface elevation in the chute by about three inches, provide rest areas for steelhead, and decrease stream gradient (SYRTAC, 2000).

In addition to the above channel obstructions, five smaller "roughness elements" or artificial instream boulders would be installed at two locations along the chute (see Figure 2-3). The instream boulders would be cast in place concrete structures designed to resemble bedrock protrusions in the channel bed. They would be installed in the same manner as the channel obstructions described above.

Use of Concrete Structures

The SYRTAC (2000) investigated the use of natural boulders instead of the cast in place concrete structures described above and determined that the artificial structures are preferable for the following reasons: (1) it would be easier to install and secure a cast in place structure rather than a natural boulder that would need to be shaped to fit the creek bed conditions, and would be difficult to move to the site; (2) anchoring of a cast in place structure would be more secure and easier than with a natural boulder; and (3) the cast in place structure provides greater flexibility to fit the site conditions.

The proposed three channel obstructions, concrete weir, and five instream boulders would be designed to withstand flows of 400 to 500 cfs. Reclamation and COMB would replace any structure heavily damaged or destroyed by storm or debris flows. If natural boulders or cobbles accumulate behind or adjacent to the structures such that their functions are impaired, Reclamation and COMB would remove them with the approval of the Adaptive Management Committee.

Construction

The proposed project would be constructed by October 1, 2003, provided the CEQA and NEPA environmental review processes are completed and all state and federal permits are acquired in time to complete construction by October 1, 2003. The time of year for construction period was specified by the CDFG in a 1601 Streambed Alteration Agreement issued for the project in 2000 to avoid winter and spring spawning and early rearing in the creek. If it appears that construction would need to extend beyond this period, Reclamation and COMB may request permission from CDFG to work until December 1, or until the first winter storms create suitable hydraulic conditions along the river and Hilton Creek to allow upstream migration by steelhead. If construction does not occur in 2003, a new Agreement would be acquired and the project would be constructed in 2004. The entire construction period is expected to be about 2 to 4 weeks.

In order to install the instream structures, flows from the supplemental water system for Hilton Creek must be diverted around the work area. If natural flows are present from the upper watershed, they would be captured and diverted around the chute area. A temporary detention pond would be created immediately upstream of the lower discharge point (Figure 2-3) by placing sandbags in the creekbed. A pump would be placed in the pond which would measure about 5 feet wide (the width of the creekbed) and about 5 to 15 feet long. The amount of water in the pond and the pumping rate would depend on inflows. A flexible plastic hose would be placed in the streambed through the work area, discharging to Hilton Creek downstream of the cascade.

Once the work area has been dewatered, temporary wooden stairs and platforms would be placed in the creek bed to permit safe access by construction workers. Access to the work area would occur at the lower release point where a construction staging area would be established. An existing access road and vehicle “pull out” are present adjacent to the discharge point. There is sufficient room in this area for up to five vehicles to park, including construction trucks and a cement truck. The staging area would measure about 30 by 100 feet. No grading is required to establish the staging area, which consists of gravel, bare dirt, and annual non-native grasses.

Vehicles would access the staging area using an existing dirt road that extends from the dam keeper’s office on the south side of the dam. The road would not require any improvements to allow access by construction vehicles. The same road and staging area was used for the installation of the supplemental watering system along Hilton Creek in 1999.

Instream structures would be constructed by manual labor, working in dry conditions in the creek bed. Workers would use portable equipment such as pneumatic drills and hammers supported by compressors and generators located at the staging area. The cast in place structures would be installed using wooden forms. Rebar would be placed in bedrock using mortar. Precautions would be taken to prevent concrete spills by placing sandbags below each structure to be built. All bedrock debris, falsework wood, concrete shavings, and other construction materials would be removed from the creek bed after construction. Construction would not require removal of any vegetation from the creek banks. Approximately 8 to 10 cubic yards of concrete would be used for the instream structures.

Fish Relocation Procedures

Fish may occur in the pool at the base of the cascade chute. Prior to initiating construction, the COMB biologist would conduct a survey of the work area to determine if steelhead/rainbow trout present. Reclamation and COMB would coordinate the survey and fish relocation efforts with NMFS pursuant to the requirements of the BO. Fish that are present in the work area would be captured and relocated to the lower end of Hilton Creek, immediately upstream of its confluence with the river.

Fish would be captured by seining fish in the plunge pool directly downstream of the cascade. Seining in this pool would be very effective because it has a smooth bedrock bottom and little instream vegetation. When seining, a two or three person crew would use a block seine (1/8 – ¼ inch mesh) to isolate the pool at the downstream end. The crew would then proceed to seine the pool beginning at the upstream end and progressing slowly downstream, being careful to keep the bottom portion of the seine along the substrate.

All fish capture operations would be conducted in the morning hours. Water temperatures would not be a concern because the temperature of the water from the Hilton Creek Supplemental Watering System would not appreciably increase by the time it reaches this pool. Water temperature and dissolved oxygen would be monitored throughout the operations. Capture operations would be terminated if temperatures exceed 20 degrees Celsius or dissolved oxygen concentrations decrease below 5 mg/l. All captured fish would be placed in five gallon buckets for transport to the lower end of Hilton Creek, below the work area.

Once fish have been removed from the creek, flows would be re-routed around the work area by constructing a temporary pond at the lower release point (above the work area) and diverting water into a flexible plastic pipe that discharges to Hilton Creek below the work area. Water would flow into the pipe by gravity.

2.6.3 Improve Passage through Route 154 Culvert (Caltrans Project)

A 154-foot long concrete arch culvert conveys Hilton Creek under Route 154. It is located about 4,200 feet from the confluence of Hilton Creek and the Santa Ynez River, and about 1,220 feet from the boundary of federal lands (Figure 2-1). The culvert is 10 feet wide at its widest point, and 12 feet in height (Figure 2-6). Each end of the culvert has 15-foot long wing walls and concrete apron that flares out to 25 feet.

The SYRTAC (2000) considered the Route 154 culvert to be a complete barrier to steelhead passage. At high flows, the velocity in the culvert is too high for steelhead passage. At low flows, the culvert may be dry or have very shallow flows that preclude fish passage. Caltrans does not consider the culvert to be a complete barrier to upstream migration (Caltrans, 2001). There are no technical analyses or observations from the SYRTAC studies, COMB, or Caltrans to resolve this difference of opinion at this time.

Reclamation proposed removal of the barrier in the Biological Assessment and FMP, acknowledging that the project would likely be implemented by Caltrans because it would involve a state facility and state lands. The objective of the project is to provide suitable hydraulic conditions to allow steelhead and rainbow trout passage to upper Hilton Creek where the SYRTAC (2000) anticipates that steelhead and rainbow trout may spawn and rear when hydrologic conditions are favorable. The project would be designed, permitted, and constructed by Caltrans using state funds. Caltrans would utilize this EIR/EIS for their CEQA compliance for the project, once this EIR/EIS has been certified by COMB.

Caltrans proposes to modify the bottom of the culvert and the inlet and outlet aprons to improve passage conditions. Concrete baffles (6 to 24 inches high) would be installed on the bottom of the culvert and aprons to reduce flow velocities, increase depths, and produce turbulent flows – all of which would assist upstream fish movement (Figure 2-6). The concrete baffles would be installed using steel dowels and mortar. Wood forms would be used to create the baffles. Approximately 5-6 cubic yards of concrete would be used for the baffles.

All construction work and access would be restricted to the highway right of way which extends 5 to 15 feet from the edge of the concrete apron on each end of the culvert. Caltrans would access the work site from both sides of Route 154, using the road shoulders for vehicle parking and staging. The culvert is located about 20 feet below the road shoulders at the base of steep slopes. Workers would access the culvert using temporary trails or portable ladders installed on the slopes above each end of the culvert. Several branches of oak trees on the slopes near the culvert opening must be pruned to permit access.

The concrete baffles would be installed by field crews and manual labor. Workers would use portable equipment supported by compressors and generators located at the staging areas. The cast in place structures would be installed using wood forms. Rebar would be placed in concrete using mortar. Precautions would be made to prevent concrete spills by placing sandbags at the outlet of the culvert. All construction debris would be removed from the creek bed after construction.

In addition to the installation of the concrete baffles in the culvert, the Caltrans project also includes as needed maintenance of the baffles. Caltrans personnel would periodically examine the baffles after major storms or at the end of winter to determine if there is any debris piled behind the baffles. Caltrans personnel would access the culvert using the highway easement. Debris would be removed by hand crews and disposed off site. Workers would not enter nor disturb the creek bed above below the culvert during the cleaning operation.

In order to implement the project, Caltrans would need to adopt the certified Final EIR/EIS and approve the project. In addition, Caltrans would also need to acquire any state or federal permits for work in and near the culvert. All work would occur in state right-of-way, and as such, no landowner access is required. The project is expected to be completed in 2004. The entire construction period is expected to require about two weeks.

Flows are not expected to be present in the culvert during construction because stream flows are generally absent along this portion of the creek by mid-summer. However, if natural flows are present in the culvert from the upper watershed, they would be captured and diverted through the culvert. A temporary detention pond would be created immediately upstream of the inlet on Caltrans right of way by placing sandbags in the creekbed. A flexible plastic hose would be placed in the culvert to by-pass flows by gravity to the creek downstream of the concrete outlet.

A small semi-perennial pool is often present immediately downstream of the outlet concrete apron. Based on observations of the pool by the COMB biologist (Scott Engblom, pers. comm.) over many years, it appears that the pool contains year-round water in most years. If steelhead/rainbow trout are present in the pool during construction, Caltrans would contact NMFS to determine if the fish should be relocated (using the methods described above), or if they should remain in the pool because construction activities can be conducted in a manner that would avoid direct impacts to the pool.

2.6.4 Hilton Creek Channel Extension

The SYRTAC (2000) proposed an extension of lower Hilton Creek to create additional steelhead rearing habitat, utilizing the benefits of the supplemental watering system. Four channel extension alternatives were evaluated. The preferred alternative (Alternative B in the FMP) consists of a 1,500-foot long channel excavated located along the base of the steep bluffs on the south bank of the river (Figure 2-1). This alternative would result in an additional 1,215 feet of rearing habitat compared to current conditions (SYRTAC, 2000).

A flow control structure would be installed along Hilton Creek to divert low flows to the channel extension. The structure would be a submerged boulder weir. The channel would be designed to provide rearing habitat for steelhead using the water released to Hilton Creek from the supplemental watering system. The flow control structure on Hilton Creek would divert flows up to 15 cfs to the channel extension; higher flows would remain in the existing Hilton Creek channel.

The channel extension would be designed with a series of pools, runs, and riffles. It would receive water from the supplemental watering system described above. The new channel would also include various habitat improvements to enhance rearing conditions, such as the placement of suitable gravel bed, occasional boulders, and woody debris. Riparian trees would be planted along the banks of the new channel. A channel design has not been developed. Hence, there is no information on the precise channel alignment, depth, and width. In addition, the grading requirements are also unknown, including whether there would be a net export or balanced cut and fill operation. Access to the work area, the construction staging area, and work limits are also undefined at this time.

2.7 TRIBUTARY PASSAGE IMPEDIMENT REMOVAL PROJECTS

2.7.1 Summary of Projects

There are many natural and man-made passage impediments on tributaries below Bradbury Dam, particularly under low to moderate flow conditions. The impediments include culverts, road crossings, and boulder cascades. The SYRTAC (2000) determined that removal of these impediments would increase access to suitable spawning and rearing habitats, thereby expanding the total available habitat for steelhead on the lower river. The highest priority tributaries are Salsipuedes, El Jaro, Hilton, and Quiota creeks because they have perennial flow in their upper reaches and can support spawning and rearing. The SYRTAC (2000) concluded that habitat availability is the primary factor limiting the steelhead population on the lower Santa Ynez River. Hence, removal of passage impediments to allow greater access to suitable aquatic habitat on tributaries is consistent with the overall intent of the FMP and BO to protect and enhance the steelhead population on the lower river. A listing of all tributary passage impediments included in the FMP/BO is provided in Table 2-7. This list includes the Jalama Road Bridge project which was not included in the FMP/BO.

Of the projects listed in Table 2-7, design information sufficient for a project level environmental review is available for Project 12 (Jalama Road Bridge on Salsipuedes Creek) and Projects 13 and 14 (Quiota Creek passage impediment projects, Refugio Road). No information on the scope and design of the passage impediment removal along El Jaro Creek (Project 15) and Nojoqui Creek (Project 16) is available at this time.

In January 2002, COMB completed a passage improvement project at the Highway 1 bridge on Salsipuedes Creek (Project 11, Table 2-1). The work was performed in the Caltrans right of way. A Mitigated Negative Declaration was adopted by COMB for the project.

2.7.2 Jalama Road Bridge Project

<u>**Project Site and Existing Passage Impediment**</u>

Salsipuedes Creek is a tributary to the Lower Santa Ynez River and joins the river in the vicinity of the City of Lompoc. The project site is situated approximately four miles upstream of the confluence at the intersection between Jalama Road and Highway 1 as shown on Figure 2-7.

Jalama Road Bridge is a County owned facility that crosses the creek at this location. A concrete and rock grade control structure is situated approximately 70 feet downstream of the Jalama Road (Figure 2-8). The grade control structure spans the width of the active channel and protects the bridge piers from channel degradation. The structure is a physical barrier to steelhead trout passage under low flow conditions (about 10 cfs or less) due to the difference in height between the water surface in the downstream pool and the crest of the structure, which is approximately five feet. At flows above 10 cfs, steelhead trout are expected to be able to pass over the structure.

TABLE 2-7
SUMMARY OF TRIBUTARY PASSAGE IMPEDIMENT PROJECTS

Creek and Project No. (see Table 2-1)	Type of Barrier	Proposed Action	Implementation Requirements
12. Salsipuedes Creek	Grade control structure downstream of Jalama Road Bridge	Modify structure with step pools to allow passage	Reclamation & COMB project on County owned facility
13. Quiota Creek (County)	Three at-grade crossings with vertical barriers	Construct permanent bridge and remove barrier	County project on County owned facility; need private landowner access and land
14. Quiota Creek (Reclamation and COMB)	Five at-grade crossings with vertical barriers	Construct permanent bridge or install culvert, and remove barrier	Reclamation & COMB project on County owned facility; need private landowner access and land
15. El Jaro Creek	Abandoned at-grade concrete crossing with culvert with vertical barrier	Modify or remove structure to reduce vertical barrier	Need landowner permission
16. Nojoqui Creek	Grade control structure with vertical barrier	No recommendations yet	Need landowner permission.

Objective

The objective of the project is to improve passage for steelhead at the Jalama Road bridge. The SYRTAC (2000) determined that the upper reaches of Salsipuedes Creek and El Jaro Creek, a tributary to Salsipuedes Creek, provide excellent steelhead/rainbow trout spawning and rearing habitat. Steelhead spawn and rear in Salsipuedes and El Jaro creeks upstream of the bridge, indicating that the Jalama Road Bridge is not an impassable barrier. However, passage improvement at the Jalama Road Bridge would increase the frequency of suitable hydraulic conditions for passage, and thereby facilitate additional migration for spawning adults and oversummering juveniles. This barrier is the first one encountered by migrating steelhead on the creek, and that its removal would facilitate passage to the upper watershed.

This project was not identified in the Biological Assessment, BO, or FMP. However, Reclamation and COMB have determined that it would be consistent with the overall plan to remove passage impediments along major tributaries to the lower river.

Project Description

The project involves the construction of three step pools in the bedrock outcrop situated along the east bank and a one-foot high concrete wall along the top of the grade control structure. The project elements are presented on Figure 2-9. During low flows, the concrete wall would divert flow into the constructed pools. During high flows, a portion of the streamflow would continue to flow through the pools as well as over the concrete wall on the crest of the grade control structure. The step pools would be constructed such that the jump height between each pool is approximately 15 inches and would provide approximately two feet of depth in each pool. The downstream outlet of the pools would consist of a concrete weir, which would act to control the pool depth and concentrate flow across the outlet.

Collectively, the proposed project would enhance steelhead/rainbow trout migration when flows are less than 10 cfs by reducing the vertical barrier to a jump height manageable for steelhead/rainbow trout and focusing the flow into the step pool area. During high flows, a portion of the streamflow would continue to flow through the project area as well as over the concrete diversion wall along the crest of the grade control structure.

Modification of the grade control structure would not affect its primary functions to stabilize the creek bed and protect the upstream bridge piers. Reclamation and COMB would require a temporary construction easement from the County of Santa Barbara to work in the County right-of-way under the bridge. Reclamation and COMB have already acquired permission from the landowner to modify the downstream structure which occurs outside the County right-of-way.

Schedule

Reclamation and COMB are completing final design, and would be seeking state and federal permits to implement the project immediately after project approval. Construction is planned for the summer and fall of 2003. Work would occur during weekdays from 7 AM to 5 PM and require about 4 to 5 weeks to complete.

Construction

Construction materials would be staged in the turnout situated on the west side of Highway 1 at the intersection of Jalama Road and Highway 1. The materials would be transported to the project site on foot using an existing trail along the east bank of the creek adjacent to the turnout and the existing ladder used to access USGS Stream Gauge #11132500 on the bridge. The trail on the east bank would need to be improved to allow safe passage. Vegetation along the trail would be pruned, and the trail bed would be modified at different locations to create a flat surface, remove obstructions, and construct new switchbacks. It is anticipated that this work would result in an 8-foot wide trail, and can be accomplished with hand crews, and without the need to import or export soils.

During the construction of the step pools, streamflow would be diverted away from the east bank in order to isolate the step pool construction area. Upon completion of the step pools, streamflow would be diverted into the step pool area in order to isolate the crest of the grade control structure to allow for construction of the concrete diversion wall. Streamflow would be diverted using sand bags which would be filled and placed using hand tools and manual labor.

Construction of the step pools would involve excavating areas of the concrete apron and bedrock along the east bank in the vicinity of the grade control structure, constructing concrete weirs at the outlet of each pool, and lining the pools with concrete. This phase of construction would involve excavating approximately 4 to 5 cubic yards of bedrock and concrete, and placing approximately 2-4 cubic yards of concrete. The excavation would be performed using manual labor and a pneumatic jackhammer, and construction of the weirs and lining of the pools would be performed using a concrete pump and manual labor. Materials would be delivered to and removed from the construction site using a crane and winch located on the bridge or at the construction staging area on Highway 1. It is anticipated that the average number of workers and vehicles at the project site during the construction work would be about six and four, respectively.

The diversion wall would be constructed of reinforced concrete and would be approximately one foot in height. Rebar would be installed using an electric drill and would be grouted in place. The wooden form for the wall would be constructed using hand tools, and concrete would be placed using a concrete pump. The bottom of the wall would be sealed to prevent any release of concrete using quick-dry mortar.

Prior to construction, Reclamation and COMB biologists would conduct surveys of the project site to search for red-legged frogs, western pond turtles, and steelhead trout. Two biologists would conduct a snorkel survey of the pool downstream of the concrete apron. Construction activities would not occur in the downstream pool. However, if these species are present in the pool, provisions would be made to prevent their entry into the work area by the use of exclusion nets and fencing.

If necessary, Reclamation and COMB would capture and relocate any steelhead/rainbow trout, western pond turtle, and red-legged frogs that are present at or near the work area. These species would be captured and relocated using agency-approved methods and personnel, and with the appropriate state and federal permits and approvals. The relocation of the steelhead is authorized under the BO, while the relocation of red-legged frogs would be authorized under a Section 7 consultation with USFWS associated with the Corps of Engineers 404 permit for the project. Reclamation and COMB would acquire approval to capture and relocate steelhead/rainbow trout, western pond turtle, and red-legged frog as part of a CDFG 1601 Streambed Alteration Agreement for the proposed project.

Following the construction activities, the site would be restored by removing all construction related materials and debris. The east bank would be stabilized with erosion control blankets, if necessary, and revegetated with native coastal sage scrub plants using a combination of seeds and container plants.

2.7.3 Quiota Creek Projects

Existing Crossings and Passage Impediments

Quiota Creek is a main tributary of the lower Santa Ynez River located about 8.4 miles downstream of Bradbury Dam (Figure 1-3). The watershed is approximately eight square miles, and includes both private lands and portions of the Los Padres National Forest. The lower two miles of the creek has intermittent flow and traverses pasture land with little riparian vegetation. The middle portion of the creek (1.9 to 3.3 miles from its confluence with the river) has a higher gradient and typically exhibits perennial flow. It contains well developed riparian vegetation and high quality aquatic habitat. The upper reach of the creek traverses the steep north-facing slopes of the Santa Ynez Mountains. The SYRTAC (2000) documented rainbow trout/steelhead along the middle and upper reaches of Quiota Creek. Suitable habitat conditions are present such as spawning substrate, stream gradient, instream cover, canopy cover, and over-summering habitat.

Refugio Road is a County road that crosses the creek nine times along the middle reach (Figure 2-10). These at-grade crossings (also known as fair weather, splash, or Arizona crossings) are constructed of concrete and include 8-12 inch diameter corrugated metal culverts to transport low flow under the road surface. Most of the crossings are in poor condition due to blocked culverts, bank undercutting, the formation of gullies related to roadway drainage, and general loss of structural integrity. In 2001, the County installed temporary one lane wooden bridges at Crossing Nos. 6 and 8.

Refugio Road is used to access cattle pasture in the upper watershed, and to access ranches on the ocean side of the Santa Ynez Mountains. The paved portion of the road ends at the ninth crossing, and the road is dirt and gravel to the top of the mountain. This portion of the road is often impassable in the winter due to erosion and wash-outs.

The at-grade crossings represent passage impediments that limit the opportunities for steelhead spawning and rearing. Two of the crossings (Nos. 2 and 7) appear to represent complete barriers to upstream migrating steelhead due to the height of the vertical barrier at the road. All other crossings present physical impediments to fish passage only during low flows (i.e., 10-15 cfs). The impediment are due to one or more of the following problems: (1) insufficient depth of flow over the crossings, that is, over the surface of the road; (2) undersized culverts under the crossings that prevent fish passage; and (3) insufficient pool depth below the crossing for fish to use when jumping; and (4) high vertical distance over the crossing that limit or prevent fish passage. Scouring and degradation downstream of the crossings and culverts have resulted in jump heights (from the water surface of the downstream scour pool to the surface of the road) that range from one to four feet.

A summary of the passage impediments is provided in Table 2-8. The locations are shown on Figure 2-10. Photographs of the existing crossings are presented in Appendix C.

Objectives

The objective of the proposed passage projects on Quiota Creek is to improve conditions for migrating steelhead to spawn and rear in this tributary by improving access during low and moderate flows. Removing the passage impediments would allow migrating steelhead to access the entire Quiota Creek, greatly expanding the spawning and rearing habitat available for steelhead. Currently, steelhead cannot migrate pass Crossing No. 2.

TABLE 2-8
SUMMARY OF PASSAGE IMPEDIMENTS ALONG QUIOTA CREEK*

No. and Resp. Agency **	Description of Crossing	Jump Height (Measured from:)			Type of Impediment		Priority Based on Severity of Impediment and/or Crossing Condition***
		Down-stream thalweg	At Pool Head	Down-stream water surface	Low Flow	High Flow	
1	Concrete structure with small pipe culvert	3	1.5	1.5	Yes	No	D
2 County	Concrete structure with small pipe culvert. Crossing is failing due to erosion.	8.3	6.3	3.8	Yes	Possibly	A
3	Concrete structure with small pipe culvert	3.8	3	2	Yes	No	C
4	Concrete structure with small pipe culvert. Crossing is failing due to erosion.	2.6	2.5	1	Yes	No	C
5	Concrete structure with small pipe culvert. Nearby erosion of edge of road	4.4	3.2	1.9	Yes	No	C
6 County	Temporary wooden bridge. At-grade crossing is destroyed	3.6	2.4	2.6	Yes	No	A
7	Concrete structure with small pipe culvert	5	3.4	2.5	Yes	No	C
8 County	Temporary wooden bridge. At-grade crossing is destroyed	3	2	0.8	Yes	No	A
9	Concrete structure with small pipe culvert	5.8	3.9	3	Yes	No	C

* Data from Entrix 2002. **See Figure 2-10 for locations of crossings. *** A= high priority due to unsafe crossing or need to replace temporary bridge. B = high priority due to severe passage impediment condition. C = moderate priority due to moderate passage impediment. D = low priority.

Sponsoring Agencies and Schedule

Reclamation and COMB propose to construct rock fishways at Crossing Nos. 3, 4, 5, 7, and 9 (Figure 2-10) to improve fish passage, as well as to enhance the structural integrity of these road crossings, which are in disrepair. The County would install permanent crossings at Crossing Nos. 6 and 8 (Figure 2-10), replacing the temporary wooden bridges installed by the County in 2000. The County would also install a bridge at Crossing No. 2, which does not have a temporary bridge. The Reclamation and the County would use different designs. Reclamation and COMB would utilize rock fishways that retain the existing at-grade crossings, while the County would remove the at-grade crossings and construct a span bridge at each crossing. Bridges would be used at Crossing Nos. 2, 6, and 8 because the vertical grade at these crossings are severe than at other crossings. Use of a rock fishway at the County crossings would require significant grading of the creek upstream and downstream of the crossing.

Construction of the County projects is anticipated to require approximately three weeks per crossing or a total of nine weeks. Construction of the rock fishways would require approximately two weeks per crossing for a total of 10 weeks. Only one bridge or rock fishway can be constructed at a time. Hence, the total construction time would be 19 weeks, or about five months. Refugio Road would be closed to all traffic during construction of the County projects, but not for the Reclamation/COMB projects. Construction activities are planned to occur from June through November. The County anticipates installing the three bridges by fall 2003, while COMB would complete its project in 2004.

The County issued a draft Negative Declaration for their project in May 2003. Information about their proposed bridges is included in this EIR/EIS for the sake of completeness, and to provide the basis for a cumulative impact assessment for all passage impediment projects along Quiota Creek.

The BO requires that Reclamation reinitiate formal consultation if the tributary passage projects on Hilton Creek (2), Salsipuedes Creek, Quiota Creek, El Jaro Creek, and Nojoqui Creek would not be completed by 2005. If some or all of the Quiota Creek projects (COMB or County) are delayed beyond 2005, Reclamation would reinitiate endangered species consultation with NMFS to determine what, if any, additional efforts are required to address the delay.

Coordination with Private Landowners

In order to construct the proposed crossings, Reclamation, COMB, and the County would require temporary and possibly permanent easements on adjacent private property. The County has a 40 to 60-foot wide easement along Refugio Road to build and maintain the paved road. The easement is very old, and its boundaries are uncertain at this time.

The project would require temporary and/or permanent encroachment on private property to install and maintain the proposed crossings. Temporary easements would be required for construction related access or work areas. Permanent easements may be required for structures and fill material associated with the new crossings. There are no plans to purchase property in fee title.

There are three landowners along the project reach. The adjacent lands are used for cattle grazing. Fences are present along both sides of the road. In addition, unpaved ranch roads are located along the inside of the fence lines on both sides of the creek, and include informal crossings of the creek. Construction of new crossings would benefit the landowners because it would improve safety conditions and increase the frequency that the roads can be used during wet weather. COMB has met with the landowners and acquired permission to construct the projects on their properties.

COMB and Reclamation Project

Rock ramp/riffle fishways would be constructed at Crossings Nos. 3, 4, 5, 7, and 9. A fishway is a structure that forms artificial riffle slope on the downstream edge of the road. The structure removes any vertical barrier by filling below the road bed. It also dissipates flow energy and creates pocket water areas to provide a migration pathway through the structure and over the road bed. Rock fishways are consistent with the channel bed morphology of Quiota Creek, which is characterized by glide, riffle, and rapid channel units. In addition to the fishways, downstream boulder weirs would be installed in conjunction with the fishways at Crossing Nos. 5 and 7 to maintain the existing pool habitat below these crossings. The proposed rock ramp/riffle fishways for each crossing are presented on Figures 2-11 through 2-16. Figure 2-12 presents a typical cross-section view of the rock ramp/riffle fishway at Crossing No.3.

The fishways would be constructed using 2 to 5 ton rock and the void spaces would be filled with fine grained material which would be compacted to prevent seepage. The larger rock (4 to 5 ton, 3 to 5 feet diameter) would be used to armor the downstream edge of the road crossing and streambank areas, and provide roughness elements within the structure. Along the road crossing, flow would be directed through the middle 20 feet of the structure by placing the rock along the outside edges at an elevation of approximately 0.5 to 1 foot above the existing road surface. Within the middle 20 feet, the rock would be placed at alternating elevations of 0.5 above the road surface and at grade with the road surface to dissipate flow energy and create velocity shadows as flow enters the structure. The smaller rock sizes (2-3 ton, 2-4 feet diameter) would be interspersed within the structure to create structural lows and pocket water areas. In general, rock sizes would grade from larger elements at the road edge to smaller elements at the downstream edge.

The structures would be constructed at a 5:1 to 10:1 slope based on the road crossing, the County easement width, and landowner access. The fishways would generally extend about 50 feet downstream of the road; the boulder weirs at Crossing Nos. 5 and 7 would be located about 60 and 105 feet from the road, respectively.

The dimensions of the structures and estimated extent of work area for each crossing are summarized in Table 2-9. The work areas are also shown on Figures 2-11 through 2-16. It appears that minor amounts of temporary and/or permanent easements would be required from adjacent property owners to construct the fishways. However, the existing fences (to contain cattle) and dirt roads on private property on both sides of the creek would not be removed or modified. The road bed at the crossing would be restored after construction – a concrete bed would be installed where the creek flows across the road, and new asphalt would be placed on the approaches to the crossing, as necessary. The road alignment, width, and profile would not be altered.

At Crossing No. 5, a high flow channel has developed approximately 10 feet south of the crossing (Figure 2-14). Streamflow has scoured and undercut the downstream edge of the road at this location. In order to maintain the roadway, a rock ramp/riffle fishway would be constructed in the high flow channel. In addition, the road crossing would be stabilized by placing a row of 4 to 5 ton rock along the downstream edge of the road and constructing a boulder weir approximately 30 feet downstream of the crossing. The boulder weir would be constructed using 4 to 5 ton rock and would act to reduce streamflow velocities and the jump height over the crossing to approximately 1 to 1.5 feet. In addition, the weir would act to preserve the existing pool habitat situated immediately downstream of the crossing. The boulders would be placed into the creek bed to a depth of approximately 1 to 2 feet and would be spaced approximately 1 to 1.5 feet apart.

TABLE 2-9
SUMMARY OF CROSSING CONSTRUCTION REQUIREMENTS FOR RECLAMATION/COMB PROJECT

Road Crossing No.	Structure	Estimated Dimensions of Project		Estimated Extent of Work Area*		Impacts (if any) to Vegetation
		Length (feet)	Width (feet)	Length (feet)	Width (feet)	
3	Rock Ramp/Riffle Fishway	15-20	50	55	45	Pruning of overhanging oak tree
4	Rock Ramp/Riffle Fishway	10-15	50	50	40	None
5	*Main Channel* – Boulders Along Downstream Edge of Road and Boulder Weir	30	30	60	30	Removal of young willow (approximately 4" diameter) and pruning of willow vegetation
	High Flow Channel - Rock Ramp/Riffle Fishway	15-20	30	55	35	Pruning of willows and possibly impacting a mature alder (approximately 6-8"-diameter)
7	Rock Ramp/Riffle Fishway and Boulder Weir	20	20	105	40	Pruning of up to 3 mature alder trees
9	Rock Ramp/Riffle Fishway	20	45	60	50	Removal of up to 4 young willow trees (<1"-diameter) and possibly impacting a young alder (approximately 2"-diameter)

* Includes roadway and construction of upstream diversion.

At Crossing No. 7, the existing crossing has altered the natural flow line of the channel which has resulted in the development of a pool along the right bank (facing upstream) downstream of the crossing (Figure 2-15). The project would involve constructing a rock ramp/riffle fishway along the downstream edge of the roadway and a boulder weir approximately 50-60 feet downstream of the crossing. The fishway would be constructed to maintain the natural flow line of the channel. The boulder weir would be constructed using 4-5 ton rock and would act to reduce streamflow velocities and preserve the existing pool habitat situated immediately downstream of the crossing.

The boulders would be placed into the creek bed to a depth of approximately 1-2 feet and would be spaced approximately 1 to 1.5 feet apart.

In order to minimize impacts during construction, stream flow would be diverted around each construction area. These activities would be accomplished using hand labor. Site isolation would be accomplished by constructing a cofferdam approximately 10 feet upstream of the site, using sandbags or an inflatable dam. Construction of the cofferdam would consist of excavating a trench (approximately 2 feet wide and 2 feet deep) across the active channel (approximately 10-20 feet), lining the excavation with plastic, and placing the sandbags or inflatable dam into the trench. The cofferdam would be constructed to an elevation which is sufficient to ensure adequate containment of the surface water upstream of the construction area. In addition, groundwater seepage would be collected and diverted away from the project site using sump pumps.

Streamflow would be routed around the construction area via gravity flow or by using a pump and a hose. The diverted flow would be discharged downstream of the construction area into a settling basin in order to minimize downstream turbidity. The settling basin would be constructed by hand, using sandbags and silt fencing.

After isolating the construction area, the concrete aprons at each crossing would be removed using a concrete saw and jack hammer. The concrete would be loaded into a dump truck and hauled to an appropriate disposal facility. Construction of the fishway structures would involve excavating approximately 2 feet of streambed material and placing imported rock between 2 and 5 tons using an excavator. The boulders would be transported to the site using a dump truck. The construction activities would primarily be conducted from the roadway with the exception of construction of the boulder weirs at Crossings Nos. 5 and 7. The weirs would be constructed using an excavator along the streambank or within the stream channel.

For each crossing, approximately cubic yards of old pavement and concrete would be removed from the site. Estimates of material to be imported include 25 cubic yards of boulders and gravels for a typical fishways, and 5 cubic yards of concrete and 5 cubic yards of asphalt to repave the roadbed at the crossing.

Site restoration would involve removal of the cofferdam, disposal of waste material, clean-up of the work area, and demobilization of equipment. The cofferdam would be removed using hand labor and an excavator would be used to backfill the excavated trenches using previously excavated material. If necessary, sediment which has accumulated upstream of the cofferdam would be removed and disposed of offsite. Any waste material generated during the construction activities would be hauled offsite for disposal at an appropriate facility. The staging areas utilized during construction would be restored to pre-construction conditions and all equipment would be moved offsite.

The construction activities for the Reclamation/COMB project would delay traffic along Refugio Road, but would not require closure of the road. Appropriate traffic control measures would be implemented in accordance with the County of Santa Barbara protocols to control vehicle passage during daytime construction, and after hours.

Prior to construction, Reclamation and COMB would conduct surveys and capture and relocate any steelhead/rainbow trout, western pond turtle, and red-legged frogs that are present at or near the work areas at the crossings. These species would be captured and relocated using agency-approved methods and personnel, and with the appropriate state and federal permits and approvals. COMB has successfully captured and relocated steelhead and red-legged frogs as part of the ongoing fish studies along the river since 1994. Steelhead/rainbow trout would be captured and relocated in accordance with the BO, which includes provisions to capture and relocate steelhead during the construction of the passage impediment projects in the BO. Reclamation and COMB would acquire approval to capture and relocate steelhead/rainbow trout, western pond turtle, and red-legged frog as part of a CDFG 1601 Streambed Alteration Agreement for the proposed project. The relocation of the threatened red-legged frog would be authorized through a Section 7 consultation with USFWS associated with the Corps of Engineers 404 permit for the project.

County Project

The County would remove the existing temporary bridges and at-grade crossings and install permanent span bridges at Crossing Nos. 2, 6, and 8. Conceptual plan views are shown on Figure 2-17 through 2-19. The bridges would be constructed of concrete, steel, and asphalt. The spans would be 70 feet at Crossing No. 2, 90 feet at Crossing No. 6, and 70 feet at Crossing No. 8. The width of the bridges would be 21 feet, 6 inches, providing two 10.5-foot wide lanes travel lanes. No sidewalks or bike paths would be provided. The wood rails on the bridges would be about 3 feet high.

The bridge abutments would be constructed of reinforced concrete. The bridge footings would be concrete spread footings buried to a depth of 4 to 4 feet. Bank protection would be placed on both banks upstream and downstream of the abutments for a distance of about 70 feet upstream and 70 feet downstream at Crossing No. 2, 60 feet upstream and 70 feet downstream at Crossing No. 6, and 50 feet upstream and 80 feet downstream of Crossing No. 8. The bank protection would consist of ungrouted rock rip-rap.

The creek bed would be graded upstream and downstream of each crossing to provide a smooth channel bed gradient under the bridge. The creek bed would be graded for a distance of about 40 feet upstream and 70 feet downstream at Crossing No. 2, 5 feet upstream and 45 feet downstream at Crossing No. 6, and 40 feet upstream and 60 feet downstream of Crossing No. 8. No rock rip-rap would be placed on the creek bed.

The roadbed on the bridges would be about 9 feet above the existing at-grade road crossings. The road on each side of the bridge would need to be raised to create a gradual transition. Hence, a 50 to 90 foot long fill slope would be constructed on the roadway approaches on each side of the bridge, ranging up to 8 feet high.

For each crossing, approximately 80 cubic yards of creek bed and bank material would be excavated and reused. About 30 cubic yards of old pavement and concrete would be removed from the site. An estimate of the quantity of material to be imported for the project is shown below in Table 2-10.

TABLE 2-10
ESTIMATE OF IMPORTED CONSTRUCTION MATERIALS FOR COUNTY PROJECT

	Clean Fill	Concrete	Rock Rip-rap	Asphalt
Crossing No. 2	80	70	325	40
Crossing No. 6	100	70	300	75
Crossing No. 8	150	70	300	70
Total=	330 cubic yards	210 cubic yards	925 cubic yards	185 cubic yards

The construction zones for each crossing are shown on Figures 2-17 through 2-19. Streamflows would be diverted around the work area. An upstream cofferdam would be installed to create a temporary impoundment. Water in the impoundment would be pumped through a flexible hose and discharged downstream of the construction zone. Groundwater seepage into the work area would be removed using a sump pump. All construction work would occur in the boundaries of the construction zone, including all grading, excavation, filling, stockpiling, and equipment access. The paved road on each side of the crossing would be used for equipment staging and parking. Refugio Road would be closed during construction. No by-pass road would be constructed at the crossings during construction.

If necessary, the County would capture and relocate any steelhead/rainbow trout, western pond turtle, and red-legged frogs that are present at or near the work area at each crossing. These species would be captured and relocated using agency-approved methods and personnel, and with the appropriate state and federal permits and approvals. The relocation of the steelhead is authorized under the BO, and the relocation of red-legged frogs would be authorized through a Section 7 consultation with USFWS associated with the Corps of Engineers 404 permit for the project. The County would also acquire approval to capture and relocate steelhead/rainbow trout, western pond turtle, and red-legged frog as part of a CDFG 1601 Streambed Alteration Agreement for the proposed project.

2.7.4 El Jaro Creek Passage Impediment Project

The objective of this project is to improve steelhead passage across an abandoned fair weather-type crossing which is located approximately 0.8 miles upstream of the confluence with Salsipuedes Creek (Figure 2-7). The upper reaches of El Jaro Creek provide excellent steelhead/rainbow trout spawning and rearing habitat; steelhead spawning and rearing has been documented on the creek (SYRTAC, 2000). Removal of this passage impediment would increase the opportunity for additional fish passage to the high quality upper reaches of El Jaro Creek, thereby facilitating migration for spawning adults and oversummering juveniles, and extending the current range of available spawning and rearing habitat on the lower river.

The existing crossing is an abandoned at-grade vehicle crossing adjacent to a residence. It is constructed of concrete and is approximately 30 feet long (spanning the width of the active channel) and varies from approximately 3 to 8 feet in width. The concrete structure contains a single 12-inch diameter culvert. The concrete road surface has failed on the south side of the crossing.

The concrete is a physical impediment to steelhead passage under low flow conditions (about 5-10 cfs) due to insufficient depth of flow across the road and the difference in height between the water surface in the downstream pool and the crest of the structure which is approximately 3 feet. The crossing is not a complete barrier, as steelhead spawning and rearing has been documented in El Jaro Creek upstream of the crossing. It appears that the structure has created an upstream pool that could support native and game fish year-round.

The proposed project would involve removal of the crossing and modification of the stream channel in the vicinity of the crossing to create a gradual flow line. The proposed project would occur on private property and require approval by the landowner. Reclamation and COMB would meet with the landowner to address any concerns and determine if the project would be acceptable.

At this time, although the structure has been examined by COMB personnel, preliminary project plans have not yet been prepared. Hence, the proposed project is conceptual in nature. As a result, the environmental impacts of this project are only addressed in this EIR/EIS at a programmatic level. Once Reclamation and COMB have developed preliminary plans for the project, a subsequent CEQA and NEPA environmental review would be completed, tiering from this EIR/EIS.

Reclamation and COMB anticipate that the project would be completed by 2005 after engineering designs are completed and all permits are acquired. The BO requires that Reclamation reinitiate formal consultation if the tributary passage projects on Hilton Creek (2), Salsipuedes Creek, Quiota Creek, El Jaro Creek, and Nojoqui Creek would not be completed by 2005. If the El Jaro Creek Passage Impediment Project is delayed or prohibited by the landowner, Reclamation would reinitiate endangered species consultation with NMFS to determine what, if any, additional efforts are required to compensate for the loss of this project.

2.7.5 Nojoqui Creek Grade Control Passage Impediment Project

The objective of the project is to improve steelhead passage over an existing grade control structure (Figure 2-20). The grade control structure is situated approximately 2.90 miles upstream of the confluence with the lower Santa Ynez River and 200 feet downstream of Nojoqui Creek Bridge 51-02Z. The bridge provides access to a private ranch. The grade control structure appears to be preventing channel degradation to protect the upstream bridge piers.

The grade control structure is approximately 20 feet long (spanning the width of the channel) and 3 feet wide, and is constructed of boulders and concrete. A 5-foot section of the structure is breached along the left bank (facing upstream) and streamflow predominately passes through this section during low flows. The structure presents a barrier to steelhead passage during low flow conditions due to the difference in height between the water surface in the downstream pool and the crest of the structure which is approximately 3 feet.

The proposed project would reduce the jump height between the downstream pool and the crest of the structure by constructing a series of step pools using concrete and boulders. The project would be designed to provide fish passage under low flow conditions.

Construction of the project would require temporary and permanent easements from the landowner for construction access and modification of the grade control structure. Construction would occur using manual labor and portable equipment. A construction staging area would be established on the west bank in a cattle pasture. A temporary foot trail would be created on the west bank to access the structure. A stream diversion would be required at the construction site because there are year-round flows in the creek at the project site.

At this time, the structure has not been examined by Reclamation and COMB personnel and preliminary project plans have not been prepared. Hence, the proposed project is conceptual in nature. As a result, the environmental impacts of this project are only addressed in this EIR/EIS at a programmatic level. Once Reclamation and COMB have developed preliminary plans for the project, a subsequent CEQA and NEPA environmental review would be completed, tiering from this EIR/EIS.

Reclamation and COMB anticipate that the project would be completed by 2005 if the landowner grants permission and all permits are acquired.

2.8 TRIBUTARY AND MAINSTEM HABITAT ENHANCEMENTS

2.8.1 El Jaro Creek Bank Stabilization Project

Project Background

Livestock operations along El Jaro Creek have resulted in increased erosion and stream sedimentation due to soil compaction inhibiting percolation, vegetation removal from grazing, and bank erosion from cattle trampling and excessive runoff. Sedimentation can adversely affect aquatic habitats in the creek. The project involves two public workshops to inform ranchers of technologically feasible and cost effective sediment management solutions and three demonstration projects on methods to reduce sediment production from rangelands. The workshops would discuss non-point source pollutant issues and would focus on positive management actions property owners can take to reduce soil erosion on their properties. The demonstration projects involve: (1) the removal of an undersized culvert and stabilization of the stream channel and adjacent streambanks within a small ephemeral drainage; (2) stabilization of an exposed side-draw located approximately 100 feet downstream of the existing culvert; and, (3) stabilization of an eroding streambank along El Jaro Creek.

The demonstration projects are located on El Jaro Creek, a tributary to Salsipuedes Creek. Salsipuedes Creek joins the Lower Santa Ynez River near the City of Lompoc in Santa Barbara County. The project site is situated approximately three miles upstream of the confluence with Salsipuedes Creek on El Chorro Ranch, adjacent to Highway 1 (Figure 2-7). The El Jaro Creek watershed is characterized by rolling hills of oak savanna and Mediterranean annual grasses. Lands in the Salsipuedes/El Jaro watershed are mainly in private ownership. Existing land uses in this portion of the watershed include irrigated and non-irrigated agriculture, livestock grazing, ranching and rural development. The culvert removal and side-draw project sites are situated within an ephemeral drainage that is tributary to El Jaro Creek. The streambank stabilization project is situated along El Jaro Creek. The locations of the project areas are presented in Figure 2-21.

Public Workshops

The two public workshops would be held at a public meeting place in the Santa Ynez Valley. The events would be publicized in local newspapers, public access cable television stations and through industry associations and interest groups, including the Cattleman's Association and the California Rangeland Trust.

The primary workshop would discuss non-point source pollution associated with streambank and upland soil erosion in the Salsipuedes/El Jaro Creek watershed. The focus would be on positive management actions property owners can take to reduce soil erosion on their properties. A follow-up public workshop would provide details for the technical implementation of the demonstration projects and presents methods for monitoring the project success in terms of water quality and instream habitat restoration.

Workshop activities include a field trip to El Chorro Ranch on El Jaro Creek to view the pre-treatment of three demonstration project sites. There would be a presentation on livestock impacts to instream fish spawning and rearing habitat, including: livestock and wildlife inputs of inorganic and organic sediments and bacterial contaminants to water, physical alteration of riparian and instream habitats by cattle access to stream corridors, and upland, streamside and instream impacts of soil compaction and vegetation removal. The follow-up workshop would revisit the sites of the demonstration projects to show the application of the projects and the resulting improvements to the riparian corridor and stream. Results of the demonstration projects and public workshops would be presented in local newspaper press releases.

Culvert Removal Project

This project involves removing an undersized culvert over an ephemeral drainage (Figure 2-22) and stabilizing the culvert area to prevent the release of sediment captured upslope of the culvert and headcut migration in the gully upslope of the culvert. The culvert is a relict of the former Highway 1 alignment and is undersized for the drainage. Consequently, stormwater runoff passes over the former roadbed and has scoured the gully downstream of the culvert. Approximately 10 feet of the culvert is exposed and severe gullying exists on the downstream side of the former roadway.

The project involves excavation of the road fill and culvert and backfilling the excavation with 1-2 ton placed rock. The rock would form a hard point that would stabilize upslope sediments and the stream channel to prevent headcut migration. The rock would be placed at an approximate slope of 10:1 which is consistent with the grade of the existing streambed. The streambanks adjacent to the excavation would also be stabilized using ½ to 1-ton rock placed at the toe of the streambank at a slope of approximately 1.5:1 to 2:1. Willow cuttings would be planted through the void spaces along the toe of the slope and the upper slope would be stabilized using jute netting and seeding with native grasses. The dimensions of the project affected area are approximately 20 feet x 20 feet x 6 feet below the existing road surface and the project would involve the excavation of approximately 80-90 cubic yards of material.

In addition to the culvert removal, the streambanks situated approximately 15 feet downstream of the culvert would be stabilized. The southern streambank would be stabilized by placing ½ to 1 ton rock at the toe of the bank, regrading the slope to approximately 1.5:1, planting willow cuttings at the toe of the slope, and covering the upslope areas with jute netting and seeding with native grasses. The northern streambank would be stabilized by planting willow cuttings at the toe of the slope and covering the upslope areas with jute netting and seeding with native grasses.

A plan view of the project area is presented in Figure 2-22 and details of the project are presented in Figure 2-23. The project would require approximately two weeks to complete. All construction activities would occur during the low flow season.

The project site is accessed by an existing dirt road from Highway 1. The staging area for the project is situated approximately 60 feet north of Highway 1 immediately inside access gate for El

Chorro Ranch and consists of a grassy area used for grazing with dimensions of approximately 50 feet by 20 feet.

The project would be implemented during the dry season when the ephemeral drainage is anticipated to be dry. However, if surface flow is present, the construction area would be isolated and the surface water flow within the drainage would be diverted around the construction area. Site isolation would be accomplished by constructing a cofferdam using sandbags approximately 5-10 feet upstream of the project site. Construction of the cofferdam would consist of excavating a trench (approximately 2 feet wide and 2 feet deep and 5 feet long) across the gully, lining the excavation with visqueen, and placing the sandbags into the trench. The cofferdam would be constructed to an elevation which is sufficient to ensure adequate containment of the surface water upstream of the construction area. Submersible pumps or gravity flow would be used to route surface water flow and groundwater seepage around the construction area. The diverted flow would be discharged downstream of the construction area near the confluence of the drainage and El Jaro Creek.

After isolating the construction area, the existing culvert and road fill would be excavated using a track excavator. The excavated material would be transported to the staging area using a loader. The excavated material would be temporarily stockpiled and used as fill at another location within El Chorro Ranch or disposed of offsite at an appropriate facility. If the excavated material is stored onsite, suitable erosion control measures would be implemented to prevent sediment runoff. The excavation would be backfilled with 1-2 ton rock placed at a 10:1 slope which is consistent with the grade of the existing streambed using a track excavator. The rock would be transported from the staging area to the project area using a loader and the rock would be placed using a track excavator.

The streambanks adjacent to the excavation would be stabilized using ½ to 1 ton rock placed at a slope of approximately 1.5:1 to 2:1 and willow cuttings would be planted in the void spaces between the rocks near the toe of the slope. The dimensions of the area are approximately 20 feet x 20 feet x 6 feet below the existing road surface. The project would involve the excavation of approximately 80-90 cubic yards of material.

In addition to the culvert removal, the existing streambanks situated approximately 15 feet downstream of the culvert would be stabilized by placing ½ to 1-ton rock at the toe of the banks to prevent scouring of the existing banks. Willow cuttings would be planted along the toe of the bank and the area above the toe would be seeded with native grasses to further stabilize the slope. Waste material generated during the construction activities would be hauled offsite for disposal at an appropriate facility. The staging areas utilized during construction would be seeded with native grasses and all equipment would be moved offsite.

Sidedraw Stabilization Project

Approximately 100 feet downstream of the culvert described above, flows within the ephemeral drainage have eroded a near-vertical streambank situated along a bend in the drainage (Figure 2-

22). There are two alternative approaches to stabilizing the drainage. Under Alternative 1, a "hard rock toe" would be placed along the bank (Figure 2-24, Cross Section 'D') using cellular geoweb or gabion baskets filled with rock. The cellular geoweb or gabion baskets would be stacked vertically to a height of approximately 5 feet at a slope of approximately 1:1, as shown on Figure 2-24. Under Alternative 2, the cellular geoweb filled with rock would be placed along the bed and lower banks of the stream in a longitudinal manner for about 45 linear feet, as shown on Figure 24 (Cross Sections D-D and E-E). The modified creek bed would have a 3:1 slope that would dissipate flow energy. The channel bed and lower portion of the slope consists of highly weathered mudstone, and, prior to installing the rock, loose soil and bedrock would be removed, and the cellular geoweb or gabion baskets would be anchored into the streambed using anchor bolts. Due to access limitations, manual labor would be used. This project, in conjunction with the removal of the existing culvert (described above), would stabilize this hillside watercourse reducing further washout and sediment input to El Jaro Creek.

The project would be completed within 2-4 days. The project would be implemented during the dry season when the ephemeral drainage is anticipated to be dry. However, if surface flow is present, the construction area would be isolated and the surface water flow within the drainage would be diverted around the construction area using the methods described above. Access to the project area and project staging would utilize the same areas as the culvert removal project. Willow cuttings would be planted along the toe of the bank and the area above the toe would be seeded with native grasses to further stabilize the slope.

El Jaro Creek Bank Stabilization Project

The streambank stabilization project area is situated along El Jaro Creek approximately 160 feet downstream of the confluence with the ephemeral drainage (Figure 2-22). The streambank is approximately 220 feet long and is actively eroding. The project would stabilize the northern streambank by constructing a hard toe and floodplain at the base of the slope (Figures 2-25 and 2-26). The hard toe would be constructed using 4-5 ton boulders which would be placed such that the top of the rock is approximately consistent with the bankful elevation. The area behind the boulder would be backfilled with native soil obtained from an existing slump along the bank. The area behind the toe would be planted with willow and other native riparian species. This treatment would stabilize the streambank, prevent further sediment inputs to the stream along the streambank, and support riparian vegetation.

The staging area for the streambank stabilization project consists of a fenced pasture directly adjacent to Highway 1, southwest of the project site (Figure 2-22). The pasture is accessible from a driveway and locked gate on the east side of the highway. The area is approximately 120 feet by 240 feet in size, and bordered by four-stand barbed wire on all sides. The northeast corner of the pasture is fitted with a drop-gate, and leads down a steep road for access to El Jaro Creek. This access road is an abandoned road cut that navigates a distance of approximately 75-100 feet (slope distance) through the riparian corridor. The road is currently in poor condition with several small rills forming along the slopes. Near the base of the slope, a very large (40+ inches DBH) cottonwood has fallen, exposing a 3-4 foot cut bank. Preparation work such as minor grading is needed before the road is adequate for equipment conveyance. Additionally, some minor pruning of low branches may be necessary for equipment clearance. From the end of this road, equipment would access the project site by driving along the creek bed.

The project would be constructed outside of the low flow channel, and the project site (approximately 700 feet of stream channel) would be isolated by diverting stream flow around the area. These activities would be accomplished using an excavator and hand labor. Site isolation would be accomplished by constructing a cofferdam upstream of the site, using sandbags or an inflatable dam. Construction of the cofferdam would consist of excavating a trench (approximately 2 feet wide and 2 feet deep by 20 feet long) across the active channel, lining the excavation with visqueen, and placing the sandbags or inflatable dam into the trench. The cofferdam would be constructed to an elevation which is sufficient to ensure adequate containment of the surface water upstream of the construction area. In addition, groundwater seepage would be collected and diverted away from the project site using sump pumps.

Streamflow would be routed around the construction area using a pump through a hose or pipe. The diverted flow would be discharged downstream of the construction area into a settling basin in order to minimize downstream turbidity. The settling basin would be constructed by hand, using sandbags and silt fencing.

The construction activities would utilize a track excavator and a loader and would involve the placement of approximately 50, 4-5 ton boulders. A loader would be used to transport the boulders to the streambank stabilization project site and the excavator would be used to place the boulders. The boulders would be placed approximately 1-2 feet below the existing grade. The boulders and floodplain area would be protected from flanking by abutting the most upstream boulder against an existing bedrock outcrop. The downstream end of the project site would tie-in to an existing vegetated floodplain area. Following placement of the boulders, the excavator would be used to place soil from an existing slump in the area behind the boulders to create a floodplain area. The floodplain would then be planted with native riparian species. Construction would require about 3 to 4 weeks to complete.

If necessary, the Reclamation and COMB would capture and relocate any steelhead/rainbow trout, western pond turtle, and red-legged frogs that are present at or near the work areas on El Jaro Creek. These species would be captured and relocated using agency-approved methods and personnel, and with the appropriate state and federal permits and approvals. The relocation of the steelhead and red-legged frogs would be authorized through a Section 7 consultation with USFWS associated with the Corps of Engineers 404 permit for the project. Reclamation and COMB would also acquire approval to capture and relocate steelhead/rainbow trout, western pond turtle, and red-legged frog as part of a CDFG 1601 Streambed Alteration Agreement for the proposed project.

Site restoration would involve removal of the cofferdam, disposal of waste material, clean-up of staging areas, and demobilization of equipment. In addition, the stream channel would be restored by loosening compacted material and regrading the streambed as necessary using the excavator. If necessary, sediment which has accumulated upstream of the cofferdam would be removed and disposed of outside of the project area. Any waste material generated during the construction activities would be hauled offsite for disposal at an appropriate facility. The staging areas utilized during construction would be restored to pre-construction conditions or better, and all equipment would be moved offsite.

2.8.2 Tributary Habitat Enhancement Projects, Including Conservation Easements

Based on years of field investigations on fish habitat and occurrence along the lower Santa Ynez River, the SYRTAC has identified tributaries in the lower watershed that provide good steelhead/rainbow trout habitat. The identified tributaries have perennial flow, at least in the upper reaches. The quality of the fish habitat on these tributaries can be improved to increase steelhead utilization and contribute to the overall protection and enhancement of steelhead in the lower watershed.

SYRTAC (2000) identified the following tributaries as candidates for in-stream habitat enhancement, listed in decreasing order of priority. These creeks exhibit reaches with habitat for steelhead trout that is consider good quality or higher, and in most cases, currently support populations of steelhead/rainbow trout.

Priority 1: Hilton Creek (federal lands), Hilton Creek (above federal lands)
Priority 2: Quiota Creek, El Jaro Creek, Upper Salsipuedes Creek, Lower Salsipuedes Creek
Priority 3: Alisal Creek (below the dam), Alisal Creek (above the dam)
Priority 4: Nojoqui Creek
Priority 5: San Miguelito Creek

Most of these tributaries occur on private lands. Protecting and enhancing steelhead habitat on these tributaries would require voluntary participation by landowners. The proposed habitat protection measures include assisting landowners with implementing sound land conservation practices and establishing conservation easements on private lands. The proposed habitat enhancements include increasing instream cover and complexity and enhancing riparian vegetation.

Reclamation and COMB would seek leases and conservation easements from private landowners on a voluntary basis with compensation. In exchange, the land would be enhanced and/or managed by a land trust organization. Land conservation measures would be implemented that benefit both fish habitat and the landowner, including livestock management, bank stabilization, soil conservation, erosion control, and riparian restoration.

In the Biological Assessment and FMP, Reclamation estimated that ten miles of conservation easements along El Jaro Creek could be acquired by 2003. The properties of interested landowners are currently being appraised. Negotiation with property owners would commence upon completion of the appraisal. Based on efforts to date, Reclamation and COMB do not believe that easements would be acquired by the end of 2003.

A variety of measures could be used to enhance aquatic habitat in the tributaries. Physical modification of the channel could create more rearing habitat, such as increasing cover and vegetative complexity over pools through riparian revegetation, and creating more pools through instream excavations. In addition, structures can be added to the pools to enhance cover, such as logs, root wads, and cobbles.

Reclamation and COMB anticipate that several small tributary habitat enhancement and/or conservation easement projects could be completed by 2006. However, at this time there are no specific plans for projects other than the pilot project identified on El Jaro Creek (see above).

The environmental impacts of tributary habitat enhancement projects and conservation easements are addressed in this EIR/EIS at a programmatic level. Each time Reclamation and COMB identify a specific project and prepare plans, a subsequent CEQA and NEPA environmental review would be completed, tiering from this EIR/EIS.

2.8.3 Mainstem Habitat Enhancement and Protection

Reclamation and COMB also propose to enhance habitat of existing pools along the mainstem of the Santa Ynez River between Bradbury Dam and Alisal Road to improve summer rearing conditions for steelhead. Additional structural elements would be added to selected pools such as boulders and woody debris that would provide refuge from predators. In addition, riparian vegetation would be planted around the perimeter of pools to reduce water temperature by shading.

Most of the proposed projects would occur on private property and would therefore, require cooperation from landowners. Enhancements would also occur at the Long Pool, located downstream of Bradbury Dam on federal lands.

The environmental impacts of mainstem habitat enhancement projects are addressed in this EIR/EIS at a programmatic level. Each time Reclamation and COMB identify a specific project and prepare plans, a subsequent CEQA and NEPA environmental review would be completed, tiering from this EIR/EIS.

2.9 FISH RESCUES

This "project" consists of fish rescues from Hilton Creek when adverse habitat conditions occur due to drought conditions, i.e., declining water levels, increased water temperatures, or decreased dissolved oxygen levels. The supplemental watering system will provide flow to Hilton Creek in most years (98 percent), but would not be able to provide flows in the summer and fall of drought years when lake elevations fall below 660 feet. If flows are shut down due to low lake levels (or to a mechanical failure), steelhead along Hilton Creek on federal property could become stranded in pools where they would be vulnerable to desiccation and predation. In this circumstance, Reclamation and COMB propose to relocate the fish to more suitable habitat to avoid mortality.

The FMP/BO also indicate that fish rescues may also be employed in other locations of along the lower Santa Ynez River for the same reasons, provided landowner access is granted. A description of typical fish rescue methods is provided below.

Fish rescue operations were successfully conducted in Hilton Creek in 1995 and 1998 by SYRTAC biologists. The protocols used in 1998 provide the model for any future operations, and have been incorporated into the BO. All fish rescue operations would be conducted with full cooperation and coordination amongst Reclamation, COMB, the Adaptive Management Committee, CDFG, USFWS, and NMFS.

The rescue operations include three elements: (1) monitoring to determine if and when rescue must be initiated; (2) capture; and (3) relocation. Relocation sites would be determined prior to the rescue operations to ensure that favorable habitat conditions are present and likely to persist until the next winter. The most likely relocation site for rescue operations on Hilton Creek is the reach between the Stilling Basin and Long Pool. Relocation sites for other tributaries have not been identified to date. Warmwater predatory fish may need to be removed from the relocation site prior to introducing steelhead. Fish capture and relocation would be accomplished using seine netting, as described in Section 2.6.2.

3.0 OVERVIEW OF THE CACHUMA PROJECT FACILITIES AND OPERATIONS

3.1 CACHUMA PROJECT FACILITIES

3.1.1 Bradbury Dam and Cachuma Lake

Bradbury Dam is located on the Santa Ynez River approximately 25 miles northwest of Santa Barbara (Figure 1-1). It is an earth-filled structure with a structural height of 279 feet and a hydraulic height of 190 feet (Figure 3-1). The crest of the dam is 766 feet. The spillway crest is at elevation 720 feet. There are four 30 by 50-foot radial gates with a concrete lined spillway chute and stilling basin. The elevation at the bottom of the gates is 720 feet. The gate opening is 30 vertical feet. The elevation of the tops of the original gates is 750 feet. In 1960, a one-foot high flashboards was installed on each gate which provided a one-foot freeboard. Beginning in 1998-99 winter, Reclamation used 0.75 feet of the flashboard to regulate the lake storage elevation to a new elevation: 750.75 feet. The remainder of the flashboard (0.25 feet or 3 inches) is used for freeboard.

The outlet works at the base of the dam has a current maximum capacity of 150 cubic feet per second (cfs). The reservoir, Cachuma Lake, has a surface area of 3,043 acres at elevation 750.0 feet (Figure 3-2). The 204,874 acre-feet constructed capacity of Cachuma Lake has been reduced due to siltation. In 1989, Reclamation estimated capacity to be 190,409 acre-feet. A survey conducted in 2000 indicated that the reservoir capacity has been further reduced to 188,035 acre-feet at elevation 750.0 feet (MNS, 2000). Pumps are required for diversions to Tecolote Tunnel when the lake is about 30,000 acre-feet. The minimum operating pool for Cachuma Lake has not been officially determined.

3.1.2 Conveyance and Local Storage Facilities

Water from Cachuma Lake is conveyed to the South Coast Member Units through the Tecolote Tunnel intake tower at the east end of the reservoir (Figure 1-2). The lowest portal on the tower is at elevation 650 feet. Tecolote Tunnel extends 6.4 miles through the Santa Ynez Mountains from Cachuma Lake to the headworks of the South Coast Conduit. The tunnel has a diameter of seven feet and a capacity of 100 cfs.

The South Coast Conduit is a high-pressure concrete pipeline that extends from the Tecolote Tunnel outlet to the Carpinteria area, a distance of over 24 miles, and includes four operational storage and regulating reservoirs described below. This pipeline distributes untreated water to Goleta Water District and Lauro Reservoir, and treated water to Sheffield Reservoir (City of Santa Barbara), Montecito Water District, and Carpinteria Valley Water District.

There are four reservoirs along the South Coast Conduit: (1) Glen Anne Dam Reservoir (500 acre-feet), located on the West Fork of Glen Annie Canyon Creek below the outlet of Tecolote Tunnel in the Goleta Water District; (2) Lauro Reservoir (640 acre-feet), located on Diablo Creek outside the

City of Santa Barbara; (3) Ortega Reservoir (60 acre-feet), located within the Montecito Water District; and (4) Carpinteria Reservoir (40 acre-feet), located within the Carpinteria Valley Water District.

Water from Cachuma Lake was originally delivered to the Santa Ynez River Water Conservation District - Improvement District #1 (SYRWCD ID#1) through the Bradbury Dam outlet works into the Santa Ynez Pipeline. This pipeline has been converted to a delivery pipeline to convey State Water Project (SWP) water from the Central Coast Water Authority's (CCWA's) Santa Ynez Pump Station to Cachuma Lake. Water from the Cachuma Project is now delivered to SYRWCD ID#1 through an exchange agreement with the other South Coast Member units in which SYRWCD ID#1 receives SWP water directly in exchange for its Cachuma entitlement in the reservoir. If necessary, SYRWCD ID#1 can also receive Cachuma Project water directly through the CCWA pipeline from Bradbury Dam when there is a significant interruption in SWP water deliveries to the Cachuma Project.

As noted above, SWP water is conveyed to Cachuma Lake for delivery to the South Coast Member Units. CCWA owns and operates a pipeline that extends from the state's Coastal Branch Pipeline near Vandenberg Air Force Base to Cachuma Lake. SWP water is pumped to Cachuma Lake from the Santa Ynez Pumping Station.

3.1.3 Facility Operations and Maintenance

Reclamation operates and maintains Bradbury Dam, including the outlet works and spillway gates. Reclamation has contracted the operation and maintenance of the other Cachuma Project facilities to the Cachuma Operation and Maintenance Board (COMB), established as a joint powers agency by the Member Units in 1956. COMB is responsible for diversion of water to the South Coast through the Tecolote Tunnel, and operation and maintenance of flow control valves, meters and instrumentation at control stations and turnouts along the South Coast Conduit and at regulating reservoirs. COMB coordinates closely with Reclamation dam tenders and Member Units' staffs to ensure that the water supply meets daily demands. COMB staff reads meters and accounts for Cachuma Project water deliveries on a monthly basis, and performs repairs and preventative maintenance on Cachuma Project facilities and equipment. COMB safeguards Cachuma Project lands and rights-of-way on the South Coast. COMB issues monthly Cachuma Project water production and use reports, operations reports, and financial and investment reports that track O&M expenditures.

3.1.4 Cachuma Recreation Area

The Cachuma Lake Recreation Area encompasses approximately 9,250 acres, including Cachuma Lake (3,043 acres at full level) and the surrounding rugged hillsides and oak woodland-covered shores (Figure 3-2). The Recreation Area is managed by the Santa Barbara County Parks Department (County Parks) according to a contract between Reclamation and the County. The contract expired in 2003. However, Reclamation recently issued a two-year extension of the contract to County Parks to allow time to negotiate a new long-term contract.

Reclamation is currently preparing a Resource Management Plan (RMP) for the Cachuma Recreation Area. The RMP will provide guidelines and management actions to protect natural resources of the area while enhancing recreational opportunities. A draft RMP and associated EIS will be issued for public review in late 2003; a final RMP will be completed in 2004.

Cachuma Lake is widely known for its natural and scenic qualities. It is also one of southern California's favorite bass and trout fishing lakes. No body contact sports such as swimming or water skiing are allowed due to restrictions by the California Department of Health Services. The 375-acre County Park is located on a peninsula on the south side of the lake. Facilities include the following: primitive and improved campsites, general store, marina and launch ramp, private docks, bait and tackle shop, horse campsites, rustic amphitheater, trailer storage yard, RV campsite, Nature Center, County Park Ranger Station, family center, swimming pools, and snack shop. The management area on the north side of the lake consists of open space that is leased for grazing. It is not open to public access except for horseback riding by permit.

3.2 PROJECT YIELD AND DELIVERIES

3.2.1 Use of Project Water

Under the Reclamation Act of 1939 and State water permits, the Cachuma Project is authorized to develop water for municipal, industrial, domestic, irrigation supply, and other beneficial uses, such as recreation. Reclamation started storing water in 1952 and completed construction of Bradbury Dam in 1956. Cachuma Lake first filled and spilled in 1958. The initial water deliveries occurred in 1955, drawing from the Tecolote Tunnel infiltration only.

The Cachuma Project provides about 65 percent of the total water supplies for the Member Units who provide water to an estimated 207,000 people along the South Coast and in a portion of the Santa Ynez Valley. Approximately 38,000 acres of croplands are irrigated by water from the Cachuma Project. Total deliveries are comprised of approximately 30 percent irrigation water and 70 percent municipal and industrial (M&I).

3.2.2 Project Entitlement and Deliveries

The initial feasibility studies that supported the Cachuma Project authorization indicated that the project could deliver a safe yield of 32,000 acre-feet per year. Safe yield is usually defined as the amount of water a project can be expected to deliver over a sustained hydrologic period -- a period that preferably is long enough to contain representative wet and dry periods, as well as critical droughts. Since the 1950s, the original estimate of safe yield has been reduced several times based on: (1) use of a longer hydrologic period that incorporates a key drought period, 1946-51; and (2) loss of reservoir storage due to ongoing sedimentation. The most recent estimate of safe yield was 25,714 acre-feet per year (Reclamation, 1990).

The original Cachuma Project contractual entitlement to the Member Units under the Master Contract was 32,000 acre-feet per year based on the initial estimate of the Project's safe yield (see above). However, with the exception of deliveries in 1976, the Member Units have requested annual deliveries that are lower than the original entitlement in order to reduce shortages in dry years.

Under the current Master Contract, Reclamation delivers an annual amount to the Member Units that does not exceed the "Available Supply." The latter represents the maximum amount of Cachuma Project water that is available after Reclamation has met all requirements for water for other purposes under current and future State and Federal laws, permits, orders, and requirements. Available Supply does not include water released pursuant to Water Rights Orders 89-18 and 94-5 for downstream water rights, and to meet the requirements of the BO.

Since 1993, the maximum annual Cachuma Project deliveries recognized among Reclamation and the Member Units has been 25,714 acre-feet per year. To date, this amount has been less than the Available Supply. This delivery limit is very similar to an estimate of operational yield developed by the Member Units. Operational yield is usually defined as that amount of water that can be delivered in all years with acceptable shortages or deficiency levels in critically dry years.

The most recent estimate of the Cachuma Project's operational yield, 25,908 acre-feet per year, was developed for the Contract Renewal EIR/EIS (Reclamation and Cachuma Project Authority, 1995). This estimate was based on hydrologic model simulations using the Agency's Santa Ynez River Hydrologic Model (SYRHM). The hydrologic period of analysis for the model simulations included the water years 1918 through 1992. Key assumptions in the modeling included a Cachuma Lake capacity of 190,409 acre-feet, a minimum pool of 12,000 acre-feet, and a maximum allowable shortage of 20 percent in any single year with shortages beginning when the lake storage reaches 100,000 acre-feet. The 20 percent deficiency criterion is considered to be an acceptable level of shortage by the Member Units. A higher operational yield for Cachuma Lake can be attained, but it would increase the risk of taking more than 20 percent shortages in any single year. It should be noted that the model was based on historic drought periods. More severe droughts could occur in the future, which would cause greater shortages than planned. A revised (and lower) estimate of operational yield has not been developed based on the new estimate of reservoir capacity completed by the COMB in 2000.

Cachuma Project deliveries include infiltration into Tecolote Tunnel. Infiltration varies with precipitation, and, prior to the recent drought, was determined to average about 3,000 acre-feet per year. The current estimate of infiltration by Reclamation and the Member Units is about 2,000 acre-feet per year. The actual amount of water from tunnel infiltration varies from year to year based on climatic conditions.

Cachuma Project annual deliveries (including tunnel infiltration) to the Member Units from 1954 to 2001 are shown in Table 3-1 and Chart 3-1 (Appendix B). They range from about 8,851 acre-feet in the fourth year of operation to 35,979 acre-feet in 1971-72. The amount of water delivered to the Member Units varies from year to year, depending on winter runoff. For example, in 1989-90 during the recent drought, the water delivery from the Cachuma Project was reduced to 19,344 acre-feet. In 1992-93, the water deliveries from the project were about 26,597 acre-feet because the reservoir filled in the winter.

TABLE 3-1
SUMMARY OF CACHUMA OPERATIONS

	Water	Inflow		End of WY	Change in	Gross	Precip.	Precip.	SWP	Releases							Tunnel	Member Unit	Project Water	Water Rights
	Year	Computed	% of Average	Storage	Storage	Evaporation	at Gage	on Lake	Inflow	Direct Diversion	Tecolote Tunnel	SYRWCD ID#1	Downstream	Fish	Spills	Total	Infiltration	Deliveries	Deliveries	Release
		acre-feet	*%*	*acre-feet*	*acre-feet*	*acre-feet*	*inches*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	*acre-feet*	
	1953	18,071	24%	9,188	9,188	1,319	13.78	108					7,669			7,669				7,669
	1954	18,953	26%	21,779	12,591	2,328	16.31	598					4,632			4,632				4,632
	1955	4,942	7%	19,584	-2,195	2,540	16.90	935					3,921			3,921	9,621	9,621	9,621	3,921
	1956	24,329	33%	36,629	17,045	4,198	21.45	1,481			2,117		2,450			4,567	6,734	8,851	8,851	2,450
	1957	6,150	8%	30,154	-6,475	4,643	14.23	1,162			5,470		3,675			9,145	5,388	10,858	10,858	3,675
DEC 886	1958	223,600	302%	196,889	166,735	11,210	35.24	4,459			4,850		5,050		35,747	45,647	5,005	9,855	9,855	5,050
	1959	18,700	25%	187,178	-9,711	14,624	14.58	3,662			8,432		2,296		3,056	13,784	4,732	13,164	13,164	2,296
	1960	5,300	7%	163,149	-24,029	13,614	11.27	2,669		169	11,409	300	3,850			15,728	3,626	15,504	15,504	3,850
	1961	3,177	4%	134,493	-28,656	12,015	11.15	2,382		663	17,308	239	1,609			19,819	4,242	22,452	22,452	1,609
	1962	105,100	142%	190,475	55,982	12,446	24.14	4,963		402	11,921	885	6,441		17,020	36,669	3,739	16,947	16,947	6,441
	1963	8,060	11%	171,736	-18,739	12,158	15.44	3,710		510	10,595	665	2,871			14,641	3,259	15,029	15,029	2,871
	1964	4,820	7%	141,506	-30,230	11,786	10.57	2,339		447	17,352	1,504	3,958			23,261	3,357	22,660	22,660	3,958
	1965	15,360	21%	122,308	-19,198	10,204	15.34	3,043		182	14,909	1,837	7,423			24,351	3,271	20,199	20,199	7,423
	1966	83,000	112%	168,926	46,618	12,524	18.57	3,707		345	17,522	2,129	3,862			23,858	3,137	23,133	23,133	3,862
	1967	210,000	283%	191,622	22,696	12,683	23.24	5,775		246	14,155	2,575	23,794		138,537	179,307	3,219	20,195	20,195	23,794
	1968	10,400	14%	160,871	-30,751	13,525	9.99	2,414		360	18,190	3,670	7,820			30,040	3,222	25,442	25,442	7,820
	1969	525,400	709%	190,181	29,310	12,300	39.39	9,727		240	15,030	2,600	7,460		468,150	493,480	3,582	21,452	21,452	7,460
	1970	28,000	38%	176,407	-13,774	13,500	11.67	1,793		340	21,450	4,110	4,890			30,790	3,065	28,965	28,965	4,890
	1971	31,000	42%	161,345	-15,062	12,300	15.06	3,497		360	22,800	3,110	11,030			37,300	3,335	29,605	29,605	11,030
	1972	8,800	12%	121,314	-40,031	11,452	10.43	2,231		167	28,158	4,469	6,771			39,565	3,185	35,979	35,979	6,771
	1973	125,600	170%	185,591	64,277	12,055	29.20	5,948		128	18,455	3,551	9,619		23,665	55,418	2,842	24,976	24,976	9,619
WR 73-37	1974	33,500	45%	182,039	-3,552	12,677	16.82	4,112		114	17,805	3,519	5,842		1,405	28,685	2,876	24,314	24,314	1,120
	1975	50,544	68%	184,467	2,428	11,864	24.50	6,069		145	24,052	3,160	1,847		16,805	46,009	3,072	30,429	30,429	576
	1976	5,837	8%	145,187	-39,280	11,802	14.22	3,187		149	26,022	4,655	5,131			35,957	2,750	33,576	33,576	4,643
	1977	1,910	3%	112,077	-33,110	10,775	13.05	2,601		98	18,741	4,581	3,035			26,455	2,191	25,611	25,611	2,799
	1978	329,219	444%	193,424	81,347	13,333	42.48	9,573		114	20,703	3,013	927		219,158	243,915	3,161	26,991	26,991	56
WR 78-10, DEC 1486, & WR 78-19	1979	61,692	83%	183,949	-9,475	13,916	21.00	5,250		151	20,100	4,029	1,836		36,385	62,502	4,295	28,575	28,575	895
	1980	154,425	208%	187,382	3,433	13,353	24.25	5,803		139	22,057	2,483	1,166		116,915	142,760	3,346	28,025	28,025	311
	1981	22,066	30%	168,871	-18,511	13,812	16.90	4,019		177	20,856	5,008	4,743			30,784	3,157	29,198	29,198	4,175
	1982	26,849	36%	159,528	-9,343	11,479	17.37	3,868		187	20,956	2,963	4,474			28,580	2,964	27,070	27,070	3,963
	1983	428,601	578%	196,347	36,819	12,630	44.52	10,143		183	22,616	1,532	4,142		361,675	390,148	3,061	27,392	27,392	3,446
	1984	39,074	53%	171,599	-24,748	14,534	13.26	3,354		193	25,601	5,054	4,577		17,217	52,642	3,360	34,208	34,208	3,163
	1985	6,764	9%	135,748	-35,851	12,276	12.48	2,816		142	22,781	2,664	5,862			31,449	2,894	28,481	28,481	5,392
	1986	76,571	103%	171,873	36,125	12,782	23.33	4,831		108	21,690	2,686	8,010			32,494	2,287	26,771	26,771	7,391
	1987	2,375	3%	128,352	-43,521	12,147	9.05	1,997		150	27,209	3,812	4,573			35,744	1,848	33,019	33,019	3,887
WR 88-2	1988	8,733	12%	99,150	-29,202	10,294	21.92	4,042		102	23,917	2,803	4,903			31,725	1,794	28,616	28,616	4,856
	1989	4,045	5%	66,098	-33,052	8,367	9.68	1,459		86	20,632	2,802	6,669			30,189	1,878	25,398	25,398	6,669
WR 89-18	1990	2,628	4%	34,188	-31,910	6,019	7.93	909		66	16,384	863	4,792			22,105	2,031	19,344	19,344	4,792
	1991	53,568	72%	60,995	26,807	6,373	24.33	2,057		43	15,762	1,656	4,983			22,444	1,876	19,337	19,337	4,983
	1992	135,828	183%	157,066	96,071	11,239	29.18	4,022		52	18,170	891	13,427			32,540	1,899	21,012	21,012	13,099
	1993	333,387	450%	177,479	20,413	13,428	36.71	8,875		79	22,582	2,042	1,518	1,501	280,698	308,420	1,894	26,597	26,597	1,518
WR 94-5	1994	16,694	23%	151,046	-26,433	12,526	17.38	4,144		73	22,821	1,819	9,537	494		34,744	1,937	26,650	26,650	9,192
	1995	365,092	493%	134,855	-16,191	10,321	45.58	10,063		62	23,887	109	1,966	894	354,107	381,025	2,028	26,086	26,086	1,547
	1996	33,243	45%	120,503	-14,352	11,627	13.43	2,653		76	24,721	2,109	9,703	2,012		38,621	2,040	28,946	28,946	9,313
	1997	56,552	76%	124,771	4,268	11,861	15.68	2,911		84	26,637	1,785	13,206	1,623		43,335	2,034	30,540	30,540	12,791
	1998	475,175	641%	185,500	60,729	11,349	53.65	12,072	1,354	62	24,473		3,956	1,976	386,055	416,522	2,057	26,592	25,238	1,684
	1999	21,562	29%	168,772	-16,728	12,341	16.67	4,077	323	70	26,397		883	2,999		30,349	2,091	28,558	28,235	
	2000	51,896	70%	170,840	2,068	12,435	21.47	4,972	2,156	80	30,364		5,972	2,037	6,067	44,520	2,413	32,857	30,701	4,423
	2001	150,243	203%	173,479	2,639	11,995	31.75	7,712	818	77	26,089		3,503	2,157	112,313	144,139	2,404	28,570	27,752	1,796
	2002	5,508	7%	129,370	-44,109	11,004	8.78	2,040	4,627	90	30,976		11,961	2,253		45,280	2,405	33,471	28,844	11,466
Count		50	50	50	50	50	50	50	5	43	47	38	50	10	18	50	48	48	48	49
Maximum		525,400	709%	196,889	166,735	14,624	53.65	12,072	4,627	663	30,976	5,054	23,794	2,999	468,150	493,480	9,621	35,979	35,979	23,794
Minimum		1,910	3%	9,188	-44,109	1,319	7.93	108	323	43	2,117	109	883	494	1,405	3,921	1,794	8,851	8,851	56
Total		4,432,343	5982%	7,056,280	129,370	551,983	1025.32	206,226	9,278	7,711	925,124	97,682	284,235	17,946	2,594,975	3,927,673	150,604	1,181,121	1,171,843	261,037
Average		88,647	120%	141,126	2,587	11,040	20.51	4,125	1,856	179	19,683	2,571	5,685	1,795	144,165	78,553	3,138	24,607	24,413	5,327

Source: Bureau of Reclamation

Notes:
1. The percent of average is based on the historical average annual runoff of 74,100 acre-feet estimated for the Santa Ynez River at the gaging station near the town of Santa Ynez. This average is based on 22 years of record during the period October 1929 through September 1952, excluding the no-record year of 1931-32.
2. Computed Inflow is the algebraic sum of the change in storage, releases, spills and evaporation minus precipitation on the reservoir surface and SWP Inflow.
3. In WY 1971 the inflow included approximately 5,700 acre-feet which reached Lake Cachuma after being released from storage in Gibraltar Reservoir. The remaining inflow (25,300 af) was about 34 percent of the historical average.
4. In WY 1971 and 1972, there were 5,580 and 1,358 acre-feet, respectively, released through the Tecolote Tunnel for delivery to the City of Santa Barbara which had been temporarily stored in Lake Cachuma.
5. Releases indicated include leakage from around spillway gates and through river outlet works valves.
6. In WY 1995, the water spilled down the river was due to large winter storms and a reservoir restriction which resulted from a safety of dams concern.
7. The Member Unit Deliveries is the algebraic sum of the releases to the Santa Ynez River WCD ID #1, Direct Diversion, and the Tecolote Tunnel plus infiltration into the tunnel.
8. In WY 2001, a new capacity table went into affect on July 1 which resulted in a reduction of 2,379 acre-feet of total storage capacity.
9. Data for Water Years 1958-2001 was taken directly from the Annual Progress Reports submitted to the Water Resources Control Board. Data for Water Years 1953-1957 was taken from Daily Operations Reports.
10. Releases to Tecolote Tunnel in WY 1998-2002 include SWP water conveyed through the reservoir and tunnel.
11. Project Water Deliveries equals the Member Unit Deliveries minus the SWP water conveyed through the reservoir and tunnel.
12. For Water Years 1953-1966, Water Rights Releases were reported as "water released for downstream rights" in the Annual Progress Reports.
13. For Water Years 1967-1973, Water Rights Releases were reported as "downstream releases from Bradbury Dam outlets for live-stream purposes" in the Annual Progress Reports.
14. For Water Years 1974-2002, Water Rights Releases were taken directly from the monthly downstream users reports.

The importance of the Cachuma Project for each Member Unit is also shown in Table 3-2, which shows the percentage of the Member Unit's total supply provided by the Cachuma Project. This percentage varies from 22 percent for SYRWCD ID#1 to 55 percent for the Goleta Water District. The City of Santa Barbara and Goleta Water District receive the largest quantities of water from the project (about 68 percent combined of the total project deliveries), as shown in Table 3-2.

TABLE 3-2
CACHUMA PROJECT ENTITLEMENTS AND
PERCENT OF TOTAL MEMBER UNIT WATER SUPPLY

Member Unit	Percentage of Project Yield (%)	Annual Deliveries Based on Operational Yield of 25,714 AFY	Percent of Total Member Unit Water Supply from Cachuma
Carpinteria Water District	10.938	2,813	41
Montecito Water District	10.311	2,651	34
City of Santa Barbara	32.188	8,277	45
Goleta Water District	36.250	9,321	55
SYRWCD, ID#1	10.313	2,651	22
Total=	100	25,713	

Peak monthly deliveries to the Member Units occur in July and August. Historical deliveries to the individual Member Units are shown on Chart 3-2 (Appendix B).

3.2.3 Water Rights Releases

Water releases are made from Cachuma Lake pursuant to Reclamation's water rights permits from the State Water Board, as described in Section 3.3. Releases to the mainstem of the Santa Ynez River replenish downstream groundwater basins to satisfy water rights of downstream users. The groundwater basins downstream of Bradbury Dam have been divided into the Above Narrows Alluvial Groundwater Basin, and the Below Narrows Groundwater Basin. The former extends along the Santa Ynez River from Bradbury Dam to the Narrows, located east of Lompoc Valley (Figure 1-3). It consists of coarse-grained unconsolidated sand and gravel river channel and younger alluvium deposits, with a length of 35 miles and a variable width of 0.2 to 1.5 miles. The depth ranges from 150 feet at the Narrows to about 50 feet near the dam. It is underlain with non-water bearing shales.

The Above Narrows Alluvial Basin is divided into three subareas based on geographic characteristics: Santa Ynez Subarea (Bradbury Dam to Alisal Road in Solvang, a distance of 11 river miles); Buellton Subarea (Alisal Road to three miles west of Buellton, a distance of 7.4 river miles), and Santa Rita Subarea (west of Buellton to the Narrows, a distance of 25 river miles).

The Below Narrows Basin consists of the Lompoc Plain Groundwater Basin underlying the Lompoc Valley. Flows in the river percolate through channel alluvium into the underlying basin. Most of the percolation occurs in the Lompoc Plain forebay, which consists of the eastern four miles of the river beginning at the Robinson Road Bridge.

As provided in Water Rights Order 73-37 (WR 73-37) and amended by WR 89-18, all of the inflow to Cachuma Reservoir is credited to the Above Narrows Account (ANA) unless there is a live stream in the river from Bradbury Dam to Floradale Avenue in the Lompoc Valley. The ANA may not exceed the total dewatered storage within the Above Narrows Alluvial Basin. If the dewatered storage exceeds the operational dewatered storage of 10,000 acre-feet, release from the ANA may be requested and made from the reservoir. Maintenance of dewatered storage allows for additional percolation of rainfall and tributary runoff originating below Bradbury Dam. The ANA is not subject to evaporative losses in the lake, but is deemed the first water spilled to the extent that the dewatered storage in the Above Narrows Aquifer is reduced by such spills. Reclamation and the Member Units have recently agreed to an operational program to make downstream water rights releases in conjunction with the fish releases to reduce impacts on Cachuma Project supply, and to ensure water rights releases for the ANA account remain similar to historic amounts.

The Below Narrows Account (BNA) is based on the difference between the estimated actual percolation below the Narrows and the estimated percolation that would have occurred if river flows were not impounded by Cachuma Lake. Reclamation calculates monthly "constructive" flows and percolation, and estimates the difference using two percolation curves adopted in WR 89-18. The two curves reflect different flow-percolation relationships based on groundwater levels in the Lompoc Plain consistent with WR 89-18. Reclamation has been using the upper curve until such time that sufficient well data have been collected to determine which curve reflects the actual differences in percolation with and without the Cachuma Project. In general, use of the upper curve (instead of using both curves) provides a higher amount of credit accrual in the BNA. Reclamation and the Member Units have recently agreed to continue to use the upper curve with provisions to credit the Cachuma Project in dry periods under a Settlement Agreement with the City of Lompoc.

As described in Section 3.2.3, downstream releases are made in accordance with WR 73-37 as amended by WR 89-18 to recharge downstream groundwater basins in average and dry years. In wet years, downstream basins are relatively full and do not require recharge to satisfy downstream water rights. In normal and some dry years, combined releases to satisfy the Above Narrows Alluvial Basin and the Below Narrows Basin are made in the summer and fall. These releases are made when the river is dry with an initial discharge rate of 135 to 150 cfs for a period of 10 to 15 days until the water reaches the Lompoc Basin forebay. At that time, the releases are reduced to lower discharge rates for several weeks to months, depending upon percolation rates.

The water rights releases from Bradbury Dam from 1973 to 2002 are shown in Table 3-3 and on Chart 3-3 (Appendix B).

TABLE 3-3
HISTORICAL DOWNSTREAM WATER RIGHTS RELEASES

Water Year	Releases (acre-feet per year)		
	ANA	BNA	Total
Releases under WR 73-37			
1973-74	1,009	0	1,009
1974-75	576	0	576
1975-76	4,643	0	4,643
1976-77	2,795	0	2,795
1977-78	56	0	56
1978-79	895	0	895
1979-80	311	0	311
1980-81	4,175	0	4,175
1981-82	3,963	0	3,963
1982-83	2,692	755	3,447
1983-84	3,162	0	3,162
1984-85	5,392	0	5,392
1985-86	5,611	1,780	7,391
1986-87	3,887	0	3,887
1987-88	3,573	1,283	4,856
Releases under WR 89-18			
1988-89	6,670	0	6,670
1989-90	4,792	0	4,792
1990-91	3,415	1,568	4,983
1991-92	9,032	4,067	13,099
1992-93	228	1,290	1,518
1993-94	6,719	2,473	9,192
1994-95	8	1,539	1,547
1995-96	6,836	2,477	9,313
1996-97	9,075	3,716	12,791
1997-98	980	705	1,684
1998-99	0	0	0
1999-00	3,588	835	4,423
2000-01	772	1,023	1,795
2001-02	8,309	3,157	11,466

Source: Stetson Engineers.

3.2.4 Reservoir Operations

Reclamation historically has managed the maximum water level of Cachuma Lake at 750 feet. However, beginning in the 1998-99 winter, Reclamation has surcharged the reservoir 0.75 feet when the reservoir spills, providing an additional 2,300 acre-feet of water. This water has been used to supplement releases for fish studies and maintenance, described in Section 3.2.5 below.

The reservoir has spilled 18 times since Bradbury Dam was completed. The most recent spills occurred in 1998, 2000, and 2001. A summary of historic spills is provided in Table 3-1.

3.2.5 Releases for Fish Studies and Maintenance

Since 1993, releases have been made from Cachuma Lake for fish studies and maintenance purposes, pursuant to a Memorandum of Understanding executed in 1994 by Reclamation and other entities (see Section 3.3.3). Under the 1994 MOU, a Fish Reserve Account of 2,000 acre-feet was established for these releases. Water stored above 750 feet due to 0.75-foot surcharging was credited to this account. When the reservoir level did not exceed 750 feet in a given year, 2,000 acre-feet from the minimum pool ("dead storage") was dedicated to the Fish Reserve Account. Releases for fish since 1993 ranged from 510 to 2,999 acre-feet per year (Table 3-1). The Fish Reserve Account and provisions of the MOU related to releases for fish maintenance and study have been superceded by the releases pursuant to the BO (see Section 3.5). Monthly releases under the fish MOU are shown on Chart 3-4.

3.2.6 Modified Storm Operations

In 1998, Reclamation initiated a Modified Storm Operations for the Cachuma Project to reduce the frequency and magnitude of peak flows along the lower Santa Ynez River, particularly in the Lompoc Valley. The program is implemented on an as-needed basis during wet winters to help protect life and property. Reclamation implements the operations at their sole discretion, but first consults with the Member Units, County Flood Control District, and other parties. The modified storm operations consist of the following elements:

- **Precautionary Releases**. Reclamation will make releases from the conservation storage in the lake prior to the onset of flood flows (i.e., flow events that are likely to result in uncontrolled spills) in order to create space for passing peak flows. By releasing water from the dam in a controlled manner, which does not cause flooding, Reclamation may avoid uncontrolled spills, which may cause flooding. Precautionary releases only evacuate a volume of storage that equal to, or less than, 50 percent of remaining runoff estimated to be in the watershed. Precautionary releases are made 24 to 36 hours in advance of inflows and typically will result in a 5 to 6 foot lowering of the lake.

- **Pre-releases.** These releases match the inflows at the beginning of a peak event, designed to pass the early part of a storm while maintaining as much of the surcharge space in the reservoir as possible. A maximum allowable release level is established prior to initiating the releases that consider downstream flows and flooding hazards.

- **Gateholding**. Under this procedure, the spillway gates are opened in response to a rise in the reservoir as flows fill the lake. This action releases water downstream while maintaining a minimum freeboard on the gates in order to prevent overtopping of the gates. Gateholding will increase the maximum water level in the lake for a given storm compared to previous operations. The maximum lake level using gateholding is 760 feet. The crest of the dam is 766 feet. The spillway crest is at elevation 720 feet. When closed, the elevation of the top of the gates is 751 feet.

3.2.7 Conveyance and Releases of SWP Water

Beginning in 1997, deliveries of water from the State Water Project (SWP) were initiated to SYRWCD, ID#1 and the South Coast Member Units. For the latter, SWP water is delivered to Cachuma Lake through the outlet works in Bradbury Dam. The SWP water mixes with water in Cachuma Lake, and an equivalent amount is removed from the lake through the Tecolote Tunnel, representing delivery of SWP water to the South Coast. Under the Warren Act contract with Reclamation, SWP water can be stored in Cachuma Lake.

SYRWCD ID#1 receives its SWP entitlement by direct delivery from the CCWA pipeline. In addition, SYRWCD ID#1 also receives SWP water directly in an exchange program with South Coast Member Units. The exchange is not part of their SWP entitlement, but instead represents Cachuma Project water.

SWP contract amounts for the Member Units (not including the CCWA Drought Buffer) are listed below.

- Carpinteria Valley Water District – 2,000 acre-feet per year
- Montecito Water District – 3,000 acre-feet per year
- City of Santa Barbara – 3,000 acre-feet per year
- Goleta Water District – 4,500 acre-feet per year basic entitlement; 7,000 acre-feet per year entitlement without CCWA Drought Buffer
- SYRWCD ID#1 – 2,000 acre-feet per year (of which 1,500 acre-feet is an amount belong to the City of Solvang)

In addition to these annual amounts, each Member Unit has contracted with CCWA for a portion of the CCWA 3,908-acre foot per year Drought Buffer that was purchased by CCWA to firm up the reliability of the SWP amounts to Santa Barbara County contractors. During those years that availability of SWP water exceeds project participant's demands, the Member Units can store drought buffer water into a groundwater basin or reduce their groundwater pumping and take drought buffer water instead. Stored drought buffer water can be used in dry years to augment SWP water deliveries.

The overall availability of SWP water varies with hydrologic cycles in northern California and contractor demands throughout the state. During wet years, the SWP is able to deliver sufficient amounts to meet all or most contractor requests. During dry years, the SWP experiences shortages and contractors only receive a portion of the requested deliveries. The long-term average annual delivery of SWP as a percentage of the amounts is a subject of debate. Each Member Unit has developed their independent estimates of the long-term reliability of SWP water for their planning purposes. These estimates range from about 50 to 75 percent. Recent deliveries of SWP water to the Member Units are shown below in Table 3-4.

TABLE 3-4
RECENT STATE WATER PROJECT DELIVERIES

Member Unit	Acre-feet per Water Year		
	1997-98	1998-99	1999-00
Carpinteria Valley Water District	59*	508*	351*
Montecito Water District	43*	122*	486*
City of Santa Barbara	0	0	0
Goleta Water District	2,113*	2545*	2,978*
SYRWCD, ID#1	506	1,085	726
Total=	2,721	4,260	4,541

* Some or all of this water was delivered to SYRWCD ID#1 and exchanged for Cachuma Project water, which was delivered to the South Coast as if it were SWP water.

SWP water is delivered to Cachuma Lake at the dam outlet works, which is also used for releasing water to the river. SWP water can be mixed with water being released from the outlet works and simultaneously discharged to the river due to configuration of the outlet works. The SWP pipeline can deliver up to 22 cfs through the outlet works. The Warren Act Contract between Reclamation and the Central Coast Water Authority (CCWA) to convey SWP water through the Cachuma Project includes the following key terms:

- SWP water deliveries may be commingled with Cachuma water releases, but must not exceed 50% of the total rate of release to the river at any time
- Commingled water must not enter the stilling basin with a temperature over 18 degrees Celsius
- SWP water may not be delivered to the reservoir during spill events
- To the extent of capacity, CCWA can store or convey up to 33,750 acre-feet per year, and additional water, if excess capacity is available

In addition, the BO prohibits discharging SWP water to the river during the period December through June unless flows are discontinuous in the mainstem to prevent smolts from imprinting on SWP water.

3.3 STATUS OF WATER RIGHTS PERMITS

In 1946, Reclamation filed with the State Water Board applications 11331 and 11332 for water rights to divert and store water from the Santa Ynez River. Permits were issued in 1958. Under conditions of the permits, Reclamation was to make releases to the downstream areas to maintain, in effect, conditions which would have existed in the absence of Cachuma Lake. The State Water Board reserved jurisdiction for fifteen years or such further time as the State Water Board may determine necessary to determine the streamflow of the Santa Ynez River required to protect vested downstream rights without resulting in waste to the ocean. This reserved jurisdiction was continued through a series of subsequent water rights orders in 1973, 1988, 1989 and 1994.

In December 1994, the State Water Board issued WR 94-5 amending Reclamation's water rights permits. The order granted an extension of WR 89-18 while continuing to reserve jurisdiction over Reclamation's permits. WR 94-5 required hearings to determine if any modifications of Reclamation's permits are necessary to provide for downstream water rights and public trust resources affected by the project. The order stated that prior to the hearings, Reclamation must conduct various studies and collect certain data that will be used by the State Water Board in the hearings. An initial hearing was conducted in November 2000. The hearings are scheduled to resume in mid- to late-2003. After completion of the hearings, the State Water Board will issue a Decision which may or may not amend Reclamation's water rights permits and the minimum release requirements to provide for downstream water rights and public trust resources affected by the project.

WR 94-5 also required that the State Water Board determine what type of CEQA environmental review would be required for the hearings, and direct Reclamation to prepare the document. The State Water Board issued a Notice of Preparation (NOP) for an EIR in May 1999. It is anticipated that the draft EIR on the operations of the Cachuma Project for the water rights hearings will be issued to the public in mid-2003.

The State Water Board's Draft EIR will analyze the environmental impacts of various operational alternatives on downstream water rights and public trust resources. The project being addressed in the water rights EIR is potential modifications (if any) to Reclamation's existing water rights permits related to downstream flow requirements and possible other measures to provide the necessary and appropriate protection of downstream water rights and public trust resources on the Santa Ynez River downstream of Bradbury Dam, that might be affected by the Cachuma Project.

It cannot be predicted which EIR alternative will be selected by the State Water Board as the "proposed project" at the water rights hearings. It will be designated during the hearing process after consideration of public testimony and the results of the environmental impact assessment in the Draft EIR. The proposed project will also be designated in the State Water Board's draft and final hearing decision document, and the associated Final EIR.

3.4 RECENT OPERATIONAL CHANGES PURSUANT TO THE BIOLOGICAL OPINION

Since 2000, Reclamation has modified operations to allow for releases for purposes of protecting and enhancing habitat for the endangered southern steelhead along the river below Bradbury Dam. These modifications do not directly affect the releases under WR 89-18, which must be met at all times. Reclamation's water rights permits do not need to be modified for these operational changes, which are allowable within the parameters of the existing permits. These operational changes are included in the FMP and BO. Reclamation and COMB have determined that these actions are not subject to additional NEPA or CEQA environmental review because they are within the normal range of operations of the Cachuma Project and the provisions of water rights permits.

Beginning in September 2000, Reclamation has initiated new releases for fish to comply with the BO. The new releases are summarized below in Table 3-5. They are designed to improve summer rearing habitat below Bradbury Dam by maintaining a minimum continuous flow at Highway 154. The target flows currently maintained are considered interim flows. Releases from Bradbury Dam to maintain these flows will continue until the long-term releases described in this EIR/EIS are implemented upon completion of the 3.0-foot surcharge, which must be available in Spring 2005 according to the BO. Reclamation began the releases from Bradbury Dam in September 2000 to meet the interim rearing target flows at Highway 154 bridge. Monthly releases during 2000-01 and 2001-02 water years are shown in Table 3-6.

TABLE 3-5
INTERIM MAINSTEM REARING TARGET FLOWS

Lake Storage Conditions (acre-feet)	Reservoir Spill?	Interim Target Flow (cfs)	Target Site
> 120,000	Spill > 20,000	5	Highway 154
> 120,000	No spill, or < 20,000	2.5	Highway 154
< 120,000	No spill	1.5	Highway 154
< 30,000	No spill	Periodic release; < or = 30 AF/month; consult with NMFS	Stilling basin & long pool

TABLE 3-6
MONTHLY FMP/BO RELEASES FOR FISH, 2000-2002

Water Year and Month	Acre-feet per month
2000-2001	
October 2000	23.9
November 2000	151.2
December 2000	59.6
January 2001	153.3
February 2001	134.3
March 2001	19.8
April 2001	0 (lake spilling)
May 2001	49.2
June 2001	285.3
July 2001	324.9
August 2001	439.2

Water Year and Month	Acre-feet per month
September 2001	515.8
Total for 2000-01 =	2,156.5
2001-2002	
October 2001	293.4
November 2001	258.7
December 2001	246.8
January 2002	245.5
February 2002	219.2
March 2002	243.7
April 2002	234.8
May 2002	267.1
June 2002	149.3
July 2002	84.4
August 2002	10.0
September 2002	0.0
Total for 2001-02=	2,252.9

The current interim release regime for steelhead and the resulting hydrologic conditions along the Lower Santa Ynez River are considered current environmental or "baseline" conditions for the purposes of this EIR/EIS (see Section 4.2).

In addition to the above downstream releases for fish, Reclamation has modified operations in the following manner, as required by the BO. These operational changes do not affect the releases under WR 89-18, and are allowable under the provisions of Reclamation's water rights permits.

- Reclamation must maintain pools in the Alisal and Refugio reaches in spill years and the first year after spill years, if steelhead are present. This action will be accomplished by using releases from Bradbury Dam or by water supplied from nearby wells of the SYRWCD ID#1. The requirement for this action ends when the 3.0-foot surcharge is implemented and all the tributary passage impediments are completed.

- A new ramp-down regime for water rights releases from the dam outlet works was implemented beginning in July 2000. The ramping down of water rights releases are managed to avoid stranding of steelhead and other fish along the lower Santa Ynez River below Bradbury Dam.

- Reclamation must maintain 2 cfs in Hilton Creek (once the pump is installed) at all times unless the Adaptive Management Committee determines otherwise and NMFS approves.

4.0 OVERVIEW OF THE ENVIRONMENTAL ANALYSIS

4.1 LEVEL OF ANALYSIS IN THE EIR/EIS

As described in Section 1.4, the FMP/BO management actions range from specific, well-defined projects ready for final design and implementation, to long-term projects or programs that will require additional planning, funding, final design, and cooperation from private landowners. The EIR/EIS evaluates, at a programmatic level, the environmental impacts of projects that have not been fully developed and are only defined at a conceptual level. This EIR/EIS also evaluates the environmental impacts of well-defined projects at a project-specific level. These projects are listed below (project numbers are from Table 2-1):

1. Modified ramp-down schedule for water rights releases (already implemented)
3. Maintain long-term rearing target flows by releases from the dam in conjunction with a 3.0-foot surcharge
4. Maintain residual pools in Alisal and Refugio reaches of the river until a 3.0-foot surcharge
5. 3.0-foot surcharge at Cachuma Lake by installing flashboards
6. Releases for fish passage using the Fish Passage Account after a 3.0-foot surcharge
7. Releases for various fish purposes using the Adaptive Management Account after a 3.0-foot surcharge
8. Hilton Creek cascade and chute passage project
10. Route 154 passage impediment removal project (Caltrans)
12. Passage impediment project on Jalama Road
13. Passage impediment project on Quiota Creek and Refugio Road (3 crossings – County project)
14. Passage impediment project on Quiota Creek and Refugio Road (6 crossings)
20. El Jaro Creek bank stabilization project

4.2 ENVIRONMENTAL BASELINE

The primary environmental conditions affected by the releases from Bradbury Dam for fish pursuant to the FMP/BO are: (1) the aquatic and recreational environments at Cachuma Lake; and (2) the aquatic and riparian habitats, surface water, and groundwater conditions along the lower Santa Ynez River from Bradbury Dam to the ocean. These conditions have been influenced by the past and ongoing operations of the project, which directly affect fluctuations of the reservoir and the amount and timing of flows below the dam. Project operations have varied over the past 45 years due to modifications in the requirements for downstream water rights by the State Water Board, and due to recent releases to protect the endangered southern steelhead. As a result, the environmental setting or baseline has been dynamic, and may still be continuing to respond to the operational changes in 1989.

The current downstream water release program to protect downstream water rights was initiated in 1989 pursuant to a State Water Board order. In 1993, voluntary downstream releases were initiated by the Member Units to study and protect steelhead downstream of the dam. A requirement for those releases was established in WR 94-5, which was then superceded in 2000 when the NMFS issued a BO to Reclamation, which established new release requirements for steelhead. Downstream releases to maintain interim rearing flows began in September 2000.

CEQA Guidelines Section 15125(a) states: "*An EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant.*"

The Notice of Preparation (NOP) and Notice of Intent (NOI) for this EIR/EIS were issued in late 2001 after the completion of the BO and implementation of the interim releases to maintain rearing flows. Hence, current environmental conditions, including the effect of the interim releases for steelhead, are used as the baseline physical conditions for impact assessment.

It should be noted that the releases for fish initiated in 1993 and modified in 2000 were implemented without any NEPA or CEQA environmental review. Reclamation and COMB have determined that these actions are not subject to NEPA or CEQA environmental review because they are within the normal range of operations of the Cachuma Project and the provisions of the water rights permits. Furthermore, these actions and downstream release would not cause adverse environmental impacts by themselves. However, these interim releases, combined with the new long-term releases under the BO, have the potential to cause cumulative impacts. The cumulative impacts of the past and proposed fish releases are addressed in Sections 5 and 11 of this EIR/EIS.

4.3 NO PROJECT/ACTION ALTERNATIVE

Under CEQA and NEPA, an EIR/EIS must evaluate the "No Project Alternative" or "No Action" alternative. The purpose of describing and analyzing a No Project/Action Alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. The No Project/Action Alternative represents the environmental baseline for assessing impacts if it is identical to the existing environmental setting analysis, which establishes that baseline (see above).

CEQA Guidelines Section 15126 states that the analysis of the No Project Alternative shall discuss the existing environmental conditions at the time the NOP is published, and the conditions "*...what would be reasonably expected to occur in the foreseeable future if the project were not approved...*"

The Guidelines further state that when the project is " …an ongoing operation, the "no project" alternative will be the continuation of the existing … operation into the future."

For the EIR/EIS, the No Project/Action Alternative is defined as the current operations (e.g., Year 2002) that are expected to continue into the near future if Reclamation and COMB did not implement any FMP/BO projects in addition to the ones already implemented. Under this alternative, the releases to maintain interim target rearing flows would continue in their current form. No other FMP/BO management action or project would be implemented, including surcharging and tributary projects.

4.4 IMPACT ANALYSIS AND SIGNIFICANCE THRESHOLDS

4.4.1 Introduction

The FMP/BO is designed to improve environmental conditions for fish and aquatic and riparian habitats. As such, the EIR/EIS is focused on incidental adverse impacts associated with implementing the FMP/BO projects. Most of these impacts would be temporary and associated with construction and access. However, other unintended long-term impacts are addressed such as loss of oak trees at Lake Cachuma due to surcharging, displacement or disruption of recreational facilities at the lake due to surcharging, reduced spill frequency, increased need for flood control maintenance in the river, and possible conversion of more arid habitats to aquatic habitats.

Environmental impacts of the FMP/BO projects are classified in the categories shown below. While these classifications are designed to assist in preparing findings pursuant to CEQA, they are also consistent with NEPA requirements to categorize impacts in terms of their significance and the residual impact after application of mitigation.

Class I Impacts. Unavoidable significant impacts. For these impacts, COMB must issue a "Statement of Overriding Considerations" under Section 15092 (b) of the *CEQA Guidelines* if the project is approved. The reasons why these impacts are considered acceptable must also be explained in Reclamation's Record of Decision.

Class II Impacts. Significant environmental impacts that can be mitigated by the application of mitigation measures identified in the EIR/EIS. Both COMB and Reclamation must determine that these mitigation measures are reasonable, feasible, and effective in reducing the level of impact to less than significant.

Class III Impacts. Other environmental impacts that are potentially adverse but not significant. Mitigation measures are generally recommended to minimize adverse impacts.

Class IV Impacts. Beneficial impacts.

An impact was determined to be significant using guidance from: (1) the definitions of "significance" in the *CEQA Guidelines* (Sections 15064, 15065) and *CEQA Statute* (Public Resource Code 21088;

and (2) the thresholds used in the updated *CEQA Guidelines Environmental Checklist* (Appendix G). Specific thresholds are provided below from Appendix G for environmental resources and issues areas which could be affected by the FMP/BO projects in more than a negligible manner.

4.4.2 Impact Thresholds

Agriculture Resources

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?

Air Quality

a) Conflict with or obstruct implementation of the applicable air quality plan?

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

d) Expose sensitive receptors to substantial pollutant concentrations?

Biological Resources

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Cultural Resources

See Section 6.7 for specific federal and state thresholds.

Geology And Soils

a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. ii) Strong seismic ground shaking? iii) Seismic-related ground failure, including liquefaction? iv) Landslides?

b) Result in substantial soil erosion or the loss of topsoil?

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Hydrology, Groundwater, and Water Quality

a) Violate any water quality standards or waste discharge requirements?

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

f) Otherwise substantially degrade water quality?

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

Land Use and Planning

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

Noise

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Recreation

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Utilities and Service Systems

Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

Mandatory Findings Of Significance

a) Does the project have the potential to

- degrade the quality of the environment
- substantially reduce the habitat of a fish or wildlife species,

- cause a fish or wildlife population to drop below self-sustaining levels,
- threaten to eliminate a plant or animal community,
- reduce the number or restrict the range of a rare or endangered plant or animal
- eliminate important examples of the major periods of California history or prehistory?

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

4.5 FMP/BO PROJECTS THAT DO NOT CAUSE ENVIRONMENTAL IMPACTS

The FMP/BO includes a public education and outreach program to explain the management actions to protect steelhead on the lower Santa Ynez River. The program will employ various methods to distribute information including workshops, newsletters, news releases, “800” phone information line, annual reports, speakers bureau, and website. The program will focus on outreach to private landowners along the river and tributaries to describe management actions that would benefit both fish and landowners, and to solicit voluntary actions from landowners to improve and protect fish habitat. Such actions may include restoring riparian habitat, supplementing spawning gravels, removing passage impediments, and range conservation measures. This element of the FMP/BO would not cause any physical modifications or effects to the environment, as it would only entail communications, mailings, meetings, and personal discussions. Hence, the public education and outreach program is not evaluated further in the EIR/EIS.

The FMP/BO also include a long-term monitoring and reporting program, which is designed to collect data to determine the success of the various management actions and projects. The information will be used to potentially modify the actions and projects to enhance success. Results of the program will be provided to the Adaptive Management Committee (see Section 3.3.1) for their consideration and recommendations on any modifications. The elements of the monitoring program are as follows:

- Water quality (e.g., dissolved oxygen) and temperature monitoring along the mainstem of the Santa Ynez River and tributaries where access is granted to determine habitat conditions due to distance from Bradbury Dam, location along a tributary, time of day, depth of water, and time of year.

- Fish surveys (including trapping) along the mainstem of the Santa Ynez River and tributaries where access is granted to determine up- and down-stream migration, and overall fish production in the lower watershed. Surveys of spawning nests will also occur.

- Habitat surveys along the mainstem of the Santa Ynez River and tributaries where access is granted to determine extent of pool, run, and riffle habitats relative to flow.

- Monitoring of habitat and water quality conditions in the lagoon at Surf, as well as the condition of the sand bar.

- Monitoring of fish movement during water rights releases to determine if fish move downstream during such releases.

- Stream flow monitoring at or near target locations (Highway 154 and Alisal Road) to determine if the rearing and passage target flows specified in the FMP/BO are being met.

- Monitoring of specific FMP/BO projects, such as passage impediment projects at Jalama Road and along Quiota Creek to determine success.

The monitoring activities will mostly involve visual observations and the use of portable scientific measuring equipment (probes, meters, etc). Stream gauges have been installed at Alisal Road, the end of the Long Pool, and along Hilton Creek. These gauges are small in size and did not require disturbance of upland or riparian habitats. Monitoring would not involve any flow diversions, nor take of native fish. As a consequence, the monitoring program is not evaluated further in the EIR/EIS.

5.0 ENVIRONMENTAL ANALYSIS
- DOWNSTREAM RELEASES FOR FISH

The incidental environmental impacts of the FMP/BO flow-related management actions for fish downstream of Bradbury Dam are addressed in the following sections. These actions include releases for steelhead rearing and passage, and are listed below.

- Modified ramp-down schedule for water rights releases (current operations)
- Maintain <u>interim</u> rearing target flows by releases from storage (current operations)
- Maintain <u>long-term</u> rearing target flows by releases after 3.0-foot surcharge
- Maintain residual pools in Alisal and Refugio reaches until 3.0 foot surcharge
- Releases from Fish Passage Account after 3.0-foot surcharge
- Releases from the Adaptive Management Account after 3.0-foot surcharge

Indirect impacts to hydrologic conditions along the Santa Ynez River downstream of Bradbury Dam due to surcharging are also addressed below. Direct impacts of surcharging (i.e., flooding impacts at the lake) are addressed in Section 6.0.

5.1 SURFACE WATER HYDROLOGY

5.1.1 Existing Conditions

<u>Surface Water Hydrology</u>

The Santa Ynez River watershed encompasses about 900 square miles and is located in the central part of Santa Barbara County (Figure 1-1). The south side of the basin is formed by the Santa Ynez Mountains. These mountains, ranging in elevation from 2,000 to 4,000 feet, separate the Santa Ynez River basin from the South Coast of the county. The north side of the basin is formed by the Purisima Hills and the San Rafael Mountains which range in elevation from 4,000 to 6,000 feet.

The Santa Ynez River Basin has a Mediterranean climate with hot, dry summers and cool, wet winters. Almost all precipitation occurs between November and April, although large variations in annual quantities occur within the basin. Annual rainfall ranges from about 14 inches near the ocean to about 30 inches at Juncal Dam with higher rates in the headwater areas due to orographic effects. Average monthly rainfall data and annual rainfall from Gibraltar Dam are presented on Charts 5-1 and 5-2, respectively (Appendix B).

The Santa Ynez River flows westerly about 90 miles to the Pacific Ocean, passing through Jameson Lake, Gibraltar Reservoir, and Cachuma Lake. Immediately above Cachuma Lake, the river passes through a narrow valley between the San Rafael and Santa Ynez mountains. Below Bradbury Dam, the river passes between the Santa Ynez Mountains and the southern edge of the Santa Ynez Upland, and through the broad part of the valley near Buellton (Figure 1-3). West of Buellton, the river flows through a narrow meandering stretch to the Narrows and emerges onto the broad, flat Lompoc Plain.

The Santa Ynez River flows across the Lompoc Plain for about 13 miles and empties into the ocean at Surf.

The flow of the river has been intermittent, both in the past and under current Cachuma Project operations. Winter flows were largely uncontrolled prior to the construction of Bradbury Dam with little or no flow in the summer months. Since operations of Bradbury Dam began in 1953, the winter flows have been moderated by reservoir operations and previously nonexistent summer flows have been replaced with releases for downstream water rights. Median monthly streamflow at the Narrows prior to, and after, construction of Bradbury Dam are shown on Chart 5-3. These data demonstrate the reduction in winter flows due to Cachuma Lake.

The upper portion of the watershed is regulated by Juncal, Gibraltar, and Bradbury dams. Juncal and Gibraltar dams are located above Bradbury Dam (Cachuma Lake), and regulate 14 and 216 square miles, respectively. Cachuma Lake regulates about 417 square miles, or less than half of the Santa Ynez River basin. The average annual runoff of the Santa Ynez River at Bradbury Dam is about 71,400 acre-feet per year (1953-1992). The average annual runoff for the Santa Ynez River at the Narrows is about 66,500 acre-feet per year with the regulation by Cachuma Lake during same period. The Narrows flow includes the effects of Cachuma Lake winter spills averaging about 37,500 acre-feet per year and summer river releases of about 4,500 acre-feet per year.

Existing Surface Diversions

Surface water diversions from the Santa Ynez River basin are made primarily from Juncal, Gibraltar, and Bradbury dams. These facilities divert water from the river for agricultural and M&I uses in a portion of the Santa Ynez Valley (Cachuma Project only) and on the South Coast of Santa Barbara County.

- Juncal Dam, completed in 1930, is owned and operated by the Montecito Water District. The original storage capacity of Jameson Lake (7,228 acre-feet) has been reduced to about 5,200 acre-feet due to siltation. Diversions of Jameson Lake regulated flows are made to Montecito on the South Coast through the 2-mile long Doulton Tunnel. Flows from Alder Creek are seasonally diverted by flume and metered into Jameson Lake when turbidity conditions permit. The tunnel intake location also allows for minor diversions of downstream tributary inflow from Fox Creek. While the California Supreme Court Gin Chow decision in 1933 allows for a maximum diversion of 2,000 acre-feet per year, occasional droughts restrict the average diversions from Jameson Lake to Montecito to about 1,750 acre-feet per year. Tunnel infiltration, while not Santa Ynez River water supply, is also delivered to Montecito Water District at a rate of about 375 acre-feet per year.

- Gibraltar Dam was constructed by the City of Santa Barbara in 1920. Gibraltar Reservoir's constructed capacity of 14,500 acre-feet had been reduced due to siltation to about 7,600 acre-feet by 1947. The dam was subsequently raised 23 feet in 1948 to increase the capacity to 14,777 acre-feet. However, due to continuing siltation, Gibraltar Reservoir capacity has been reduced once again to about 7,100 acre-feet. Diversions from Gibraltar are made to the City of Santa

Barbara through the 3.7-mile long Mission Tunnel. Gibraltar Dam diversions to the City of Santa Barbara could be made up to 4,580 acre-feet per year without requiring mitigation measures as specified in the Upper Santa Ynez River Operations Agreement (discussed below). Gibraltar Reservoir is not operated on a safe yield basis. Carryover storage is not sufficient to protect against dry winters. Annual diversions to the City have ranged from over 9,000 acre-feet in very wet years to nearly zero in drought years. Alternative sources must be relied upon in these years. Mission Tunnel infiltration, averaging about 1,000 acre-feet per year, is also delivered to the City.

- Bradbury Dam was completed in 1953 as part of the Cachuma Project. The 204,874 acre-feet constructed capacity of Cachuma Lake has been reduced due to siltation. In 1989, it was estimated by Reclamation to be 190,409 acre-feet. A new survey conducted in 2000 indicates that the reservoir capacity has been further reduced to 188,035 acre-feet at elevation 750.0 feet (MNS, 2000). Diversions from Cachuma Lake are made to the four Member Units on the South Coast, and SYRWCD ID#1 in the Santa Ynez Valley. Water is delivered to the SYRWCD ID#1 primarily through an exchange agreement with the other South Coast Member Units in which SYRWCD ID#1 receives SWP water directly in exchange for its Cachuma entitlement in the reservoir. If necessary, SYRWCD ID#1 can also receive water directly through the CCWA pipeline from Bradbury Dam when there is a significant disruption in SWP water deliveries. The South Coast Member Units are served through the 6.4-mile long Tecolote Tunnel that extends from the lake to near Glen Anne Reservoir in Goleta.

  The minimum operating pool for Cachuma Lake can be as low as 12,000 acre-feet, but diversions to Tecolote Tunnel that occur when the lake is about 30,000 acre-feet require pumps to deliver water to South Coast Member Units. This occurred for several months during the 1988-91 drought. Historic annual project deliveries to the South Coast Member Units and SYRWCD ID#1 are provided in Table 2-2. Based on the 1995 renewed Master Contract between the Member Units and Reclamation, an operation yield of 25,714 acre-feet per year has been established. The annual yield was estimated by modeling, which included a maximum of 20 percent shortage in the worst year of the critical drought based on the historic hydrologic data (1918-1993), 1989 lake capacity, and WR 89-18 operations. This scenario assumes that reserves are not set aside each year for an additional dry year; establishing a reserve is a likely action during a drought of unknown duration, and would intensify the planned 20 percent shortage.

  The operational yield of the Cachuma Project includes infiltration into Tecolote Tunnel. Infiltration varies with precipitation, and, prior to the recent drought, was determined to average about 3,000 acre-feet per year. The average infiltration rate has been reevaluated by Reclamation and the Member Units since the 1988-91 drought, and has been lowered to about 2,000 acre-feet per year.

Historical Flood Flows

There are four stream gages on the river between Bradbury Dam and the Pacific Ocean. The one with the longest period of record (since 1907) is located near Lompoc at the Narrows. There have been several major flood events along the Santa Ynez River over the past 100 years. Major floods occurred in the years 1907, 1914, 1938, 1943, 1952, 1969, 1978, 1983, 1995 and 1998. Reported peak discharges for these storms ranged from 25,000 to 120,000 cfs.

The most devastating flood occurred in January and February 1969 affecting residential, commercial, agricultural, and public property; highways, railroads, and bridges; utilities; and irrigation and flood control facilities. In addition to the major flood events, several minor floods with peak discharges ranging from 15,000 to 25,000 cfs have occurred since the 1930's and have caused minor damage to portions of the Lompoc Valley, including flows in 1983, 1995, 1998, and 2001.

The river channel capacities vary greatly along the river below the dam. With the exception of the 1969 floods, river channel capacities have been adequate to pass historic flood flows without damage to urban areas such as Solvang, Buellton, and Lompoc. However, past flood events have caused flooding and erosion to undeveloped and agricultural lands at various locations along the river. Previous floods have also damaged or destroyed numerous bridges including the Refugio Road, Alisal, Robinson (Highway 246), Floradale, 13th Street, and Southern Pacific Railroad bridges.

Flooding in the Lompoc Valley

Flooding of agricultural lands west of the Lompoc Regional Wastewater Treatment Plant has been an ongoing concern of Santa Barbara County Flood Control District (County FCD) over the past 10 years. Riparian growth in the Santa Ynez River channel west of Lompoc has been enhanced by continuous discharge of the effluent from the treatment plant. The dense riparian vegetation in the river channel creates a flood hazard by reducing the conveyance capacity. In addition, it reduces water velocities, which in turn, increase sediment deposits, which further decrease the capacity. Finally, trees in the riverbed can become uprooted during flood events and block the channel under bridges thereby causing additional flooding upstream and serious damage to the bridges.

To reduce flooding hazards, the County FCD has periodically cleared vegetation from the channel from above Floradale Bridge to 13th Street bridge to increase capacity. Clearing events occurred in 1992/1993, and 1998. After the 100-foot wide channel clearing in December 1992/January 1993, the County FCD estimated that 18,300 cfs was conveyed during the March 1993 flood flows with only minor flooding of adjacent agricultural lands. Flows of about 20,000 cfs were observed in the project reach without flooding during the flood flows of February 1998 (after the December 1997/January 1998 mowing) and in March 2001. These observations indicate that the 100-foot wide mowing creates about 20,000 cfs channel capacity in the project reach, which in turn, provides a reasonable level of protection for the adjacent agricultural lands.

In 2001, the County FCD approved a long-term routine maintenance program to maintain the 100-foot wide swath in the project reach. The District will continue the mowing of the 100-foot wide swath on an as-needed basis, estimated to be every 3 to 5 years.

Channel Maintenance below Bradbury Dam

The County FCD has insufficient funds in the Santa Ynez Valley Flood Assessment Zone for vegetation management along the Santa Ynez River between the dam and Lompoc. In a recent election, the voters of the Zone did not approve an increase in the flood control assessment fee. The County FCD will not be able to manage channel vegetation to reduce any new flood hazards that might arise along this reach of the river. Furthermore, the County FCD only maintains channel capacity in natural creeks and rivers in order to protect public infrastructure such as roads and major utilities. Hence, the County FCD would not typically maintain channels to protect agricultural crossings and pastures on private land, such as the San Lucas Ranch below Bradbury Dam. Reclamation and COMB do not have the authority or ability to conduct channel maintenance along the river, nor do they have the funds to support a new channel maintenance program by the County FCD.

Modified Storm Operations

In 1998, Reclamation implemented a Modified Storm Operations to reduce the frequency and magnitude of peak flows along the lower Santa Ynez River, particularly in the Lompoc Valley. The program is implemented on an as-needed basis during wet winters primarily by making releases prior to the onset of a storm in order to create space for passing storm flows. These precautionary releases are made 24 to 36 hours in advance of inflows and typically will result in a 5 to 6 foot lowering of the lake. Reclamation may also make releases that match inflows at the beginning of a storm event, designed to pass the early part of a storm. Releases will be made when at least that amount of water has already fallen on the watershed. These actions effectively reduce the peak downstream flows compared to prior operations. According to the County FCD, the modified storm operations reduced the risk of flooding in the Lompoc Valley in 1998 and 2001. The modified storm operations are designed to not reduce safe yield or operational yield of the Cachuma Project.

5.1.2 Potential Impacts

In the following section, the impacts of the FMP/BO releases for fish on surface water hydrology below the dam are addressed. The resulting changes in river flows may not, in and of themselves, represent adverse or beneficial impacts. The favorable or unfavorable aspects of these hydrologic changes are primarily based on their effects on groundwater quantity and quality along the river, and on aquatic and riparian habitats along the river. The only hydrological effect that can be interpreted as adverse or beneficial would be the change in flood hazard downstream of the dam. Impacts due to changes in the Cachuma Project deliveries to Member Units under the proposed project are addressed in Section 5.2.

5.1.2.1 Overview of Hydrologic Modeling for the EIR/EIS

The hydrologic characteristics and impacts of the proposed project were evaluated using the Santa Ynez River Hydrologic Model (SYRHM), developed by Santa Barbara County Water Agency

(SBCWA). The SYRHM was first developed in 1979 and has been used since by water agencies to evaluate various management alternatives in the basin. The model was used in Reclamation's 1995 EIR/EIS for the Cachuma Contract Renewal. Over the last two decades, the SYRHM has been expanded and modified in consultation with the Santa Ynez River Hydrology Committee, composed of technical hydrology experts from Reclamation, the Member Units, and downstream interests. All hydrologic modeling for the EIR was performed by Stetson Engineers under the direction of Reclamation and COMB, and reviewed by a broad based Technical Advisory Committee. A detailed description of the modeling and the results of the hydrological simulations are provided in Stetson (2001). The modeling performed for this EIR/EIS was the same modeling performed for the State Water Board's EIR under preparation for the WR 94-5 water rights hearing.

Hydrologic data utilized in SYRHM include precipitation in the Santa Ynez basin above and below Bradbury Dam; Santa Ynez River streamflow; tributary inflow from streams below Bradbury Dam; infiltration to Doulton, Mission, and Tecolote tunnels; evaporation from Jameson, Gibraltar, and Cachuma Lake; lower Santa Ynez River riparian basin municipal and industrial, agricultural, and phreatophyte consumptive uses; river bank inflow; river bank depletion; precipitation percolation factors; and percolation to the Lompoc Plain from Santa Ynez River water.

The simulation model was used to evaluate changes in the following hydrologic conditions due to the FMP/BO flow related management actions (primarily, the releases for long-term rearing flows and passage flows):

- Lake storage and elevation
- Spills from the lake
- Alluvial groundwater levels and storage
- Streamflow below the dam

The simulation modeling for this EIR/EIS include the following releases and operational changes associated with the FMP/BO:

- Releases to maintain interim target flows by releases with a 0.75-foot surcharge
- Releases to maintain long-term rearing target flows by releases after 3.0-foot surcharge
- 3.0-ft surcharge to develop water for Fish Passage Account and Adaptive Management Account, and the associated releases from these accounts

The proposed modified ramp-down schedule for water rights releases occurs during a 24-hour period. The SYRHM is a monthly step model; as such, this operational change cannot be modeled. However, the change in ramping schedule is negligible compared to previous ramping regimes, and is not expected to have a measurable effect on the hydrology and hydraulics of the river.

The results of the modeling for the operations of the Cachuma Project with the FMP/BO flow-related management actions were compared to hydrologic conditions predicted by the model based on "current operations." Current operations for modeling purposes include interim rearing flows and surcharging the reservoir to 0.75 feet. State Water Project (SWP) water is included in the modeling for both current and proposed operations.

In several instances in the EIR/EIS, the hydrologic conditions due to the FMP/BO actions are compared to operations prior to the FMP and BO – that is, operations under WR 89-18 before SWP water was delivered to the lake. This scenario is called "recent historic operations or pre-BO operations."

It should be emphasized that all of the results presented in the EIS/EIR are the result of analyzing *simulated operations* using SYRHM. Simulated operations should not be confused with experienced or real time operations. All modeling of project alternatives used the historic hydrologic conditions from the period of record 1918 to 1993, which includes a wide range of rainfall conditions. For example, there were four significant dry periods in this period of record, as well as several very wet years. By using the historic period of record for the basis of the modeling, the hydrologic impacts of each alternative can be predicted with greater certainty.

All simulation models have a certain limitation in predicting absolute results due to inherent errors in the mathematically derived representations of actual operations and the historic input data.

A summary of the key downstream hydrologic characteristics of the recent historic, current, and proposed operations is presented in Table 5-1 based on the modeling by Stetson Engineers (2001).

TABLE 5-1
KEY HYDROLOGIC CHARACTERISTICS (SIMULATION)

Parameter	Recent Historic Operations Under WR 89-18	Current Operations with Releases for Interim Rearing Target Flows	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge
Average spills/leakage (AFY)	37,580	36,693	35,415
Average 89-18 releases (AFY)	6,322	6,023	5,737
Average fish releases (AFY)	0	1,362	2,715
Total discharges from the dam (AFY)	43,902	44,078	43,867
No. of spill months	84	82	78
No. of spill water years	26	26	25
No. of spill water years >20,000 acre-feet	17	16	15

Source: Stetson Engineers (2001). Modeling period 1918-1993.

5.1.2.2 Reduction in Spills

Effects of Current Releases for Interim Rearing Flows

The spill frequency and average annual spill amount under current conditions are slightly less than under recent historic operations because of the interim releases for fish, which create more storage in the reservoir. The number of spill months over a 76-year period has been reduced under current operations by about two percent (82 months versus 84 months, see Table 5-1). The average annual spill and leakage amount have also been reduced under current operations by about 887 acre-feet (or two percent).

Effects of Proposed Releases for Long-term Rearing and Passage Flows

Under the provisions of the FMP/BO, releases for fish would occur as needed to maintain rearing habitat to either Highway 154 or Alisal Road based on hydrologic conditions (see Section 2.4.3). These releases would only occur after Reclamation had the ability to surcharge the reservoir by three feet. In addition to maintaining rearing flows, releases will be made in years following spills during the flow recession (usually March-May) to facilitate fish passage above Solvang.

The spill frequency under the proposed operations would be less than under current operations due to a larger reservoir created by surcharging. The number of spill months over a 76-year simulation modeling period is estimated to be 78 months compared to 82 months under the current operations (Table 5-1), a five percent reduction. The average annual spill and leakage amount would be reduced three percent under the proposed project compared to current operations.

The reduction in spills under both current operations and with the proposed long-term releases and 3.0-foot surcharge does not mean that there would be less water reaching the river downstream of Bradbury Dam. The larger reservoir with the 3.0-foot surcharge essentially stores water that would ordinarily spill. This water is then released at a later date to maintain downstream rearing flows. Hence, the reduction in spill frequency does not cause an equivalent reduction in the total amount of water discharged to the river. As shown in Table 5-1, the total amount of water discharged from the dam to the Santa Ynez River is essentially the same under recent historic operations, current operations, and proposed operations.

5.1.2.3 Changes in Downstream Flows

Effects of Current Releases for Interim Rearing Flows

Under recent historic operations, the average annual water rights release was 6,322 acre-feet (Table 5-1). However, the total combined water rights and fish releases under current operations are greater, with an estimated average annual combined release of 7,385 acre-feet (16 percent increase).

Under current operations, releases from the dam are made to meet interim rearing target flows at Highway 154. As a consequence, low flows downstream of Bradbury Dam are now occurring for a longer duration and over a longer reach of the river than under the recent historic operations (i.e., prior to the FMP/BO).

The additional releases from the dam under current operations are shown in Table 5-2. Under the current operations, releases from the dam are two cfs or greater 99 percent of the time. In contrast, releases of two cfs or more under recent historic operations occurred only 43 percent of the time.

Interim releases for fish under current operations affect the magnitude and seasonal pattern of dewatered storage in the Above Narrows Aquifer (see Section 5.3). In essence, the additional releases early in the year for fish reduce the dewatered storage in the aquifer. Hence, the amount of water rights releases have been reduced under current operations compared to recent historic operations because of incidental benefits of the fish releases on the downstream alluvial aquifer.

TABLE 5-2
FLOWS FROM CACHUMA LAKE
DUE TO SPILLS AND DOWNSTREAM RELEASES (SIMULATION)

Cubic feet per second	Percentage of Months that Spills and Downstream Releases are at or **ABOVE** the Indicated Flow (simulation, 1918-1993)		
	Recent Historic Operations Under WR 89-18	Current Operations with Releases for Interim Rearing Target Flows	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge
2	43 %	99 %	99 %
5	35 %	41 %	69 %
10	31 %	30 %	36 %
20	26 %	26 %	27 %
50	15 %	15 %	13 %

The interim releases for fish under current operations result in more frequent and greater low-flows downstream of the dam compared to recent historic operations, as shown in Table 5-3. For example, under the current operations, flows at Highway 154 are two cfs or greater 82 percent of the time. In contrast, flows of two cfs or more under recent historic operations occurred only 50 percent of the time. The increase in downstream low-flows under current operations becomes smaller with distance from the dam, such that there is very little difference in the frequency of low-flows near Buellton (Table 5-3).

There is very little difference in the frequency of higher flows downstream of the dam (not including flood flows from spills) between current and recent historic operations because flows over 50 cfs are primarily due to natural runoff, not releases for water rights or fish, as shown in Table 5-3.

Despite the difference in the amount of water released for water rights and fish purposes between recent historic operations and current operations, the total amount of water discharged from the dam to the Santa Ynez River is essentially the same (see Table 5-1). In essence, the water discharged to the river in fish releases offsets the reduction in discharges to the river from spills and water rights releases under current operations.

Effects of Proposed Releases for Long-term Rearing and Passage Flows

Under the provisions of the FMP/BO, releases for fish would occur as needed to maintain rearing habitat to either Highway 154 or Alisal Road based on hydrologic conditions (see Section 2.4.3). These releases would only occur after Reclamation had the ability to surcharge the reservoir by three feet. In addition to maintaining rearing flows, releases will be made in years following spills during the flow recession (usually March-May) to facilitate fish passage above Solvang.

Under the proposed FMP/BO operations, the average annual water rights release will be 5,737 acre-feet (Table 5-1), less than under current operations. The water rights releases under the proposed operations would be less than under current operations because the releases for fish purposes earlier in the year reduces the need for water rights releases to replenish groundwater basins (Table 5-1).

The total combined water rights and fish releases under the proposed operations would be slightly greater than under current operations. The estimated average annual combined water rights and fish releases would be 8,452 acre-feet compared to 7,385 acre-feet under current operations. This 14 percent increase is due to the higher rearing target flows that would be maintained under the proposed project.

The proposed operations would exhibit more frequent downstream low flows (e.g., 2 – 10 cfs) than under current operations due to greater releases for fish (Table 5-3). For example, the proposed flows at Highway 154 would be 5 cfs or greater 78 percent of the time. In contrast, flows of 5 cfs or more under current operations are estimated to occur only 47 percent of the time. The increase in downstream low-flows under the proposed operations becomes smaller with distance from the dam, such that there is very little difference in the frequency of low-flows near Buellton (Table 5-3).

Despite the difference in the amount of water released for water rights and fish purposes between current operations and proposed operations, the total amount of water discharged from the dam to the Santa Ynez River is essentially the same (see Table 5-1). In essence, the water discharged to the river in fish releases offsets the reduction in discharges to the river from spills and water rights releases under proposed operations.

TABLE 5-3
STREAMFLOWS DOWNSTREAM OF CACHUMA LAKE (SIMULATION)

Cubic feet per second	Percentage of Months that Flows are at or **ABOVE** the Indicated Flow (simulation, 1981-1993)		
	Recent Historic Operations Under WR 89-18	Current Operations with Releases for Interim Rearing Target Flows	Proposed Releases for Long-term Rearing Target Flows & Passage Flows with 3' surcharge
Below Hilton Creek			
2	49 %	99 %	99 %
5	39 %	47 %	75 %
10	32 %	32 %	37 %
20	26 %	26 %	24 %
50	15 %	14 %	8 %
Highway 154			
2	50 %	82 %	99 %
5	40 %	47 %	78 %
10	33 %	34 %	36 %
20	27 %	27 %	29 %
50	12 %	12 %	12 %
Alisal Road			
2	47 %	53 %	68 %
5	39 %	43 %	50 %
10	31 %	33 %	34 %
20	22 %	23 %	24 %
50	11 %	12 %	11 %
Near Buellton			
2	47 %	51 %	57 %
5	40 %	41 %	44 %
10	30 %	32 %	34 %
20	23 %	25 %	26 %
50	12 %	12 %	12 %
Above Salsipuedes Creek			
2	37 %	39 %	42 %
5	33 %	34 %	37 %
10	29 %	30 %	32 %
20	24 %	25 %	26 %
50	12 %	12 %	13 %
Narrows			
2	45 %	45 %	48 %
5	38 %	38 %	41 %
10	32 %	33 %	35 %
20	27 %	28 %	29 %
50	13 %	14 %	14 %

5.1.2.4 Impacts on Flood Hazards

Overview of Potential Impact

Historically, the County FCD has not needed to conduct channel maintenance along the lower Santa Ynez River outside of the western Lompoc Valley because the upstream river channel has apparently contained sufficient capacity in the past. Most of the river between the dam and Buellton does not contain bank protection or development adjacent to the river, with the exception of scattered land development in Solvang, Santa Ynez, and Buellton; and a golf course in Solvang. The City of Solvang and SYRWCD ID#1 have several water supply wells in and adjacent to the river; these wells have been significantly damaged by bank erosion during the 1995 and 1998 high flow events in the river. This reach of the river contains several major public bridges at Refugio Road, Alisal Road, and Highway 101. These bridges have not been damaged by recent high flow events.

The river between the dam and Highway 154 on San Lucas Ranch is contains a floodplain with a variable width. There are several large stream terraces 400 to 500 feet wide. The owners of San Lucas Ranch have provided limited information about improvements on the river along this reach. It appears that there may be one or more river wells and possibly some water pumps. In addition, there are several at-grade cattle and vehicle crossings of the Santa Ynez River on San Lucas Ranch between Bradbury Dam and Highway 154. These crossings apparently consist of on-site riverbed material and used to rotate cattle from one pasture to another. They are only used during low flows. The crossings are periodically damaged by high flows and are then repaired.

The potential to create new, or increase existing, flood hazards along the Santa Ynez River below Bradbury Dam due to the current and proposed releases for fish is evaluated below. In general, flood hazards can be created or increased by the following conditions: (1) a reduction in the frequency and amount of spills that have historically scoured the river channel on a periodic basis, essentially removing obstructive vegetation through natural processes, and thereby maintaining channel capacity; and/or (2) increasing the size, extent, and density of woody vegetation in the river channel that could reduce channel capacity and cause overbank flooding during high flow events, or generate woody debris that could clog downstream bridges at Alisal Road and Highway 101.

Effect of Current Releases

As described in Section 5.1.1.2, the spill frequency and average annual spill amount under current operations (with the interim releases for fish) are slightly less (about two percent) than under recent historic operations. This reduction in spill conditions is not expected to have a measurable effect on the vegetation conditions and associated flood hazards on the river downstream of Bradbury Dam for the following reasons:

- The reduction in spills under current operations is due to minor reservoir surcharging (0.75 feet). Only small spills (e.g., < 5,000 acre-feet) would be affected by the surcharging.

These spills do not create the large flood flows downstream of the dam that scour the river channel and remove vegetation. The smaller spills do not have an appreciable effect on river channel capacity.

- The predicted reduction in spill frequency due to current operations is negligible. It is also based on a simulation model, and as such, is only an approximation.

It should be noted that the Modified Storm Operations implemented by Reclamation in 1998 (See Section 3.2.6) was designed, in part, to reduce the peak flows and the duration and size of spill events through the use of pre-releases, gateholding, and precautionary releases. The reduction in spills under current operations due to the 0.75-foot surcharge would be substantially less than that caused by the Modified Storm Operations.

As described above, low flows downstream of Bradbury Dam occur for a longer duration and over a longer reach of the river under current operations (due to interim releases for fish initiated in late 2000) than under recent historic operations. The increase in downstream low-flows under current operations becomes smaller with distance from the dam, such that there is very little difference in the frequency of low-flows near Alisal Road. The increase in low flows downstream of Bradbury Dam may increase the density, vigor, and extent of riparian vegetation in portions of the river channel over time due to greater moisture availability, particularly during the early summer when water was generally absent from the river channel under recent historic conditions. The availability of water throughout the year in the channel will extend the growing season for phreatophytes and reduce the period of drought stress. The increase in riparian vegetation is expected to be evident in the next several years as releases for fish continue. The effect is expected to be most pronounced in the reach between the dam and Highway 154 (which traverses the San Lucas Ranch) where rearing flows for steelhead would be continuous except in drought years. The effect would extend further downstream but would be attenuated with distance from the dam. It is anticipated that the increase in riparian vegetation would not be measurable downstream of Highway 154 Bridge where flows would not be maintained for fish under current operations.

The potential increase in riparian vegetation is not expected to significantly reduce channel capacity and create potential flooding hazards for the following reasons:

- The increased low flows (generally 2 to 5 cfs) will be contained in the thalweg of the river channel. These flows will be concentrated in a narrow zone (usually less than 10 feet across) within a larger river channel that has a width of 200 to 500 feet). Riparian and wetland vegetation is expected to increase along this wetted low flow channel over time, until the low flow channel and its vegetation are removed by flood flows. The increase in vegetation along such a narrow zone would have a negligible effect on channel capacity.

- The potential increase in vegetation along the low flow channel is not expected to create significant stands of large riparian trees that could create channel obstructions or downstream debris. Much of the vegetation that is being stimulated along the new wetted channel is composed of herbaceous wetland plants adapted to year-round saturated soils.

Riparian trees develop in portions of the channel with only seasonal saturation. The wetland plants (e.g., cattails and bulrushes) that are developing in the center of the channel do not create significant channel obstructions or flooding hazards.

It should be noted that there is little to no difference in the frequency of moderate to high flows (i.e., greater than 50 cfs) downstream of the dam between current and recent historic operations. These flows are primarily due to natural runoff, not releases for water rights or fish. They will continue to scour the river channel and remove obstructive vegetation through natural riverine processes. Hence, the hydrologic regime for moderate to high flows would not be altered by current operations.

Based on the above considerations, current operations (which only include releases to Highway 154 for rearing flows) are not expected to significantly increase the potential for flooding hazards along the lower Santa Ynez River (compared to pre-FMP/BO conditions).

Effects of Proposed Releases for Long-term Rearing and Passage Flows

The spill frequency and average annual spill amount under the proposed operations (with the long-term releases for fish) are less (about five percent) than under current operations. This reduction in spill conditions is not expected to have a measurable effect on the vegetation conditions and associated flood hazards on the river downstream of Bradbury Dam for the reasons described above for current operations – that is, the reduction in spill frequency is minor; it only affects small spills that do not affect flooding conditions; and the effects would be masked by the Modified Storm Operations.

With the proposed releases for long-term rearing flows, low flows downstream of Cachuma Lake would occur for a longer duration and over a larger portion of the river than under current operations. The increase in downstream low-flows under current operations becomes smaller with distance from the dam, such that there is very little difference in the frequency of low-flows near Alisal Road. As described for current operations above, the increase in low flows downstream of Bradbury Dam may increase the density, vigor, and extent of riparian vegetation in portions of the river channel over time due to greater moisture availability, particularly during the early summer when water was generally absent from the river channel under recent historic conditions. However, the potential increase in riparian vegetation is not expected to significantly reduce channel capacity and create potential flooding hazards for the reasons described above for current operations.

Based on the above considerations, the proposed operations (which include releases to Alisal Road for rearing flows) are not expected to significantly increase the potential for flooding hazards along the lower Santa Ynez River (compared to current operations). **Any effect on flooding hazard due to reduced spill frequency and more prolonged and extensive low flows would be considered an adverse, but not significant impact (Class III).**

The potential increase in flooding hazard along the river is based on the assumptions that additional flows along the river would cause greater vegetation growth, which in turn, would cause an adverse hydraulic effect. While the assumptions seem logical and reasonable, there are many factors and conditions that could invalidate these assumptions, and suggest that that flooding impacts are not likely to occur. For example, the response of the river vegetation to the additional flows is not known. While it seems logic to expect additional growth, there are other factors that influence the density, productivity, and extent of vegetation in the river including temperature, seasonality of flows, and natural plant mortality. In addition, many riparian plants do not cause substantial hydraulic impediments to flow because they are low growing, non-woody, or senescent during the winter runoff period.

Cumulative Effects of Current and Proposed Releases

The current and proposed releases from Bradbury Dam to meet downstream rearing and passage flows under the FMP/BO could have a cumulative effect on riparian vegetation along the Santa Ynez River between the dam and Alisal Road. For example, the above analyses indicate that the reductions in spills due to current fish releases and due to the proposed long-term releases for fish are minor by themselves. However, the combined reduction in spill frequency and amount (about 7 percent) is still considered too small to significantly affect the condition of riparian vegetation on the river and increase flooding hazards. Similarly, the combined effects of current operations and the proposed operations would cause more prolonged low flows downstream of Cachuma Lake and over a larger portion of the river than either operation alone. However, the cumulative effect of these changes in operations is still too small to cause a significant growth of riparian vegetation that could increase flooding hazards.

As shown in Table 5-1, the total amount of water discharged from the dam to the Santa Ynez River is essentially the same under recent historic operations, current operations, and proposed operations. In essence, the current and proposed operations are simply altering the timing and magnitude of downstream flows caused by releases and spills from the dam, not the total quantity of water over time. Any increase in flooding hazards due to vegetation growth is likely to be immeasurable due to the confounding effects of droughts or periodic floods**, and as such, would be considered adverse, but not significant (Class III).**

5.1.3 Mitigation Measures and Residual Impacts

The current and proposed fish releases and surcharging would not result in any potentially significant impacts on downstream flood hazards. No hydrologic impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are necessary.

5.2 WATER SUPPLY CONDITIONS

5.2.1 Member Units' Water Supply Conditions

An overview of the Cachuma Project Member Units and their water supply and demand conditions is provided in this section. The percentage of each Member Unit's total supply provided by the Cachuma Project is shown below.

- Carpinteria Valley Water District 41 %
- Montecito Water District 34 %
- City of Santa Barbara 45 %
- Goleta Water District 55 %
- SYRWCD, ID#1 22 %

The amount of Cachuma water delivered to the Member Units varies from year to year, depending on winter runoff, lake storage, water demand, and other water supply sources. The City of Santa Barbara and Goleta Water District receive the largest quantity of water from the project, receiving about 11,000 and 12,000 acre-feet in 1999-2000, respectively.

Carpinteria Valley Water District

The Carpinteria Valley Water District encompasses about 8,912 acres with a mixture of agriculture (40 percent), residential (13 percent), and industrial/commercial/institutional (14 percent) and open space (33 percent) land uses. Domestic water service is provided to a population of about 17,900 and approximately 3,240 acres of irrigated crops, ranging from lemons and avocados to nursery products. The District maintains 3,936 connections. It has three sources of water: Cachuma Project, Carpinteria Groundwater Basin, and SWP water. As shown in Table 5-4, Cachuma Project water represents about 40 percent of the District's total available supplies. Groundwater is extracted from the Carpinteria Basin which has a total perennial yield of about 6,000 acre-feet. The District pumps about 1,800 acre-feet per year on average from this basin. Approximately 50 percent of total District water deliveries are for agricultural customers.

TABLE 5-4
WATER SUPPLY AND DEMAND - CARPINTERIA VALLEY WATER DISTRICT

	Total (acre-feet per year)	Comment
Supply (average production)		
Cachuma Project	2,813	Fixed percentage of Cachuma Project yield. Cachuma represents 41% of total supply
State Water Project	1,650	SWP entitlement is 2,000 AFY plus 200 AFY of CCWA drought buffer; CVWD assumes 75 %average annual delivery
Local groundwater	3,000	District’s portion of Carpinteria Groundwater Basin’s safe yield estimated at 6,000 AFY
Total=	7,463	
Demand (average)		
Current (2001)	4,300	Approx. 50% for agricultural use
Build-out (2020)	5,700	Slight increase in M&I use; agricultural demands remain constant

*Source: CVWD (2001 and pers. comm. from C. Hamilton, Gen. Manager, June 2002).

Montecito Water District

The Montecito Water District encompasses an area of approximately 9,888 acres of which about 70 percent is residential, while the remainder is a mixture of commercial/recreation (1 percent), open space (18 percent), and agriculture (11 percent). The District produces water from the following sources: Cachuma Project, Jameson Reservoir/Doulton Tunnel (located along the Santa Ynez River above Cachuma Lake), diversions along Fox and Alder Creeks (tributaries to the Santa Ynez River), SWP water, and groundwater (see Table 5-5). The District does not provide water to all properties in the service area. Many are served by private wells and stream diversions, and nine private water companies. The District's long-term share of the groundwater basins' perennial yield is estimated at 400 acre-feet per year. The District pumps from the Montecito Basin which has a perennial yield of about 1,650 acre-feet per year. Approximately 67 percent of the water use is for residential uses. The remainder is delivered to agricultural customers and for recreational uses (i.e., golf courses and parks).

TABLE 5-5
WATER SUPPLY AND DEMAND – MONTECITO WATER DISTRICT

	Total (acre-feet per year)	Comment
Supply (average production)		
Cachuma Project	2,660	Fixed percentage of Cachuma Project yield. Cachuma represents 34% of total supply
Jameson Lake, Fox and Alder creeks	2,000	Diversions on the upper Santa Ynez River
Doulton Tunnel	375	
State Water Project	2,280	SWP entitlement is 3,000 AFY plus 300 AFY of CCWA drought buffer; MWD assumes 76% average annual delivery of entitlement
Local groundwater	400	District's portion of Montecito Groundwater Basin's safe yield of1,650 AFY
Total=	7,715	
Demand (average)		
Current (2000)	6,073	12% is losses and transfers to City of S.B.
Build-out (2020)	6,835	Slight increase in all uses

*Source: MWD (2001).

City of Santa Barbara

The City of Santa Barbara encompasses approximately 12,000 acres of which about 90 percent is developed. The developed area comprises residential (43 percent), commercial/industrial/ institutional (26 percent), vacant land (24 percent), and transportation corridors (7 percent). The City produces water from the following sources: Cachuma Project, Gibraltar Reservoir/Mission Tunnel/Devil's Canyon Creek (located along the Santa Ynez River above Cachuma Lake), water transferred from Jameson Reservoir by agreement with Montecito Water District, reclaimed water, SWP water, desalination, and groundwater (see Table 5-6). The City's long-term share of the groundwater basin's perennial yield is estimated at 1,400 acre-feet per year. The total safe yield of the Santa Barbara Groundwater Basin (includes Unit #1, Unit #3, and the Foothill Storage Unit) is estimated at 1,900 acre-feet per year. Almost all deliveries are for M&I uses in the City; agricultural demands are estimated at about 70-100 acre-feet per year.

TABLE 5-6
WATER SUPPLY AND DEMAND – CITY OF SANTA BARBARA

	Total (acre-feet per year)	Comment
Supply (average production in the City's LTWSP)		
Cachuma Project	8,203	Fixed percentage of Cachuma Project yield. Cachuma represents 45% of total supply
Gibraltar Reservoir and Devils Canyon	4,310	
Mission Tunnel	1,109	Infiltration; tunnel from Gibraltar Reservoir
Juncal Reservoir	300	Water from Montecito Water District per prior agreement
State Water Project	2,200	SWP entitlement is 3,000 AFY plus 300 AFY of CCWA drought buffer;
Local groundwater	1,018	City's portion of the Santa Barbara Groundwater Basin's safe yield of about 1,850 AFY; used only to replace surface water shortages due to drought
Recycled	900	
Desalination	141	For use only during emergency. Currently in storage mode. Max. capacity = 3,125 AFY
Total=	18,181	
Demand (average)		
Current (2000 - 2001)	14,300	
Build-out (2009 per LTWSP)	18,200	

*Source: City of Santa Barbara (2000; 1994 adopted Long Term Water Supply Program; and pers. comm. from S. Mack, City Water Supply Manager, June 2002).

Goleta Water District

The Goleta Water District encompasses an area of approximately 32,000 acres of which about 4,000 acres are agricultural (12 percent), 5,760 acres (18 percent) is residential, 640 acres (2 percent) commercial, and 21,600 acres (68 percent) open space. The District serves the University of California, Santa Barbara, the Santa Barbara Airport, schools, recreational facilities, and the newly established City of Goleta. The District produces water from the following sources: Cachuma Project, recycled water, SWP water, and groundwater (Table 5-7).

The majority of the District's water supply is from the Cachuma Project. The District has 7,000 acre-feet per year of SWP entitlement, plus 450 acre-feet per year of CCWA's drought buffer. The District's right to the CCWA facility capacity is only 4,500 acre-feet per year. In 1995, the District began making deliveries from a new recycled water project developed in cooperation with the Goleta Sanitary District, a separate public agency. The recycled water project has a capacity of approximately 1,500 acre-feet per year and the District is currently delivering approximately 1,000 acre-feet per year to the University of California, Santa Barbara, several golf courses and other users who were previously using potable water. The District's right to produce groundwater from the local Goleta Basin has been adjudicated through the *Wright v. Goleta Water District* Judgement. The District has an adjudicated right to extract approximately 2,350 acre-feet per year, and any surplus water available. The *Wright* Judgment also provides the District with the right to defer producing its annual groundwater entitlement, and consider that water as the District's stored water for later use during droughts. The *Wright* Judgment also provides the District with the right to inject water into the basin and claim that as the District's stored water, in addition to its annual entitlement. As of June 2002, the District has rights to approximately 29,000-acre feet of stored groundwater in addition to its annual entitlement.

TABLE 5-7
WATER SUPPLY AND DEMAND – GOLETA WATER DISTRICT

	Total (acre-feet per year)	Comment
Supply (average production)		
Cachuma Project	9,321	Fixed percentage of Cachuma Project yield; Cachuma represents about 55% of total supply
State Water Project	3,800-4,500	SWP entitlement is 7,000 AFY plus 450 AFY of CCWA drought buffer. The District assumes 51-60 percent average annual delivery of entitlement and drought buffer. The District's right to CCWA facility capacity is 4,500 AFY.
Local groundwater	2,350	District's portion of the Goleta Basin. Safe yield estimated at 3,410 AFY.
Recycled water project	1,500	Approximate capacity of existing project.
Total=	16,971-17,671	
Demand (average)		
Current (2000)	14,000	Includes approximately 1,000 AFY of recycled water
Build-out (2020)	16,000	Includes approximately 1,500 AFY of recycled water

Source: GWD (2001, 2002).

Santa Ynez River Water Conservation District, Improvement District #1

The SYRWCD ID#1 encompasses an area of approximately 10,850 acres of which about 5,000 acres are residential, 150 acres are commercial, 400 acres are institutional, 2,600 acres are agricultural, and 2,700 acres are grazed or undeveloped. SYRWCD ID#1 produces water from the following sources: Cachuma Project, SWP water, groundwater from the Santa Ynez Upland, and underflow from the Santa Ynez River Riparian basins (see Table 5-8). The latter supplies are developed in two well fields in the river (4 cfs and 6 cfs fields) and a gallery in the riverbed, which is currently inactive. Approximately 50-60 percent of the water deliveries are for agricultural customers; the remainder is for residential uses. SYRWCD ID#1 is a primary supplier of M&I water for the City of Solvang. The District has an entitlement for SWP of 2,000 acre-feet per year, which includes an entitlement of 1,500 acre-feet per year for the City of Solvang. Cachuma Project water represents an important source of SYRWCD ID#1's total water supply.

SYRWCD ID#1 currently participates in a water exchange program with other Cachuma Project Member Units. Under the program, South Coast Member Units purchase SWP water, which is then delivered directly to SYRWCD ID#1 from the CCWA pipeline near Santa Ynez. The South Coast Member Units then take an equivalent amount of Cachuma water in exchange. This program allows the Member Units to avoid the cost of pumping SWP water to Cachuma Lake and then conveying downstream again to SYRWCD ID#1.

TABLE 5-8
WATER SUPPLY AND DEMAND –
SANTA YNEZ RIVER WATER CONSERVATION DISTRICT, ID#1

	Total (acre-feet per year)	Comment
Supply (production in 2000)		
Cachuma Project	2,651	Fixed percentage of Cachuma Project yield. Represents about 22% of total supply.
Santa Ynez Uplands Groundwater Basin	1,617+	Current pumping rate. Historic rate was approx. 4,000 AFY. Prescriptive rights estimated to be 3,700 to 4,700.
Gallery Well	~~0~~	Currently inactive. Maximum permitted diversion is 515 AFY
Santa Ynez River Underflow	1,697	This is estimate of future maximum production from two permitted well fields (4 cfs field = 2,220, 6 cfs field = 3,400)
State Water Project	500	SWP entitlement is 2,000 AFY plus 200 AFY of CCWA drought buffer. 1500 AFY per year is allocated to the City of Solvang. The remaining 500 AFY plus 200 AFY of drought buffer is the District's entitlement. Assume 75 % of 500 acre feet is supply amount.
Total=	6,465+	
Demand (average)		
Current (2000)	5,552	
Build-out (2020)	6,619	

*Source: Stetson Engineers (1994) and SYRWCD ID#1 (2000 and 2001).

Recent deliveries of water from all sources (including Cachuma Project) by the Member Units to their customers are shown in Table 5-9.

TABLE 5-9
MEMBER UNITS' WATER DELIVERIES TO THEIR CUSTOMERS, 1989-2001*
(ACRE-FEET)

Year	Carpinteria	Montecito	Santa Barbara	Goleta**	SYRWCD ID#1
1989-90	6,398	5,106	16,637	13,994	7,902
1990-91	4,768	3,580	9,427	9,593	6,363
1991-92	4,028	3,093	9,518	9,076	6,050
1992-93	4,330	3,900	11,073	12,172	6,343
1993-94	4,331	3,750	11,438	12,671	6,236
1994-95	4,470	4,044	12,337	11,531	6,138
1995-96	4,413	5,383	13,636	12,312	6,812
1996-97	4,688	4,202	14,230	14,667	6,506
1997-98	3,880	4,306	12,818	11,758	5,110
1998-99	4,443	4,812	14,291	13,700	6,163
1999-00	4,672	5,337	15,291	13,396	6,681
Avg=	4,201	3,959	11,724	11,239	5,858

* Includes reclaimed water from 1995 to current.

5.2.2 Potential Impacts

5.2.2.1 Use of SYRHM Modeling

The impact of the proposed operations on water deliveries from Cachuma Lake are summarized in Table 5-10 based on the results of the SYRHM simulations over the period of 1918-1993 (Stetson Engineers, 2001). The model estimates project deliveries each month after the release requirements under WR 89-18 and the BO have been met. A constant demand of 25,714 acre-feet per year was applied in the model, which represents the operational yield identified by the Member Units that would meet their water supply needs based on SYRHM simulations for the 1995 Contract Renewal EIR/EIS modeling. Using this target yield, the maximum shortage in project yield would not exceed 20 percent in one year based on the droughts observed in the modeling period with a minimum pool in Cachuma Lake of 12,000 acre-feet. The Member Units can request and receive higher project deliveries if Reclamation determines that there is available supply. However, use of a higher yield could result in greater shortages in dry years. Table 5-10 also assumes perfect forecasting, whereas in real-time planning, additional reserves could be set aside during a drought which would exacerbate the shortages shown.

In the following sections, the impacts of (1) the current operations involving interim releases for fish, and (2) the proposed FMP/BO releases to meet long-term rearing flows and periodic passage flows on deliveries to Member Units are addressed by using four measurements of impact:

- Effect on average annual deliveries from the Cachuma Project
- Effect on the anticipated number of years with substantial shortages in deliveries
- Effect on the magnitude of shortages in deliveries in the worst drought year
- Effect on the magnitude of shortages in deliveries anticipated in a three-year drought that replicates the worst drought on record

5.2.2.2 Effects of Releases under Current Operations

Effect on Average Annual Project Yield

The average annual project yield under current operations is 193 acre-feet (or one percent) less than under recent historic operations due to the implementation of the interim rearing target flows beginning in September 2000 (Table 5-10).

TABLE 5-10
IMPACTS ON PROJECT DELIVERIES TO MEMBER UNITS
BASED ON SIMULATION MODELING*

Water Supply Parameter	Recent Historic Operations Under WR 89-18	Current Operations with Releases for Interim Rearing Target Flows	Proposed Releases for Long-term Rearing Target Flows & Passage Flows with 3' surcharge
Average Annual Deliveries and Years of Shortages (Simulation Period 1918-1993)			
Average annual delivery (includes 2,000 AFY from Tecolote Tunnel)	25,308	25,115	25,122
No. of years with 10% or more shortage over the 76-year simulation period	5 years	6 years	6 years
Critical Drought Year (Simulation of Historic Worst Drought Year – 1951)			
Shortage in critical drought year (acre-feet)	7,070	9,810	9,890
Shortage as a percentage of current annual operational yield of 25,714 AFY	27%	38%	38%
Critical 3-year Drought Period (based on simulation of 1949-51 drought)			
Shortage in critical drought years (acre-feet)	14,210	20,130	19,920
Shortage as a percentage of current annual operational yield of 25,714 AFY for three years	18%	26%	26%

* Source: Stetson Engineers (2001).

Frequency of Years with Shortages in Project Deliveries

The estimated number of years with shortages of 10 percent or more in project deliveries to the Member Units is shown in Table 5-10. Under recent historic operations without the FMP/BO interim or long-term releases for fish, the number of years with such shortages is estimated to be five over the 76-year simulation modeling period. Interim releases for fish under current operations reduce lake storage and overall project yield. As a result, the number of years in which shortages are expected under current operations is slightly greater (6 years) than under recent historic operations. This difference is considered too small to be meaningful in the context of the modeling limitations using SYRHM, such as simulating real-time management decisions.

Shortages During Worst Drought Year

The project yield during the worst drought year on record (1951) under current operations is expected to be 20,130 acre-feet, which represents 26 percent of the current annual operational yield (Table 5-10). This shortage is greater than the shortage anticipated under recent historic operations, which is estimated to be 18 percent of the operational yield during the three-year period. The increased anticipated shortage under current operations (equivalent to a 42 percent increase) is due to lower overall amount of water stored in the lake because of additional releases to meet interim rearing target flows.

Shortages During the Critical Drought Period

The project yield during the critical drought period on record (1949-51) under current operations is expected to be 9,810 acre-feet, which represents 38 percent of the current annual operational yield for a three year period (Table 5-10). This shortage is greater than the shortage anticipated under recent historic operations, which is estimated to be 28 percent of the annual operational yield. The increased anticipated shortage under current operations (equivalent to a 39 percent increase) is due to lower overall amount of water stored in the lake because of additional releases to meet interim rearing target flows.

5.2.2.3 Impact due to Releases under Proposed FMP/BO Operations

The baseline condition used for the following impact assessment is current operations which involve releases for fish to meet interim rearing target flows. The impact conclusions are based on the implementation of the 3.0-foot surcharge, which was designed to offset the water supply impacts of the FMP/BO releases for fish. If the surcharge were not implemented, significant water supply impacts would occur, as described in Section 10.0 (Alternatives).

Impact on Average Annual Project Yield

The average annual yield with the FMP/BO releases for long-term rearing flows and periodic passage flows would be 7 acre-feet per year less than under current operations (Table 5-10). The reduction would be less than one percent of the total average annual yield, and as such, would be minor and not represent an adverse impact.

Frequency of Years with Shortages in Project Deliveries

The FMP/BO will involve greater releases for fish than under current operations. However, the reduction in deliveries to the Member Units will be offset by the 3.0-foot surcharge, by design. Hence, the frequency of shortages in project deliveries with the FMP/BO long-term releases for fish would be the same as under current operations (6 out of 76 years, see Table 5-10) because surcharging would increase storage in the reservoir. Hence, the proposed FMP/BO releases would not cause a significant impact on project deliveries based on an analysis of years with shortages of 10 percent or more.

Deliveries During Worst Drought Year

The predicted shortages in the worst drought year under the proposed operations would be about the same as under current operations despite the higher releases for steelhead because of the additional storage created by a 3.0-foot surcharge. Hence, the proposed FMP/BO releases would not cause a significant impact on project deliveries in the worst drought year.

Shortages During the Critical Drought Period

The amount of shortages in critical drought years under the proposed project is essentially the same as under current operations. Hence, the proposed FMP/BO releases would not cause a significant impact on project deliveries in the critical drought period.

5.2.2.4 Cumulative Impacts due to Current and Proposed Releases

As shown above, the releases for long-term rearing flows under the proposed FMP/BO would not cause significant reductions in Cachuma Project deliveries to the Member Units because the 3.0-foot surcharge would offset the increment of water used for these releases. However, water supply from the Cachuma Project have been substantially affected by the current operations which involve releases for fish without any new surcharge to offset the loss of water that would otherwise be delivered to the Member Units. The combined effects of the current fish releases and the proposed fish releases (with a 3.0-foot surcharge) are shown in Table 5-10, and summarized below:

- The average annual project yield would not be significantly reduced from recent historic operations
- The frequency of years with shortages in deliveries of 10 percent or more would increase slightly
- The shortages in deliveries during the worst drought year would be 40 percent greater (9,890 versus 7,070 acre-feet) than under recent historic operations
- The shortages in deliveries during the critical 3-year drought period would be 40 percent greater (19,920 versus 14,210 acre-feet) than under recent historic operations

The increased anticipated shortage during drought years due to the cumulative effects of current and proposed fish releases, even with the 3.0-foot surcharge, **is considered a significant, unmitigable impact (Class I) to the Member Units' water supply and their customers.**

5.2.3 Mitigation Measures and Residual Impact

The proposed long-term releases for fish coupled with the 3.0-foot surcharging would not result in any significant adverse impacts on water supply for the Member Units. However, the cumulative impact of current and proposed releases on Cachuma Project deliveries to the Member Units is considered significant. There is no feasible mitigation measure that would ensure that the shortages would be fully offset. The Member Units have drought contingency plans that are designed to provide supplemental water and reduce water demands during these drought periods. However, the occurrence and length of drought periods cannot be predicted, nor can the availability of supplemental water supplies be ensured at that time. As such, there is a potential that the increased shortages would not be fully offset, and there would be a potentially significant, residual impact.

5.3 ABOVE NARROWS ALLUVIAL AQUIFER

5.3.1 Existing Conditions

A detailed description of the Above Narrows Alluvial Aquifer is provided in the State Water Rights EIR. A summary is provided below.

The Above Narrows Aquifer (also known as the Santa Ynez Riparian Groundwater Basin) consists of the Santa Ynez River alluvium from Bradbury Dam to the Narrows. Groundwater storage and groundwater levels in the Above Narrows Aquifer fluctuate in response to streamflow and groundwater pumping.

Groundwater storage and groundwater levels generally increase during winter and spring, and other wet periods, when flow in the Santa Ynez River loses water to the underlying alluvial aquifer. The Above Narrows Aquifer usually becomes full shortly after the onset of "wet" conditions and then it no longer accepts additional water. Surface water will pass through the basin with very little percolation under high streamflows and/or when the basin is full.

Groundwater storage and groundwater levels decrease in the Above Narrows Aquifer during summer, fall and dry periods through pumping, evapotranspiration by phreatophytes, groundwater discharge back into the Santa Ynez River as base flow, and by underflow through the alluvium downstream toward the Lompoc Basin.

Pumping for agricultural, domestic, and municipal uses and losses by phreatophytes decreases the amount of water in storage, which in wet years allows the basin to act as a reservoir, and results in capture of more stream flow. However, pumping causes acceleration of the decline in groundwater storage and levels during dry periods, particularly in the upper-most reaches where natural runoff from a limited drainage area already is reducing the amount of water in storage. In addition, pumping will cause local declines in groundwater storage and water levels which would not necessarily occur under undisturbed conditions.

Dewatered storage in the basin is generally maintained between 10,000 and 12,000 acre-feet through the releases from the Cachuma Project under WR 89-18.

Groundwater quality in the Above Narrows Aquifer will also fluctuate to some extent with seasonal and climatic trends. During wet periods, the basin absorbs high quality surface water flows, blending with water already present in the alluvium. In addition, groundwater will be flushed through the basin displacing poorer quality water with higher quality water. This effect becomes magnified the longer the wet period. Conversely, during dry periods, the basin will absorb poorer quality groundwater flow from tributary streams to the Santa Ynez River and possibly relatively poorer quality groundwater flow from shales and other water-bearing rocks that underlie and surround the basin.

Groundwater pumping also affects groundwater quality. Pumping tends to remove total dissolved solids from the basin; however, this beneficial effect is likely offset by the return flows of water used for municipal, agricultural and other uses. In addition, pumpage causes declines in groundwater levels, thereby potentially increasing the migration of relatively poorer quality groundwater from shale and other water-bearing rocks that underlie and surround the basin.

Due to permit conditions and orders set forth by the State Water Board for operation of the Cachuma Project, the potential and actual amount of water stored and made available for use in the Above Narrows Aquifer has been sustained and increased over the years. Releases from the dam under WR 89-18 were developed to protect downstream beneficial uses.

5.3.2 Potential Impacts

Stetson Engineers (2001) conducted a modeling analysis of the effects of the proposed operations on the groundwater levels and storage conditions in the Above Narrows Alluvial Aquifer for the State Water Board EIR. The results of analysis are summarized below.

The mean and median monthly dewatered storage for the Above Narrows Aquifer over the simulation period is presented in Table 5-11. The modeling results indicate that dewatered storage under current operations is less than under recent historic conditions. For example, the median monthly dewatered storage over the entire basin under current operations is estimated to be 10,517 acre-feet, compared to 10,952 under the recent historic operations. The reduction in dewatered storage is due to the interim releases for steelhead in the summer and fall that are now being implemented.

TABLE 5-11
MONTHLY DEWATERED STORAGE IN THE ABOVE NARROWS ALLUVIAL BASIN (SIMULATION)

	Acre-feet for each Scenario based on Simulation (1918-1993)		
	Recent Historic Operations Under WR 89-18	Current Operations with Releases for Interim Rearing Target Flows	Proposed Releases for Long-term Rearing Target Flows & Passage Flows with 3' surcharge
Mean	11,524	10,769	10,281
Median	10,952	10,517	10,081
Minimum	2,329	2,330	2,315

Median monthly dewatered storage under the proposed project would be less than under current operations because the proposed project would involve additional downstream releases to support steelhead rearing and passage. **Hence, the proposed project would have a beneficial impact (Class IV) on the alluvial basin storage conditions.**

It should also be noted that the dewatered storage in the Above Narrows Aquifer is actively managed through the ANA releases from Cachuma Lake. Under WR 89-18 (which applies to current and proposed operations), the dewatered storage is monitored and ANA releases are requested by SYRWCD when the dewatered storage exceeds 10,000 acre-feet. Hence, no significant difference in management of the ANA releases is expected to occur under the proposed project compared to existing conditions.

The results of the modeling of groundwater elevations by Stetson Engineers (2001) are the same as for groundwater storage described above.

5.3.3 Mitigation Measures and Residual Impacts

The current and proposed fish releases and surcharging would not result in any potentially significant impacts on the Above Narrows Aquifer. No groundwater impact thresholds listed in Section 4.4 would be exceeded. In fact, the proposed project would result in beneficial impacts to groundwater resources. Hence, no mitigation measures are necessary.

5.4 SURFACE WATER QUALITY

One of the primary issues addressed in the State Water Board EIR is the effect of the Cachuma Project on groundwater quality (total dissolved solids (TDS)) in the Lompoc Plain groundwater basin. This basin is the primary water supply for the City of Lompoc. It has very high TDS consisting of various naturally occurring mineral salts. TDS values have increased over time in the Lompoc Plain. The TDS concentration of the groundwater in the central and western plains has increased from less than 1,000 milligrams per liter in the 1940s to greater than 2,000 milligrams per liter in the 1960s (USGS, 1997). The surface water flow of Santa Ynez River reaching the Lompoc Basin is a significant source of recharge, and as such, influences the TDS values in the basin. In the past 10 years, TDS levels have been reduced due to a series of wet years in the 1990s, increased water rights deliveries below the Narrows under WR 89-18, and the introduction of SWP water to the river by wastewater discharges from communities using SWP water (Vandenberg Village, Buellton, Solvang, and Santa Ynez).

Stetson Engineers (2001) conducted several technical studies for the State Water Board EIR to assess the salinity conditions in the reservoir and in the river downstream of the lake to determine how the interim and proposed long-term releases for fish could affect the TDS levels in river water used to recharge the Lompoc Plain. The studies involved the use of the SYRHM to predict TDS concentrations and salt loading (i.e., quantities of salt) using the historic hydrologic record. A summary of the modeling studies is provided in this section for the lake and river salinity conditions. Salinity issues associated with the Lompoc Basin are addressed in Section 5.5. The interested reader is directed to Stetson Engineers (2001) for a detailed analysis of how the new releases for fish affect lake and downstream water quality.

5.4.1 Existing Conditions

Stetson Engineers (2000) compiled a comprehensive database on TDS in the Santa Ynez River watershed with the assistance of the Santa Ynez Water Quality Technical Advisory Committee. Over 9,000 separate measurements were compiled from 50 locations in the watershed. TDS values for the river at the Narrows over the period 1942 to 1993 indicate an inverse relationship between TDS and flows. In the winter months when there is runoff, TDS values are generally around 500 mg/l. TDS values increase to about 1,000 mg/l in the summer and fall when flows are minimal. Flows that exceed 100 cfs typically have TDS concentrations that range from 499 to 700 mg/l, while flows that are less than 10 cfs range from 1,100 to 1,300 mg/l. The median TDS value at the Narrows is 1,070 mg/l (Stetson Engineers, 2000). TDS values in Salsipuedes Creek, one of the largest tributaries downstream of the dam, typically range from 800 to 1,100 mg/l.

5.4.2 Potential Impacts on River TDS

Stetson Engineers (2000) modified the SYRHM to add a salinity component to simulate TDS levels in the lake and along the river using historic hydrologic conditions from 1942-1993. The model was used to evaluate the effect of current interim and proposed long-term releases for fish. A detailed description of the modeling procedures, model calibration, and results of the modeling is presented in the State Water Board EIR and Stetson Engineers (2001), and summarized briefly below.

Effects of Current Operations

TDS concentrations in water rights releases below the dam under current operations are predicted to be lower than under recent historic operations. The median TDS concentration in water rights releases under current operations is estimated to be about 460 mg/l, which is a combination of low salinity SWP water (about 300 mg/l) and higher salinity reservoir water (about 600 mg/l). Under recent historic operations prior to the importation of SWP water, the median TDS level in water rights releases is estimated to be about 625 mg/l. The median difference in TDS concentrations of water rights releases at the dam between current operations and recent historic operations is 165 mg/l.

The importation of SWP water under current operations and its inclusion in water rights and fish passage releases are expected to reduce TDS concentrations of such releases. The reduced TDS would occur for both ANA and BNA flows (the latter include flows that reach the Lompoc Valley). This effect would be restricted to the period of time that water rights releases are made, and only when SWP water is commingled. Water rights releases are made when there is little to no flow in the river, and when tributary flow is absent. Hence, there would be little to no mixing of this higher quality water with lower quality runoff in the river.

As noted above, the improvement in water quality in downstream water rights releases being experienced under current operations is due to the commingling of SWP and reservoir water in the water rights releases (up to 50 percent). The predicted effects represent the maximum improvements likely to occur when the SWP water is commingled at 50 percent in all water rights releases. At this time, the amount of SWP water delivered to the reservoir is less than 10 percent of the total South Coast Member Units' entitlement. As such, only a minor improvement is occurring at this time and in the next several years. The improvement in water quality in downstream water rights releases in the future will be proportional to the amount of SWP water delivered to the reservoir and commingled with water rights releases.

Water releases for steelhead rearing, as required under the FMP/BO, will only be made through the Hilton Creek supplemental watering system (maximum capacity of 10 cfs) in order to conjunctively use this water to support both Hilton Creek habitat and mainstem habitat. As a consequence, the rearing releases to maintain target flows at Highway 154 or Alisal Road will not typically contain SWP water. The TDS of these releases will reflect the current salinity levels in the reservoir (about 600 mg/l).

TDS concentrations in spills from the reservoir under current operations may be less than under recent historic operations because SWP water is now being imported. However, SWP water is typically not stored in the reservoir when reservoir storage is high with an upcoming winter season because SWP water is deemed to be the first to spill from the lake. In addition, the TDS concentrations in spill water is likely to be dominated by the inflows from upstream, not the TDS levels of stored water. However, the cumulative improvement in TDS levels in the reservoir under current operations after many years may contribute to a slight reduction in TDS concentrations in spill water, although this effect is expected to be minor and is speculative.

Potential Impacts of the FMP/BO Releases

The salinity modeling by Stetson Engineers (2001) showed that TDS levels in the water rights releases under the proposed project would be similar to those under current operations. The amounts of SWP water released for both purposes under current operations and for the proposed project are essentially the same. In addition, the varying quantities of SWP water delivered from year to year would not cause any difference in the TDS levels between current operations and the proposed project because the amount of SWP water commingled with water rights releases would be essentially the same for current and proposed operations. For example, the TDS of releases for steelhead rearing would be about 581 mg/l for current operations, and 582 to 583 mg/l for the proposed project.

The mean monthly TDS of flows at the Narrows from all sources (i.e., runoff and water rights releases) under the proposed project would be essentially the same as under current operations in the fall months. Hence, the proposed project would have no impact on the water quality conditions on the lower Santa Ynez River. The TDS of flows at the Narrows for current and proposed operations would be about 50-100 mg/l less in the fall months compared to recent historic operations due to SWP water commingled with water rights releases (Stetson Engineers, 2001).

5.4.3 Mitigation Measures and Residual Impacts

The current and proposed fish releases and surcharging would not result in any potentially significant impacts on the water quality in the river. No water quality impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are necessary.

5.5 LOMPOC GROUNDWATER BASIN CONDITIONS

5.5.1 Background Information

Stetson Engineers (2001) conducted detailed technical studies for the State Water Board EIR to assess the effect of current and proposed operations of the Cachuma Project related to downstream releases to determine the effect on water quality in the Lompoc Basin. The studies involved the use of two groundwater models to predict TDS concentrations and groundwater levels using the historic hydrologic record. A summary of the modeling results is provided in this section. The interested reader is directed to Stetson Engineers (2001) for a detailed analysis of the impacts of the proposed project on the Lompoc Basin.

The results of the Lompoc Basin groundwater models (Stetson Engineers, 2001) suggest that groundwater quality is greatly influenced by the timing, amount, and TDS of Santa Ynez River flows at the Narrows where the Lompoc Basin is recharged from river flows. Inflows to the Narrows will vary based on the operation of the reservoir, particularly related to frequency and duration of spills, amount of BNA water releases, and amount of SWP water commingled with water rights and fish releases. As described in Section 5.4, the TDS of the river flows at the Narrows under current operations is lower than under recent historic operations due to the commingling of SWP water in the water rights releases.

5.5.2 Potential Impacts

Effects of Current Operations

Based on the modeling analyses in Stetson Engineers (2001), the TDS levels in the Lompoc Basin (Main Zone Aquifer) may show a minor reduction under current operations, compared to recent historic operations (i.e., pre-BO, pre-SWP water deliveries). The average annual differences in TDS levels in wells of the Lompoc Basin between current operations and recent historic operation range from 1 to 17 mg/l. The differences are very small relative to the total TDS levels in these wells (800 to 2,500 mg/l). The reduced TDS levels are likely due to a combination of high quality SWP water in water rights releases to the Narrows.

Potential Impacts of the FMP/BO Releases

The modeling results in Stetson Engineers (2001) indicate that TDS levels in the groundwater of the Lompoc Basin under the proposed project would improve, particularly in the western and eastern portions of the basin. The predicted reduction in TDS levels is predicted to be less than 5 percent compared to current operations. **As such, the proposed project could result in a beneficial impact on water quality in the Lompoc Plain, and in the quality of the drinking water for the City of Lompoc (Class IV).** The magnitude of a potential improvement in water quality is small.

The results of the modeling by Stetson Engineers (2001) indicate no significant changes in groundwater levels in the Lompoc Basin under the proposed project.

5.5.3 Mitigation Measures and Residual Impacts

The current and proposed fish releases and surcharging would not result in any potentially significant impacts to the Lompoc Basin. No groundwater or water quality impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are necessary.

5.6 SOUTHERN STEELHEAD AND OTHER FISH

5.6.1 Existing Conditions

The following information about southern steelhead and other fish is based on the studies by the Santa Ynez River Technical Advisory Committee (SYRTAC) on behalf of Reclamation and the Member Units under provisions of the 1994 Fish MOU (SYRTAC, 1994, 1996, 1997, 1998, 2000a, 2000b), as well as an update prepared by Entrix (2001) for the State Water Board EIR.

5.6.1.1 Species Accounts

Twenty-six species of fish inhabit the Santa Ynez River watershed (Table 5-12), including 11 native species. Steelhead/rainbow trout, prickly sculpin, partially armored threespine stickleback, and Pacific lamprey are native to the Santa Ynez River and seven additional native species are found only in the lagoon (tidewater goby, Pacific herring, topsmelt, shiner perch, starry flounder, staghorn sculpin, and striped mullet). Fifteen fish species have been introduced to the watershed including the arroyo chub, large- and small- mouth bass, sunfishes, catfish, among others. Three sensitive fish species are found in the Santa Ynez River watershed:

- Southern California Evolutionary Significant Unit of steelhead trout (*Oncorhynchus mykiss*) – Federally-listed endangered species
- Tidewater goby (*Eucyclogobius newberryi*) – Federally-listed endangered species
- Arroyo chub (*Gila orcutti*) – California species of concern

In February 2000, the Santa Ynez River downstream of Bradbury Dam and its tributaries are designated as critical habitat for the endangered steelhead. [Note: critical habitat designation has been set aside by a federal court action in 2002; resolution of the designation is pending]. The Santa Ynez River lagoon is not designated as critical habitat for the tidewater goby.

<u>**Steelhead/Rainbow Trout**</u>

Coastal rainbow trout are native to the Santa Ynez River and exhibit two distinctive life history strategies. Resident rainbow trout live their entire lives in freshwater. Anadromous steelhead are born in freshwater, emigrate to the ocean to rear to maturity, and then return to freshwater to spawn. It is common to find populations exhibiting both life history strategies within the same river system. Individuals exhibiting one life history strategy can produce offspring that exhibit the other strategy. Juveniles of rainbow trout and steelhead are indistinguishable except when steelhead juveniles smolt, typically during February through May. Anadromous steelhead were listed in August 1997 by the National Marine Fisheries Service (NMFS) as an endangered species under the federal Endangered Species Act (ESA).

TABLE 5-12
NATIVE AND INTRODUCED FISH IN CACHUMA LAKE AND THE SANTA YNEZ RIVER

Common Name	Scientific Name	Status	Location
Rainbow/steelhead trout	*Oncorhynchus mykiss*	N[1]	RATCL
Threespine stickleback	*Gasterosteus aculeatus*	N	RATCL
Prickly sculpin	*Cottus asper*	N	RATCL
Pacific lamprey	*Lampetra tridentata*	N	R
Arroyo chub	*Gila orcutti*	I[2]	RATCL
Fathead minnow	*Pimephales promelas*	I	RTL
Mosquitofish	*Gambusia affinis*	I	RATCL
Smallmouth bass	*Micropterus dolomieui*	I	RACL
Largemouth bass	*Micropterus salmoides*	I	RATC
Bluegill	*Lepomis macrochirus*	I	RAC
Green sunfish	*Lepomis cyanellus*	I	RATCL
Redear sunfish	*Lepomis microlophus*	I	RC
Black crappie	*Pomoxis nigromaculatus*	I	RC
White crappie	*Pomoxis annularis*	I	C
Channel catfish	*Ictalurus punctatus*	I	RACL
Black bullhead	*Ameiurus melas*	I	RATCL
Threadfin shad	*Dorosoma petenense*	I	C
Goldfish	*Carassius auratus*	I	RAC
Carp	*Cyprinus carpio*	I	RAC
Tidewater goby	*Eucyclogobius newberryi*	N[1*]	L
Pacific herring	*Clupea harengus*	N	L
Topsmelt	*Atherinops affinis*	N	L
Shiner perch	*Cymatogaster aggregata*	N	L
Staghorn sculpin	*Leptocottus armatus*	N	L
Starry flounder	*Platichthys stallatus*	N	L
Striped mullet	*Mugil cephalus*	N	L
Brown trout	*Salmo trutta*	I	-[3]
Brook trout	*Salvelinus fontinalis*	I	-[3]
Walleye	*Stizostedion vitreum*	I	-[3]

[1]Endangered species under the ESA; *the tidewater goby has been proposed to be de-listed although no action has yet been taken.
[2]California species of special concern. [3]Introductions of these species were unsuccessful according to CDFG Region 5 data.
R = Santa Ynez River below Bradbury Dam T = Tributary Streams C = Cachuma Lake A = Santa Ynez River above Cachuma Lake L = Santa Ynez River lagoon N = Native species I = Introduced species

In the Santa Ynez River system, adult steelhead migrate from the ocean to spawn mainly January through April. Upstream migration requires sufficient streamflow to breach the sandbar at the river mouth and to allow passage in the river. In dry years, passage can be impeded by low flows at critical locations (*e.g.,* riffles). Steelhead typically migrate upstream when streamflows rise during a storm event. The eggs are laid in a nest (redd) in gravel. Fish prefer gravels that are free of fine sediment to promote water circulation around the incubating eggs. After spawning, adult steelhead may return to the ocean (about 30% of adults). Unlike most salmonids, steelhead may return to spawn in later years. Steelhead may spend one to several years in freshwater before emigrating to the ocean. Typically, however, southern California steelhead migrate to the ocean as 1 or 2 year olds (5-10 inches long) (Entrix, 2001). The juvenile outmigration period is typically February through May, but the timing of migration is dependent upon streamflows. Juveniles undergo physiological changes that adapt them to a life in saltwater, and become "smolts." Resident rainbow trout may reach maturity and spawn in their second year of life, although the time of first spawning is generally in their third or fourth year.

Steelhead and rainbow trout juveniles are indistinguishable, both in appearance and in habitat use. Young-of-the-year often utilize riffle and run habitat during the growing season and move to deeper, slower water during the high flow months. Larger fish (yearlings or older) use heads of pools for feeding. Pools provide over-summer refugia for trout in small streams during low flow conditions. A second strategy is to rear in a lagoon.

A temperature of 20°C (68°F) for daily average water temperatures has been used in central and southern California by CDFG to evaluate the suitability of stream temperatures for rainbow trout. This level represents a water temperature below which reasonable growth of rainbow trout may be expected. Data in the literature suggests that temperatures above 21.5°C (71°F) result in no net growth, while maximum daily water temperatures greater than 25°C (77°F) result in potentially lethal conditions.

Tidewater Goby

The tidewater goby is a small estuarine fish, rarely exceeding 2 inches in length, that inhabits lagoons and the tidally influenced region of rivers from San Diego County to Del Norte County, California. They are typically found in the upper ends of lagoons in brackish water, usually in salinities of less than 10 ppt, but have been found in water ranging from 0 to 40 ppt (Swift et al., 1989). Tidewater gobies are bottom dwellers and are typically found at depths of less than 3 feet. Instream, they inhabit low-velocity habitats out of the main current. Tidewater gobies may spawn at anytime of the year, but spawning typically peaks in late April through early May. Spawning takes place in burrows dug 4-8 inches deep in coarse sand. Spawning takes place at fairly low to moderate salinities (5-10 parts-per-thousand [ppt]. After hatching, the larval tidewater goby become planktonic (suspended in the water column) and are associated with aquatic plants in near-shore habitat. Juvenile tidewater goby are benthic dwellers, similar to adults. Tidewater gobies were common in the Santa Ynez River lagoon in 1987 and 1993, and both young-of-the-year and adults have been collected (CDFG 1988, SYRTAC 1994).

Arroyo Chub

The arroyo chub was introduced into the Santa Ynez River drainage during the early 1930's. Arroyo chub are native to the Los Angeles, San Gabriel, San Luis Rey, Santa Margarita, and Santa Ana river systems, as well as San Juan Creek. The arroyo chub is a relatively small, chunky minnow, typically less than 5 inches in length. Arroyo chub prefer slow-moving sections of rivers with a sand or mud substrate, or standing waters in reservoirs. Although the arroyo chub seems to prefer very low water velocities, they are apparently adapted to surviving periodic high winter flows. They are adapted to survive in widely fluctuating water temperatures and oxygen levels. Arroyo chub were observed in a pool in the Santa Ynez River which had a pre-dawn dissolved oxygen (DO) minimum level of approximately 1.6 ppm (SYRTAC 1994). In 1993, SYRTAC (1997) found arroyo chub along the river below the dam in abundant numbers in shallow pools, and relatively scarce in riffle and run habitats. However, they were not observed in pools inhabited by large predators (bass and sunfish). Arroyo chub are found throughout the Santa Ynez River watershed.

Pacific Lamprey

Pacific lamprey are anadromous, spending four to seven years in freshwater and one to two years in the ocean. Spawning lamprey, like steelhead, are dependent on winter storms providing sufficient streamflow to open the mouth of the lagoon to the ocean, and to provide adequate streamflow to allow for upstream migration. Pacific lamprey spawning migration begins in February and lasts through early May. They build nests in gravel and rock substrates in areas of low velocity. The freshwater residency of the young is spent typically as bottom dwellers. Pacific lamprey inhabit the Santa Ynez River below Cachuma Lake and may inhabit the tributaries although none have been observed in tributary habitats.

Threespine Stickleback

Freshwater populations of threespine stickleback live in shallow, low-velocity habitats, often in association with aquatic plants. Spawning can occur from March through October. Nests are built in beds of aquatic plants with sand substrates. The diet of threespine stickleback consists of small organisms living on plants and the stream bottom. Stickleback are mostly an annual species, but some individuals may survive for two to three years. Threespine stickleback inhabit the Santa Ynez River above and below Cachuma Lake and are found in the Salsipuedes/El Jaro Creek system.

Prickly Sculpin

Prickly sculpin can live in an extremely wide range of habitats. Prickly sculpin are known to live in freshwater and saltwater, in streams that are small, clear and cold, in rivers that are large, warm and turbid, and in lakes of all sizes, rich in nutrients or infertile. They can tolerate water temperatures up to at least 82°F. Prickly sculpin inhabit Cachuma Lake, the Santa Ynez River below the lake, and the lower reaches of Hilton and Salsipuedes Creeks.

Pacific Herring

Pacific herring are a small schooling marine fish that enter estuaries and bays to spawn. Pacific herring spawn from late October through March. After spawning has been completed, adult Pacific herring return to their ocean feeding grounds. After hatching, young herring usually remain through the spring and summer in the estuary or bay in which they were spawned before migrating to the ocean in the fall. Herring produced in the Santa Ynez River lagoon would likely remain until the following winter when high streamflow reopened the sandbar.

Topsmelt, Shiner Perch , Staghorn Sculpin, and Starry Flounder

Topsmelt, shiner perch, staghorn sculpin, and Starry flounder are common marine fish that also occur in estuaries and lower reaches of coastal streams. They exhibit a tolerance to a wide range of salinities, particularly topsmelt and perch. These species occur periodically in the Santa Ynez River lagoon.

Introduced Species

Fifteen introduced species have populations in the watershed (Table 5-11). All of the introduced species occur in Cachuma Lake and along the Santa Ynez River above and below the lake, except for the white crappie and threadfin shad, which only occur in the lake. Most of these introduced species are game species or baitfish that were originally planted in Cachuma Lake but have since spread. Many of the game fish can prey on steelhead and other native species. Most notable among these are largemouth and smallmouth bass, green sunfish, and black bullhead (a type of catfish).

5.6.1.2 Fish Communities

Mainstem Below Bradbury Dam

SYRTAC studies conducted from 1993 to 2000 have documented steelhead/rainbow trout in the mainstem Santa Ynez River downstream of Cachuma Lake. These studies have occurred during wet and average periods, therefore, results probably do not reflect distribution and relative abundance in dry years. Steelhead/rainbow trout are found in the mainstem below Bradbury Dam, primarily in the first three miles downstream of the dam, but they have been observed rearing as far down as the Alisal Road bridge (approximately 10 miles downstream) (SYRTAC 1997, 2000a). Steelhead primarily use the mainstem as a migration corridor to the habitat immediately downstream of the dam and to tributaries located on the south side of the watershed that provide perennial habitat.

Spawning activity has been observed in the mainstem directly downstream of Bradbury Dam in nearly every year of the SYRTAC studies (SYRTAC 1997, 1998, 2000a), but no redds were reported in 1997 (SYRTAC 1998). While no spawning has been observed downstream of the Highway 154 Reach, redds have been observed in the Refugio Reach in 1999 and in the Alisal

Reach in 2000 (SYRTAC 2000a; S. Engblom, pers. com. 2000). In addition, young-of-the-year have been documented in the Refugio and Alisal reaches in 1995 and 1998, both years.

Pacific lamprey, also an anadromous species, has been observed in the mainstem. Other native residents of the lower Santa Ynez River include threespine stickleback and prickly sculpin. Several introduced fishes are found in the mainstem including: arroyo chub, fathead minnow, mosquitofish, large- and smallmouth bass, bluegill, green and redear sunfish, black crappie, channel catfish, black bullhead, goldfish, and carp. The majority of the non-native fish are concentrated in pool habitat that exist throughout the summer in the first 10 miles downstream of Bradbury Dam.

Tributaries Below Bradbury Dam

Steelhead/rainbow trout have been observed during the SYRTAC studies in all of the major south-side tributaries although use of Nojoqui Creek has been minimal. The following descriptions were summarized from Entrix (2001).

- ***Hilton Creek***. Hilton Creek is inhabited by steelhead/rainbow trout and prickly sculpin. No introduced warmwater species, such as bass, bullhead or sunfish, have been found in Hilton Creek. Adult steelhead/rainbow trout passage to upper Hilton Creek is impeded first at a cascade and bedrock chute (located about 1,380 feet upstream from the confluence with the Santa Ynez River) and then completely blocked at a culvert under the Highway 154 crossing (about 4,200 feet upstream from the confluence). Spawning is generally more common closer to the cascade/chute. No spawning or young-of-the-year have been observed above the cascade to the Reclamation property boundary (about 2,980 feet upstream). A CDFG fisheries biologist has observed adult steelhead/rainbow trout in the pool immediately below the Highway 154 Culvert (M. Cardenas, pers. com. 2000). In addition, a COMB fish biologist also observed three age classes of adult steelhead/rainbow trout in the plunge pool immediately below the Highway 154 culvert in 2000 and 2001 (S. Engblom, pers. comm., 2001). These observations were made from the Caltrans easement. One of the fish observed in 2001 was a 18 to 20 inch long adult trout following a large flow event, indicating that fish can pass through the passage impediments on lower Hilton Creek under optimal hydraulic conditions.

  Adult steelhead/rainbow trout have been documented migrating into Hilton Creek in all years that SYRTAC observations have been made (SYRTAC 1997, 1998, 2000b), but numbers were low in years with low winter runoff. Actual spawning with production of young-of-the-year was documented in 1995, 1997, 1998, 1999, 2000, 2001, and 2002 (S. Engblom, pers. comm., July 2002). Adults migrating into Hilton Creek are often large and could be anadromous steelhead from the ocean (particularly in wet years), rainbow trout that spilled over from Cachuma Lake, or fish that are resident in the river, its tributaries or the lagoon.

  Young steelhead remain in fresh water for a year or more. Because the stream goes dry during the summer, young-of-the-year cannot complete rearing in lower Hilton Creek under natural conditions (SYRTAC 1997, 1998, 2000a). The fish are either stranded or must enter the mainstem where the likelihood of predation by bass and catfish increases. Fish rescue operations were conducted in 1995 and 1998 to move young-of-the-year from the drying stream to better habitat. During the 1995 fish rescue, over 220 young-of-the-year and 5 adults were rescued and relocated. In June 1998, 831 young-of-the-year and three adults were captured in 1,200 linear feet of stream (SYRTAC 2000b). Since the spring of 2000, a supplemental watering system has provided consistent, cool water from Cachuma Lake to support almost one thousand young-of-the-year.

- ***Quiota Creek***. Visual surveys conducted by DFG from 1993 to 1998 and roadside surveys by SYRTAC biologists (1993 to 2000) show that Quiota Creek, especially in the upper reach, supports steelhead/rainbow trout. Over 100 young-of-the-year were observed in August 1994, and another 100 young-of-the-year and 20 to 30 juvenile/adults were observed in a tributary to Quiota Creek in August 1994 (SYRTAC 1997). A visual survey in February 1995 documented spawning activity, redds and two adults (one 16-inch female and 6-to 8-inch male) approximately 2 miles upstream of the confluence with the Santa Ynez River (SYRTAC 1997). Observations from nine road crossings in late 1998 documented approximately100 young-of-the-year from about 1.5 to 3 miles. In 2002, an extremely dry year that did not produce winter runoff, rainbow trout spawning was documented upstream of Crossing No. 4 (S. Engblom, pers. comm., July 2002). Young of the year were also observed in 2002.

- ***Alisal Creek.*** Fish surveys were conducted in February 1995, when access to private property was available for migrant trapping (SYRTAC 1997). Prior to 1995, migration into Alisal Creek was blocked by a concrete drop structure and apron. This structure was washed away by high flows in early 1995, and steelhead/rainbow trout were subsequently trapped in the lower creek. Twenty resident rainbow trout juveniles and adults were found in Alisal Creek upstream of Alisal Reservoir (SYRTAC 1997). Bass and sunfish inhabit the reservoir. Trapping in lower Alisal Creek in January 1995 captured two adult steelhead/rainbow trout migrating upstream into the creek. Many other steelhead/rainbow trout of various size classes were observed to be common to abundant within the upper portions of Alisal Creek (S. Engblom, pers. com. 2000).

- ***Nojoqui Creek.*** Electrofishing and snorkel surveys in May 1994 found arroyo chub and threespine stickleback abundant in Nojoqui Creek, with small populations of green sunfish and largemouth bass in a few pools (SYRTAC data, 1995-98). However, no steelhead/rainbow trout were observed or captured. Two adults were captured migrating upstream in March 1998 and another adult observed in a pool, but no other steelhead/rainbow trout were captured in 1995 or 1997. It is speculated that, unlike the other creeks in the lower basin, Nojoqui does not have a remnant population within its watershed. Land use activities, coupled with the recent drought effectively dried Nojoqui Creek for several years during the late 1980's and early 1990's. With no remnant seed population within the creek, very small numbers of adults returning from the ocean, and low numbers within the Santa Ynez watershed, it is highly unlikely that Nojoqui Creek could become populated with steelhead/rainbow trout in the near future.

- ***Salsipuedes-El Jaro Creeks***. Steelhead/rainbow trout of all size classes have been found in the Salsipuedes-El Jaro Creek system. During summer months when water temperatures are warm, they are typically found in pools and deep runs. Arroyo chub, fathead minnow, and threespine stickleback were common throughout. Warmwater species, such as green sunfish, largemouth bass, and bullhead, have been previously observed in lower Salsipuedes Creek, although they have not been observed in recent years. Steelhead/rainbow trout have been observed on several occasions in both Salsipuedes and El Jaro creeks. In March 1987, an electrofishing survey by U.S. Fish and Wildlife Service (USFWS) collected two adult females and two adult males (Harper and Kaufman 1988). In 1994, an electrofishing survey in May and August found young-of-the-year and juvenile steelhead/rainbow trout around the confluence of Salsipuedes and El Jaro, and one adult was found in Salsipuedes upstream of the confluence (SYRTAC 1997). In 1997, snorkel surveys in lower Salsipuedes found young-of-the-year (33), juveniles (172), and small adults (16), while surveys in upper Salsipuedes and El Jaro found young-of-the-year (56 in upper Salsipuedes, 45 in El Jaro) as well as juveniles and adults (10 in upper Salsipuedes, 62 in El Jaro) (SYRTAC 1998).

  In 1997, an average rainfall year, 34 upstream migrants were captured in a trap installed in lower Salsipuedes Creek. In 1998, only one upstream migrant was captured, and 40 migrants were captured in 1999. Spawning has been documented in both streams (SYRTAC 1997, 2000b). In 1997, surveys found most redds just above the confluence (within a 1/2 mile) in El Jaro (18 redds) and upper Salsipuedes (11 redds), with 14 redds located on lower Salsipuedes Creek. Three redds were observed in Salsipuedes Creek in 1998 (upper only), while 64 redds were observed in 1999 (48 lower, 16 upper). No redds were observed in El Jaro Creek during surveys conducted in 1998 and 1999.

- ***San Miguelito Creek*.** Passage from the Santa Ynez River is completely blocked by the concrete culvert, drop structures and other barriers, such as a bridge with a long concrete apron that is raised 15 feet above the downcut channel. Resident rainbow trout spawn and rear in the upper creek. Young-of-the-year rainbow trout and adults were relatively abundant near San Miguelito Park (about 3 miles upstream of Lompoc) in 1996 surveys (SYRTAC 1997). Spawning surveys began in 1997 and found 49 redds. In 1998, one redd was observed, while 35 redds were observed in 1999.

- ***Lagoon.*** A number of species have been found in the lagoon. There is typically a salinity gradient in the lagoon such that the salinity is higher near the ocean, and a freshwater lens exists near the inflow of the Santa Ynez River. Both ocean and brackish water species have been observed in the lagoon including the tidewater goby, Pacific herring, topsmelt, shiner perch, staghorn sculpin, starry flounder, and striped mullet. The following freshwater species have also been found in the lagoon, although concentrated near the upper end: threespine stickleback, prickly sculpin, arroyo chub, fathead minnow, mosquitofish, smallmouth bass, green sunfish, channel catfish and black bullhead.

  In August of 1993, a beach seining survey was conducted in the Lagoon by the SYRTAC (1997). Ten species of fish were caught, including smallmouth bass, arroyo chub, mosquitofish, stickleback, tidewater goby, starry flounder, Pacific herring, topsmelt, shiner perch, and staghorn sculpin. A second set of lagoon fishery surveys were conducted by the SYRTAC in 1999 (SYRTAC 2000b). During the 1999 surveys 14 species of fish were captured, including 7 species not found during the 1993 survey. Species observed in the 1999 survey include: steelhead, fathead minnow, channel catfish, green sunfish, bullhead, prickly sculpin, arroyo chub, stickleback, starry flounder, Pacific herring, topsmelt, shiner perch, staghorn sculpin, and striped mullet. A single steelhead was captured during the 1999 survey at the mid-lagoon sampling location.

In 1993, tidewater gobies were collected throughout the lagoon, in salinities ranging from 6.5 to 16.0 ppt (SYRTAC, 1997). Tidewater goby abundance was considerably higher in the upper half of the lagoon where the numbers of gobies per seine haul exceeded 100. The salinities in this portion of the lagoon ranged from approximately 8.0 to 13.5 ppt. Tidewater goby abundance in the lower half of the lagoon was considerably lower, ranging from one to 24 per seine haul. Corresponding salinities in the lower half of the lagoon were approximately 14.0 to 16.0 ppt. During the August survey, most of the gobies observed were adult (e.g., approximately 1.5 inches in length). Observations in July 1994 indicated successful reproduction by tidewater gobies, as evidenced by the presence of large numbers of young-of-the-year. Freshwater fish (smallmouth bass, arroyo chub and mosquitofish) were found in a narrow (approximately 0.5 meter thick) freshwater lens located in the upstream end of the lagoon. Overall, the lagoon appeared to be extremely productive.

5.6.1.3 Status of Fish Habitat

Habitat conditions have been assessed in the lower Santa Ynez River and its tributaries by the SYRTAC and others where access was granted by landowners (ENTRIX 1995a, SYRTAC 1997, 1998, 2000a). Habitat types (e.g. pool, run, riffle) and other habitat variables were documented including water quality, substrate, cover, instream vegetation, and riparian canopy. In addition, water temperatures and dissolved oxygen (DO) concentrations have been monitored in several locations. The condition and distribution of fish habitat below Bradbury Dam, evaluated prior to implementation of the Biological Opinion (BO), is presented below, based on Entrix (2001). Habitat conditions are expected to improve along the mainstem of the river as the BO is implemented over time. Reclamation began implementation of the BO in 2000. The first action along the mainstem was the initiation of low flow releases in September 2000 to meet interim rearing target flows at Highway 154, although voluntary releases for fish have been made since 1993.

Summary of Fish Habitat

- ***Spawning Habitat***. Spawning has been observed in the mainstem directly downstream of Bradbury Dam in 1993 and 1998. Downstream of Highway 154, spawning activity is scarce (Figure 5-1). Evidence of spawning was found near Refugio Road in 1999, and young-of-the-year have been documented here in 1995 and 1998, very wet years. In addition, spawning was observed and young-of-the-year found in habitat directly downstream of Alisal Bridge in 2000.

Good spawning habitat for steelhead/rainbow trout is located in Hilton Creek and mid-to-upper Quiota Creek. Spawning habitat in Salsipuedes and El Jaro creeks is moderate due to the presence of fine sediments and sand in the stream. Steelhead/rainbow trout consistently spawn in these tributaries. Good habitat occurs above passage impediments in San Miguelito and Alisal creeks.

- ***Rearing Habitat.*** Potentially good quality steelhead/rainbow trout rearing habitat is present in the mainstem between Bradbury Dam and the Highway 154 (Figure 5-2). In general, the Refugio and Alisal reaches of the mainstem have poor rearing habitat conditions, although refuge pools in these reaches are valuable. Rearing habitat is unavailable downstream of the Alisal Reach in the mainstem, although the lagoon could provide some moderate-quality rearing habitat. The limitations for mainstem habitat for steelhead/rainbow trout apply to other fish populations because these fish require perennial habitat which is typically not found below the Alisal Bridge except in the portion of the river where flow is maintained by the releases from the Lompoc wastewater treatment plant. In addition to mainstem habitat, a number of the south-side tributary streams provide oversummering habitat for steelhead/rainbow trout. High quality steelhead/rainbow trout rearing habitat is located in Quiota Creek, upper Salsipuedes Creek, and, with flow enhancement, in lower Hilton Creek. Fair quality habitat exists in El Jaro and lower Salsipuedes creeks, and above impassible barriers in San Miguelito Creek. Excellent rearing habitat is present above impassable barriers on Alisal Creek. While Nojoqui Creek appears to have some good habitat elements, the lack of a resident seed population and depressed steelhead numbers in the basin make it unlikely that this tributary will be colonized in the future. This creek was dry during the drought of 1988-1991.

Habitat Description of Study Reaches along the Mainstem

Steelhead habitat along the 48 miles of river downstream of Bradbury Dam was divided into six different reaches (see Table 5-13), then characterized by the SYRTAC (1997, 1998, 2000a). A summary of steelhead habitat conditions is presented below based on Entrix (2001).

Highway 154 Reach. The Highway 154 reach extends from the dam to Highway 154 bridge, at distance of about 2.9 miles. It has a more confined channel than reaches further downstream, as well as better riparian cover in general. This reach is dominated by pool habitat, most of which were less than 3 feet deep. Several large and deep perennial pools are present on Reclamation property, including the Stilling Basin and the Long Pool. Substrate consisted primarily of cobble near Bradbury Dam with increasing proportions of sand and gravel downstream. High-flow events in 1995 and 1998 have since resulted in additional gravels being moved into the system from Hilton Creek and other tributaries. However, gravels appear to be deposited above the wetted channel along and downstream of the Long Pool.

TABLE 5-13
MAINSTEM STUDY REACHES BELOW BRADBURY DAM

Reach Name	Landmarks	Reach Length (miles)	Miles below Bradbury Dam
Highway 154	Bradbury Dam down to Highway 154 Bridge	2.9	0 - 2.9
Refugio	Highway 154 Bridge down to Refugio Road	5.0	2.9 - 7.9
Alisal	Refugio Road down to Alisal Bridge in Solvang	2.6	7.9 - 10.5
Avenue of the Flags	Alisal Bridge in Solvang down to Avenue of the Flags Bridge in Buellton	3.1	10.5 - 13.6
Buellton to Lompoc	Buellton to Highway 1 Bridge in Lompoc (includes Weister and Cargasachi study area)	23.9	13.6 - 37.5
Below Lompoc	Highway 1 Bridge in Lompoc to lagoon	8.3	37.5 - 45.8

From a fisheries perspective, riparian vegetation in most areas of the lower Santa Ynez River is not well developed, and does not provide significant shading for aquatic habitats. The Highway 154 reach has moderate canopy coverage, better than canopy cover in reaches further downstream. Instream aquatic vegetation, mainly algae, forms in the Highway 154 Reach typically in pools. During the early part of the summer this reach appears to have less algal growth than more downstream reaches. However, by the late summer, algae becomes abundant. Temperature monitoring and modeling results by SYRTAC and Stetson Engineers indicate that this reach of the mainstem Santa Ynez River is the only portion of the river where water temperatures remain within the tolerance limits of steelhead.

Refugio Reach. Flows in this 5-mile long reach often become intermittent or non- existent during the summer. The habitat composition is about 33% pools, 32% runs, 17% glides, and 18% riffles during spring and early summer flows. The substrate is a mix of small cobble, gravel, and fine sediment. Spawning-sized gravels were once extremely limited within the wetted channel between Refugio Road and Bradbury Dam. However, recent high flow years have deposited gravels along this reach (Entrix, 2001). Instream cover is moderate in pools. Riparian vegetation is not well developed, and canopy coverage is low. This reach has the most extensive growths of algae in the summer compared with the other mainstem reaches (Entrix, 2001).

Suitable temperatures during the summer in this reach cannot be maintained on a reliable basis even at flows of up to 150 cfs (SYRTAC data). Upwelling of cool groundwater, which occurs in a few pool habitats, can provide a thermal refuge for fish in the summer.

Alisal Reach. The Alisal Reach extends about 2.6 miles from the Refugio Road Bridge to the Alisal Road Bridge in Solvang (approximately 10.5 miles downstream from Bradbury). Quiota, Alamo Pintado, and Alisal creeks join the mainstem Santa Ynez River in this reach. Flows generally become fragmented during the summer and fall months except in very wet years. The habitat composition of this reach is 35% riffles, 29% runs, 27% glides, and only 9% pools. The substrate is small cobble, gravel, and fine sediments (Entrix, 2001). Riparian vegetation is not well developed, and canopy coverage is poor. Floating mats of algae can be extensive in the summer. The Alisal Reach is the downstream extent to which steelhead have been observed on a regular basis in the mainstem. Temperatures suitable for steelhead cannot be maintained during the summer in this portion of the river on a reliable basis even with flow releases of up to 150 cfs. Upwelling pools are present on the Alisal Reach.

Avenue of the Flags Reach. The habitats along the Avenue of the Flags Reach are almost exclusively runs. The substrate is mostly sand and gravel. The upper half of the reach is essentially devoid of canopy cover due to gravel mining operations downstream of Alisal Bridge. The lower half of this reach has abundant vegetation and canopy cover at several locations.

Buellton to Lompoc. The mainstem between Buellton and Lompoc (about 37.5 miles downstream from Bradbury at the Highway 1 Bridge) extends 23.9 miles. Near the confluence with Salsipuedes Creek, the channel is broad and braided, with little shading. Runs are the dominant habitat type, with some riffles and few pools. Substrate is mainly sand and small gravel. Canopy cover and instream cover are minimal. Coverage from algal mats is lower compared to the Refugio and Alisal reaches.

Below Lompoc. Habitats two miles below the Lompoc Wastewater Treatment Facility are dominated by deep pools formed by numerous beaver ponds. Runs are also extensive, accounting for 37% of the reach (Entrix, 2001). Downstream of Bailey Avenue in Lompoc, progressively greater concentrations of riparian vegetation occur, including extensive growths of willows, both along the sides and within the river channel. The growth of willows and other vegetation in this area is supported by freshwater (treated effluent) releases to the channel from the Lompoc Wastewater Treatment Facility. Substrate in the area is typically sand and fine silt.

Habitat Description of Study Reaches in Major Tributaries

The SYRTAC studies have focused on the tributaries on the south side of the mainstem because these tributaries have perennial flow in their upper reaches. Steelhead/rainbow trout have been observed during the SYRTAC (2000a) studies in all of the major south-side tributaries. The habitat, where accessible, has been surveyed in these streams and these observations are presented below.

Hilton Creek. Hilton Creek flows are very sporadic and highly dependent on seasonal rainfall. During wet years, the creek typically flows until late May, sometimes later depending on runoff. Natural flows generally diminish during the late spring or early summer of wet years in the lower reach downstream of the upper release point. Flows do not persist in the lower reach for more than a few days during average years.

The lower reach of Hilton Creek is high gradient and well confined. Riparian vegetation and the walls of the incised channel shade the streambed. A rocky cascade and bedrock chute are passage impediments for migrating steelhead, located about 1,380 feet upstream from the confluence with the river, and a culvert forms a passage impediment (possibly a migration barrier) approximately 4,200 feet upstream.

Channel width averages about 9 feet, and maximum pool depth averages 3 feet. Most pools have suitable spawning habitat at their tails. The lower creek, up to the chute pool, comprises 58% riffle/cascade, 27% run, and 15% pool (Entrix, 2001). Above the chute pool to the Reclamation property boundary (1,553 feet total), the habitat consists of 61% riffle/cascade, 34% run, and 5% pool. The reach just above the bedrock chute (about 300 feet) is consecutive run/riffle habitat with little or no canopy cover. Above this open reach to the Highway 154 culvert (about 2,400 feet total), habitat conditions are good to excellent (Entrix, 2001) based on observations from adjacent federal property. Pool habitat is greater than those in lower Hilton and old growth sycamore dominate the vegetation providing dense canopy cover. Streamflows persist longer in this reach than farther downstream.

Water temperatures of natural flows are generally suitable for rearing through the entire year. With the addition of water from the supplemental watering system in 1999 and the flexible intake and pump system in 2003, suitable rearing temperatures can be maintained all summer.

A formal field investigation of habitat conditions on upper Hilton Creek, located on the San Lucas Ranch, has not been completed because access has not been provided to COMB or Reclamation.

Quiota Creek. Studies on this tributary have been limited due to lack of access on private property. Oaks and willows generally were abundant, although riparian vegetation was lacking in many places. Silt was the predominant substrate, especially in pools. Summer flow appears to be intermittent in average and dry years in the lower section. Grazing decreased the amount of streamside vegetation in this area. Refugio Road crosses Quiota Creek nine times. The numerous road crossings of Refugio Road are impediments to upstream passage at low and high flows. All nine crossings are shallow-water "Arizona" style crossings with concrete beds. Several sites have a 2- to 3-foot drop downstream of the concrete apron.

Good canopy conditions provide shading along portions of the stream. Pool habitats have good depth and complexity of instream cover. Numerous undercut banks exist (particularly in pools) providing excellent rearing habitat. In contrast to several other tributaries, substrate is composed of larger size gravel, cobbles, and boulders. In the lower reach, lack of good shading suggests that water temperature may not be suitable in the summer. Cattle fecal material was also observed in and around the stream in this area, which may contribute to nutrient loading.

Alisal Creek. Riparian and instream habitat is similar to that of upper Quiota Creek. The lower creek runs through a golf course. A dam and small reservoir (Alisal Reservoir) occurs about 3.6 miles upstream from the confluence and block passage for steelhead to upstream areas. Approximately 2 miles of Alisal Creek flows above the Alisal Reservoir. Conditions below this reservoir appear fair, with good riparian vegetation and canopy cover. The habitat above the reservoir is very good with excellent riparian vegetation and canopy, and has perennial flow. No temperature monitoring has been conducted, but observations suggest good temperature conditions in upper Alisal Creek (Entrix, 2001). Lower Alisal Creek downstream of the reservoir dries during the early to mid-summer of wet years, and is typically dry during the spring of average years.

Nojoqui Creek. The lower reach of Nojoqui Creek from the confluence with the mainstem Santa Ynez River up to 1/2 to 3/4 miles had degraded conditions with no canopy, little vegetation, eroded banks, and little or no flow during summer. Further upstream, however, conditions appear to be good for spawning and rearing, although flow is fragmented and intermittent within this section, particularly during average and dry years. The stream has dense riparian vegetation and canopy cover, good instream cover from boulders, roots, and undercut banks. No significant passage impediments currently exist, although a minor one occurs 2.9 miles upstream of its confluence with the Santa Ynez River and a major one occurs at the Highway 101 culvert. Summer water temperatures may occasionally be unsuitable for steelhead/rainbow trout; although, in general, water temperatures appear to be favorable (Entrix, 2001).

Salsipuedes Creek and El Jaro Creek. The Salsipuedes-El Jaro creek system is the largest tributary drainage in the lower basin. This system is the second tributary that returning steelhead encounter after entering the Santa Ynez river from the ocean, and the first into which they can migrate. Access to habitat within Salsipuedes and El Jaro creeks by anadromous steelhead may be limited by low-flow passage impediments associated with bridges or road crossings.

The habitat along lower Salsipuedes Creek is composed primarily of shallow runs, with some deep runs, step runs, pools, and riffles. After the first quarter mile, the floodplain widens, and there is minimal riparian vegetation and canopy. Several small pools with undercut banks and other features provide important summer habitat for steelhead/rainbow trout. Riparian vegetation was scoured from the main channel in the winters of 1995 and 1998. Following the heavy winter flows of 1998, lower Salsipuedes Creek habitat was mostly runs and slightly fewer pools (73% runs, 15% glides, 7% riffles, and 4% pools) (SYRTAC 2000b). Silty conditions were generally found throughout lower Salsipuedes Creek although riffles were dominated by small cobbles.

In 1994, seven habitat units were identified and measured in upper Salsipuedes Creek, directly upstream of the confluence of El Jaro Creek. The habitat units surveyed include 4 pools, 2 riffles, and 1 run, covering a distance of approximately 500 feet, where access issues limited the extent of the survey. Excellent cover and shading, and suitable spawning gravels were observed in all riffle and pool tail areas. A 1996 survey found that habitat was composed mainly of runs (44% by length), followed by step runs (27%), pools (20%), and riffles (9%). Canopy coverage is relatively high compared to lower Salsipuedes and El Jaro creeks. Instream cover was 38 to 40% for all habitat types. Substrate composition is similar across habitat types, with gravels dominant, and, in pools and runs, fine sediments subdominant.

Based on recent surveys by COMB, there is a greater incidence of destabilized banks on lower Salsipuedes Creek than on El Jaro Creek. There is a greater usage of livestock an dry farming along Salsipuedes Creek compared to El Jaro Creek.

The banks and channel in El Jaro Creek are very similar to lower Salsipuedes. The 1994 survey near the confluence with Salsipuedes Creek documented large pools, good riparian cover with overhanging vegetation, good instream cover in the form of vegetation and boulders, and generally excellent trout habitat. Further upstream there are areas of marginal habitat with abundant fine sediment, slow flow, and medium canopy. Other sections have high gradient riffles, very rocky substrate, and appear to provide quality trout habitat. Although some reaches upstream of the ford have excellent spawning and rearing habitat, no trout were observed in the stream for 2 miles. El Jaro Creek was surveyed again in 1996. The survey (4,490 feet total) found primarily runs (61% by length), with lower proportions of pools (17%), step runs (13%), riffles (6%), and deep runs (3%). Canopy cover averaged 26% in pools, 28% in riffles, 23% in deep runs, and only 5% in runs. Instream cover was greatest in pools. Substrate in pools and deep runs were dominated by fine sediments. Riffles and runs were dominated by gravels. Following the heavy winter flows of 1998, a survey in July 1998 (4,548 feet total) found more riffles and fewer pools (66% runs, 19% riffles, 12% glides, and 3% pools) (SYRTAC 2000b). The large storms of 1995,1998, and 2000 have altered this reach by filling in some pool habitat, creating other pool habitat, and scouring riparian vegetation.

Water temperatures in upper Salsipuedes Creek are suitable for steelhead year-round, and slightly cooler than in El Jaro Creek or in lower Salsipuedes Creek. Mean daily temperatures in El Jaro and lower Salsipuedes creeks in the summer are often unfavorable for steelhead. While summer temperatures appear to be unfavorable for summer rearing, it is the most productive tributary in the entire watershed downstream of Bradbury Dam.

Santa Ynez River Lagoon. The lagoon typically forms as flows decline after the winter runoff period when the mouth of the river fills with sand deposited by both the river and by the strong longitudinal drift of sand from north to south along the shoreline. High winter river flows are capable of opening an outlet. Low summer flows are typically insufficient to keep the outlet open, although inflow from the Lompoc treatment facility and wave action can breach this barrier.

The lagoon is about 13,000 feet long, with an average width of about 300 feet. Near the beach, it is substantially wider than at the upstream end. The average water depth is about 4 feet, and the water surface elevation with the mouth closed is about 5 feet MSL. The lagoon supports the growth of emergent aquatic vegetation along the margins, but the majority of the lagoon is open water. Substrate in the lagoon typically consists of sand and silt.

The lagoon represents a unique habitat characterized by saltwater/freshwater mixing. Water quality within the lagoon, particularly salinity, has a major influence on the distribution of fish and macroinvertebrates inhabiting this area of the system. Vertical gradients in water temperature, dissolved oxygen, and salinity were observed within deeper areas of the lagoon during periods when the lagoon mouth was closed. Vertical stratification in water quality parameters varies substantially between locations and survey periods. Dissolved oxygen concentrations decreases quickly with depth.

Average daily and maximum daily water temperatures within the lagoon during the summer usually area lower than water temperatures measured elsewhere on the mainstem of the river. Salinity is at ocean levels at the mouth of the lagoon, decreasing to freshwater levels at the upstream end. Salinity level varied at each site between months, reflecting seasonal variation in the balance between freshwater inflow and tidal influence.

5.6.2 Potential Impacts of FMP/BO Releases

5.6.2.1 Southern Steelhead along the River

The Santa Ynez River downstream of Bradbury Dam is home to anadromous steelhead and several native resident species, including rainbow trout, three-spine stickleback, and prickly sculpin. Many non-native fish species are also present. The effect of different downstream flow regimes under the proposed project is described below based on Entrix (2002). The analysis is focused on mainstem habitat for steelhead/rainbow trout and resident fish, including the lagoon.

To provide an objective basis for evaluating flow-related impacts, a scoring system was developed to evaluate the likely effect of different flow regimes on fish habitat in the lower Santa Ynez River and in Cachuma Lake. The scoring system was set up on a relative scale of 0 to 5, with a score of zero indicating little or no habitat value and a score of five indicating the higher habitat value. A separate scoring system was set up for each species and lifestage that was potentially affected by the proposed project.

The primary method by which the proposed project may affect fish resources is through changes in streamflow; therefore, a score value was assigned to each monthly flow. The monthly mean flows or water surface elevations were computed by the Santa Ynez River Hydrologic Model (SYRHM) for each month of water years 1918 through 1993. The score was based only on the months when the species/lifestage being evaluated would be expected to be present in the river or reservoir. The frequency of each score value was calculated for the period of record. Scores were then averaged over the 76 years where streamflow and water surface elevations were simulated to achieve an average score for each operational scenario for the species/lifestage group. These scores formed the basis for habitat analyses of mainstem (steelhead and residents).

The flow levels used in the scoring system for steelhead are based on the habitat and passage analyses conducted for the SYRTAC (1999a and b) and on the flow levels that were determined by NMFS to result in no jeopardy to steelhead (NMFS, 2000). The scoring system assigns higher scores to an operation that is likely to provide more habitat and lower scores to those that are likely to provide less habitat. The scoring criteria for steelhead are shown in Table 5-14.

TABLE 5-14
SCORING CRITERIA FOR STEELHEAD HABITAT

Life Stage	Flow Location	Months Considered	Scores					
			← better			worse →		
			(5)	(4)	(3)	(2)	(1)	(0)
Passage	Alisal Road	January - April	≥ 14 days*	11 to 14 days	7 to 10 days	4 to 6 days	1 to 3 days	0 days
Spawning	Highway 154	February - May	> 30 cfs	> 15 to ≤ 30 cfs	> 10 to ≤ 15 cfs	> 5 to ≤ 10 cfs	> 2.5 to ≤ 5 cfs	≤ 2.5 cfs
Fry Rearing	Highway 154	April - August	≥ 10 cfs	≥ 5 to < 10 cfs	≥ 2.5 to < 5 cfs	≥ 1.5 to < 2.5 cfs	> 0 to < 1.5 cfs	0 cfs
Juvenile Rearing	Highway 154	January - December	≥ 10 cfs	≥ 5 to < 10 cfs	≥ 2.5 to < 5 cfs	≥ 1.5 to < 2.5 cfs	> 0 to < 1.5 cfs	0 cfs

* A 'passage day' is defined as a flow of ≥ 25 cfs at the Alisal Road bridge. Source: Entrix (2002)

Method of Analysis and Scoring

To allow steelhead/rainbow trout to migrate within the mainstem and into the tributaries, passage flows must be available within the system and the sandbar at the mouth of the lagoon must be open. A passage analysis was conducted to determine where potential low-flow impediments were located in the lower mainstem of the Santa Ynez River (SYRTAC, 1999b). The result of these analyses indicate that a flow of 25 cfs at the Alisal Road bridge provides sufficient flow to pass the identified critical riffles between Bradbury Dam and the lagoon 92 percent of the time (SYRTAC, 2000a). Therefore, for suitable access to mainstem and tributary spawning habitat, there must be sufficient number of days with flow at the Alisal Road Bridge greater than or equal to 25 cfs.

Adult steelhead primarily migrate upstream in the Santa Ynez River from February through April (SYRTAC 1997, 2000a and b). To compare the passage opportunities between the current and proposed operations, the total number of passage days provided under each operation was estimated using the SYRHM and daily flow data base. A passage day is defined as a day with a flow of greater than or equal to 25 cfs at the USGS gage at the Alisal Road bridge. NMFS considered 14 days of passage in a particular year to be an adequate passage opportunity (NMFS, 2000), and therefore this was given a score of 5 (Table 5-14).

The scoring analysis for spawning and rearing habitat uses the SYRHM to simulate flows in the Highway 154 Reach. The Highway 154 Reach was selected as the index location. This location was used because results of studies conducted by the SYRTAC (2000a) have demonstrated that good spawning and rearing habitat for steelhead/rainbow trout exist here. For mainstem spawning, there must be sufficient flow to provide some habitat during some or all of the spawning season, which is typically between February and April in the Santa Ynez River (SYRTAC, 2000a). The period analyzed to assess spawning starts at the onset of the peak spawning season (February) through the end of the peak fry emergence period (May). A study conducted by the SYRTAC (1999a) assessed the relationship of habitat area to flow in the Highway 154 reach which was used to develop the flow criteria used for the spawning habitat in Table 5-14.

The scoring system developed for fry rearing in April through August and juveniles for all 12 months, was based on the rearing target flows levels established in the BO. The minimum, long-term rearing target flow level established by the BO for rearing is 2.5 cfs, therefore, this flow was equated with a score of “3,” which falls in the middle of the scoring range. No flow conditions were scored “0.” A score of “5” was given to flows greater than 10 cfs because this is the maximum rearing flow required in the BO for habitat maintenance.

Results

The scoring of passage opportunities for each operational scenario was divided into two categories as shown in Table 5-15. The number of years that would meet the passage criteria established in the BO (i.e., 14 days of passage flows at Alisal, resulting in a score of “5”) under current operations and recent historic operations would be the same - in 21 of the 52 years (Table 5-15). Current operations do not include releases to facilitate passage. In contrast, the proposed project would substantially increase the frequency of years with passage for steelhead due to releases to supplement passage (Table 5-15). **Hence, the proposed project would result in a beneficial impact (Class IV) on steelhead passage compared to current operations**.

TABLE 5-15
SCORES FOR STEELHEAD ADULT MIGRATION
AT THE ALISAL ROAD BRIDGE

Operations	Frequency of Scores						
	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	21	0	5	4	6	16	2.6
Current	21	4	2	5	5	15	2.7
Proposed	31	6	0	2	1	12	3.5

Source: Entrix (2002)

Under current operations, spawning flows greater than 30 cfs are provided in 23 of the 52-year simulation period (Score “5” in Table 5-16). A similar frequency for spawning flows of 30 cfs would occur under recent historic operations. The spawning habitat scores show that in a number of years, regardless of Cachuma Project operations, enough runoff occurs to provide for spawning habitat between the dam and Highway 154. Current operations also result in fewer years in which spawning is prohibited, that is, years with score of “0” which represents spawning flows less than 2.5 cfs) compared to recent historic operations.

The proposed project would involve greater releases for steelhead rearing than current operations in the mainstem between the dam and Highway 154 bridge during the February through May spawning/incubation season. The frequency of high flows for spawning (30 cfs or more) under the proposed project would be the same as under current operations. However, the proposed operations would also increase the number of years with intermediate flows for spawning (i.e., years with spawning scores of "2" and "3"). The proposed project would have fewer years in which there is little flow (less than 5 cfs, scores of "0" and "1"). **Hence, the proposed project would result in a beneficial impact (Class IV) on steelhead spawning compared to current operations.**

TABLE 5-16
SCORES FOR STEELHEAD/RAINBOW TROUT SPAWNING
AT THE HIGHWAY 154 BRIDGE

Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	23	2	6	10	12	23	2.3
Current	23	5	5	11	22	10	2.6
Proposed	23	7	17	18	9	2	3.1

Source: Entrix (2002)

Under recent historic operations, no flows or very low flows (2.5 cfs) would occur during some portion of the fry rearing period in 64 of 76 years of the simulation period (scores "0" and "1" in Table 5-17. During low and no flow conditions, fry and juvenile steelhead/rainbow trout shelter in isolated pools. However, they are subject to predation by bass and sunfish in both wet and dry conditions. In contrast, poor fry rearing habitat is mostly avoided under current operations. The releases for rearing under current operations (interim target flows) would provide flows of 5 to 10 cfs (a score of "4") in 17 of 76 years, compared to one year under recent historic operations. Hence, the current operations are improving fry rearing conditions for steelhead. It should be noted that there are no observations or data on steelhead in the summer along this reach.

The frequency and quality of fry rearing habitat flows under the proposed project would significantly improve fry rearing conditions compared to current operations as shown in Table 5-17. The higher releases for rearing under the proposed project would result in 50 or more years of high rearing scores during the 76-year simulation period compared to 17 years under current operations. **Hence, the proposed project would result in a beneficial impact (Class IV) on steelhead fry rearing along the mainstem of the river compared to current operations.**

TABLE 5-17
SCORES FOR STEELHEAD/RAINBOW TROUT FRY REARING AT THE HIGHWAY 154 BRIDGE

Frequency of Scores							
	← better			worse →			
Operations	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	0	1	3	8	14	50	0.6
Current	1	16	38	21	0	1	2.9
Proposed	0	54	21	0	0	1	3.7

Source: Entrix (2002)

The results of the analysis of juvenile rearing habitat for recent historic, current, and proposed operations (see Table 5-18) follow the same pattern and conclusion as for fry rearing habitat.

TABLE 5-18
SCORES FOR STEELHEAD/RAINBOW TROUT JUVENILE REARING AT THE HIGHWAY 154 BRIDGE

Frequency of Scores							
Operation	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	0	0	1	0	4	71	0.1
Current	0	15	39	20	0	2	2.6
Proposed	0	41	33	0	0	2	3.5

Source: Entrix (2002)

5.6.2.2 Resident Fish along the River

A scoring system was developed to evaluate the relative value of the different operations in providing habitat for resident fish (e.g., arroyo chub, largemouth bass, prickly sculpin, catfish). Prior to the construction of Bradbury Dam, summer and fall flows were absent downstream of the dam site. The low-flow period is an important factor in fish population size and therefore, flows during this time of the year were used in the analysis. The scores in this system ranged from zero to five, with “0” representing poorer habitat conditions and “5” representing the better habitat. The Highway 154 bridge was selected as the index location for comparing the effects of reservoir releases on mainstem rearing habitat because the river downstream of Highway 154 becomes discontinuous in most years, and as such, habitat downstream of the Highway 154 is often not directly related to mainstem flow.

Scores were equated with flow ranges based on the BO and the top width versus flow curves for the Highway 154 reach in the mainstem. At flows below 5 cfs, an increase in flow results in a large increase in top width. By flows of 10 cfs, for most habitat unit types, increases in flow result in increases in habitat width, but the rate of increase is much lower than at lower flows (SYRTAC, 1999a). Therefore, under low-flow conditions, the majority of the benefit of increasing the flow is reached by 10 cfs. A score of “5” was assigned to years when flow in the summer would be 10 cfs or more at Highway 154). A score of “0” was assigned to years in which there was no flow during at least one month of the year. Scores associated with intermediate flows are shown below.

Score	Flow Criteria for Highway 154 Bridge
5	≥10 cfs
4	≥5 to <10 cfs
3	≥2.5 to <5 cfs
2	≥1.5 to <2.5 cfs
1	>0 to <1.5 cfs
0	0 cfs

The score for the month in each water year with the lowest average flow for rearing is reported in Table 5-19. The results indicate that current operations provide more rearing habitat during the driest part of the year than under recent historic operations. Without the releases to meet interim rearing target flows under the current operations, there would no flow at the Highway 154 bridge in 71 of 76 years used in the simulation.

The frequency and quality of rearing habitat under the proposed project would be significantly greater than under current operations (Table 5-19) because the proposed project would involve higher rearing target flows, including target flows at Alisal Bridge. **Hence, the proposed project would result in a beneficial impact (Class IV) on resident fish rearing along the mainstem of the river compared to current operations.**

TABLE 5-19
SCORES FOR RESIDENT FISH REARING AT THE HIGHWAY 154 BRIDGE

Frequency of Scores							
	← better			worse →			
Operations	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	0	0	1	0	4	71	0.1
Current	0	15	39	30	0	2	2.6
Proposed	0	41	33	0	0	2	3.5

Source: Entrix (2002)

The above analysis and the observations of the COMB biologist clearly indicate that the current and proposed FMP/BO releases will create new, and enhance existing, suitable rearing habitat along the mainstem of the Santa Ynez River. However, it should be acknowledged that the new and expanded rearing habitat (i.e., pools) also will support predatory fish, one of the primary sources of mortality of summer rearing steelhead on the mainstem of the river. Hence, the current and proposed releases would result in both a beneficial effect on steelhead (noted above) and an adverse impact (increased habitat for predatory fish). There are no analytic tools to predict how the rate of predation will change, if at all, with expanded rearing habitat. Absent any monitoring data, it is assumed that the increased rearing habitat will not result in a disproportionate increase in predation of steelhead, and that the numbers of steelhead rearing on the mainstem of the river will increase compared to current conditions. This assumption is implicit in the FMP and BO, and represents the consensus opinion of the SYRTAC, including Reclamation and NMFS. Nevertheless, it must be recognized that the new rearing habitat will increase steelhead predation because there will be more predatory fish and more steelhead. **This is considered a natural and expected outcome of the FMP/BO, and is designated as an adverse, but not significant impact (Class III).**

5.6.3 Mitigation Measures and Residual Impacts

The proposed project would not result in any potentially significant impacts to fish along the lower Santa Ynez River, including the endangered southern steelhead. No biological impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are necessary.

5.7 RIPARIAN AND LAKESHORE VEGETATION

5.7.1 Existing Conditions

5.7.1.1 Vegetation Types

Vegetation types along the Santa Ynez River are described below based on the 1995 Contract Renewal EIR/EIS and updated information from Jones & Stokes (2001).

Riparian Types:

- **Open Water/Live Stream (Wet Low Flow Channel) -** seasonal live streams, and ephemeral or semi-permanent pond and pools. Herbaceous vegetation may or may not be present.

- **River Wash (Dry Low Flow Channel) -** areas of the river channel which are usually devoid of vegetation due to the time of year (dry season). Includes sand, gravel, or boulder substrate.

- **Barren River Terrace** - arid terraces within the river channel which are naturally devoid of vegetation. This portion of the river is dominated by fluvial gravel deposits with exposed soils.

- **Disturbed River Wash/Terrace -** areas of the river channel which have been subject to disturbance such as mining, flood control activities, or ORV use; may or may not be devoid of vegetation. Dominant plant species include willow (*Salix* sp.), mulefat (*Baccharis salicifolia*), coyote brush (*Baccharis pilularis* ssp. *consanguinea*), sweetclover (*Melilotus indicus*), tree tobacco (*Nicotiana glauca*), mustard (*Brassica geniculata*), *Raphanus sativus*, *Malva parviflora*, *Carduus pycnocephalus*, *Xanthium strumarium*, *Matricaria matricarioides*, and grasses such as *Bromus diandrus* and *rubens*, and *Hordeum leporinum*.

- **Freshwater Marsh** - freshwater or brackish emergent, persistent vegetation with or without open water at the lowest elevations in the channel. Dominant plant species include cattails (*Typha* sp.), sedges and bulrushes (*Carex* sp., *Cyperus* sp., *Scirpus* sp.), dock (*Rumex* sp.), smartweed (*Polygonum* sp.), speedwell (*Veronica* sp.), plantain (*Plantago* sp.) and duckweed (*Lemna minor*).

- **River Terrace Scrub/Herbland -** the portion of the stream channel that is dominated by fluvial gravel deposits with a near absence of perennial species. The herbaceous element of this type ranges from nearly non-existent to near complete ground cover during late summer. Coyote brush, scalebroom (*Lepidospartum squamatum*), mustard, sweet fennel (*Foeniculum vulgare*), and non-native grasses occurs in scattered small patches on high terraces.

- **Willow/Mulefat Scrub -** dominated by willow and mulefat and occurs generally on along the low flow channel banks. Dominant plant species include arroyo, red and yellow willow (*Salix lasiolepsis*, *laevigata*, *lasiandra*), mulefat, coyote brush, poison oak (*toxicodendrum* *diversilobum*), blackberry (*Rubus ursinus*), elderberry (*Sambucus mexicana*), box elder (*Acer negundo*), hoary nettle (*Urtica holosericea*), bristly ox-tongue (*Picris echioides*).

- **Riparian Woodland/Forest -** along the edges and banks of the river. Vegetation is dominated by arroyo willow and black cottonwood (*Populus balsamifera trichocarpa*) and Fremont cottonwood (*Populus fremontii*). These species are intermixed with mature willow-forest species including sandbar and yellow willow.

- **Oak Riparian Forest -** coast live oak (*Quercus agrifolia*) dominates this type which occurs primarily on protected north-facing ravines within the river channel. Associated species include toyon (*Heteromeles arbutifolia*) and elderberry (*Sambucus mexicana*).

Estuarine Types:

- **Saltwater Marsh** - low-growing perennial herbs in tidally influenced area dominated by pickleweed (*Salicornia sp.*) and frankenia (*Frankenia sp.*) occur at the Santa Ynez River lagoon.

Upland Types:

- **Grassland** - adjacent to the river channel on arid hillsides; also a component of oak woodlands. Dominant non-native species include *Avena fatua* and *Bromus* sp. Dominant native species include *Amsinckia* sp. and *Layia platyglossa*.

- **Oak Woodland/Forest -** dominated by coast live oak and includes all woodlands and forests occurring outside of the river floodplain. Blue and valley oak species also occur.

- **Chaparral** - on dry, rocky slopes and dominated by big pod ceanothus (*Ceonothus megacarpus*), spiny redberry (*Rhamnus crocea*), chamise (*Adenostoma fasciculatum*), sage (*Salvia* sp.), and scrub oak (*Quercus dumosa*).

- **Coastal Sage Scrub -** on dry, rocky slopes. Dominant species include California sagebrush (*Artemisia californica*) and sage (*Salvia* sp.).

Riparian Vegetation Conditions Within Each Reach

In the 1995 Contract Renewal EIR/EIS, the river from the dam to the ocean was divided into nine study reaches to describe riparian vegetation conditions, as shown on Figure 5-3. The dominant vegetation types, relative density ranking, relative disturbance ranking, and adjacent land uses for each reach are summarized on Figure 5-3.

The most dense reaches below the dam are located from Highway 101 at Buellton to Highway 246 (18 miles), and from the Lompoc Wastewater Treatment Plant to the ocean (9 miles). In the former area, there are apparently favorable groundwater conditions, a lack of recent scouring, and only minor human disturbance. Riparian growth in the Lompoc Valley is probably enhanced by the low river gradient that limits scouring effects, extensive agricultural run-off, and the discharges from the Lompoc Wastewater Treatment Plant.

The least dense reach is from the dam to San Lucas Bridge where there is very low soil moisture and a predominance of coarse substrate. This area includes the Santa Ynez subarea riparian basin which is prone to dewatering during extended droughts due to its location at the head of the hydrologic gradient created by the dam.

The density and pattern of vegetation along the river are a result of many factors, including the time since the last major flood, extent of human disturbance, and seasonal and long-term riparian groundwater levels. A study was conducted as part of the 1995 Contract Renewal EIR on vegetation dynamics along the river since 1969. This flood destroyed much of the riparian vegetation along the river, creating a new successional process that has not been curtailed or re-initiated by another flood since 1969. The results of the study indicated that there has been a steady and dramatic increase in both scrub and woody riparian vegetation since 1969 except for: (1) localized die-outs of willows, sycamores, and cottonwoods in 1987 - 1990 drought; and (2) localized removal of vegetation due to flood flows during 1983, 1995, 1998, and 2001. Despite these occasional natural disturbances, the pattern of riparian vegetation along the river (i.e., the relative distribution and position of various vegetation types) has remained relatively constant since 1969, suggesting that a predictable pattern of riparian plant growth is occurring based on the physical and hydrologic conditions since 1969. At this time, the overall extent of riparian vegetation from the dam to the ocean is the highest since 1969. In addition, the current density of vegetation is also the highest since the earliest air photo records in 1928.

Santa Ynez River Riparian Vegetation Monitoring Study

In WR 73-37, the State Board required that Reclamation develop a vegetation study plan and monitoring program to determine if the changes in water rights releases initiated in 1973 would affect the extent and condition of riparian vegetation downstream of the dam. The requirement was in response to concerns expressed by the California Department of Fish and Game. The initial effort at meeting this requirement was vegetation study based on a series of historic aerial photographs by Holland (1988). A more comprehensive study was completed by Reclamation and the Member Units in 2000 (Jones & Stokes, 2000) which was submitted to the State Board in compliance with the State Board's requirement, initially issued with WR 73-37, and reconfirmed in WR 94-5. Major conclusions of that study include:

- The quality of the riparian vegetation along the river is good, with multiple age-classes, a diversity of woody and herbaceous native plants, and complex canopy structure. Recent recruitment was evident at most locations, although limited to a narrow band along the low flow channel between the dam and Buellton.

- The condition and distribution of riparian vegetation on the river are primarily influenced by past natural flood events and land use conversions

- It does not appear that the reduction in spring flows and more rapid spring flow recession due to the presence of the project have limited recruitment needed to replace natural population losses along the river. Mature riparian vegetation is healthy and vigorous, and recruitment is observed throughout the river. In addition, because flood flows are episodic and woody riparian species are relatively long lived, it is not necessary to annually inundate the flow floodplain and recruit new growth to maintain a self-sustaining woodland.

- The effect of the project on depth of groundwater does not appear to have any direct impact on the distribution or vigor of riparian vegetation

No measurable effect on the extent and condition of riparian vegetation was detected from the change in project operations from the live stream operations (1953-73) to the managed release program under WR 89-18.

5.7.1.2 Sensitive Plant Species

The occurrence of sensitive plant species along the river below Bradbury Dam is addressed in this section. Sensitive species consist of state and federally listed, proposed, and candidate plants; state "species of special concern" identified by CDFG; and species considered threatened and endangered by the California Native Plant Society (Skinner and Pavlik, 1998).

- Beach Layia (*Layia carnosa*) (CE, FE). Beach layia is known from coastal foredunes at a few widely separated locations in northern and central California. Beach layia is a low-growing, glandular, succulent annual that flowers from May through July. It has not been seen in Santa Barbara County since 1929, when it was collected at the Santa Ynez river mouth. This species is presumed extirpated from the project area.

- Beach Spectaclepod (*Dithyrea maritima*) (CT). Beach spectaclepod is a prostrate perennial herb that occurs on relatively undisturbed coastal foredunes from Morro Bay to Los Angeles County and on San Miguel Island and occurs on the back slopes of foredunes at Surf.

- La Graciosa Thistle (*Cirsium loncholepis*) (CT, FE). La Graciosa thistle is an annual to short-lived perennial herb that occurs in brackish and freshwater wetlands, mostly near the coast, in northern Santa Barbara and southern San Luis Obispo counties. It was reported from the vicinity of Surf, and from 2 miles east of the rivermouth, but it has not been found in recent years, despite repeated surveys, and is now presumed extirpated from these areas.

- Surf Thistle (*Cirsium rhothophilum*) (ST). Surf thistle is a perennial herb that occurs on relatively undisturbed coastal foredunes in San Luis Obispo and Santa Barbara counties, including on the dunes near Surf.

- Crisp Monardella (*Monardella crispa*) (CNPS-1B). Crisp monardella is a perennial herb that occurs in open sandy areas on coastal dunes, including both fore- and backdune areas. Although it has been reported on the dunes near Surf, these records appear likely to have been *M. frutescens*.

- San Luis Obispo Monardella (*Monardella frutescens*) (CNPS-1B). This species is a perennial herb that flowers from May through September and occurs in dune scrub on stabilized backdunes along the coastline of northern Santa Barbara and southern San Luis Obispo Counties. This species is abundant on San Antonio Terrace. It also occurs on the dunes north and south of the Santa Ynez river mouth.

5.7.2 Impacts to Riparian Vegetation along the River

The releases to the river associated with the FMP/BO could affect riparian vegetation along the Santa Ynez River in the following ways: (1) potentially affect the natural riparian vegetation succession patterns due to a reduction in spills, if such spills would ordinarily scour vegetation and/or cause plant recruitment on the floodplain; and (2) increase the amount of riparian vegetation along the river due to more prolonged low flows below the dam. These impacts are addressed below.

Effects of Current Operations

As described in Section 5.1, current operations have altered the downstream hydrology in the following manner compared to recent historic operations:

- The spill frequency and average annual spill amount under current conditions are slightly less (about two percent) than under recent historic operations.

- Due to the current program for fish releases, the low flows downstream of Cachuma Lake occur for a longer duration and over a longer reach of the river than under the recent historic operations. The increase in downstream low-flows under current operations becomes smaller with distance from the dam, such that there is very little difference in the frequency of low-flows near Alisal Road.

This reduction in spill conditions is not expected to have a measurable effect on the vegetation conditions as explained in Section 5.1.2.3. The spills that are affected by current operations do not ordinarily scour vegetation or substantially disturb the river channel and facilitate natural riparian successional patterns. In addition, the reduction in spill frequency is very low (two percent). There is very little difference in the frequency of high flows (i.e., 20-100 cfs) downstream of the dam between current and recent historic operations because such flows are primarily due to natural runoff, not releases for water rights or fish. In addition, the total amount of water discharged from Bradbury Dam in water rights releases, fish releases, and spills is essentially the same for current and recent historic operations.

Low flows downstream of Cachuma Lake occur for a longer duration and over a larger portion of the river under current operations (due to interim releases for fish initiated in late 2000) than under recent historic operations. The increased flows could increase the density, vigor, and extent of riparian vegetation in the river channel over time due to greater moisture availability, particularly during the early summer when water is generally absent from the river channel under current conditions. The availability of water throughout the year in the channel will extend the growing season for phreatophytes and reduce the period of drought stress. The effect would be most pronounced in the reach between the dam and Highway 154 where rearing flows for steelhead would be continuous except in drought years. The effect would extend further downstream but would be attenuated with distance from the dam. It is anticipated that the increase in riparian vegetation would not be measurable below Highway 154 where flows would not be maintained for fish.

Potential Impacts of the FMP/BO Releases

As described in Section 5.1, the FMP/BO long-term rearing and passage releases would alter downstream hydrology in the following manner compared to current operations:

- The spill frequency and average annual spill amount under the proposed project would be slightly less than under current operations

- The frequency and duration of low-flows downstream of the dam would be more than under current operations

The reduction in spill conditions is not expected to have a measurable effect on the vegetation conditions on the river downstream of Bradbury Dam because: the reduction in spill frequency is minor; it only affects small spills that do not scour vegetation; and the effects would be masked by the Modified Storm Operations (see Section 5.1.2.3). Hence, the proposed project is not expected to affect riparian recruitment on floodplains.

The increase in low flows downstream of Bradbury Dam may increase the density, vigor, and extent of riparian vegetation in portions of the river channel over time due to greater moisture availability, as described above for current operations. It is anticipated that the increase in riparian vegetation would not be measurable downstream of Alisal Bridge, the location for downstream rearing flows under certain circumstances.

The increased low flows (generally 2 to 5 cfs) will be contained in the thalweg of the river channel. These flows will be concentrated in a narrow zone (usually less than 10 feet across) within a larger river channel that has a width of 200 to 500 feet). Riparian and wetland vegetation is expected to increase along this wetted low flow channel over time, until the low flow channel and its vegetation are removed by flood flows. The increase in vegetation along such a narrow zone would be considered a **beneficial (Class IV) to wetland and riparian vegetation along the Santa Ynez River.**

5.7.3 Impacts to Sensitive Plant Species

None of the six sensitive plant species listed in Section 5.7.1.2 occur in the Santa Ynez River channel between the dam and the ocean. Hence, changes flow regime downstream of the dam would not affect these species.

5.7.4 Mitigation Measures and Residual Impacts

The proposed long-term rearing and passage releases would not result in any potentially significant impacts to riparian vegetation or sensitive plant species along the river. No botanical impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are considered necessary.

5.8 SENSITIVE AQUATIC SPECIES AND TERRESTRIAL WILDLIFE

5.8.1 Existing Conditions

Riparian vegetation along the lower Santa Ynez River support a great diversity of aquatic and terrestrial wildlife species. Streams and pools provide habitat for aquatic and semi-aquatic species such as Pacific chorus frog, western toad, Pacific treefrog, and the introduced bullfrog. Common reptiles include the ensatina, western fence lizard, common kingsnake, gopher snake, and common garter snake. Riparian vegetation is also used by small mammals for cover, movement corridors, and foraging.

5.8.1.1 Sensitive Wildlife Species

In addition to common wildlife species noted above, various sensitive aquatic and wildlife species occur along the lower Santa Ynez River from the dam to the ocean, and at Cachuma Lake. Sensitive species include those designated as threatened or endangered by the California Department of Fish and Game (CDFG) and/or US Fish and Wildlife Service (USFWS), or as a "species of special concern" by the CDFG. A review of the occurrence of sensitive species at the lake and along the river is presented below.

Arroyo Southwestern Toad

The arroyo southwestern toad is a federally endangered species. It historically occurred in coastal drainages from the upper Salinas River to Rio Santo Domingo in Baja California Norte. Arroyo southwestern toads are typically found in upper streams where they breed in pools generally less than one foot deep with minimal current and a gently sloping shoreline, and where bordering vegetation is absent or set back from the margins of the pool. Adults use nearby sandy terraces for burrowing and may forage in live oak flats along the river floodplain. Within the Santa Ynez watershed, the arroyo southwestern toad is reported to occur between Mono Creek and Middle Santa Ynez Campground on the Santa Ynez River and on Mono and Indian creeks.

The species is not known from any of the tributaries flowing into Cachuma Lake, and it is not known to occur below Bradbury Dam, although pools that meet breeding requirements occur there. One arroyo toad was found in the upper basin above Cachuma Lake during 2000 surveys conducted by the COMB biologist. Critical habitat was designated for this species in 2001 by USFWS, but did not include the lower Santa Ynez River. Potentially suitable habitat for the arroyo southwestern toad occurs at scattered locations along the lower river, primarily between Bradbury Dam and Alisal Road.

California Red-Legged Frog

The California red-legged frog is listed as a threatened species by the USFWS. It historically occurred in coastal mountains from Marin County south to northern Baja California, and along the floor and foothills of the Central Valley from about Shasta County south to Kern County. California red-legged frogs are confined strictly to aquatic habitats, such as creeks, streams, and ponds, and occur primarily in areas having pools two to three feet deep with dense emergent or shoreline vegetation. Although they may move between breeding pools and foraging areas, they rarely leave the dense cover of the riparian corridor. California red-legged frogs breed from November to March when eggs are attached to emergent vegetation. Eggs hatch within six to fourteen days, and metamorphosis generally occurs between July and September. Red-legged frogs are omnivorous and will eat other animals including other amphibians and small mammals. Major predators include introduced fish, bullfrogs, and native garter snakes.

Red-legged frogs are not likely to occur in Cachuma Lake due to the presence of predatory fish. However, they are likely to be present in tributaries to the lake. Frogs were not located along the lower Santa Ynez River during the 1994 surveys for the Contract Renewal EIR/EIS, perhaps due to the presence of predatory fish and bullfrogs throughout the lower rever. In 1996, an individual was found in the mainstem of the Santa Ynez River, northwest of the Santa Rosa Hills by the SYRTAC biologist. Much of the Santa Ynez River above Alisal Road becomes dry by early summer, and is, therefore, unlikely to support California red-legged frogs due to the lack of permanent water. However, portions of the river downstream from Buellton support large areas of habitat for the California red-legged frog, and pools in this area probably contain permanent water due to agricultural and urban runoff and discharges from wastewater treatment plants. The presence of bullfrogs, largemouth bass, and green sunfish may limit the potential for red-legged frogs. Recent sightings and potentially suitable habitat areas on the lower river are shown on Figure 5-4.

Red-legged frogs occur on tributaries to the Santa Ynez River (Figure 5-9). Frogs were observed by the COMB biologist in Nojoqui Creek near the fifth bridge crossing from the confluence in 1995, and 1996. In 2000, the COMB biologist recorded individuals at the confluence of Salsipuedes and El Jaro Creeks, as well as in El Jaro Creek, a quarter-mile from the confluence. A frog was also recorded in San Miguelito Creek, approximately one mile north of Miguelito Park. Other tributaries that may support the red-legged frog include El Jaro Creek, Alisal Creek, Quito Creek, Alamo Pintado Creek along Figueroa Mountain Road, Calabazal and San Lucas creeks, Hilton Creek, and Santa Agueda Creek. Critical habitat was designated for this species in 2001 by USFWS, but did not include the lower Santa Ynez River or any lower tributaries.

California Tiger Salamander

On January 19, 2000, the USFWS issued an emergency listing of the populations in Santa Barbara County as an endangered species. In 2003, it was re-designated as threatened. The species in the County represents a Distinct Vertebrate Population Segment of the tiger salamander that occurs throughout the state. Less than 20 breeding sites are present in the County. The populations in Santa Barbara County are restricted to the Santa Maria, Los Alamos, and Santa Rita valleys. The species does not appear to rely on creeks or riparian habitat for any of its life cycle. No populations are known to occur in adjacent to the Santa Ynez River, nor in stock ponds in proximity to the river. Cachuma Lake itself does not offer suitable habitat for the species.

The California tiger salamander has strict habitat requirements that must be met for it to complete its life cycle. It breeds in vernal pools, temporary ponds, and stock ponds. Adults are known to migrate more than 1.2 miles to the breeding sites. Breeding takes place following the first significant winter rains, at which time adults migrate from their protective burrows (excavated by ground squirrels and pocket gophers) to breeding pools and ponds. Adults may feed actively at night prior to and following the active breeding season, and on mild days some daily activity may be noted. Eggs hatch within a few weeks and the larvae develop over a period of weeks as the temporary pools slowly dry. Typically, the larvae transform to become juveniles in late spring or early summer. Juveniles usually migrate to the summer burrow system with or shortly after the adults and, like the adults, often emerge on suitable nights to feed.

Southwestern Pond Turtle

The southwestern pond turtle is a state Species of Special Concern that occurs from roughly Monterey Bay south through the Coast Ranges to northern Baja California Norte. Southwestern pond turtles live primarily in freshwater rivers, streams, lakes, ponds, vernal pools, and seasonal wetlands, but also seem to have some tolerance for slightly brackish conditions. They may live in intermittent streams where permanent pools exist. In the relatively mild climate of central and southern California, pond turtles may spend extended periods on land away from water. The species requires slowly moving water and appropriate basking sites such as logs, banks, or other suitable areas above water level. Hatchlings are a particularly vulnerable stage, and require shallow water (less than 30 cm) and abundant emergent vegetation. Bullfrogs and largemouth bass are predators on hatchling turtles. Food consists primarily of small to moderately-sized invertebrates, especially insects and crayfish, but vegetation, small fish, and carrion may also be consumed. Mating occurs between May and September and eggs are laid from May through August.

Habitat for the southwestern pond turtle occurs throughout the Santa Ynez River watershed. Turtles were observed at many locations along the river during the 1994 field surveys for the Contract Renewal EIR/EIS. Turtles occur between Gibraltar Reservoir and Cachuma Lake where they reside in large pools at the end of Paradise Road. Turtles were observed in Long Pool below Bradbury

Dam, between Refugio and Alisal Road near Solvang, and at several locations west of Buellton. Suitable turtle habitat exists below the Floradale Bridge west of Lompoc, and turtles were observed in Salsipuedes Creek southeast of Lompoc. Although turtles have been observed along the lower river by the SYRTAC biologist between Bradbury Dam and Buellton, the most suitable habitat occurs downstream from Buellton, where deep pools and dense vegetation occur at several locations along the river.

Two-Striped Garter Snake

The two-striped garter snake is a State Species of Special Concern. It occurs from Monterey County south through the coast ranges to northern Baja California. It is a highly aquatic species that is typically found near slowly moving creeks and streams, ponds, and coastal lagoons where water is permanent and tadpoles, frogs, and small fish are present as a prey base. These snakes are often found in areas of barren soil or short grass near the aquatic sites, and individuals may use large boulders for basking. Females give birth from mid to late-summer and by October individuals may move to adjacent upland areas where they apparently hibernate in rodent burrows or under logs or boulders.

The two-striped garter snake is reported to occur in the upper Santa Ynez River above Gibraltar Reservoir and elsewhere in the watershed. It is unlikely that the species occurs along the lake, but it is highly likely to be found on some of the tributaries flowing into the Lake. During 1994 surveys for the Cachuma Contract Renewal EIR/EIS, a small two-striped garter snake was observed just downstream from Bradbury Dam attempting to eat a relatively large stickleback. During surveys conducted by the SYRTAC biologist in August 2000, several two-striped garter snakes were observed in Salsipuedes Creek approximately 1.5 miles upstream of the confluence with the Santa Ynez River mainstem. Also in year 2000, the SYRTAC biologist documented this species on Nojoqui Creek, near the bridge crossing about 1.5 miles upstream of the mainstem confluence and another in the mainstem, near the confluence. Suitable habitat for the species occurs elsewhere downstream and is especially abundant in the area around Buellton. Lack of permanent water upstream from Buellton may preclude the two-striped garter snake in this portion of the river

Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) is a state and federal endangered species. It is a small bird that occurs in riparian habitats along rivers and streams where there are dense growths of willows, coyote brush, tamarisk, and Russian olive. The southwestern willow flycatcher is one of five subspecies of the willow flycatcher currently recognized. The breeding range of the southwestern willow flycatcher includes southern California, southern Nevada, southern Utah, Arizona, New Mexico, and western Texas.

The southwestern willow flycatcher nests in thickets of trees and shrubs approximately 10-25 feet or more in height, with dense foliage in throughout the canopy. Nest site vegetation is usually dense and structurally homogeneous. Nesting willow flycatchers virtually always nest near surface water or saturated soil. At some nest sites, surface water may be present early in the breeding season but only damp soil is present by late June or early July. Habitat patches from 1 to 3 acres can support one or two nesting pairs. The nest is constructed in a fork or on a horizontal branch, approximately 3-15 feet) above ground in a medium-sized bush or small tree, with dense vegetation above and around the nest. The southwestern willow flycatcher builds nests and lays eggs in late May and early June and fledges young in early to mid-July. The southwestern willow flycatcher is an insectivore. It forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage. It also forages in areas adjacent to nest sites, which may be more open. The southwestern willow flycatcher most likely winters in Mexico, Central America, and perhaps northern South America.

The southwestern willow flycatcher breeds along the lower Santa Ynez River, which represents its northern geographic limit. Surveys were conducted from May to July 2000 to determine the distribution of the southwestern willow flycatcher from Cachuma Lake to the ocean. There are two known breeding populations along the lower Santa Ynez River. The largest occurs about three miles south of the Avenue of the Flags bridge in the City of Buellton, extending to Santa Rosa Creek. That population consists of 15-20 breeding pairs. The second population occurs downstream of Floradale Bridge, primarily near the 13th Street Bridge and VAFB waterfowl ponds near the river. Locations of breeding birds based on recent surveys are listed below and shown on Figure 5-5. The number of flycatchers recorded during the 2000 surveys was 27-30, with the largest population near Buellton (approximately 15-17 birds).

- Ballard site (approximately 0.6 mile upstream of US 101), 2000 and in the past.
- Buellton site (approximately 0.7-1.3 miles downstream of US 101), 1986-2000.
- Yvonne site (approximately 3.4 miles downstream of US 101), 1996-2000.
- Santa Rosa site (upstream from the confluence with Santa Rosa Creek, approximately 5-6.5 miles downstream of US 101), 1994-2000
- Salsipuedes site (approximately 2.3 miles upstream from Route 246), 1996.
- Northwest of Lompoc (approximately 2.3 miles downstream from Highway 1), 1991-1993.
- VAFB, south of the military residence, (approximately 3.4 miles downstream from Highway 1), 1991-1993.
- VAFB, just downstream of Renwick Avenue, 1991-1999.
- VAFB, Waterfowl Management Ponds, 1996-2000.
- VAFB, southeast edge of Santa Ynez River mouth, 1992-1994.

The UCSB Museum of Systematics and Ecology has performed annual surveys over portions of the river downstream of Buellton in 1994, 1996, 1997, and 2000. The number of flycatchers observed during these surveys ranged from 33–39 in 1996 to 26–28 in 1997. The results of these surveys suggest that the Santa Ynez River is a significant area in the overall status of flycatcher.

Most of the river from Bradbury Dam downstream to below Solvang (i.e., to about 1.3 miles downstream of Alisal Road) contains poor habitat for the flycatcher due to the lack of well developed and continuous riparian woodland. The most suitable habitat on the lower river begins about 1.3 miles downstream from Alisal Road, and consists of scattered reaches with well developed riparian woodland, as shown on Figure 5-5.

As noted earlier, the southwestern willow flycatcher breeds only in dense riparian vegetation near surface water or saturated soils. Species composition and structure of habitat vary widely. On the Santa Ynez River, willow flycatchers tend to breed in willow-dominated habitat, usually with a dense understory that may include native and exotic species. Flycatchers may breed at sites with openings in the canopy where a dense growth of herbaceous plants occurs, sites with height heterogeneity in the canopy, or sites at the edge of the riparian canopy.

Water is a crucial element of southwestern willow flycatcher habitat on the Santa Ynez River, as elsewhere. Typically, the flycatchers choose sites in dense riparian vegetation next to the river channel, as with some territories at the Buellton site, the Yvonne site, and the uppermost portion of the Santa Rosa site. Flycatchers breeding on the river often choose sites with standing water or moist surface soils away from the main channel. Thus split channels and low-lying areas at the base of the riparian but away from the main channel can provide good habitat, such as at the area approximately 0.5 mile downstream of the confluence of the Santa Ynez River and Santa Rosa Creek, where shallow pools and moist soil lie at the base of the south bank. Depressions in the riparian zone that are away from the main channel can also remain moist throughout the breeding season, and such areas may support willow flycatcher territories, as in the case of the area on Vandenberg Air Force Base (VAFB), just west of the 13th St. bridge. Finally, areas with standing water near willow woodland, as occurs at the Miguelito Wetland just south of the river channel and 1.3 miles east of the Pacific Ocean, can provide good breeding habitat for flycatchers.

Willow flycatchers on the Santa Ynez River often choose sites near beaver dams, as at the Buellton site and the Ballard site in 2000. Effluent from the Lompoc wastewater treatment facility provides excellent conditions for breeding southwestern willow flycatchers along the river west of Lompoc. The year-round discharge supports lush willow growth in the river channel.

Least Bell's Vireo

The least Bell's vireo is a state and federal endangered species. It breeds in the upper Santa Ynez River (above Gibraltar Reservoir) and lower Mono Creek. Nesting occurred along the lower Santa Ynez River until the 1940s. Bell’s vireos use a variety of riparian habitat types with dense understory growth. Suitable habitat is present along much of the lower river, particularly between Buellton and the Narrows. A breeding population is not present along the lower river, although there have been many recent sightings of transients and possible breeding individuals. No Bell’s vireos were recorded on the lower Santa Ynez River in the spring or summer 2000.

Suitable habitat for the vireo occurs from Alisal Road to Highway 101. Further downstream, good quality riparian habitat begins again at Gardner Ranch. For about 0.7 mile downstream from Gardner Ranch is extensive riparian habitat where other vireo species, thrushes, warblers, and finches were noted during the 2000 surveys. Some very good riparian habitats also exist in the upper and lower portions between Highway101 and the Sanford Winery (approximately 1 mile upstream from Santa Rosa Creek). The riparian zone broadens on the west, or north, side of the river about 4.2 miles downstream of Highway 101, where a Bell’s vireo was detected on 10 July 1996. Furthermore, there are good riparian areas, notably on the north bank, below Sweeney Road between Salsipuedes Creek and Route 246. Bell's vireos were present here in the summers of both 1996 and 1997, and nesting evidence was found the latter year (Museum of Systematics and Ecology, UCSB).

Good habitat occurs from Salsipuedes Creek downstream to the 246 bridge. In 1997, a vireo was present approximately two miles upstream of Route 246. In July 1998, a singing vireo was also in this area, while another was near the two mile mark (Museum of Systematics and Ecology, UCSB). Also just above the mouth of Salsipuedes Creek, a broad riparian terrace is on the northeast side of the river, which could support the Bell's vireo. Further downstream, between the Lompoc Sewage Plant and Union Sugar Avenue is more Bell's vireo habitat, just below and downstream from the Floradale Bridge, and again just upstream of Union Sugar Avenue. Finally, from Union Sugar Avenue to 13th Street (VAFB) is the last stretch of potential Bell's vireo habitat, with mature willow-dominated riparian habitat extensive along the south bank the entire length of this reach.

Belding's Savannah Sparrow

The Belding's savannah sparrow is a state endangered species that resides in pickleweed saltmarsh. Resident populations occur in Goleta Slough and Carpinteria Marsh, as well as at the mouth of the Santa Ynez River. Foraging adult and juvenile birds use mudflats and sandbars when tidal movement exposes them. In the mid- 1990s, the number of adult Belding's savannah sparrows found at the Santa Ynez River estuary within the VAFB was 150-200.

Western Yellow-billed Cuckoo

The yellow-billed cuckoo is a state endangered species. Although the cuckoo probably once nested commonly in the county, there are no definite breeding records for any period. In Santa Barbara County, the yellow-billed cuckoo is considered a "casual transient," and there were only twelve records for this species anywhere in the county between 1963 and 1993 (Lehman 1994). A transient was detected in July 2000 along the Santa Ynez River, about two miles upstream of Highway 246. Suitable habitat occurs along this portion of the river. However, the overall rarity of this species makes it unlikely that it will occur as a breeder in the near future.

Approximately 2.5 - 3 miles downstream of Highway 101 provides some marginal habitat for the yellow-billed cuckoo, with a loose canopy of mature cottonwoods and a dense understory. Also the reach from Salsipuedes Creek downstream to the Highway 246 bridge includes the excellent general riparian habitat where this species. The portion of the river above the mouth of Salsipuedes Creek contains a broad riparian terrace on the northeastern side of the river that has potential to support the cuckoo.

California Brown Pelican

The brown pelican is a state and federal endangered species. It is a large, fish-eating bird that occurs in the nearshore waters along California. Brown pelicans nest in Baja California, and on Anacapa

Island. Brown pelican are regularly seen offshore in the Santa Barbara Channel, and may occasionally be found at the mouth of the Santa Ynez River.

Bald Eagle

The bald eagle is a state and federal endangered species. It inhabits coastal bays, estuaries, and deep-water lakes. One or more pair of bald eagles breed regularly at Cachuma Lake, and appear to be year-round residents. Eagles primarily eat catfish and other types of fish, and coots. In winter, Cachuma Lake hosts relatively large numbers of bald eagles. During the past 15 years counts have ranged from two to 18 birds. The number of wintering birds appears to have increased substantially over the past 30 years. Bald eagles may rarely winter at the mouth of the Santa Ynez River.

American Peregrine Falcon

The peregrine falcon is a state endangered species. They nest on cliff ledges or potholes usually near water. During the nesting season, peregrines may forage up to 10 or more miles from the nest, especially over water. Peregrines nest in the Santa Ynez Mountains. Cachuma Lake is within the foraging range of this species. In winter, resident peregrine falcons are augmented by migrants from the north, which may be found foraging anywhere in the project area, most particularly at the mouth of the Santa Ynez River.

Western Snowy Plover

The snowy plover is a federal endangered species. It is a small shorebird that nests in depressions in the sand above the drift zone. This species is a fairly common winter visitor at the mouth of the Santa Ynez River, and a spring breeder. Plovers nest in the dunes within a one-half mile on either side of the river mouth. USFWS has designated critical habitat for this species at the mouth of the river.

California Least Tern

The California least tern is a state and federal endangered species. This species nests in the upper beach habitat at the mouths of the Santa Maria and Santa Ynez rivers, and several locations on VAFB. Nesting at the mouth of the Santa Ynez River is infrequent and involves only a small number of birds.

5.8.1.2 Riparian Breeding Bird Habitat

A diversity of birds utilizes the riparian habitats along the Santa Ynez River. Common species include black phoebe, house finch, song sparrow, scrub jay, plain titmouse, yellow warbler, red-tailed hawk, giant horned owl, common yellowthroat, turkey vulture, house sparrow, cliff swallow, California quail, California towhee, spotted towhee, Anna's hummingbird, mourning dove, acorn woodpecker, and bush tit. The portion of the river with well-developed riparian woodland suitable for riparian-dependent primarily occurs from one mile downstream of Alisal Road to VAFB. Specific areas where high numbers of riparian breeders were located during the

2000 surveys are shown on Figure 5-6. Typical breeding birds encountered include the warbling vireo, Swainson's thrush, yellow warbler, Wilson's warbler, and yellow-breasted chat.

Many water-associated birds also occur along the lower river. During the 2000 surveys, non-breeding green herons were present throughout the lower Santa Ynez River downstream of Bradbury Dam. Great blue herons are also widespread along the river. One of the few nesting locations for the great blue herons in the County occurs just west of Bradbury Dam. Another possible nesting site is located approximately 10 miles upstream of Route 246. Other members of the heron family found along the river during the 2000 surveys include the great egret, snowy egret, and black-crowned night heron. All of these species summer in the county, including along the Santa Ynez River. Individual snowy egrets were recorded during the spring-summer of 2000 at Refugio Road and just upstream of the Highway 246 bridge. Individual great egrets were recorded between Avenue of the Flags and Highway 101. Black-crowned night herons were recorded near Union Sugar Avenue, Avenue of the Flags and at the Buellton site.

The spotted sandpiper is a rare breeder on the lower river. It may have nested in 1993 below Bradbury Dam and near Buellton. The killdeer is a common breeding shorebird on the lower Santa Ynez River. In 2000, it was noted in larger numbers one mile upstream of Refugio Road, along the eastern and northern fringes of Lompoc, and a mile upstream of Union Sugar Avenue. Some of the lower parts of the river are good for wintering and migrating shorebirds. The area downstream of the 13th Street Bridge on VAFB appears to be suitable for greater yellowlegs and dowitchers. The most favorable location for migrating and wintering species is the river mouth, especially in the fall and when large expanses of mud are exposed. Mallards are widespread along the lower river. Other waterfowl that occur in low numbers include American wigeon, common mergansers and cinnamon teal.

5.8.2 Potential Impacts

Effects of Current Operations

As described in Section 5.1.2.3, current operations have altered the downstream hydrology of the Santa Ynez River downstream of Cachuma Lake. Due to the current program for fish releases, the low flows downstream of Cachuma Lake occur for a longer duration and over a larger portion of the river than under the recent historic operations. The increase in downstream low-flows under current operations becomes smaller with distance from the dam, such that there is very little difference in the frequency of low-flows near Alisal Road.

As described in Section 5.7.2.3, the above changes in hydrologic conditions downstream of Cachuma Lake are expected to increase the density, vigor, and extent of riparian vegetation in the river channel over time due to greater moisture availability, particularly during the early summer when water is generally absent from the river channel under current conditions. The increase in riparian vegetation is expected to benefit aquatic and terrestrial wildlife. For example, the availability of water throughout the year in the channel would enhance habitat for the two-striped garter snake, western pond turtle, waterfowl, herons, and shorebirds. The greater riparian cover would increase nesting and foraging areas for riparian breeding birds. The increased and more reliable aquatic and riparian habitats created by the releases for steelhead under current operations could expand the range and number of sensitive species along the river, particularly upstream of Alisal Road, including the least Bell's vireo, willow flycatcher, and yellow-billed cuckoo.

Potential Impact of FMP/BO Releases

The releases for steelhead rearing and passage flows downstream of the dam under the proposed project would be greater than for current operations because all future operations must meet the same release requirements pursuant to the BO. The frequency and amount of low-flows downstream of the dam (to Alisal Road) would be greater under the proposed project.
The additional flows downstream of Bradbury Dam under the proposed project could increase the vigor and extent of wetland and riparian vegetation along the river to Alisal Bridge, and indirectly benefit the associated aquatic and terrestrial wildlife, including sensitive species. **This is considered a beneficial impact (Class IV) to these resources.** Regarding federally listed species, this impact would be considered a "may affect" situation based on the terminology used to assess effects on listed species under Section 7 of the Endangered Species Act.

The proposed project would not affect flows to the Santa Ynez River lagoon, and as such, would not affect the environmental conditions in the salt marsh, lagoon, and beach areas that support sensitive species such as the Brown pelican, least tern, snowy plover, and Belding savanna sparrow.

5.8.3 Mitigation Measures and Residual Impacts

The proposed long-term rearing and passage releases would not result in any potentially significant impacts to sensitive wildlife species along the river. No biological impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are considered necessary.

5.9 RECREATION

5.9.1 Existing Conditions

Forest Service Lands

Lower Santa Ynez Recreation Area

The Lower Santa Ynez Recreation Area is located along the Santa Ynez River from Fremont Campground on Paradise Road to Gibraltar Reservoir (Figure 5-13). It includes campgrounds, trail camps, day use areas and several trails. The campgrounds (Fremont, Paradise, Los Prietos, Upper Oso and Sage Hill Group Campground) are located along Paradise Road, which generally parallels the river. The trail camps (Nineteen Oaks, Hidden Potrero and Middle Camuesa) are located along Santa Cruz Trail and Camuesa Road. The day use or picnic areas are located at White Rock, Lower Oso, Falls and Live Oak. Hikers, backpackers, mountain bikers and equestrians can access several trails in the Lower Santa Ynez Recreation Area for day use or for access to back-country and wilderness campgrounds. Off road vehicles are prohibited in the Lower Santa Ynez Recreation Area and on all trails. The Santa Ynez River in the Los Padres National Forest is open year round for swimming and fishing for trout, bluegill, green sunfish and catfish. During the late winter and spring, the CDFG stocks the river with trout above Cachuma Lake from Fremont Campground as far up river as allowed by water levels and access.

Upper Santa Ynez Recreation Area

The Upper Santa Ynez Recreation Area is located just east of the Gibraltar Reservoir (Figure5-13). This area is more remote and harder to access than the Lower Santa Ynez Recreation area. The Upper Santa Ynez Recreation Area offers campgrounds (Juncal, Middle Santa Ynez, P-Bar Flat and Mono), day use areas, several trails and hot springs. Hikers, backpackers, mountain bikers and equestrians can access several trails for day use and extended trips, including Mono-Alamar, Indian Creek, Agua-Caliente, Cold Springs, Blue Canyon, and Jameson Reservoir and Alder Creek trails. Mono-Alamar and Blue Canyon Trail offer overnight camping and access to the Dick Smith Wilderness. Mountain bikes are not permitted in the Dick Smith Wilderness. Off-highway vehicle (OHV) riders can use Camuesa and Buckhorn Roads.

Downstream Areas

Recreation on or along the Santa Ynez River between Bradbury Dam and the ocean is limited because most of the land adjacent to the river is privately owned and access is restricted. Persons wanting to recreate along the river need access permission from private land owners or face potential trespassing violations. Despite trespassing laws, people occasionally fish along the river without permission from landowners. Illegal fishing also occurs on tributaries.

Fishing is restricted along the Santa Ynez River from the dam to the ocean due to the presence of the endangered southern steelhead. The California Department of Fish and Game (CDFG) regulations prohibit fishing from the dam to the ocean at all times.

Ocean Beach Park is maintained by the County Park Department and has a parking lot, picnic tables, barbecues, restrooms, a drinking fountain, telephone, and a path under the railroad tracks leading to the ocean. At the park, visitors can hike to the surf, or fish in the ocean and the river. Park visitors must remain in the confines of the park, which is surrounded by VAFB property and patrolled heavily.

Other recreational areas along the Santa Ynez River downstream of Bradbury Dam include:

- River Park and Riverbed Park – two City of Lompoc Parks located along the riverbanks between Highway 246 and McLaughlin Road. The former includes day use, RV camping, and tent camping. Riverbend Park is primarily used for baseball.

- Alisal Golf Course – located in Solvang, the course abuts the river near Alisal Road

- Santa Rosa County Park – a small day use park located along the river between Buellton and Lompoc

5.9.2 Potential Impacts

Most of the river downstream of Cachuma Lake is private property with limited access. No public recreational facilities are located within the river channel. Several public parks are located adjacent to the river, including Riverbend and River Park in Lompoc Valley, Santa Rosa Park, and Ocean Park at the mouth of the river. Alisal Golf Course, a private facility, is located on the river near Solvang. Changes in operations under the proposed project that would affect flows in the river and the extent and condition of riparian vegetation would only have an indirect effect on recreational uses. This effect is expected to be neutral, as recreational uses along the river are not directly associated with river flows or the condition of riparian vegetation.

The proposed project would not affect flows to the Santa Ynez River lagoon, and as such, would not affect the environmental conditions at Ocean Beach Park.

5.9.3 Mitigation Measures and Residual Impact

The proposed long-term rearing and passage releases would not result in any potentially significant impacts to recreational uses along the river. No recreation impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are considered necessary.

5.10 AGRICULTURAL USES AND OPERATIONS

5.10.1 San Lucas Ranch Downstream of Bradbury Dam

The Santa Ynez River immediately downstream of Bradbury Dam traverses the San Lucas Ranch, as shown on Figure 5-8. The reach of the Santa Ynez River on the ranch is about 3 miles in length (Figure 5-8). The San Lucas Ranch encompasses over 10,000 acres, most of which is located south of Route 154. The owner of San Lucas Ranch, Ms. Nancy Crawford-Hall, has expressed concern to COMB and Reclamation about impacts of the ongoing and proposed releases for fish habitats on agricultural operations on the ranch.

To evaluate potential impacts of the current and proposed releases for fish, COMB requested in September 2002 that San Lucas Ranch provide access to the ranch property along the Santa Ynez River to characterize agricultural operations along the river. The ranch owner denied the request, but provided written responses to COMB's questions about agricultural operations along the river. Based on the responses to these questions and a review of aerial photography of the property along the river (see Figure 5-9), agricultural operations on the property near the river are summarized below.

Cattle are grazed on various pastures on the San Lucas Ranch. The pastures are mostly located south of Route 154, as shown on Figure 5-9. The land north of Route 154 contains a ranch residence and associated work buildings, a small landing strip located in the middle of a cattle pasture, various horse corrals and bull pastures, and cultivated fields. The river forms the northern boundary of the ranch, except for the northeastern portion of the ranch near Bradbury Dam (Figure 5-9).

Access for vehicles and cattle to the portions of the ranch south of Route 154 is provided at two locations: (1) a highway undercrossing near the main ranch residence; and (2) the old Route 154 bridge which has been transferred to San Lucas Ranch from Caltrans (Figure 5-9). Other access routes may be present, but are not visible from the aerial photography. The ranch owner did not indicate if other access routes are present.

The ranch owner indicated that cattle have free access to the river bed for grazing and watering, and that cattle graze on both sides of the river. It is assumed that grazing on the north side of the river would occur on the northeastern portion of the ranch, directly north of the dam (Figure 5-9). Cattle must cross the river to access this portion of the ranch.

The ranch owner indicated that there are several cattle crossings on the river, and that they consist of riverbed materials without any physical improvements. Three possible at-grade river crossings appear in the aerial photograph of the river on San Lucas Ranch (Figure 5-9). The ranch owner indicated that these crossings are also maintained for vehicular use. No information was provided on the type and frequency of maintenance required for these crossings. In addition to the at-grade river crossings noted above, the old Highway 154 bridge represents an all-weather river crossing that is used for cattle and vehicles.

According to the ranch owner, cattle cross the river (at the at-grade crossings) when conditions are suitable – either the river bed is dry or the water is shallow and slow moving. Crossings occur when it is necessary to move to a new pasture. During periods of high flows, such as in flood years, cattle on north pastures are moved across the river by horseback using public roads (the route was not specified by the ranch owner). Historically, Reclamation and the Santa Ynez Water River Conservation District have contacted San Lucas Ranch prior to making water rights releases to ensure that releases would not cause adverse impacts to grazing operations or other activities in the riverbed.

The ranch owner indicated that no surface or suspended utility lines cross the river, other than at least one power line. Possible suspended pipelines are visible on the aerial photograph (Figure 5-9). The ranch owner indicated that there are several “pumps” in the river that need to be removed prior to flood events. It was not clear from the ranch owner’s description if the pumps are floating devices, or if the reference was to groundwater wells. The ranch owner indicated that water rights releases did not affect these “pumps.” No bank protection or other structures are apparently located in the river channel, or have been subject to damage from flooding or water rights releases.

5.10.2 Potential Impacts

Effects on Cattle Crossings

Under current operations, water is released from the Hilton Creek watering system to meet interim target rearing flows of 2,5 to 5 cfs at Highway 154 bridge. With the proposed project, the rearing flows would be increased to up to 10 cfs when the reservoir is near full. Releases would only be made if flows from natural runoff and/or water rights releases are not sufficient to meet these target flows. Water rights releases would be made in the same manner and time of year as under current operations.

As described in Section 5.1, the FMP/BO long-term rearing and passage releases would alter downstream hydrology in the following manner compared to current operations:

- The spill frequency and average annual spill amount under the proposed project would be slightly less than under current operations
- The frequency and duration of low-flows downstream of the dam would be more than under current operations

The increased low flows associated with releases for rearing habitat (2.5 to 10 cfs) will be contained in the thalweg of the river channel on San Lucas Ranch. These flows are not sufficient to cause flooding of adjacent lands. They will be concentrated in a narrow zone (usually less than 10 to 30 feet across) within a larger river channel that has a width of 200 to 500 feet. Riparian and wetland vegetation is expected to increase along the perimeter of this wetted low flow channel over time, until the low flow channel and its vegetation are scoured by flood flows.

The increased duration and magnitude of low flows on the river on San Lucas Ranch could affect the cattle crossings. The at-grade crossings become difficult to use when the water depth is too high or fast, and when prolonged flows cause algae to grow on the rocks, creating an unsafe condition for cattle, particularly calves. According to the ranch owner, there was no difficulty crossing the river prior to 1997. Since that time, it has become difficult to cross the river when needed due to more prolonged flows in the river associated with pre-FMP/BO releases for fish habitat. The ranch owner indicated that since 1997, the ranch operators simply wait until flow conditions are suitable, then take cattle across the river.

Based on information provided by the ranch owner, the increased low flows in the river may make it more difficult for cattle to cross the river, but apparently would not preclude such crossings. However, this condition would interfere with the normal cattle operations on the ranch, causing a nuisance and possible modification of the pasture rotation. Without additional information about the grazing operations, the significance of the impact cannot be fully assessed. **Based on available information, the impact of new releases from the dam for fish rearing habitat are considered adverse, but not significant (Class III).**

Reclamation and COMB previously recognized the difficulty faced by San Lucas Ranch due to proposed higher flows associated with releases for fish. In the past several years, COMB has met with San Lucas Ranch representatives to discuss possible improvements to the cattle crossings on the river to address the concerns of the ranch owner. The ranch owner eventually terminated the dialogue and refused access when COMB requested that a representative of NMFS conduct a visit and provide technical guidance on improved cattle crossings.

In light of the ranch owner's refusal to pursue a cooperative effort to address the cattle crossing issue, Reclamation and COMB conclude that no feasible mitigation measure is available to lessen the magnitude of the impact described above.

Releases for passage flows from Bradbury Dam are not expected to affect cattle crossings because these releases would be made during receding flows of a wet winter when the water in the river on San Lucas Ranch is already high due to natural runoff.

Effects on Ranch Facilities

There may be pumps and wells in the river channel on San Lucas Ranch, although the number and locations have not been described by the ranch owner. The proposed releases for rearing habitat (usually 2.5 to 10 cfs) are not expected to damage these facilities because the flow velocities and depths would be low, and because these flows would be relatively constant once they are initiated. In addition, it is assumed that the ranch owner has sited these facilities in river channel locations where such low flows from natural runoff would not interfere with their operations.

Effect on Vegetation

As described in Section 5.7.2.3, the above changes in hydrologic conditions downstream of Cachuma Lake are expected to increase the density, vigor, and extent of riparian vegetation in the river channel over time due to greater moisture availability, particularly during the early summer when water is generally absent from the river channel under current conditions. The increased vegetation along the perimeter of the river channel is not expected to interfere with the agricultural operations on San Lucas Ranch, which occur on floodplain terraces above the river channel.

Impact of Additional Fish

The releases from Bradbury Dam for rearing habitat are designed to provide suitable flow and temperature conditions along the river to the target locations (either Highway 154 or Alisal Bridge) to support steelhead rearing in the summer. Hence, these flows may cause an increase in the number of steelhead along the affected portions of the river compared to current conditions.

The increased presence of steelhead on San Lucas Ranch would not, in and of itself, cause any disruption of grazing or other agricultural activities on the ranch. However, the federal Endangered Species Act prohibits the taking of the steelhead, which is broadly defined to include direct harm or harassment, and certain habitat modifications. As such, the owners of San Lucas Ranch would need to determine if their current activities in the river (i.e., cattle crossings, pumps, and wells) uses could result in take, and if so, what actions the landowner should implement to avoid this take. At this time, there is no evidence presented by the ranch owner, or discovered by Reclamation or COMB during the course of the EIR/EIS preparation, that the potential increased presence of steelhead on the river would displace or significantly alter ongoing lawful activities on private land. It should be noted that steelhead occur in various locations in the Santa Ynez River with agricultural land uses, and that significant conflicts have not occurred.

5.10.3 Mitigation Measures and Residual Impact

The proposed long-term rearing and passage releases would not result in any potentially significant impacts to agricultural operations on San Lucas Ranch. No agricultural or land use impact thresholds listed in Section 4.4 would be exceeded. The lead agencies were unsuccessful in acquiring landowner cooperation and access to assist in modifying cattle crossings to reduce the inconvenience of the prolonged low flows in the river that affect cattle crossings. Hence, the lead agencies conclude that no feasible mitigation measure is available.

6.0 ENVIRONMENTAL ANALYSIS
- DIRECT IMPACTS OF RESERVOIR SURCHARGING

6.1 LAKE STORAGE AND ELEVATION

6.1.1 Existing Conditions

The amount of water in Cachuma Lake varies depending upon runoff, downstream releases, and diversions to the Member Units. Annual storage at the end of summer in Cachuma Lake is shown on Chart 6-1. Periods of low storage reflect droughts since 1953. The most pronounced decrease in storage occurred in 1990 during the fourth year of the most recent drought. Lake elevations vary similar to storage. The maximum lake level was 750 feet until 1993, when Reclamation implemented a 0.75-foot surcharge to support releases under the Fish MOU. Lake levels vary during the year due to runoff, diversions, releases, and evaporation. The peak lake level is typically reached in April or May as the winter runoff has ended and before significant diversions and downstream releases. Median monthly lake levels are shown on Chart 6-2 for two periods: 1958 – 2000 and 1989-2000. The latter period represents operations under WR 89-18, which continue today. Higher lake levels are present under WR 89-18 because of more frequent wet years in the period 1993-2000.

6.1.2 Potential Impacts of Surcharging and FMP/BO Releases

Change in Lake Storage

The median monthly storage amounts under historic and current conditions, and with the proposed surcharge and long-term release regime are presented in Table 6-1. Current operations exhibit slightly lower lake storage at the end of summer (November) than under recent historic operation due to releases for steelhead during the summer. Winter (peak) lake storage amounts are also slightly less than under historic operations, but spring and summer storage amounts are higher. Median monthly storage under the proposed project would be greater than under current operations throughout the year due to the additional water from a 3.0-foot surcharge.

TABLE 6-1
MEDIAN MONTHLY STORAGE IN CACHUMA LAKE (SIMULATION)

Month	Median Monthly Storage (simulation, 1918-1993) in acre-feet		
	Recent Historic Operations Under WR 89-18*	Current Operations with Releases for Interim Rearing Target Flows**	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3’ surcharge
November	130,855	130,485	136,080
February	153,045	152,395	154,605
April	164,740	165,535	167,875
July	146,285	146,850	153,065

* Prior to the FMP and BO; no releases for fish per the FMP/BO. ** Includes current 0.75’ surcharge.

Median annual, winter, and fall lake elevations for recent historic and current operations, and for operations with the proposed surcharging and long-term releases are provided in Table 6-2. Current operations with the interim releases for fish without surcharging result in the lowest lake levels. The proposed operations would exhibit the highest year-round lake levels despite the greater releases for fish due to the 3.0-foot surcharge.

TABLE 6-2
MEDIAN LAKE LEVEL (SIMULATION)

Period	Median Water Elevation (feet)		
	Recent Historic Operations Under WR 89-18*	Current Operations with Releases for Interim Rearing Target Flows**	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' surcharge
Annual	734.0	733.7	734.6
Feb	737.5	737.2	738.1
Aug	732.5	732.2	735.0

* Prior to the FMP and BO; no releases for fish per the FMP/BO. ** Includes current 0.75' surcharge.

The frequency of surcharging is summarized in Table 6-3. The results of the simulation indicate that under historic operations, the reservoir reaches the maximum lake level in 26 of the 76 years of the simulation period. The frequency of reaching a full lake is the same under current operations. The frequency of the lake being filled with 3.0-foot high flashboards would occur with the same frequency as under current operations.

TABLE 6-3
FREQUENCY OF SURCHARGING (SIMULATION)

Lake Elevation Reached During Surcharging (feet)	No. of Years Surcharging Predicted to Occur in 76-year Period		
	Recent Historic Operations Under WR 89-18*	Current Operations with Releases for Interim Rearing Target Flows**	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' surcharge
750 – 750.9	26 years	26 years	27 years
751 – 751.9			26 years
752 – 752.9			26 years
= or >753			26 years

* Prior to the FMP and BO; no releases for fish per the FMP/BO. ** Includes current 0.75' surcharge.

The percentage of time that Cachuma Lake will reach maximum levels is presented in Table 6-4 based on the simulation modeling. These results indicate that under current operations, the current maximum lake level (750.75 feet) is achieved 11 percent of the time. This is slightly greater than under recent past operations. Under the proposed 3.0-foot surcharge, lake levels would reach or exceed 750.75 feet 16 percent of the time.

TABLE 6-4
PERCENTAGE OF MONTHS AT DIFFERENT ELEVATIONS (SIMULATION)

Lake Elevation (feet)	Percentage of Months that Lake Elevations are Met or Exceeded		
	Recent Historic Operations Under WR 89-18*	Current Operations with Releases for Interim Rearing Target Flows**	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' surcharge
750	9 %	11 %	16 %
751			14 %
752			11%
753			9 %

* Prior to the FMP and BO; no releases for fish per the FMP/BO. ** Includes current 0.75' surcharge.

The median period of inundation at higher lake elevations for the operational scenarios is presented in Table 6-5. The results of the modeling simulation indicate that median number of consecutive months at the maximum lake elevation is the same for recent historic, current, and proposed operations – about four months.

TABLE 6-5
DURATION OF INUNDATION (SIMULATION)

Lake Elevation (feet)	Median Number of Consecutive Months at or Above Lake Elevation		
	Recent Historic Operations Under WR 89-18*	Current Operations with Releases for Interim Rearing Target Flows**	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' surcharge
750	3 months	4 months	5 months
751			5 months
752			4 months
753			3 months

* Prior to the FMP and BO; no releases for fish per the FMP/BO. ** Includes current 0.75' surcharge.

Impacts of increased water levels in the reservoir due to surcharging on oak trees and recreational facilities are addressed in Sections 6.5 and 6.6, respectively.

6.2 RESERVOIR WATER QUALITY

6.2.1 Existing Conditions

A large set of data on the TDS of Cachuma Lake has been collected over the past 40 years by Reclamation, the California Department of Water Resources, City of Santa Barbara, and City of Lompoc. Over time, the TDS in the reservoir has increased from around 525 mg/l to 650 mg/l. The average annual range of TDS over time is 547 to 625 mg/l, as shown in Table 6-6. The average seasonal variation in TDS during the year is about 80 mg/l.

TABLE 6-6
HISTORICAL CACHUMA LAKE TOTAL DISSOLVED SOLIDS

Parameter	Concentration (mg/l)
Average annual minimum	547
Average annual maximum	625
Average variation within a year	78

The typical seasonal pattern of TDS is low TDS value in the winter due to fresh inflows, followed by an increase in TDS of up to 100 mg/l over the summer and fall due to evaporation. TDS can increase more than 100 mg/l during years with low inflow and/or high TDS inflow in average and dry years. In wet years with high inflow, TDS in the reservoir will decrease to 475 to 550 mg/l as there is a large increase in storage consisting of higher quality runoff. Substantial decreases in TDS occur in wet years. The largest increase in TDS occurred during the 1986 to 1991 drought. In 1986 (a wet year), the TDS was about 550 mg/l. By the end of 1990, reservoir TDS had increased to 750 mg/l.

Cachuma Lake follows a typical pattern of stratification during the spring and summer, with vertical mixing in the late fall and winter. Water temperatures at depths of 30 to 50 feet decrease 5 to 20 degrees Celsius during the spring and summer as the lake stratifies. Vertical mixing is prevented by the temperature stratification. As surface water temperatures decrease in the fall, vertical mixing occurs and the lake turns over.

Over the course of a year, TDS does not vary substantially with depth in the lake and does not appear to be greatly affected by temperature stratification (Stetson Engineers, 2001). TDS measurements were taken monthly from 1984 to 1999 at different intakes (and therefore, different depths) on Tecolote Tunnel during the year (SYRTAC, 1997). The average difference in TDS amongst the different depths was only 4 percent. Available data from Tecolote Tunnel indicate that there is complete vertical mixing relative to TDS in Cachuma Lake.

6.2.2 Impacts on Reservoir TDS

Effects of Current Operations

The water quality modeling by Stetson Engineers (2001) indicates that the TDS levels in the reservoir under current operations will be about 15-45 mg/l lower than under recent historic operations. The lower TDS under current operations is due to the delivery of SWP water to the reservoir where it commingles with lake water and reduces overall salinity levels over time.

The reduction in reservoir TDS under current operations due to importation of SWP water will occur in a gradual manner over time as more and more SWP water is delivered to Cachuma Lake to meet increasing demands by the Member Units. The reduction in lake TDS would be proportional to the amount of SWP water delivered over time to Cachuma Lake.

Under current operations, SWP water is used in water rights and fish releases from the dam. By releasing a portion of SWP water from the outlet works (prior to it entering the reservoir), the full water quality benefits in the lake due to commingling SWP and reservoir water would not occur. However, SWP water that does not enter the reservoir is released to the river where it can reduce TDS concentrations and salt loading in downstream surface water and groundwater basins.

Impacts of Proposed Surcharging and FMP/BO Releases

The simulated lake TDS under the proposed operations involving a 3.0-foot surcharge and long-term releases for fish would be about 5-20 mg/l higher than under current operations. The amount of SWP water delivered to the reservoir under the proposed project and current operations would be the same. The predicted higher TDS levels are probably due to increased fish releases of low salinity reservoir water and the slight increase in lake evaporation associated with the small increase in median lake surface area. **The potential increase in TDS in Cachuma Lake under the proposed project is considered an adverse, but not significant impact (Class III).** The impact is not considered significant because:

- The expected TDS levels over time would be less than under recent historic conditions, and therefore, would represent a net benefit.
- The predicted increase in TDS (5-20 mg/l) over current operations represents 0.1 to 0.3 % of the average reservoir salinity of 600 mg/l

It should also be noted that water released from Cachuma Lake to the river for downstream water rights exhibit about a 300 mg/l increase as water travels from the dam to the Narrows due primarily to interactions with the river channel sediments and groundwater (Stetson Engineers, 2001). The projected increase in TDS levels in the lake would be minor compared to the observed increased in TDS levels along the river.

Surcharging will capture high inflows during the winter which typically have low TDS concentrations. As such, there may be a temporary reduction in TDS in the lake after surcharging. However, the salinity modeling indicated that this improvement in TDS levels is mostly reversed by the effects of evaporation on a larger lake surface during the subsequent summer months and increased fish releases of low salinity reservoir water.

Cumulative Impacts

The above-referenced analyses indicate that the current operations would reduce TDS levels Cachuma Lake due to the introduction of SWP water into the reservoir over time. Conversely, the implementation of the 3.0-foot surcharge would slightly increase TDS levels (0.3 %) in Cachuma Lake partly due to increased evaporation. The magnitude of these changes in TDS level is similar. Hence, the predicted changes in TDS levels in the reservoir would be offsetting. No adverse cumulative impact on TDS levels is therefore anticipated.

6.2.3 Mitigation Measures and Residual Impact

Impacts to TDS levels in the lake due to surcharging and FMP/BO releases would be negligible. No water quality impact threshold listed in Section 4.4 would be exceeded. As such, no mitigation measure is required. There would be no significant cumulative impact from the combined effects of current operations and the proposed operations with the FMP/BO release requirements and 3.0-foot surcharging.

6.3 LAKE FISH

6.3.1 Existing Conditions

Cachuma Lake was managed as a rainbow trout fishery until 1957 when largemouth bass, a warmwater species, were introduced into the lake. Since 1957, Cachuma Lake has been stocked with a variety of warmwater fish and hatchery rainbow trout. At least 15 species have been identified in the lake including: rainbow trout, prickly sculpin, largemouth bass and smallmouth bass, bluegill, redear sunfish, green sunfish, white crappie, black crappie, channel catfish, black bullhead, threadfin shad, goldfish, carp and mosquitofish. Cachuma Lake is a popular destination for fisherman in the area. Key game fish include large- and smallmouth bass, bluegill, green and redear sunfish, and black and white crappie.

Rainbow trout are currently maintained in Cachuma Lake primarily through stocking. CDFG annually stocked between 45,000 and 60,000 catchable size rainbow trout into the lake in the early 1990s. Since at least 1997, the allotment for Cachuma Lake has been 48,000 rainbow trout. The mainstem Santa Ynez River upstream of Cachuma Lake has been stocked on a yearly basis with between 9,000 and 12,000 trout.

6.3.2 Potential Impacts

6.3.2.1 Rainbow Trout

Rainbow trout require stream habitat to spawn and complete their life cycle and therefore require access to tributaries to Cachuma Lake. Water level reductions due to modified releases may affect the ability of these fish to migrate from Cachuma Lake into tributaries providing spawning habitat. Changes in water surface elevation are not anticipated to affect fry, juvenile, or adult lifestages for rainbow trout. Fish spawned from lake rainbow trout typically spend two years in streams and two years in the lake before maturing. Thus, fry and smaller juveniles will likely remain in the stream habitat where they will be unaffected by reservoir operations. Juveniles and adults, which inhabit the lake, are mobile enough to be generally unaffected by changes in lake levels.

Rainbow trout migration into streams could potentially be affected by a phenomenon called stream perching. Stream perching may result from wave action eroding the bank at the mouth of a stream. As the reservoir water elevation recedes during the summer, the erosional zone will occur over a greater distance. Over time, a steep drop off or a high gradient chute may form resulting in a partial or complete barrier to fish migration into spawning tributaries. Stream perching is more likely to occur along relatively high gradient shorelines.

Depth soundings have been taken from the mouths of Cachuma and Santa Cruz creeks (Entrix, 1995a), two large tributaries to Cachuma Lake. The soundings were taken to a depth of approximately 20 feet (reservoir surface elevations between 746 to 726 feet) to determine the potential for the stream mouths to become perched. The results indicate that the gradient in both canyons between the depths measured was relatively moderate, and no distinct changes in elevation were located. These results indicate that the potential for stream perching is minimal. Hence, rainbow trout inhabiting Cachuma Lake are not expected to have difficulty ascending into tributaries under the varying lake levels.

6.3.2.2 Game Fish

Overview of Assessment Method

As noted earlier, many different fish inhabit Cachuma Lake including rainbow trout, three-spine stickleback, prickly sculpin, arroyo chub, mosquito fish, bass, sunfish, catfish, threadfin shad, goldfish, and carp. The alternative operations would affect the timing and amount of water released from the reservoir and, as such, would affect lake elevations and the nearshore habitat of resident fish. The changes in project operations may result in a net gain or loss in aquatic habitat for different life stages. The early life history stages (egg and fry) of fish are most vulnerable to effects from fluctuations in water surface elevation.

To assess the effects of different lake level under the proposed project, an analysis was conducted by Entrix (2001) in which the amount of critical shallow water habitat for selected lake fish was estimated for the new lake level. A scoring system was then used to rate the amount of habitat available due to different lake level fluctuations.

The change in lake levels under the proposed project is described in Section 5.1. The current operations exhibit slightly lower lake elevations compared to recent historic operations under WR 89-18. However, the frequency of reaching the maximum lake level and the duration of maximum lake levels have not changed. Operations under the proposed project would exhibit higher lake levels due to surcharging at 3.0 feet.

The seasonal pattern of fluctuation would be similar between current operations and the proposed project. In essence, the current shoreline at 750.75 feet would be shifted to a higher shoreline at 753 feet where the pattern of seasonal and annual fluctuation is generally repeated.

The analysis of lake level fluctuation on game fish was focused on two representative fish types in Cachuma Lake -- largemouth bass and sunfish. These species and members of their family Centrarchidae (smallmouth bass, white and black crappie, bluegill, green sunfish, redear sunfish) complete their early life stages in water less than 10 feet deep. Nests are generally built in shallow water in the spring. A rapid drop in the water surface elevation could result in the nests becoming dewatered, resulting in the mortality of eggs. Fry spend their first few months rearing in shallow water in and around aquatic plants and submerged objects where they find food and shelter from predators. A rapid decrease in the water surface elevation during the rearing season may result in a loss in nearshore cover through dewatering, and an increase in the rate of mortality through predation. Therefore, bass and sunfish generally benefit from relatively stable water surface elevations during their spawning season and fry rearing season. The effects of new lake level were examined for the following habitats: (1) bass spawning; (2) sunfish spawning; and (3) bass/sunfish fry rearing. A description of scoring criteria for each species and life stage is provided below.

Largemouth Bass Spawning Habitat

The potential for the proposed project to affect largemouth bass spawning habitat was assessed by analyzing the amount of spawning habitat (i.e. between 0.5 ft and 8.2 ft) affected by water surface elevation changes during the months of April and May for each water year for the period of record. Using SYRHM simulations, water surface elevations at the end of each month were compared to those at the start to determine the extent to which reservoir operations under the proposed project affect the habitat available at the start of the month. A scoring system was developed to assess potential impacts of both reservoir drawdowns and reservoir increases during the spawning period (April and May), as shown below. All scoring was based on a relative scale of zero to five, with five being better and zero being worse. The frequency of each score was compiled and scores were averaged over the 76-year simulation period. A high score suggests that largemouth bass have a high likelihood of reproducing successfully under the reservoir operations. A score of zero would indicate a lower likelihood that spawning would be successful.

Score	Criteria	
	Monthly Water Surface Elevation Decrease	Monthly Water Surface Elevation Increase
5	< 0.5 feet	≤ 13.0 feet
4	which decreases the available spawning depth[*] by > 0 but ≤ 20% (≥ 0.5 ft to < 2.0 ft)	which decreases the available spawning depth[1] by > 0 but ≤ 20% (≥ 13 ft to < 21 ft)
3	which decreases the available spawning depth by > 20% but ≤ 40% (≥ 2.0 ft to < 3.6 ft)	which decreases the available spawning depth by > 20% but ≤ 40% (≥ 21 ft to < 29 ft)
2	which decreases the available spawning depth by > 40% but ≤ 60% (≥ 3.6 ft to < 5.1 ft)	which decreases the available spawning depth by > 40% but ≤ 60% (≥ 29 ft to < 37 ft)
1	which decreases the available spawning depth by > 60% but ≤ 80% (≥ 5.1 ft to < 6.7 ft)	which decreases the available spawning depth by > 60% but ≤ 80% (≥ 37 ft to < 45 ft)
0	which decreases the available spawning depth by > 80% (≥ 6.7 ft)	which decreases the available spawning depth by > 80% (≥ 45 ft)

[*] "Available spawning depth" is defined as the spawning habitat (area located between the depths of 0.5 and 8.2 feet) available at the start of the month for potential nest building.

Sunfish Spawning Habitat

The scoring system for sunfish spawning habitat was based on that described for largemouth bass, except that spawning habitat was designated as depths between 0.5 and six feet deep and the maximum inundation depth was determined based on sunfish spawning temperature ranges which varies during the spawning period. The potential for the proposed project to affect sunfish spawning habitat was assessed by analyzing the amount of spawning habitat affected by water surface elevation changes during the months of March through July for each water year for the simulation period. Specific scoring criteria are shown below.

Score	Criteria	
	Monthly Water Surface Elevation Decrease	Monthly Water Surface Elevation Increase
5	<0.5 feet	< 5 ft
4	which decreases the available spawning depth[1] by > 0 but ≤ 20% (≥ 0.5 ft to < 1.6 ft)	≥ 5 ft to < 10 ft
3	which decreases the available spawning depth by > 20% but ≤ 40% (≥ 1.6 ft to < 2.7 ft)	≥ 10 ft to < 15 ft
2	which decreases the available spawning depth by > 40% but ≤ 60% (≥ 2.7 ft to < 3.8 ft)	≥ 15 ft to < 20 ft
1	which decreases the available spawning depth by > 60% but ≤ 80% (≥ 3.8 ft to < 4.9 ft)	≥ 20 ft to < 25 ft
0	which decreases the available spawning depth by > 80% (≥ 4.9 ft)	≥ 25 ft

Bass and Sunfish Fry Rearing Habitat

For the purposes of this analysis, fry rearing habitat was defined as the area less than 10 feet deep, and May 1 was designated the beginning of the rearing season. A scoring system was developed to rate monthly reservoir drawdown, as shown below. A drawdown of three feet or less was equated with the middle of the scoring range given the monthly time step which is considered to provide some time for growth of aquatic plants in response to declining water surface elevation. The remaining scores were divided evenly such that a score of “5” represented little monthly drawdown (a foot or less) and a score of one represented a more severe rate of drawdown. A score of zero was equated with a drawdown of greater than 5 feet based upon the even distribution of scores and represents poorer habitat conditions.

Score	Criteria
5	monthly water surface elevation decrease ≥ 0 and ≤ 1 ft
4	monthly water surface elevation decrease > 1 and ≤ 2 ft
3	monthly water surface elevation decrease > 2 and ≤ 3 ft
2	monthly water surface elevation decrease > 3 and ≤ 4 ft
1	monthly water surface elevation decrease > 4 and ≤ 5ft
0	monthly water surface elevation decrease > 5 ft

A second analysis was conducted to assess the amount of rearing habitat (area < 10 feet deep) available to fry. Rearing habitat area was calculated using a regression derived from lake surface area (in acres) and water surface elevation (in feet) data. The available fry rearing habitat area is the difference between the surface area at the elevation in question and the surface area at ten feet below the area in question. The amount of fry rearing habitat was calculated for each month in which fry rearing is anticipated to occur in Cachuma Lake for the 76 year period of record. The median rearing habitat area is presented for each month.

Evaluation of Current Operations and the Proposed Operations under the FMP/BO

Largemouth Bass Spawning Habitat

Scoring of bass spawning habitat in Cachuma Lake was essentially the same for recent historic, current, and proposed operations (Table 6-7). The small differences in lake levels amongst these alternative operations are not sufficient to cause a significant difference in the amount of nearshore spawning habitat.

TABLE 6-7
SCORES FOR LARGEMOUTH BASS SPAWNING IN CACHUMA LAKE

April							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	42	32	1	1	0	0	4.5
Current	41	33	1	1	0	0	4.5
Proposed	37	36	2	1	0	0	4.4
May							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	23	41	11	1	0	0	4.1
Current	23	43	9	1	0	0	4.2
Proposed	23	43	9	1	0	0	4.2

Sunfish Spawning Habitat

The results of the simulation for sunfish spawning habitat indicate that there is little to no difference in spawning habitat under recent historic, current, and proposed operations (Table 6-8). The average scores for each operational scenario are either the same or within a tenth of a point during the spawning period of March through June. The results show a general decrease in the stability of spawning habitat over the course of the spring and early summer for all operations.

TABLE 6-8
SCORES FOR SUNFISH SPAWNING IN CACHUMA LAKE

Operations	← better			worse →			
MARCH							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	53	18	2	0	1	2	4.5
Current	53	18	2	0	1	2	4.5
Proposed	47	23	2	1	1	2	4.4
APRIL							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	39	34	1	0	0	2	4.4
Current	37	35	2	0	0	2	4.4
Proposed	33	37	4	0	0	2	4.3
MAY							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	23	38	8	6	1	0	4.0
Current	23	38	7	7	1	0	4.0
Proposed	23	38	7	7	1	0	4.0
JUNE							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	7	38	19	9	2	1	3.5
Current	7	35	24	7	3	0	3.5
Proposed	7	32	29	4	4	0	3.4

The results indicate that current operations are not adversely affecting sunfish spawning habitat compared to recent historic operations. In addition, the proposed project would not adversely affect sunfish spawning habitat, even with lake surcharging.

Bass and Sunfish Fry Rearing Habitat

The results of the bass and sunfish fry rearing scoring analysis indicate no significant difference in the amount of habitat under recent historic, current, and proposed operations (Table 6-9).

TABLE 6-9
SCORES FOR SUNFISH FRY REARING IN CACHUMA LAKE

MAY							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	31	33	10	1	1	0	4.2
Current	31	35	8	1	1	0	4.2
Proposed	30	36	6	3	1	0	4.2
JUNE							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	11	40	16	6	3	0	3.7
Current	11	42	15	5	3	0	3.7
Proposed	11	42	16	4	3	0	3.7
JULY							
Frequency of Scores							
Operations	← better			worse →			
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Historic	2	25	18	23	8	0	2.9
Current	2	24	21	25	4	0	2.9
Proposed	2	27	19	24	4	0	3.0

Table 6-10 compares the estimated fry rearing habitat area available during the different portions of the rearing season for recent historic, current, and proposed operations. The results demonstrate that water surface elevation declines through the fry rearing season for all operations equally.

TABLE 6-10
MEDIAN AVAILABLE FRY REARING HABITAT
IN CACHUMA LAKE

	Median Monthly Habitat Area (Acres)		
	Recent Historic	Current	Proposed
Start of Season	314	316	320
May	309	310	315
June	296	299	306
July	285	286	295
End of Season	277	276	286
Median*	293	293	299
Range*	148-357	147-361	147-375

Based on these analyses, it is concluded that current operations is not adversely affecting rearing habitat. In addition, the proposed project would not adversely affect sunfish spawning habitat, even with lake surcharging.

6.3.2.3 Cumulative Impacts

There would be no significant cumulative impact on lake fish due to the combined effects of current operations and the proposed operations with the 3.0-foot surcharging because there is little to no difference in fish habitat under recent historic, current, and proposed operations.

6.3.3 Mitigation Measures and Residual Impact

The proposed surcharging would not adversely affect native and game fish in Cachuma Lake. No aquatic species impact threshold listed in Section 4.4 would be exceeded. As such, no mitigation measure is required. There would be no significant cumulative impact from the combined effects of current operations and the proposed operations with the 3.0-foot surcharging.

6.4 LAKESHORE VEGETATION, INCLUDING OAKS

6.4.1 Existing Conditions

Vegetation Types

A variety of native vegetation types occur around Cachuma Lake, as summarized below and shown on Figure 6-1.

Grasslands are common on the flats and slopes northwest of Cachuma Lake and are dominated by introduced species such as wild oats (*Avena fatua*), soft chess (*Bromus mollis*), and Italian ryegrass (*Lolium perenne*).Native spring flowering herbs are also present, including *Amsinckia* sp. and *Layia platyglossa*.

Coast live oak woodlands occur throughout the vicinity of Cachuma Lake, primarily on protected north-facing slopes and ravines. These woodlands often include a dense understory of poison oak (*Toxicodendron diversilobum*), toyon (*Heteromeles arbutifolia*), sagebrush (*Artemisia californica*), and redberry (*Rhamnus crocea*), blackberry (*Rubus ursinus*), elderberry (*Sambucus mexicana*). Valley oak and blue oak trees are present in smaller amounts.

Chaparral is common on dry, rocky slopes and is dominated by big pod ceanothus (*Ceanothus megacarpus*), spiny redberry (*Rhamnus crocea*), chamise (*Adenostoma fasciculatum*), sage (*Salvia* sp.), and scrub oak (*Quercus dumosa*).

Scrub vegetation occurs along the north shore of Cachuma Lake on steep south-facing slopes. Scrub vegetation within the study area is classified as Venturan coastal sage scrub dominated by *Artemisia californica* and various sage species (*Salivia* sp.).

Freshwater marsh areas occur in scattered locations around the margins of Cachuma Lake where there is shallow water. Dense stands of emergent wetland plants are present dominated by cattail (*Typha* spp.), bulrush (*Scirpus* spp.), sedges (*Carex* spp.), curly dock (*Rumex* sp.), smartweed (*Polygonum* sp.), speedwell (*Veronica* sp.), and duckweed (*Lemna minor*). Marsh areas were often bordered by stands of mulefat (*Baccharis glutinosa)* and willow (*Salix lasiolepsis, laevigata, lasiandra*).

Riparian vegetation is located in scattered narrow bands around the lake, along Cachuma and Santa Cruz creeks, and along several other smaller intermittent streams that empty into the lake. This vegetation is dominated by mulefat, willow, coyote brush, poison oak, box elder (*Acer negundo*), hoary nettle (*Urtica holosericea*), and bristly ox tongue (*Picris echioid*). Tamarisk scrub occurs in scattered areas around the lake on sandy or gravelly braided washes.

Sensitive Plant Species

Sensitive plant species that occur in the Santa Ynez River watershed were identified in Section 5.7.1.2. Sensitive species consist of state and federally listed, proposed, and candidate plants; state "species of special concern" identified by CDFG; and species considered threatened and endangered by the California Native Plant Society (2001). None of the six species are known or expected to occur at Cachuma Lake due to an absence of suitable habitat for these species.

6.4.2 Impacts to Lakeshore Vegetation

The maximum lake elevation under recent historic operations is 750 feet. Beginning in the winter of 1998-99, the maximum lake elevation was increased to 750.75 feet to produce water for releases for fish under the Fish MOU. This maximum lake level is now observed under current operations. Maximum lake levels would increase 2.25 feet under the proposed project due to surcharging the reservoir.

The effect of surcharging on lake levels is discussed in Section 6.1. Surcharging would occur, on average, every three years. The frequency of achieving the maximum lake level is about 11 percent under current and proposed operations. The median number of consecutive months at the maximum lake level is about four months for current and proposed operations. The area affected by the increased lake level is dependent upon the slope of the shore. Using topographic and bathymetric maps, an estimate was developed of the total area inundated by surcharging at 3.0 feet. The results are shown in Table 6-11. They indicate that the total acreage affected by the 3.0-foot surcharging is 91 acres. The average width of effect is 25 feet.

TABLE 6-11
INUNDATION ACREAGE AND WIDTH DUE TO SURCHARGING

Maximum Lake Elevation (feet)	Area (acres)	Increase in Area (acres)	Average Width of Inundation Zone	Maximum Width of Inundation Zone (feet)
705.75 (current operations)	3,056	--	--	--
753.0 (3' surcharge)	3,147	91	25	363

Increased maximum lake levels over current conditions (750.75 feet) would alter the vegetation that currently occurs along the margins of the lake above the water level. The periodic inundation during surcharge years is likely to destroy upland vegetation types over time. The effect could require up to 10 years to occur. For example, inundation of upland vegetation for one month or less may not be sufficient to kill woody plants. However, prolonged inundation over one year, or repeated inundation over many years, may have a severe effect.

Upland vegetation above the current lake levels would be converted to one of several other habitat types, depending upon the slope and substrate of the shoreline: (1) bare shoreline would develop on steep slopes that were once vegetated with chaparral or coastal sage scrub; (2) annual grassland with a small percentage of wetland herbs would develop on moderate slopes that were vegetated with grassland or oak woodlands; and (3) emergent wetland would develop on very flat slopes that contained annual grassland because the depth of water would be shallow during surcharging.

To estimate the effect of higher lake levels on shoreline vegetation, boat surveys were conducted to identify and map vegetation types in the inundation zone associated with the 3.0-foot surcharging. The results are presented in Table 6-12, and indicate the most common upland vegetation types that would be affected are chaparral and oak woodland. **The destruction of upland vegetation types (excluding oak woodlands) for the proposed project (compared to current operations) is considered an adverse, but not significant impact (Class III)** because of the small acreage involved compared to the total acreage of these common vegetation types in the area. Impacts of surcharging on oak woodlands are addressed below in Section 6.4.3.

Freshwater marsh areas around the margins of the lake are expected to persist under higher maximum lake levels. Wetlands are located in shallow water areas around the lake where there are flat or very low gradient slopes under water. Raising the lake level at these locations would essentially shift the wetlands upslope. Hence, surcharging the reservoir under the proposed project would have a neutral effect on wetlands along the lake margins.

TABLE 6-12
LAKESHORE VEGETATION AFFECTED BY 3.0 FOOT SURCHARGING

Vegetation	% of Lake Margin Vegetation	Acres Affected by Periodic Flooding above 750.75 feet
Chaparral	39.5	35.9
Oak woodland	26.5	24.1
Freshwater marsh	25.3	23.0
Coastal sage scrub	2.7	2.5
Grassland	2.4	2.2
Barren slopes	1.8	1.6
County Park (turf, bare slope)	1.8	1.6
TOTAL		90.9

6.4.3 Impacts to Lakeshore Oak Trees

Estimate of Oak Tree Loss

As shown in Table 6-12, surcharging to 3.0 feet would affect oak woodlands that occur along the margins of the lake. To more precisely determine the magnitude of the impacts of surcharging under the proposed project, field surveys were conducted to inventory the number of trees in the inundation zone (Figure 6-2). Surveys were conducted from both the shore and from a boat. Only trees with diameters of 6 inches at breast height were counted. The only oak trees that occur in the inundation zones are coast live oak and valley oak. Field estimations were supplemented by a review of detailed topographic maps depicting large trees in the County Park (1"=100' scale). A topographic map at scale 1"=400' was used along the margins of the lake.

The number and species of oak trees in the new inundation zone (3.0 feet) above the current maximum lake level were estimated. The number of trees in a 3-foot wide zone above the new maximum lake levels was also estimated. This zone represents an area subject to wave action during winter storm or windy days, as well as possible storm surcharging which occurs during very high inflows to a lake that is already filled.

Cachuma Lake exhibits a clearly visible high-water line below which oak trees are mostly absent. The few oaks that are rooted below 750.75 feet elevations are in poor condition due to root flooding, as well as damage from wave action that has caused the trees to become unstable or topple. Oak trees located at or within several feet of the current high-water line often have exposed roots. Many are also located on eroding, undercut banks that have been affected by wave action and storm surcharging. These field observations confirm that oak trees within the new maximum lake level will eventually perish due to a combination of root flooding and physical disturbance from wave action. The field observations also suggested that some of the trees in the wave action zone (that is, three feet above the new maximum water elevation) would be destroyed due to root flooding and/or wave action. Based on the field investigations, it was assumed 25 percent of trees in the indirect impact zone would be destroyed, and that all others would persist due to the infrequent nature of the impact in this zone.

The loss of trees in the direct inundation zone is expected to occur over many years, possibly 10 or 15 years, unless there is a significant surcharging event with unusually high and rough wave action that physically topples trees from the direct and indirect impact zones. The loss of trees in the wave action zone is expected to occur over a longer period of time, possibly 20 or more years based on field observations of trees in the current wave action zone created over 40 years ago. A summary of the total number of oak trees to be lost associated with the proposed project is provided in Table 6-13.

TABLE 6-13
ESTIMATE OF OAK TREES AFFECTED IN INUNDATION ZONE FOR 3 FOOT SURCHARGE

Number of Oak Trees Affected (All coast live oak except for valley oaks shown in parentheses)		
Direct Inundation	Indirect Impacts due to Wave Action (approx.)	Total
339 (30)	113 (10)	452 (40)

The loss of oak trees associated with the proposed project along the margins of Cachuma Lake is considered a significant, but mitigable impact (Class II). A proposed oak tree restoration program is described below that is designed to compensate for the loss of trees at the lake. The loss of oak trees is considered significant and mitigable once the replacement trees have become well established and self-sustaining, which is estimated to be about 10 years. Depending upon the rate of loss of oak trees due to surcharging and the rate of growth of the replacement trees, the lag time between tree loss and establishment of self-sustaining trees may be very small.

Oak Tree Restoration Program

The objective of an oak tree replacement program would be to replace coast live and valley oak trees lost due to periodic surcharging in a phased manner linked to the incremental loss of oak trees over time. The program would represent a CEQA and NEPA mitigation measure to reduce the impacts of oak tree loss from surcharging. The program would utilize opportunities for establishing new oak woodlands and enhancing existing ones within the Cachuma Recreation Area, which includes all federal lands around the lake and the County Park on federal lands. Reclamation does not consider it feasible, nor desirable, to acquire land or easements from private landowners outside the Recreation Area for the purposes of oak tree restoration. By locating the restoration sites on federal land, Reclamation will have full control to maintain and protect new oak tree habitat.

Reclamation recently completed the preparation and initial implementation of another oak tree restoration program at the Cachuma Recreation Area (Tetra Tech, 2001). In 1996, Reclamation began modifying Bradbury Dam to correct seismic deficiencies. The Bradbury Dam Project involved excavation and fill activities at the dam and surrounding area. An Environmental Assessment (EA) and Supplemental EA were issued in 1996 and 2000, respectively for the project. The project has resulted in the loss of about 282 coast live and valley oak trees at several borrow sites near the dam.

In March 2001, Reclamation issued a final oak tree restoration plan for the Bradbury Dam Project. The plan identifies six oak tree restoration sites in the Recreation Area where approximately 3,000 coast live and valley oak trees will be planted over the next several years. Initial planting began in early 2001. These sites are remote areas with annual grassland or rangelands and are not used for any recreational activities (Figure 6-3). Reclamation conducted a comprehensive search for suitable oak restoration sites during the preparation of the Bradbury Dam Project oak restoration plan. All suitable sites outside the Cachuma Lake County Park area have been designated for use under this program.

As such, oak tree restoration opportunities at the 375-acre County Park were explored for this EIR. URS Corporation met with staff from the Santa Barbara County Parks and Recreation Department (County Parks) to discuss oak planting opportunities. County Parks has a 50-year lease from Reclamation to develop and manage the land within the park that terminated in January 2003, but has been extended for another two years as Reclamation and the County negotiate a new long term agreement. The County Park staff has indicated that there is no recruitment of oak trees in the park due to disturbance by park visitors. There is a severe need to plant young oak trees in the County Park to replace the mature trees that are present, and that are expected to suffer ongoing natural mortality. The park staff wishes to initiate an oak tree planting program immediately to ensure that there will be adequate shade and habitat in the park boundaries in the next 20 years.

County Parks initiated a small oak tree planting program several years ago involving the planting of about 200 coast live oak trees in the park. Most of these trees have become established saplings and are protected by stakes and fencing, as needed. However, this planting program was very limited in scope. The park staff indicated that the County Parks does not have the funding to initiate a large scale oak restoration program.

Based on the above considerations, Reclamation believes that implementing an oak tree restoration program in the County Park would provide both mitigation for trees removed by surcharging and would benefit recreational uses at the park. The restoration program would be designed to create new oak woodlands, as well as to enhance existing oak woodlands in the park, without creating conflicts with ongoing and future recreational uses. It would be implemented in cooperation with County Parks.

The park contains a significant amount of mature coast live and valley oak woodlands – approximately 1,200 mature trees (Figure 6-4). Most of the woodland areas contain an understory of annual grassland and native shrubs. Although the entire County Park is accessible to park users, the woodlands represent remnants of a more natural woodland setting with native wildlife populations. The latter include common species such as the western fence lizard and arboreal salamander. Common small mammals at the park include the Virginia opossum, dusky-footed woodrat, striped skunk, raccoon, and coyote. Birds that use the oak woodlands at the park include red-tailed hawk, barn owl, Anna's hummingbird, Nuttal's woodpecker, northern flicker, ash–throated flycatcher, scrub jay, plain titmouse, bushtit, California quail, mourning dove, and dark-eyed junco.

Reclamation would implement the program in a phased approach. One half of the trees to be planted would be installed immediately. Reclamation would then monitor the loss of trees during surcharge events over the next 10 years. The number of downed or dying trees would be counted immediately after surcharging events, as well as during the months when the water level recedes and bank erosion could occur. The number of trees lost during that year would be replaced at the County Park. At the end of 10 years, Reclamation would conduct a final count of trees in the inundation zone to determine the remaining number of trees that are likely to die due to inundation, and as such, need to be replaced. Final replacement trees would be planted immediately to complete the replacement process. This phased approach is recommended to ensure a precise count of trees affected by surcharging and to allow Reclamation and County Parks opportunity to refine and enhance the oak restoration program over time based on actual planting and maintenance experience.

Oak trees would be replaced at a ratio that ensures a final 2:1 replacement ratio – that is, the target number of mature oak trees (at 20 years) would be twice the number removed by surcharging. Use of a target replacement ratio greater than 1:1 provides compensation for the loss of mature trees. To achieve the target replacement ratio, oak trees will need to be planted at a higher initial replacement ratio to compensate for the loss of trees during early development due to predation, drought stress, disease, and vandalism. The mortality observed by County Parks during their recent oak planting efforts at the park was about 33 percent. The mortality was due to predation by gophers, drought stress, and vandalism. This mortality rate is relatively low due to the ease by which County Parks personnel can protect and maintain plants. Based on this observed mortality rate, the initial replacement ratio to account for mortality would be 3:1 (incorporating a 2:1 replacement ratio and factor to account for mortality).

URS Corporation conducted field investigations at the County Park in May 2001 to identify oak tree restoration sites and to determine how many trees could be planted at the site. URS Corporation identified 52 "study units" at the park, which were demarcated by roads and other obvious boundaries, as shown on Figure 6-5. Active playing fields and developed areas were excluded. All oak trees in each unit were counted and density values were calculated. Based on the observed densities, three categories of density were identified (low (1-12 trees per acre), moderate (13-24 trees per acre), and high (>25 tree per acre)) and mapped (Figure 6-5). The combined total number of mature coast live oak and valley oak trees in the study units is 1,170.

Based on observations of oak tree densities at the park, URS Corporation set the following target densities for each unit (Figure 6-5). The overall objective was to create more closed canopy groves at the park to provide shade and more habitat for birds, insects, and small mammals. Units that were selected for planting do not include active recreational uses such as camping sites.

- For low-density units, one half of the units will be planted to achieve a moderate density in 20 years (19 tree per acre), and one half of the units will be planted to achieve a high density in 20 years (30 tree per acre).

- For moderate density units, one half of the units will be planted to achieve a high density in 20 years (30 trees per unit) and the remainder of the units will not be planted.

- Five units with high density will be planted with a small number of oaks, primarily to fill in open areas.

Based on this planting approach, the total number of new trees that could be successfully established over time in the park is as follows: 768 in low density units, 197 trees in moderate density units, and 89 trees in high density units, for a total of 1,054 additional trees. This value represents the maximum number of trees to be established in 20 years at the park. Additional trees would interfere with recreational uses or would be difficult to establish due to crowding.

The estimated number of trees that would be adversely affected by the project due to surcharging is presented in Table 6-14. In addition, Table 6-14 presents the final target number of trees and the initial number of trees to be planted. Coast live and valley oak trees would be planted in proportion to their occurrence in the surcharge impact zone. Approximately 90 percent of the trees to be planted would be coast live oak. However, it should be noted that there is insufficient space to plant the required number of trees under the proposed project. Hence, additional oak tree planting sites around the lake would be needed over time.

TABLE 6-14
OAK TREE REPLACEMENT QUANTITIES AND RATIOS FOR A 3 FOOT SURCHARGE

Number of Oak Trees		
Removed by Surcharging over Time	Final Target Number of Trees based on 2:1 Replacement Ratio	Initial Planting based on 33 % Mortality (3:1 initial replacement ratio)
452	904	1,356

As noted above, the loss of oak trees under the proposed project is considered significant until such time that the replacement trees have become well established and self-sustaining, which is estimated to be about 10 years. At such time, the impact would be considered mitigated to a less than significant level as the new trees would then grow and reproduce without artificial support. The proposed oak tree replacement program described above is designed to minimize the loss of trees during the interim growing period to the extent practical. Depending upon the rate of loss of oak trees due to surcharging and the rate of growth of new trees, the lag time between tree loss and establishment of self-sustaining trees may be very small. Eventually, the loss of trees would be mitigated to a less than significant level.

6.4.4 Impacts to Sensitive Plant Species

None of the six sensitive plant species listed in Section 5.7.2 occur around the margins of Cachuma Lake. Hence, changes in lake elevation would not affect these species.

6.4.5 Mitigation Measures and Residual Impact

The loss of oak trees associated with the proposed project along the margins of Cachuma Lake is considered a significant, mitigable impact that can be mitigated to a less than significant level by the following mitigation measure:

OK-1 To mitigate for the loss of oak trees under the proposed project, Reclamation and COMB shall implement the proposed long-term oak tree restoration program at the Cachuma Lake County Park as described in Section 6.4.3. Oak trees would be replaced at a ratio that ensures a final 2:1 replacement ratio. The maximum number of new trees that would be established at the 375-acre County Park would be 1,054 coast live oak and valley oak trees, planted in proportion to their current abundance at the lake. Approximately 90 percent of the trees to be planted would be coast live oak. The exact number of trees to be replaced would be based on the surcharging level and actual tree loss over time. The restoration program would be designed to create new oak woodlands, as well as to enhance existing oak woodlands in the park, without creating conflicts with ongoing and future recreational uses. Reclamation would implement the program in a phased approach. One half of the trees to be planted would be installed immediately. Reclamation would then monitor the loss of trees during surcharge events over the next 10 years, and replace them on an annual basis. Most of the trees would be planted in the County Park area. Additional oak tree restoration sites around the lake will be required over time.

The loss of other native vegetation types in the surcharge zone is considered less than significant. As such, no mitigation measure is required.

6.5 SENSITIVE AQUATIC SPECIES AND TERRESTRIAL WILDLIFE

6.5.1 Existing Conditions

The occurrence of sensitive aquatic and wildlife species occur along the lower Santa Ynez River from the dam to the ocean, and including Cachuma Lake, was described in Section 5.8.1.1. Sensitive species include those designated as threatened or endangered by the California Department of Fish and Game (CDFG) and/or US Fish and Wildlife Service (USFWS), or as a "species of special concern" by the CDFG. Two species are known to occur at the lake - the bald eagle and American peregrine falcon. Information about their occurrence at Cachuma Lake is provided in Section 5.8.1.1.

6.5.2 Potential Impacts

As described in Section 6.4.2, increased maximum lake levels over current conditions due to surcharging under the proposed project would alter the vegetation that currently occurs along the margins of the lake above the water level. The periodic inundation during surcharge years is likely to destroy upland vegetation types over time. The effect could require up to10 years to occur. The total area around the margins of the lake that would be affected would be 91 acres under the proposed project (3.0-foot surcharge).

The most common upland vegetation types that would be affected are chaparral and oak woodland. The removal of a narrow band of upland vegetation along the perimeter of the lake would reduce cover and food sources for common wildlife. Wildlife using these habitats would be displaced to adjacent similar habitats. No sensitive wildlife species occur in these habitats. The loss of trees along the lakeshore is expected to occur over many years, possibly 10 to 20 or more years. It is estimated that over time, up to 452 oak trees would be lost due to surcharging.

The destruction of upland wildlife habitat (including the loss of oak woodlands) under the proposed project considered an adverse, but not significant impact (Class III) because:(1) a small acreage is involved compared to the total acreage of these common habitat types in the area which is sufficient to support large wildlife populations; (2) the loss of a narrow band of habitat (15 to 25 feet) around the lake margin would not substantially degrade wildlife cover and foraging opportunities at the lake because a similar margin of upland habitats will remain after surcharging; (3) the impact would occur slowly over time, allowing wildlife populations to accommodate the change; (4) oak trees would be replaced in the County Park under the proposed oak tree restoration program; and (5) no sensitive wildlife species would be affected.

This impact to wildlife habitat is distinguished from the loss of oak trees themselves (described in Section 6.4.3), which was considered significant and not fully mitigable until the replacement trees are well established. The impact to wildlife associated with the oak trees around the perimeter of the lake is considered less than significant because the removal of a narrow band of trees, often scattered at distances of 100 or more feet from one another) would not appreciably affect the wildlife cover and food resources in the oak tree habitat around the lake which is extensive.

Freshwater marsh areas around the margins of the lake are expected to persist under higher maximum lake levels. Wetlands are located in shallow water areas around the lake where there are flat or very low gradient slopes under water. Raising the lake level at these locations would essentially shift the wetlands upslope. Hence, surcharging the reservoir under the proposed project would have a neutral effect on wetlands and their resident wildlife populations along the lake margins.

The bald eagle and peregrine falcon would not be affected by the loss of oak trees along the lake margins and the effects on shoreline wetlands.

6.5.3 Mitigation Measures and Residual Impact

No mitigation is required because the proposed surcharging would not result in any potentially significant impacts to sensitive wildlife at Cachuma Lake. No sensitive species impact threshold listed in Section 4.4 would be exceeded.

6.6 RECREATION

6.6.1 Cachuma Recreation Area

The Cachuma Lake Recreation Area (Recreation Area) is federal land designated for recreational uses. It includes Cachuma Lake and the surrounding hillsides (Figure 3-2). The surface area of Cachuma Lake is about 3,100 acres at full level, of which 2,950 acres are available for boating and fishing. Approximately 6,448 acres of land surrounding the lake are part of the Recreation Area; however, only 375 acres are developed for public recreational use as a County Park (Figure 6-6). The Recreation Area provides a variety of year-round recreation activities, attracting visitors from throughout the southern California region.

Contract with Bureau of Reclamation

After Reclamation constructed Bradbury Dam, the County of Santa Barbara (County) agreed to manage recreation at the federally owned reservoir. A 50-year contract between Reclamation and the County, titled *Agreement to Administer Recreation Area (Contract No. 14-06-200-600)* was executed in January 1953. According to the contract, the County will develop, maintain and administer recreation according to a recreation plan, prepared by the County in 1953, and approved by the National Park Service (Park Service) and Reclamation. The original plan specified a 375-acre County Park on the south side of the lake. The contract allows modifications to the recreation plan by either Reclamation or the County provided both parties agree and the modification is approved by the Park Service. The contract prohibits the County from adding any additional service or facility to the Recreation Area that is not included in the plan. Funding for operations, maintenance, administrative costs at the Recreation Area is the responsibility of the County. The contract expires in January 2003. Reclamation has extended the contract for two years in order to provide time to negotiate a new long-term contract with the County.

According to the contract, the County is responsible for controlling and regulating all licenses and leases regarding recreation services and facilities, and for uses such as grazing and cultivation. The County is authorized to make and enforce rules at the Recreation Area to prevent pollution, protect visitor health and safety, law and order, plants and wildlife, and to protect and conserve the scenic, scientific, aesthetic, historic and archeological resources of the area. Rules and regulations made and enforced by the County at the Recreation Area must be consistent with local, state, and federal rules and regulations.

The contract requires the County to create a reserve fund from a portion of the net income derived from Recreation Area operations. Reserve fund money is used by the County to develop and maintain the recreation area. The contract provides that the amount of money set aside in the reserve fund be agreed upon annually by Reclamation and the County. Any excess income generated at the park was to be dedicated to the original capital costs of the Cachuma Project.

Recreational Facilities and Uses

Cachuma Lake is widely known for its natural, scenic qualities. Its location in a mostly undeveloped valley among wooded mountains attracts visitors that seek a quiet, outdoor experience. The lake has a Nature Center that promotes the natural history of the lake area and region. Visitors can enjoy a quiet setting while fishing, boating or wildlife watching. No swimming or waterskiing is allowed. Lake speed limits prohibit wakes in all bays and coves and speeds in excess of 10 miles per hour unless no other boats would be inconvenienced by the wake.

Most of the recreational area facilities, such as campgrounds and boat ramps, are concentrated in the County Park, a 375-acre site on a peninsula located on the south side of the lake (Figure 6-6). The north side of the lake is primarily recreational area bordered by private property consisting of ranches and grazing lands. Highway 154 parallels the south shore and provides access to the Recreation Area facilities. There are no other public access points to the Recreation Area.

Public facilities located in the County Park include the following: campsites, general store, marina and launch ramp, private docks, bait and tackle shop, snack shop, horse campsites, rustic amphitheater, trailer storage yard, transient mobile home park, nature center, County Park Ranger Station, and a family fun center with arcade, swimming pools, outdoor roller rink and snack shop. A brief summary of the recreational opportunities and facilities at the County Park, and in the Recreation Area in general, is provided below.

Camping

The main campground is located along the south shore in the County Park (Figure 3-2). Campsites for tents and RV's are available year-round on a first-come, first serve basis. There are 500 campsites, which include 90 sites with electrical, water and sewer hookups, 38 sites with electrical and water hookups, and 4 sites with corrals for horses. The campsites with corrals have access to equestrian trails located outside the recreation area. All campsites include picnic tables and barbecue pits and are located near showers, rest rooms, and water. Other facilities available to day users and campers include: laundromat, gas station, telephones, RV dump station, children's play area, swimming pools, and during summer, bicycle rentals. The County Park provides accessible facilities and paths for handicapped visitors.

A second campground at the Recreation Area, Live Oak Campground, is located east of Cachuma Lake along the oak-lined banks of the Santa Ynez River (Figure 3-2). Live Oak campground is accessible only by an access road, and is used by large groups of equestrians and other groups for camping. The campground has outdoor showers, a covered eating area, barbecue pits, electricity, and a corral and facilities for horses. Ranch road horse trail begins at Live Oak Campground and leads to a loop trail on the north side of the lake.

Boating

Boats for fishing and sightseeing are allowed on the lake all year. Powerboating is permitted, however water contact activities associated with the boating (i.e., water skiing) are not allowed. Boats are available for rent at the marina, including aluminum skiffs with and without engines and covered aluminum patio deck boats with engines. The marina also has private boat mooring facilities for long and short term rentals. Public access to some areas of the lake is restricted by log booms and buoy lines (Figure 3-2). Restricted areas include the shallow end of Santa Cruz Bay, the narrows near the mouth of the river, Cachuma Bay, and water surrounding the dam and Tecolote water pipeline intake facilities. Access to the dam and water intake facility is restricted to ensure boater safety and due to health code regulations. Sailboats are allowed on Cachuma Lake and are given the right-of-way. Catamarans are prohibited in narrow areas such as the narrows east of Arrowhead Island, Santa Cruz Bay, Harvey Bay, Sweetwater Bay, Clark Canyon and Johnson Bay.

Fishing

Cachuma Lake provides a large and diverse recreational fisheries, supporting smallmouth and largemouth bass, rainbow trout, bullhead, channel catfish, bluegill, redear sunfish, green sunfish, white crappie, and black crappie. Cachuma Lake is one of southern California's finest bass fishing lakes because bass flourish in the lake's rocky "dropoffs" (places where the elevation changes abruptly), shallow areas, and weedbeds. Bass tournaments are held frequently during spring. Bigger fish are caught in the winter months of January through March; however, more fish are caught in the summer months.

Trout fishing is also very popular at Cachuma Lake. Trout are caught trolling and bait fishing. Trout do not spawn at Cachuma Lake since water temperatures are too warm. The Park Department currently stocks Cachuma Lake with approximately 4,000 pounds of trout once every two weeks from September through April. The two to five pound trout are trucked from a hatchery in Idaho. On alternating weeks during this period, the Department of Fish and Game (CDFG) stocks the lake with trout from the Fillmore State Fish Hatchery. CDFG matches the number of trout stocked by the Park Department. The Park Department pays for Idaho trout with recreation area fees and CDFG is funded by license fees.

Bass fishing locations are concentrated at the eastern end of the lake surrounding Arrowhead Island, and at dropoffs located throughout the lake. Trout fishing locations are located at the headwaters of coves and on points. Catfish fishing locations are located at the shallow end of coves. Crappie fishing locations are concentrated at the east end of the lake surrounding Arrowhead Island, and at Jack Rabbit Flats. Bluegill and red ear sunfish fishing locations are scattered at shallow locations throughout the lake.

Naturalist Programs

The Recreation Area has a well-developed naturalist program. The Interpretive Nature Center features displays of the area's plants, wildlife, history, geology, and Native American artifacts. The

Center schedules nature walks, fireside theater, wildlife lake cruises, astronomy programs and summer movies.

Wildlife Watching

Visitors can see a wide variety of animals and birds in the Recreation Area such as deer, bear, wild pigs and over 275 species of resident and migratory birds. Wildlife cruises are conducted year round from the marina to different locations along the north shore of the lake. Bald eagles reside year-round at Cachuma Lake and can be seen on two-hour "Eagle Cruises," led by a park naturalist from November through February on the north shore.

Hiking and Equestrian Trails

Several hiking trails are located within the County Park and portions of the Recreation Area. The Oak Canyon Loop Trail begins and ends at the Nature Center, circling the RV park area near Harvey's Cove. Horses and mountain bikes are prohibited on these trails. Sweetwater Trail begins at the parking lot at Harvey's Cove and continues west along the lake. Mohawk Trail begins near the swimming pool and continues east through the Recreation Area. In addition to the two equestrian trails at the Live Oak Campground, there are two other equestrian trails in the Recreation Area, both of which extend from the County Park area to the Santa Ynez Mountains to the south.

Visitor Use Patterns

Most of the Recreation Area visitors reside in southern California. Overnight camping constitutes the majority of annual visitation. Although day use is a small portion of overall visitation, day use areas can be crowded on summer weekends. More than half of the visitors travel to the Recreation Area for fishing and boating. Camping is the second most popular attraction. Over 40 percent of annual visitation occurs during the summer months of June, July and August. The peak attendance month is August. Attendance is lighter in the spring and fall months and drops to about five percent of annual visitation during the winter months. Attendance varies from year to year. The lowest attendance was observed during the recent drought years (1998-1991), particularly in 1990-91 when the lake level was at its lowest (661 feet). Recreation that does not directly depend on water, such as hiking and camping, were also affected during the drought. When the lake level dropped approximately 89 feet below full level, some of the trails were far from the water and hiking was not as attractive.

Recreation Management

The Santa Barbara County Park Department (Park Department) manages the County Park (Figure 6-6) as a financially independent park. Fees collected from visitors pay for facility operation and maintenance, employee salaries, and managing concessions and special services at the recreation area. Fees are collected upon entering for activities and services such as day use, camping, boat launching and equestrian camping. The Park Department saves some revenues in a reserve fund to pay for capital improvement and to pay for operating costs during unprofitable years.

A number of private concessions operate in the recreation area, including Cachuma Store, Cachuma Boats, Cachuma Bikes, and Cachuma Snacks. The owners of the concessions fund their own operations and maintenance and pay the Park Department a percentage of their gross income from all sales and receipts.

The Cachuma Lake Foundation is a non-profit organization designed to raise money for educational programs, natural history oriented displays, events and the Cachuma Lake Docents Organization at Cachuma Lake. The Cachuma Lake Docents Organization prepares and staffs many of the Cachuma Lake Foundation programs and displays.

6.6.2 Potential Impacts Due to Surcharging

Effect on Shoreline Conditions

The maximum lake elevation under recent historic operations is 750 feet. In 1993, the maximum lake elevation was increased to 750.75 feet to produce water for releases for fish under the Fish MOU. This maximum lake level is now observed under current operations. Maximum lake levels would increase 2.25 feet under the proposed project due to surcharging the reservoir to 3.0 feet.

The effect of surcharging on lake levels is discussed in Section 6.1. Surcharging would occur, on average, every three years. The frequency of achieving the maximum lake level is about 11 percent of the time for recent historic, current, and proposed operations. The median number of consecutive months at the maximum lake level for all operations is about four months. The area affected by increased lake levels is dependent upon the slope of the shore. Using topographic and bathymetric maps, an estimate was developed of the total area inundated by surcharging at 3.0 feet. The total acreage affected by the 3.0-foot surcharging is 91 acres. The average width of effect is 25 feet.

Increased maximum lake levels over current conditions (750.75 feet) would adversely affect native vegetation along the margins of the lake. The periodic inundation during surcharge years is likely to destroy upland vegetation types over time. The most common upland vegetation types that would be affected are chaparral and oak woodland, including oak trees. Freshwater marsh areas around the margins of the lake are expected to persist under higher maximum lake levels. Wetlands are located in shallow water areas around the lake where there are flat or very low gradient slopes under water. Raising the lake level at these locations would essentially shift the wetlands upslope.

The loss of upland vegetation along the lakeshore is not expected to have an impact on recreational uses and experiences at Cachuma Lake. In essence, the shoreline will shift upslope and would not cause any perceptible change in shoreline configuration, nor would it increase the visibility or frequency of exposure of the barren slopes below the maximum water level. Lake level fluctuations would remain essentially the same as under current operations, albeit 2.25 feet higher.

The higher maximum lake levels under the proposed project would not have an adverse impact on game fish, as described in Section 6.3.2.

Effect on County Park

Higher lake level would affect recreational facilities at the County Park. An assessment of the potential effect on facilities was prepared by County Parks and presented in Flowers & Associates (2000). The assessment included an inventory of the base elevations of various facilities to determine if higher lake levels could flood the facilities or otherwise affect their functions. The report examined three new maximum lake levels: 751.8 (1.8 foot surcharge), 753 (3 foot surcharge), and 755 feet (5 foot surcharge). It assumed that water levels would be increased by up to three feet from storm surges and waves. Hence, the maximum new lake levels used in the analysis were 754.8 (1.8 foot surcharge with 3 foot surge), 756 (3 foot surcharge with 3 foot surge), and 758 feet (5 foot surcharge with 3 foot surge).

Flowers & Associates (2000) categorized facilities at the County Park as critical and non-critical facilities. Critical facilities provide services for public health and safety. They must be protected from the highest water levels at all time, regardless of the status of recreation conditions at the lake. Critical facilities were defined by Flowers & Associates (2000) to include the drinking water treatment plant and sewer lift stations. All other park facilities were considered non-critical facilities that provide recreational support or opportunities, but are not necessary to protect public health and safety, and can be out of commission for short periods of time without significantly disrupting recreational activities at Cachuma Lake.

In the Flowers & Associates (2000) study, County Parks specified that critical facilities would need to be moved above elevation 758 feet to accommodate 5-foot surcharge with 3-foot wave surge. Non-critical facilities would need to be located to elevation 756 feet to accommodate a 3-foot surcharge with a 3-foot wave surge). County Parks did not conduct a specific assessment of facility impacts for a 3-foot surcharge without the wave surge. The analysis for the 5-foot surcharge is considered highly conservative, as Reclamation is not now, nor has ever, proposed a surcharge greater than 3 feet. County Parks estimates the total construction costs of all facility relocations to be about $10.4 million (Flowers & Associates, 2001). The locations of the facilities are shown on Figure 6-7. Design and permitting would involve additional costs.

Inundation of recreational facilities at the County Park due to surcharging under the proposed project could disrupt recreational activities and possibly cause a public safety hazard. Surcharging would initially occur in the winter months, usually in February or March during peak runoff. At that time, visitors and recreational activities at Cachuma Lake are at a low level. However, the maximum lake level can persist for many months under certain circumstances, and conflict with early summer recreation on the lake and in the campgrounds. If surcharging disrupts key park functions, it could result in restrictions on the type and location of park activity, and possibly the number of visitors.

The magnitude and significance of the impact on recreational uses depends on the facilities affected, and the duration of impact that causes disruption of recreation. For example, temporary closure of an overflow parking lot during the winter months due to a higher lake level would not be considered significant. In contrast, closure of the boat launch or marina due to higher lake levels would be considered significant.

To more precisely determine the potential disruption of park functions due to the 3-foot surcharging, URS Corporation reviewed the Flowers & Associates (2000) report and topographic maps of the County Park. A summary of the facilities that would be affected by surcharging is presented in Table 6-15. The URS analysis addressed the need to relocate facilities under still water conditions (that is, maximum water levels of 753 feet), and due to wave action with a full reservoir (that is, 753 plus 3 feet = 756 feet).

Facilities that would be inundated by a 3-foot surcharge (to elevation 753 feet) with no wave action include: (1) three critical facilities: water treatment plant and intake, marina path and floating docks, boat launch ramp; and (2) two non-critical facilities: Barona Shores path and Teepee Island footbridge. All other facilities would not be inundated by a 3-foot surcharge if there were no waves. These facilities include marina overflow parking lot, Mohawk Road, Harvey's Cove path, bait shop, snack bar, sewer lift stations 2 and 3, Harvey's picnic grove, Sweetwater trail, boat works shop, and Mohawk overflow parking. The need to relocate these facilities to protect from wave action must be determined by County Parks based on the level of risk that they are willing to take regarding each facility. For many facilities located at or near 753 feet elevation, inundation due to a 3-foot surcharge with wave action could be tolerated because the facilities would not be destroyed and the duration of the wave action would be limited to hours or a day, and because the public can be excluded from these areas of the park during the storm period when there are high waves. However, there is a potential that some of these facilities could experience damage that could require weeks to months to repair.

TABLE 6-15
RECREATIONAL FACILITIES AFFECTED BY SURCHARGING

Facility (see Figure 6-6)	Current Base Elevation (Est. in feet)	Affected by 3-foot Surcharge and 3' Wave Run Up? (756')	Affected by 3-foot Surcharge and No Wave Run Up? (753')	Notes
Drinking Water Intake	755	Yes	No	The facility flood elevation is about 755'. Need to adjust intake pipe.
Drinking Water Treatment Plant	753	Yes	Yes	This facility includes five structures: two buildings and three tanks. The lowest structures are the northernmost building and tank at about 753'
Sewer Lift No. 2	759	Yes	No	The aboveground portion of this facility is at 760'. Below ground elevation is unknown. This facility must be moved under 3' surcharge to maintain 50' horizontal distance from open water
Sewer Lift No. 3	758	Yes	No	The aboveground portions of this facility are between 759 and 758'. This facility must be moved under 3' surcharge to maintain 50'

Facility (see Figure 6-6)	Current Base Elevation (Est. in feet)	Affected by 3-foot Surcharge and 3' Wave Run Up? (756')	Affected by 3-foot Surcharge and No Wave Run Up? (753')	Notes
				horizontal distance from open water
Marina Path and Stairs and Floating Docks	753	Yes	Yes	The existing walkway is at 753'and the floating docks are at 750'.
Boat Launch Ramp	750	Yes	Yes	The top of the launch ramp is at 750' and the turning and loading area at the top of the ramp is at 752'.
Bait and Tackle Shop, Snack Bar, retaining wall	756	Yes	No	The bait and tackle shop and retaining wall are at 756'.
Marina Overflow Parking	753	Yes	No	The lowest point of the parking lot is 753' at the far western end, near the lake's edge. The lot gradually slopes upward towards the east to 765'.
Mohawk Road	756	Yes	No	The lowest point in the road is at 756', just south of sewer pump station #3.
Harvey's Cove Picnic Area	755	Yes	No	The lowest point of this picnic area is 755', just above the dock ramp. The area slopes gradually upward towards the south to approx. 758' before the slope becomes steeper.
Harvey's Cove Path	754	Yes	No	The lowest point of the path is at 754', both on the way to the picnic area and just before the floating ramp to the fishing dock.
Barona Shores Trail	755	Yes	Yes	The low point on the trail is near 750'
Teepee Island foot bridge	752	Yes	Yes	The bridge abutments are located at 752'
Sweetwater Trail	755	Yes	No	At its lowest point, the trail drops down to 755'
Boat Works Shop	760	Yes?	No	The shop is near 760' on a flat ground surface. Construction of a berm may be needed under 3' surcharge to provide more boat laydown area
Picnic Area Adjacent to Shop	751	Yes	Yes	The lowest point of the picnic area is at 751'
UCSB Crew Building and Ramp	756	Yes	No	The building is at 756'
Mohawk Overflow Area and Road	754	Yes	No	The lowest point of the picnic area/overflow is 754'. The road leading to the shore currently reach 754'

In addition to increasing the static water level, surcharging will also increase the peak water levels during spill events. Cachuma Lake has spilled 31 times during 17 years. The peak elevations achieved during the spill event are shown below in Table 6-16. The lake was at these elevations for only a short period of time (hours to several days) before the lake dropped to its maximum elevation of 750 feet (prior to 1993) and 750.75 feet (after 1993). These data indicate that the maximum lake levels during spill events have been less than 751 feet. The highest lake levels, almost 757 feet, occurred during the 1969 floods.

TABLE 6-16
PEAK LAKE LEVELS DURING HISTORIC SPILLS

Maximum Lake Elevation (feet)	Number of Spill Events
756-757	1 (1969)
755-756	1 (1969)
754-755	1 (1998)
753-754	1 (1978)
752-753	3 (83, 98, 01)
751-752	5
750-751	15
<750	4

The maximum lake level using gateholding is 760 feet. The crest of the dam is 766 feet. The spillway crest is at elevation 720 feet. When closed, the top of the gates is 750.75 feet.

Under the new modified storm operations, Reclamation can utilize "gateholding" to reduce downstream flooding, as described in Section 3.2.6. Under this method, the spillway gates are opened in response to a rise in the reservoir as flood flows fill the lake. This action releases water downstream while maintaining a minimum freeboard on the gates in order to prevent overtopping of the gates and the dam crest. Gateholding will increase the maximum static water level in the lake for a given flood compared to current operations. Hence, the maximum spill elevations in the future will likely be higher than those observed in the past (and shown in Table 6-16).

In order to continue operations of the park at Cachuma Lake, many of the recreational facilities listed in Table 6-15 will need to be relocated. At a minimum, the following three critical facilities would need to be relocated immediately to prevent disruption of the park during the first year of surcharging: water treatment plant and intake, boat launch ramp, and marina path and docks. The estimated costs of relocating these facilities are $4.8 million for a new treatment plant, and $3.0 million for the combined upgraded boat launch and marina modifications. The total estimated design, permitting, and construction of all facility relocations shown in Table 6-15 is estimated by Flowers & Associates and County staff to be $12.5 million.

The potential disruption of recreational uses at the County Park due to surcharging under the proposed project is considered a significant, but mitigable impact (Class II) on recreation at the lake. The impact on recreation at the lake would be avoided by relocating the affected facilities to a higher elevation. Under the recreation contract with Reclamation, the County is responsible for relocating the facilities to avoid conflicts with reservoir operations, including surcharging. In a letter dated July 12, 2002 to COMB, Reclamation stated that County recreational facilities within the zone of potential inundation due to operations of the project, including the proposed surcharging, must be relocated by the County. Under Article 8 of the 1953 Recreation Contract with the County, lands along the margins of the lake must be made available for operational purposes. Hence, the mitigation for this impact is under the authority of another public agency –

County of Santa Barbara. Once the facilities are relocated, the surcharging would not adversely affect recreational uses. It should be noted that surcharging would not occur every year, and that no impacts would occur to park facilities during non-surcharge years.

Reclamation and COMB recognize that relocation of the affected facilities will represent a significant financial commitment for the County. Relocation may require several years to fund, design, and implement. For example, the County Parks Department does not currently have the financial resources to complete the relocation of the facilities listed in Table 6-15. The County has secured grant funding to assist with the relocation of at least one of the pump stations, modification of the boat launch facility and marina, and possible funding for the treatment plant relocation. However, no funds are available or identified for other facility relocations. The County Parks Department will continue to seek grant funding and congressional appropriations, but the prospects for near term funding are limited. County Parks Department staff believes that only a very limited amount of funds would be available from the County General Fund.

The flashboards will be installed in late 2003, which will allow for a potential surcharge in the winter of 2003-2004. Less than a year is available to fund, design, and relocate facilities prior to the first possible surcharge event. Hence, even if funding was available, there would be insufficient time to complete any facility relocation prior to the first winter, except for one sewer lift station. Even if the surcharge were delayed to the winter of 2005-06, the latest date that the surcharge was to be implemented as described in the BO, there would still be insufficient time to secure funding, complete design and permitting, and complete construction of facilities. No reliable estimate can be made of the time required to complete the facility relocation due to the uncertainties and obstacles noted above; however, it would likely require at least 5 years from the time that a grant was awarded to the end of construction.

In light of the above information, there will be a period of time when recreational uses at the lake could be affected by surcharging. Until the relocations are completed, critical recreational facilities (water treatment plant, boat launch ramp, marina path and docks) could be flooded during a maximum surcharge event which would likely result in park closure for weeks to months. Other non-critical facilities such as trails, parking lots, and shops could also be closed. This short term impact would be considered significant, but would remain a fully mitigable impact (Class II) because the facilities will eventually be relocated in order to continue recreational uses of the County Park.

The impacts of relocating the County Park facilities would be considered indirect and cumulative effects of the proposed project, and are addressed in Section 11.0.

6.6.3 Mitigation Measures and Residual Impact

The facility relocation is the responsibility of the County, and as such, the mitigation to avoid a long-term significant recreation impact is under the authority of another public agency, not Reclamation or COMB. The residual impact after relocation of facilities (i.e., mitigation) would be less than significant.

6.7 CULTURAL RESOURCES

6.7.1 Scope of Investigation

The proposed surcharging could affect two prehistoric archeological sites along the margins of Cachuma Lake. The following impact assessment is based on archaeological surveys conducted by Reclamation in 1986-1987 and 2001 (West and Slaymaker 1987; West and Welch 2001), and supplemented by archaeological site records and additional survey reports on file at the Central Coast Information Center (Maki, 2001). The mitigation measures described below are based on Reclamation's Historic Properties Treatment Plan for the affected sites (West, 2002), and an executed Memorandum of Agreement among Reclamation, California State Historic Preservation Officer, and the Santa Ynez Band of Mission Indians (as a concurring party) regarding effects of the project on historic properties in accordance with 36 CFR 800 implementing Section 106 of the National Historic Preservation Act (NHPA). The following assessment of impacts and development of appropriate mitigation measures is based on the requirements in the NHPA, not CEQA, because the project is a federal action that would affect historic properties on federal lands.

6.7.2 Regional Setting

Ethnography

The project area lies within the historic territory of the Native American Indian group known as the Chumash. The Chumash occupied the region from San Luis Obispo County to Malibu Canyon on the coast, and inland as far as the western edge of the San Joaquin Valley, and the four northern Channel Islands (Grant 1978). The Chumash are subdivided into factions based on six distinct dialects: Barbareño, Ventureño, Purisimeño, Ynezeño, Obispeño, and Island.

Cachuma Lake falls within the historic territory of the Ynezeño, whose name is derived from the mission with local jurisdiction, Santa Ines. The Ynezeño are less documented than the coastal Chumash both in historical references and by archaeological research. It is known that their material culture was quite similar to the coastal Chumash, but their economy placed more emphasis on hunting and gathering then the maritime-oriented economy of the coastal tribes.

The Chumash were very advanced in their culture, social organization, religious beliefs, and art and material object production (Morrato 1984). Class differentiation, inherited chieftainship and intervillage alliances were all components of Chumash society. The development of a highly effective maritime subsistence pattern, comprised of exploitation of fish, shellfish, sea mammals, and waterfowl, enabled Chumash villages of nearly 1,000 individuals to cluster in areas along the coast. These were the most populous aboriginal settlements west of the Mississippi River (Morrato 1984). Permanent inland settlements subsisted from a variety of resources including acorns, seed plants, rabbits, and deer. The smaller inland villages were often economically allied with the larger coastal villages.

At the time of European settlement in the Santa Barbara Channel area, which began with the construction of the Santa Barbara Presidio in 1762, there were approximately 25 Ynezeño villages, eight of which were in the middle and upper Santa Ynez River Valley (Rudolph 1990). The villages were tied to together by marriage and each village contained from 40 to 280 people (West and Slaymaker 1987). These villages have been described by early European explorers, Spanish missionaries, the early ethnographer John P. Harrington, and modern anthropologists. Marriage patterns, baptismal records, and genealogies are documented for many of the villages. Although Chumash society was decimated by epidemic diseases and missionization during the early historic period, today more than 500 living Chumash descendants trace their ancestry from the historic villages of the Santa Ynez River Valley (Reclamation and CPA, 1995).

Prehistory

Archaeological data are increasing to support the hypothesis that prehistoric occupation of the California coast dates to over 10,000 years before the present (B.P.) (Erlandson and Colten 1991). Such data include the recent dating of human bones from Santa Rosa Island at 13,000 years old (Ritsh 1999). This early Paleo-Indian occupation is not well understood, because of a paucity of archaeological data. The archaeological record does indicate that sedentary populations occupied the coastal regions of California more than 8,000 years ago. Several chronological frameworks have been developed for the Chumash region including Rogers (1929), Wallace (1955), Harrison (1964), Warren (1968), and King (1990). King postulates three major periods -- Early, Middle and Late. Based on artifact typologies from a great number of sites, he was able to discern numerous style changes within each of the major periods. The Early Period (8000 to 3350 Before Present [B.P.]) is characterized by a primarily seed processing subsistence economy. The Middle Period (3350 to 800 B.P.) is marked by a shift in the economic/subsistence focus from plant gathering and the use of hard seeds, to a more generalized hunting-maritime-gathering adaptation, with an increased focus on acorns. The full development of the Chumash culture, one of the most socially and economically complex hunting and gathering groups in North America, occurred during the Late Period (800 to 150 B.P.).

At the time of Spanish contact (1542), large Chumash villages typically contained sweathouses, storehouses, numerous homes, ceremonial areas, and extensive middens of residential debris. Villages were located near important resources in coastal, estuarine and riparian habitats. Cemeteries typically were located near the villages; elaborate burial practices included the interment of grave goods such as beads, quartz crystals, red and yellow pigments, delicate soapstone bowls, sandstone mortars, and carved charmstones.

In comparison to Santa Barbara's coastal plain, the Santa Ynez Valley was sparsely populated throughout prehistory. Subsistence was based on a wide variety of floral and faunal resources. Acorns, pinyon nuts and seeds from numerous grasses and forbs provided storable staples. Deer, quail, rabbit, and freshwater fish were consumed, as were marine fish, shellfish and sea mammals acquired through exchange or trips to the coast.

Ethnohistoric records indicate that the interior Chumash established summer and winter villages, individual sweat bath sites, short-term camps for gathering and processing acorns and pinyon nuts, isolated hearths and millingstone sites for roasting yucca and pounding and boiling islay bulbs, and caches for food and water in caves and rock shelters.

History

Early Exploration Period (1542-1782)

The initiation of the historic era in Santa Barbara County began with an exploratory voyage led by Juan Rodriguez Cabrillo in 1542 - 1543. The next European explorers to pass through the Santa Barbara Channel were Sebastian Rodriguez Cermeno in 1595, followed by Sebastian Vizcaino in 1602. Over one hundred and fifty years passed before the next major European expedition reached Santa Barbara County. In 1769, Gaspar de Portola and Fray Crespi departed the newly established San Diego settlement and marched northward toward Monterey with the objective of securing the port and establishing five missions along the route. They passed through present-day Santa Barbara County that same year. The 1769 Portola Expedition and the later De Anza Expedition of 1775 were preludes to systematic Spanish colonization of Alta California. These early maritime and overland expeditions brought the Spanish in contact with the natives of the Santa Barbara region, but it was not until the late 1700s the interior was penetrated.

Spanish Mission Period History (1782-1820)

Along the Santa Barbara Channel the Spanish Mission Period commenced with the foundation of the Santa Barbara Presidio in A.D. 1782; four years later the Santa Barbara Mission was founded. In 1798 an exploring expedition was sent to the Santa Ynez Valley to find a location for a new mission. Fourteen villages were mentioned within 12 leagues of a spot called Alajulapu, meaning rincon or corner. This spot, where Mission Santa Inez was established, is next to the present-day town of Solvang. Farther Estevan Tapis recorded the names of the valley's villages, their location in relation to Alajulapu, and the number of residence structures at each village. Tapis' estimated four persons per structure. Two of these villages have been correlated with known archaeological sites in the vicinity of Cachuma Lake.

The village of Teqepsh (Tequepis, Teqeps - Chumash for "seed beater") was located on the west bank of Tequepis Creek near its confluence with the Santa Ynez River. This was the first village encountered on the expedition. This village site (CA-SBa-477) is now inundated by Cachuma Lake. Also noted by early explorers was the village of Elijman (CA-SBa-485) located on a terrace on the west side of the Santa Ynez River.

The Santa Ynez River was originally called the Santa Rosa River of Calaguasa after the large village of Calaguasa (Calahuasa) once located just downstream of Teqepsh. The name Cachuma probably derives from the village of Aquitsumu mentioned by Tapis as being 7 leagues from the mission site. The plat of College Rancho, surveyed in 1858, preserves the name Aquachuma or Aguachuma as the name for Cachuma Creek, and the plat for Rancho Tequeps spelling for the creek's name is Guchuma. Site CA-SBa-809 is the probable archaeological remnant of this village located along Cachuma Creek.

Mission Santa Inez was established on September 17, 1804, by Fathers Jose Antonio Calzada and Jose Romualdo Gutierez. A cadre of neophytes from nearby missions was installed at Santa Inez to provide skilled labor and train subsequently proselytized natives. The first baptisms included children and 15 men. Among these were the headmen of the villages Calahuasa, Soctonocmu and Ahuama.

Missions Santa Barbara and La Purisima had been proselytizing the Santa Ynez Valley for some time prior to the founding of the Mission Santa Inez. With its establishment, the jurisdiction of the Mission Santa Barbara commended upstream of the village of Teqepsh.

Rancho San Marcos, located at the eastern end of the project area, was established in 1804 to serve the Mission Santa Barbara. Its lands extended along the Santa Ynez River from Tequepis Canyon upstream to about the Fremont campground, then northward for about 8 miles. Under the supervision of an alcalde, neophytes raised livestock and crops for the growing mission population. The original adobe building consisted of living quarters and a chapel. Modified over the years, the San Marcos Adobe now is in ruins. The ruins and remaining associated features (CA-SBa-109/H) are on the National Register of Historic Places. The adobe and the adjacent area were known as "Mistwaghewag" or "Mistaxiwax" by the Chumash. It is not known whether the village predated the founding of Rancho San Marcos.

Rancho and Anglo- Mexican Period History (1821-1880)

With the successful revolt of Mexico against Spain in 1821, all mission lands passed from Spanish to Mexican ownership. Anxious to remove any sources of former Spanish power, the Mexican government in 1834 secularized the missions and began to sell or grant their former grazing lands. Cachuma Lake falls within the historic territory of two large Mexican land grants, Tequepis and Rancho San Marcos. Tequepis was granted to Antonio Maria Villa by Governor Pio Pico in 1845. William Pierce acquired it from Villa's heirs in 1868. The Rancho San Marcos, as described earlier, was originally part of the Santa Barbara Mission lands. Nicholas and Richard Den purchased the 35,500-acre rancho from Governor Pio Pico in 1846. As on other large, self-sufficient ranches in Santa Barbara County, cattle grazing and grain production were the principal economic mainstays on Tequepis and Rancho San Marcos.

After the Mexican-American War in 1848, California was ceded to the United States, becoming a state in 1850. Numerous easterners, mid-westerners, and Europeans emigrated to California, lured first by gold, and later by farming opportunities. Large land grants and cattle and sheep raising continued as the California way of life, however, until the great drought of 1862-64 killed most of the cattle, forcing large landholders into bankruptcy. At this point the balance tipped from Mexican land ownership to American, as foreclosed land began to be subdivided for smaller farm-sized parcels and sold to outsiders.

In 1855, the Christian natives residing at Mission Santa Inez were forced to take up residence at the site of the present Santa Ynez Indian Reservation. By this time, the Chumash population had been decimated by infectious diseases and had experienced massive social disruption due to European contact and missionization.

Americanization Period History (1880-1960)

As more and more Americans emigrated to California to buy farm land, towns sprang up, roads and wharves were developed to take crops to market, and a stage coach system grew up to connect passengers and mail throughout the state. The Santa Ynez turnpike road was cut over San Marcos Pass by Chinese laborers in 1868, charging a toll for passengers traveling from Los Angeles to San Luis Obispo. Stages stopped at Cold Springs to change the driver and horses and allow the passengers to get food and water. The present Cold Springs Tavern is a survivor of those early stagecoach days. Additionally the stage stopped at Chalk Rock, now inundated by Cachuma Lake, and Ballard's adobe (County Landmark No. 20), four miles below Los Olivos.

Between 1874 and 1910, the towns of Lompoc, Santa Ynez, Los Olivos, Ballard, and Solvang were established. Settlers were attracted to the Santa Ynez Valley by good weather, water and rich soil capable of producing wheat, barley and a wide variety of fruit trees. Point Sal and Lompoc wharves shipped the produce of these towns to markets up and down the coast. By 1887 the Pacific Coast Railway stop in Los Olivos provided Santa Ynez River Valley farmers an alternative way to get agricultural goods to market.

From mission times until the 20th Century, Santa Barbara relied on the De la Guerra wells for domestic water supplies. Even with supplemental sources, the water supply was inadequate for the growing population. As early as 1888, the Santa Ynez River was recognized as a potential major source of water for Santa Barbara. The Mission Tunnel was completed in 1914 to carry water, by gravity, from the Santa Ynez River to Santa Barbara. Planning for the Cachuma Dam (now Bradbury Dam) was started in 1941, construction commenced in 1949 and the dam was completed in 1953. The reservoir filled with enough water to go over the spillway on April 12, 1958. The Cachuma Lake Recreation Area (Recreation Area) is federally owned land designated for recreational uses. It includes Cachuma Lake and approximately 6,448 acres of surrounding land.

6.7.3 Site Specific Setting at Cachuma Lake

There are at least 18 documented archaeological surveys or excavations within the area immediately surrounding Cachuma Lake on file at the Central Coast Information Center (CCIC) housed at the University California, Santa Barbara. The two most pertinent archaeological investigations in regards to the potential surcharging are Reclamation’s 1986-87 survey for the proposed enlargement of Bradbury Dam (West and Slaymaker 1987), and a 2001 survey by Reclamation for the EIR (West and Welch 2001). The 2001 survey included a field examination of 12 archaeological sites recorded between the elevations of 734 to 760 feet. Lake elevation during the 1986-1987 survey was 730 to 740 feet. The lake level ranged from 741.3 to 746 feet during the 2001 survey.

Archaeological Resources

A record search was conducted at the CCIC for the proposed surcharge project in February 2001 by Maki (2001). Forty-six archaeological sites are recorded within the Cachuma Recreation Area. Forty-one of the sites are Native American in origin, three have historic and prehistoric and/or protohistoric materials, and two are historic. The status of the 46 archaeological sites in relation to the current project is as follows. Two archaeological sites were destroyed during construction of Bradbury Dam. There are 13 archaeological sites that have been inundated by Cachuma Lake and, thus, are located below the proposed surcharge zone. Twenty–five (25) sites are located at and above elevations of 760 feet and, therefore, above the proposed 3.0-foot surcharge impact zone. Three archaeological sites (CA-SBa-481, 2685H and 2728H) were not relocated during the 1997 or 2001 surveys. It appears these sites are destroyed and would not be affected by the proposed surcharging (West and Welch, 2001).

The three remaining sites, CA-SBa-891, -2101, and –2105, are located along the current margins of the current lake (750.75 feet maximum level) and extend above and below the existing lake level. As such, portions of the sites have been eroded over the past 50 years since the lake was established.

CA-SBa-891/2105

CA-SBa-891/2105 was originally recorded as two separate sites by West and Slaymaker in 1987 and described as follows. CA-SBa-891 consists of a sparse scatter of milling tools with chert flakes, cores, basin metates, a unifacial slab metate, manos, and a possible mortar, with an elevation range of 738 to 760 ft. CA-SBa-2105 is a linear deposit along the lakeshore consisting of chert flakes, chert bifaces, cores, and 1 unifacial mano and one possible mano. Severe wave erosion was noted at both sites (West and Slaymaker 1997).

Results of the 2001 field examination suggest that the gap between CA-SBa-891 and CA-SBa-2105 is the result of siltation and not an actual break in cultural deposits. Therefore, West and Welch (2001) conclude that the two archaeological sites are one large site. The 2001 field examination identified 20+ handstones, mostly bifacial, two pitted, and at least six large basin metates scattered along the wave cut portions of CA-SBa-891/2105. Other items noted included two pestles, several unifacial cobble tools, hammerstones, flakes, cores, and a single projectile point. CA-SBa-891/2105's artifact assemblage is consistent with sites that date to middle Holocene or earlier (Early Period/early Middle Period/Milling Stone Horizon) (West and Welch 2001). West and Welch (2001) conclude their discussion on CA-SBa-891/2105 as follows:

> *"In summary, while portions of the cultural deposit within the drawdown zone have been destroyed or have been more or less permanently inundated, undisturbed deposits still remain above the inundation zone. Because of the high likelihood that large areas of undisturbed cultural deposits still remain at SBa-891/2105, the site appears to have significant research potential in clarifying the region's prehistory and thus we conclude that it is eligible to the National Register under criterion D."*

CA-SBa-2101

CA-SBa-2101 was recorded by West and Slaymaker (1987) and described as a large linear midden with artifacts. Surface observations in 1987 indicated the site was at least 150 meters in length along western Santa Cruz Bay and 25 meters wide. The site was noted as severely wave cut with a depth of at least 40-cm. It is probable that CA-SBa-2101 and CA-SBa-481 are the same site.

The 2001 field investigation found that a large part of CA-SBa-2101 has apparently been eroded by reservoir fluctuations and the only intact part of the site is above the wave-cut bank. Artifacts observed included chert flakes, a chert core, and fire cracked rock and one marine shell fragment. West and Welch (2001) conclude their discussion on CA-SBa-2101 as follows:

> *"While much of this site has been destroyed it appears that some cultural deposit remains and that the site still contains, albeit incomplete, information that would be useful for interpreting the area's prehistory and would be eligible under criterion D. The site may provide chronological data that may be useful in reconstructing settlement patterns. The presence of marine shell indicates connections with the coast. Several test pits may help to clarify the significance of this site."*

Historical Resources

The Rancho San Marcos Adobe (CA-SBa-109/H) is listed on the National Register of Historic Places (NRHP). This historic site consists of the remains of the original mayordomo adobe built on the San Marcos Rancho in 1804, parts of one to three kilns and a remnant of the old Stagecoach Road. A number of buildings on the San Marcos Old Ranch Headquarters were evaluated as significant under CEQA for the Rancho San Marcos Golf Course project in 1990 (Rudolph 1990). Prehistoric resources have also been associated with this site. The proposed 3.0-foot surcharge project is expect to have no impact on Rancho San Marcos' historic structures and/or prehistoric site area, as this site is located at an elevation above 760 feet.

To the west of the Rancho San Marcos buildings on the shore of Cachuma Lake is the Rancho San Fernando Rey, which includes a large stable, adobe house, and numerous ranch hands' houses, built by Dwight Murphy in 1938. The Rancho San Fernando Rey buildings have not been evaluated for historical significance. However, the rancho is not within the Recreation Area and the USGS 7.5' Cachuma Lake Quadrangle indicates that the rancho's structures are all above the 760-foot elevation contour line and, therefore, will not be impacted by project implementation.

The proposed surcharge requires that flashboards be placed on top of the Bradbury Dam gates. The dam is less than 50 years of age and has no special engineering features or national significant criteria that would make it eligible for listing on the National Register (West and Welch 2001). Therefore, the project's minor modifications to the Bradbury Dam are not considered a significant impact.

The following structures within Cachuma Lake County Park could be periodically affected by higher lake levels during a 3.0-foot surcharge: water treatment facility, bridge to Teepee Island, marina, launch ramp, sections of road leading to and in the Mohawk Area, and sewage pumping stations. Neither the road or any of the structures is 50 years old or architecturally significant, therefore, they are not considered historic resources and warrant no further evaluation and/or mitigation.

Ethnographic Resources

There are no Traditional Cultural Properties within the Area of Potential Effect (letter to Reclamation from Tribal Elder's Council, Santa Ynez Band of Mission Indians, February 11, 202). Ethnohistorical villages were present in the Recreation Area prior to the reservoir. These village sites, including their burials, provide a sense of continuity with the past to contemporary Native Americans. There are no known gathering areas of plants used by Native Americans in the Recreation Area.

6.7.4 Potential Impacts

Protection of cultural resources on federal lands is required under federal regulations, statutes and guidelines, including Section 106 of the National Historic Preservation Act (NHPA), Executive Order 11593, and the Code of Federal Regulations (36 CFR Part 800) set forth by the Advisory Council on Historic Preservation.

Modification of flashboards on the spillway gates would increase maximum lake level from 750.75 feet to 753.0 feet under the proposed project. Two prehistoric archaeological sites (CA-SBa-891/2105 and –2101) along the lake margins would be subject to increased erosion. Erosion of the sites could destroy their integrity and the elements of the sites that impart their historic significance. Both sites are considered eligible to be listed in the National Register of Historic Places. **The disturbance of the sites is considered a significant, but mitigable impact (Class II).** The appropriate mitigation for impacts to these sites is archeological data recovery based on an approved Historic Properties Treatment Plan, prepared in accordance with the requirements of the NHPA and its implementing regulations, and with concurrence with the State Historic Preservation Officer (see Mitigation Measure CR-1). Reclamation has prepared a Historic Properties Treatment Plan and executed a Memorandum of Agreement with SHPO and the Santa Ynez Band of Mission Indians, pursuant to Section 106 of the NHPA. Reclamation will be conducting archeological data recovery studies in the winter of 2002-2003 at the two affected sites. Hence, Mitigation Measure CR-1 will be completed prior to final action on the proposed surcharging project.

There is a potential that buried cultural resources, prehistoric and/or historic, could be exposed and/or eroded by the proposed surcharging, **which would be considered a significant, but mitigable impact (Class II).** This impact could be reduced to a less than significant level by the application of Mitigation Measures CR-2.

Construction activities associated with relocation of recreational facilities to accommodate surcharging would not occur at any known archeological sites in the County Park based on field investigations by Conejo Archeological Consultants (2002) at the facility relocation sites. However, there is a potential to disturb unknown prehistoric archeological sites at the park, which contains numerous archeological resources. **This impact is considered potentially significant, but mitigable (Class II).** Significant impacts can be avoided by ensuring that all relocated facilities will avoid known archeological sites, and conducting construction monitoring to address impacts to unknown buried cultural resources (see Mitigation Measure CR-3).

6.7.5 Mitigation Measures and Residual Impact

Under NHPA, it is generally preferable to avoid impacts to significant cultural resources when feasible. However, past attempts to protect archaeological sites in the draw-down zone of reservoirs have been expensive and ineffective (Carrell et al. 1976; West and Welch 2001). Storms and/or seismic events can destroy even the most well maintained protective structure such as an earthen berm, rip-rap, sheet piling or even gunite caps, leading to irreparable flooding damage to the cultural resource that was to be protected. Since long-term protection within the surcharge impact zone is realistically unfeasible, data recovery is the preferred alternative for mitigating project impacts to a less than significant level.

As required by 36 CFR 800, the Santa Ynez Band of Mission Indians has been consulted and is participating in the Section 106 process of the NHPA. Reclamation recently executed a Memorandum of Agreement with the SHPO and the Santa Ynez Band of Mission Indians regarding the Section 106 process, including implementation of the archeological data recovery study included in Mitigation Measure CR-1 below. Implementation of the following mitigation measures for known and possible unknown archeological resources would reduce all impacts to less than significant levels.

CR-1 A data recovery study shall be conducted at sites CA-SBa-891/2105 and CA-SBa-2101 in accordance with Reclamation's final Historic Properties Treatment Plan (West, April 2002) and the Memorandum of Agreement with SHPO and the Santa Ynez Band of Mission Indians.

CR-2 If in the future currently unknown archaeological resources are identified within the surcharge impact zone, any such find shall be evaluated by a professional archaeologist and mitigated appropriately in accordance with Section 106 of the NHPA.

CR-3 An archeological monitor shall be present during construction work associated with facility relocation if work shall occur in a sensitive area where unknown prehistoric resources could be encountered. If such resources are encountered, earthwork shall be suspended at that location until such time that the County Parks Department has investigated the nature and significance of the resource with Reclamation's cultural resource specialist, and made a determination on appropriate treatment. This measure would be implemented by the County Parks Department when relocating facilities to accommodate the surcharge.

7.0 ENVIRONMENTAL ANALYSIS – HILTON CREEK PROJECTS

The incidental environmental impacts of the following projects along Lower Hilton Creek are addressed in this section. The level of environmental analysis for these projects is indicated below. The project numbers are derived from the list of all FMP/BO projects, presented in Table 2-1. Detailed descriptions of the proposed projects are provided in Section 2.6.

1. Hilton Creek cascade and bedrock chute passage project – project level analysis
2. Hilton Creek channel extension – programmatic analysis
3. Route 154 culvert modifications (Caltrans) – project level analysis

It should be noted that Reclamation installed the first phase of a supplemental watering system on Hilton Creek to improve summer rearing habitat in 1999. The system was installed as part of the seismic modifications to Bradbury Dam, prior to the completion of the FMP or BO. It consists of a gravity feed from the reservoir through existing pipes in the dam to enhance habitat conditions in the summer along lower Hilton Creek. The second phase of the system, a flexible intake and pump system, will be completed in 2003. Reclamation completed a NEPA Categorical Exemption for this project in April 2002. Condition 2 of the BO requires Reclamation to maintain flows in lower Hilton Creek at levels no lower than 2 cfs once the pump system under Phase 2 of the Hilton Creek Supplemental Watering System has been installed, unless the Adaptive Management Committee (AMC) decides otherwise and NMFS approves.

Hilton Creek is a small intermittent stream located downstream of Bradbury Dam (Figure 7-1). The watershed encompasses about four square miles. The lower 2,980 feet of the creek are located on federal land acquired by Reclamation for the construction of Bradbury Dam (Figure 7-1). The rest of the creek and its watershed are located on private property – the San Lucas Ranch – with the exception of the Route 154 right-of-way owned by Caltrans (Figure 7-1). The reach below Route 154 is about 4,200 feet long. The upper 1,220 feet are located on San Lucas Ranch. A concrete arched culvert conveys Hilton Creek under Route 154. The portion of the creek on Reclamation property downstream of Route 154 was realigned during the construction of Bradbury Dam. The new alignment passes through bedrock formations west of the original alignment.

7.1 PASSAGE IMPEDIMENT REMOVAL ON FEDERAL LAND

7.1.1 Existing Conditions

Descriptions of the riparian and aquatic habitats along lower Hilton Creek on federal property are provided in the FMP. The project reach is about 250 feet long and extends from the cascade upstream to the lower release point (Figure 7-1). The project reach consists of a narrow confined channel embedded in bedrock with a bedrock bottom (see photographs in Appendix C). Riparian shrubs and trees are rooted along the channel in rock fissures and in areas with soils. Young willow and mulefat plants are present, as well as perennial riparian herbs such as watercress, mugwort, and stinging nettle. The reach receives year-round water from Reclamation's supplemental watering system that was installed in 1999. As such, it supports rearing habitat for steelhead. Due to the bedrock bottom and higher water velocities, no accumulation of spawning gravels occurs here. Overall, the quality of the aquatic habitat is very high to excellent due to the presence of cool water, suitable channel substrate, and sufficient riparian cover.

The southern steelhead is the only endangered or otherwise sensitive species known to occur on lower Hilton Creek. Suitable habitat is present for the red-legged frog, a federal endangered species. However, there are no historic records nor documented sightings of this species along Hilton Creek. The COMB biologist has been working on the creek for more than 8 years and has not observed this species on Hilton Creek. Suitable habitat is not present for the southwestern pond turtle or western spadefoot toad, both state Species of Special Concern. The riparian vegetation along the creek is not sufficiently dense and wide to support the endangered least Bell's vireo or southwestern willow flycatcher. The former species breeds on the upper Santa Ynez River above Gibraltar Reservoir, while the latter breeds on the lower river near Buellton and Lompoc.

7.1.2 Temporary Construction Related Impacts

As described in Section 2.6.2, the cascade and bedrock chute will be modified with concrete channel obstructions and weirs that are installed manually by field crews working in the streambed. Prior to construction, fish in the work areas (if present in the chute pool) will be captured and relocated, then the upstream releases will be diverted around the work area. Work in the creek will involve excavation of rocks (probably with jackhammers), driving steel rods, constructing wood forms, and pouring concrete. All construction vehicles will be parked on top of the east bank in an existing parking area that is mostly barren and covered with gravel. The construction period will be about two weeks

Work in the creekbed would temporarily disturb the creek substrate and vegetation rooted adjacent to the individual work sites for channel obstructions. Low-growing riparian herbs and shrubs will be pruned, trampled, and/or removed at several of the work sites. **This temporary disturbance to existing vegetation is considered adverse, but not significant (Class III)** for the following reasons. One, very little vegetation would be removed, probably less than 3-5 willow saplings and less than 1,000 square feet of herbaceous vegetation along the creek bed. Two, this type of vegetation would recolonize quickly because of the favorable moisture conditions along the creek and the abundance of sources of seeds and propagules.

Fish could occur in the work area because it is suitable habitat for rearing. However, prior to initiating construction, the COMB biologist would conduct a survey of the work area to determine if juvenile steelhead/rainbow trout are present. The proposed fish capture and relocation procedures have been designed to minimize take of any adult or juvenile steelhead/rainbow trout, and to provide conditions in the relocation site that are suitable and predator free. The procedures will be implemented in coordination with NMFS, and under the incidental take provisions of the BO for the Cachuma Project. Any disturbance or adverse effects to the trout during this procedure would be minimal and acceptable to NMFS; **as such, any incidental adverse impact of capture and temporary relocation would be considered adverse, but not significant (Class III)**.

Construction activities would involve increased human presence at the project site, noise and emissions from vehicles and construction equipment, and additional vehicle travel on the service road to Hilton Creek. These construction-related impacts could discourage wildlife use near the project site during the day when construction is occurring. **This impact is considered an adverse, but less than significant impact (Class III)** because the magnitude of the construction related activities is small, highly restricted in areal extent, and for only a short duration.

Excavation of rock and pouring concrete could result in discharge of sediments and concrete to the creekbed, which in turn could adversely affect aquatic life if the material is introduced to the creek and river while Hilton Creek is flowing. However, this impact would be avoided because Reclamation and COMB will complete construction when the creek is dry and prior to the winter season. In addition, an erosion control and spill contingency plan will be prepared as part of the final design. It will specify measures to contain any accidental spills or construction wash water, and methods to stabilize the banks (if necessary) after construction has ended.

Although the red-legged frog is not expected to occur along the project reach, there is a remote possibility that it could be present due to recent colonization. Dewatering of the creek and construction activities could displace or harm this species, if present. To avoid these impacts, Reclamation and COMB would implement a pre-construction frog capture and relocation effort. Daytime surveys would be conducted to identify potential pools along and below the project reach, followed by nighttime surveys to determine the occurrence of the species. If frogs were present, they would be captured and relocated in consultation with the US Fish and Wildlife Service (USFWS). The COMB biologist has conducted similar capture and relocation procedures for the red-legged frog (under the provisions of a take permit from USFWS along the lower river and tributaries associated with maintaining the fish traps. Hence, this environmental protection measure is considered a standard operating procedure for the SYRTAC and would be implemented as part of the proposed project. Any disturbance or adverse effects to frogs during this procedure would be minimal and acceptable to USFWS; **as such, any incidental adverse impact of temporary relocation would be considered adverse, but not significant (Class III)**.

An investigation on the potential presence of archeological resources along the project reach was conducted by Conejo Archeological Consultants (2000). All ground disturbances would occur in the stream channel which do not contain cultural deposits. In addition, no bedrock mortars have been located at the project site. Hence, impacts to archeological resources are not anticipated.

7.1.3 Operations-Related Impacts

Modification of the cascade and bedrock chute will improve passage conditions for steelhead/rainbow trout along lower Hilton Creek. The improved conditions could result in greater numbers of adults traveling up Hilton Creek and using the upper reaches on federal property (below the upper release point) for spawning and rearing. In addition, there would be a greater opportunity for steelhead/rainbow trout to migrate to the Route 154 culvert during the winter, if flow conditions are suitable.

The Route 154 culvert is considered a complete barrier to steelhead passage by COMB (Entrix 2000), and only a passage impediment by Caltrans. Based on COMB's determination, completion of the Hilton Creek passage project would not introduce steelhead to upper Hilton Creek above Route 154. However, it will facilitate migration of steelhead/rainbow trout to the reach of Hilton Creek between Route 154 and federal property. This portion of the creek is located on San Lucas Ranch. Based on recent field investigations (see Section 7.2.2 below), this 1,220 foot long reach contains suitable channel substrate and riparian cover for steelhead/rainbow trout spawning and rearing; however, flows in this reach are generally too low or absent by summer, such that steelhead/rainbow trout do not remain in this reach. With the presence of a perennial source of water on Reclamation property, fish that travel to this reach of the creek on private property would most likely move downstream as conditions worsen in the early summer. Hence, the probability and extent of fish stranding along this reach are considered very low.

The steelhead is adapted to locating rearing habitat and responding to seasonal changes in rearing habitat. These adaptations have allowed the species to persist despite major drought cycles, unpredictable weather patterns, and predictable seasonal variations in flow. Hence, any mortality associated with steelhead using the reach of Hilton Creek between Route 154 and Reclamation property would be considered a natural outcome of the species exploiting new rearing habitats. The SYRTAC has determined that the benefits of expanding suitable habitat for the species would offset any possible losses due to fish stranding in the summer or during dry years.

7.1.4 Mitigation Measures and Residual Impact

No potentially significant environmental impacts are anticipated, and no impact thresholds listed in Section 4.4 would be exceeded. Hence, no mitigation measures are required or considered necessary.

7.2 IMPROVE PASSAGE THROUGH ROUTE 154 CULVERT (CALTRANS)

7.2.1 Temporary Construction Related Impacts

A 154-foot long concrete arch culvert conveys Hilton Creek under Route 154. It is located about 4,200 feet from the confluence of Hilton Creek and the Santa Ynez River, and about 1,220 feet from the boundary of federal lands (Figure 7-1). A description of the construction activities associated with the modification of the Route 154 culvert is provided in Section 2.6.3.

Caltrans will improve passage conditions by installing concrete baffles (6 to 24 inches high) on the bottom of the culvert and aprons to reduce flow velocities, increase depths, and produce turbulent flows. All construction work and access would be restricted to the highway right of way, which extends 5 to 15 feet from the edge of the concrete apron on each end of the culvert. Caltrans would access the work site from both sides of Route 154, using the road shoulders for vehicle parking and staging. The culvert is located about 20 feet below the road shoulders at the base of steep slopes. Workers would access the culvert using temporary trails or portable ladders installed on the slopes above each end of the culvert. Several branches of oak trees on the slopes near the culvert opening will need to be pruned to permit access. The concrete baffles will be installed by field crews and manual labor. Workers will use portable equipment supported by compressors and generators located at the staging areas.

The culvert is expected to be dry during construction and not require a stream diversion. All work will be restricted to the bottom of the culvert and concrete aprons. Workers may use the creek bed in the adjacent right of way at both ends of the culvert for observations, moving materials, and access. However, the creekbed will not be altered in any manner. Following construction, Caltrans will remove all concrete shaving, construction debris, and concrete. Based on these considerations, no impact to water quality is anticipated.

A small semi-perennial pool is often present immediately downstream of the outlet concrete apron. If water is present in the pool, Caltrans would place temporary fencing to exclude workers from the pond. If steelhead/rainbow trout are observed to be present in the pool during construction, Caltrans will contact NMFS to determine if the fish should be relocated or if they should remain in the pool since construction activities would avoid direct impacts to the pool.

Construction activities would involve increased human presence at the project site, noise and emissions from vehicles and construction equipment, and additional vehicle use of the Route 154 road shoulders near Hilton Creek. These construction-related impacts could discourage wildlife use near the culvert during the day when construction is occurring. **This impact is considered an adverse, but less than significant impact (Class III)** because magnitude of the construction related activities are very small, highly restricted in area, and for only a short duration (less than two weeks).

The culvert and the associated downstream semi-perennial pool do not provide appear to provide suitable habitat for red-legged frog or southwestern pond turtle (Caltrans, 2001). Nevertheless, Caltrans proposes as part of the proposed project to conduct a pre-construction survey for the steelhead, red-legged frog, and pond turtle. Caltrans would implement a capture and relocation effort with USFWS and NMFS if one or more of these species were located at or immediately downstream of the culvert. Any disturbance or adverse effects to these species during this procedure would be minimal and acceptable to USFWS and NMFS; **as such, any incidental adverse impact of temporary relocation would be considered adverse, but not significant (Class III)**. All surveying and species relocation efforts in the pool downstream of would be restricted to Caltrans easement.

An investigation of the potential presence of archeological resources at the culvert was conducted by Mikkelsen (1999). All ground disturbances would occur in the culvert. In addition, no bedrock mortars have been located at the project site. Hence, impacts to archeological resources are not anticipated. The culvert was constructed in 1950 when the highway was moved to its current location. The culvert does not represent a historic structure.

7.2.2 Impacts on Upper Hilton Creek (San Lucas Ranch)

Background Information

Caltrans considers the culvert to be a passage impediment to fish, not a complete barrier. [Note: COMB considers the culvert to be a complete barrier to steelhead]. Hence, installation of the baffles will improve existing passage conditions for steelhead/rainbow trout along lower Hilton Creek. The improved conditions could result in more adult steelhead traveling to Hilton Creek upstream of Route 154 to seek spawning and rearing habitat. Upper Hilton Creek is located on a portion of San Lucas Ranch, a very large ranch that also includes the Santa Ynez River from near the dam to below Route 154 bridge. The ranch owner has expressed concerns about the impacts of both Hilton Creek passage impediment projects, which could result in greater numbers and a higher frequency of steelhead accessing Hilton Creek upstream of Route 154. An assessment of the potential environmental impacts and possible land use conflicts on this portion of San Lucas Ranch is provided below.

Environmental Conditions

The description of the environmental conditions of Hilton Creek and its watershed on San Lucas Ranch for this EIR/EIS is based on a review of aerial photographs and observations by the COMB biologist during a brief field visit to this portion of San Lucas Ranch with the ranch owner in January 2003. Since late 2002, COMB has requested full access from the landowner to examine the creek in order to characterize aquatic habitats and the suitability of the creek for southern steelhead spawning and rearing. In addition, COMB sought access to observe the land uses in the watershed and identify any potential land use conflicts with the proposed downstream passage impediment removal projects. San Lucas Ranch finally agreed to allow the COMB biologist to visit selected portions of the Hilton Creek while accompanied by the ranch owner, Ms. Nancy Crawford-Hall, and her biologist, Ms Alice Rich. No other access was provided to COMB, Reclamation, or the EIR/EIS consultant, including access for the purposes of identifying conflicts with ongoing activities in the watershed. A summary of the observations by the COMB biologist is provided below.

On January 27, 2003, Mr. Scott Engblom of COMB surveyed portions of Hilton Creek to assess the presence of steelhead/rainbow trout rearing and spawning habitat. Access to the creek was allowed at three locations only: (1) the section of the creek between Reclamation property and Route 154; (2) a road crossing located at 34 34' 133" N; 119 58' 804"W; and (3) another road crossing located at 34 33' 253" N; 119 59' 128" W. No access was allowed upstream of the entrance to Bee Rock Quarry. Mr. Engblom was accompanied by Dr. Rich and/or Ms. Crawford-Hall at all times.

At each of the access points, the COMB biologist walked a short distance upstream and downstream, observing the general morphological characteristics of the creek channel and the presence of riparian vegetation and canopy cover. Generally, the creek was very similar in appearance at all three access points, although the active channel decreased in width upstream. Canopy coverage was dense at each access point. The creek was dry except for the reach immediately upstream of Route 154 and at the second road crossing where flow was visible. Dr. Alice Rich indicated that water is expected to be present upstream of the second road crossing into the spring. She also informed the COMB biologist that during a 2002 electrofishing survey, she captured an approximate 3-inch steelhead/rainbow trout immediately upstream of the second road crossing. Because this habitat was dry when she returned several months later, she assumed the fish died.

The downstream reaches that were examined include: (1) the entire 0.5-mile long reach between Reclamation property and the Route 154 culvert; and (2) a 0.3 mile-long reach upstream of Highway 154. During the survey of these reaches, the creek was sporadically wetted with minimal flowing water (<2 gallons per minute) followed by long sections of dry creek channel. The creek width was approximately 20-35 feet with the active channel composed almost entirely of boulder, cobble, gravel, and sand material. No woody debris was present. All the trees were growing outside of the active channel, but completely shaded the stream channel. The majority of the channel appears to be composed of run and riffle habitats. Pool habitats were present but limited in number. The areas that were wetted varied in the length of time they were wetted and included several pool type habitats. Those areas that were wetted for a longer duration had evidence of aquatic insects, namely caddis fly cases, scattered throughout the bottom substrate, indicating these areas had been watered for some time. The reach immediately upstream of the Route 154 culvert contained extensive bedrock.

The upstream survey was conducted from the second road crossing and encompassed approximately 0.5 miles of stream corridor, both upstream and downstream of the road crossing. This section had flowing water available throughout. The channel shape and substrate was almost identical to the lower section with the exception being the channel width is narrower (10-20 feet) and there are more trees growing close or immediately adjacent to the active channel. Water was flowing at an estimated rate of 5 gallons per minute and disappeared underground approximately 300 yards downstream of the second road crossing.

In summary, excellent rearing habitat was available and a limited amount of spawning locations was observed during the survey. Instream complexity is provided by cobbles and boulders, and offer good-excellent cover opportunities and excellent invertebrate production areas. Spawning habitat is would be localized to the tails of pool habitats and in some run habitats. Although there were only limited flows in the creek during the survey, it should be noted that the survey was conducted after the third driest year on record. In normal or wet years, the COMB biologist believes that large segments of upper Hilton Creek would provide excellent rearing habitat for steelhead/rainbow trout. It is the COMB biologist's opinion that a flow rate of 5 cfs or greater would allow enough water to pass migrating steelhead through upper Hilton Creek. No obvious passage impediments or barriers were observed during the survey.

Based on these observations and his knowledge of other tributaries in the Santa Ynez River and of Hilton Creek downstream of San Lucas Ranch, the COMB biologist concludes that Hilton Creek upstream of the Route 154 culvert provides a substantial amount of rearing habitat and a moderate amount of spawning habitat for rainbow/steelhead trout.

Absent observations from different times of year and from years with different winter runoff conditions, it is not possible to characterize the full range of habitat conditions and the frequency when suitable conditions are present. However, it appears that the creek may provide perennial pools in certain years that could be suitable for oversummering by rainbow/steelhead trout. Dr. Rich's observations of a trout in the creek indicate that suitable conditions are present. However, it is unknown if the fish originated from upstream or downstream reaches.

Additional field surveys are required to more accurately characterize the suitability of the creek for rainbow/steelhead trout, including a determination of spawning and rearing by direct observation, and an evaluation of habitat conditions during wet years when there is a greater potential for perennial pools. Perennial pools, even when separated by dry reaches, are important sources of rainbow/steelhead trout because fish in these pools are free to migrate and reproduce during the subsequent winter.

Reclamation and COMB have limited information on the land uses along Hilton Creek associated with the San Lucas Ranch. San Lucas Ranch provided some limited information about activities in the Hilton Creek watershed in written responses to nine questions provided to San Lucas Ranch for the purposes of gathering information for the EIS/EIR. Based on the responses to these questions, it appears that cattle grazing occurs in the Hilton Creek watershed, which is part of a 6,000-acre pasture system on the ranch north of Route 154. Cattle are apparently free to access the creek for watering along those reaches where the brush and slope conditions are suitable. The time of the year that cattle are present in the pasture north of Route 154 and in the Hilton Creek watershed is based on forage availability. There are three at-grade road crossings of Hilton Creek that are used by cattle. The frequency that cattle access the creek, or cross the creek, are unknown. The ranch owner indicated that no crops or orchards are present in the Hilton Creek watershed.

Over the past 30 years, San Lucas Ranch has leased an area for a limestone mine along an unnamed side canyon east of Hilton Creek (Figure 7-1). An access road to the mine is parallel to Hilton Creek, but is located at least 200 to 1,000 feet from the creek. Historically, sediments from the mine were conveyed down Hilton Creek during major flow events. In the past several years, the mine operator (Granite Construction) has implemented various required stormwater and sediment management practices as required by the County of Santa Barbara and Regional Water Quality Control Board. Granite has consulted with the CDFG and NMFS concerning the appropriate method to prevent continued sedimentation of the creek from the mine. At this time, the lead agencies understand that CDFG and NMFS believe that on-site sediment controls at the mining areas would provide greater control than a sediment retention pond at the base of the mine lease, immediately upstream of Hilton Creek. The recommendations by CDFG and NMFS were based in part on the consideration that steelhead may occur in the upper watershed in the future, and that a sediment basin would create a passage barrier or nuisance for fish that reach the upper watershed.

The ranch owner has indicated that water is diverted from Hilton Creek for use at San Lucas Ranch in compliance with state laws. Information on the location, size, placement, diversion rate and uses of water from this facility was not provided to COMB and Reclamation by San Lucas Ranch.

A private trap and skeet field is also located in the Hilton Creek watershed and operates under a lease agreement with San Lucas Ranch (Figure 7-1).

Evaluation of Impacts

As described in Section 2.6.2, the modification of the cascade and bedrock chute on lower Hilton Creek (on Reclamation property) will improve the hydraulic conditions for steelhead passage. The cascade and bedrock chute is not considered a complete passage barrier, only an impediment because suitable flow conditions are limited. Completion of the proposed project would provide acceptable steelhead passage conditions at streamflows above 5 cfs, and improve passage conditions at flows above 10 cfs (SYRTAC, 2000). As a result, it is expected that there will be frequent and abundant steelhead on Hilton Creek upstream of Reclamation property.

Caltrans (2001) considers the Route 154 culvert to be a passage impediment for steelhead, not a complete barrier to upper Hilton Creek. Hence, there is an assumption that steelhead periodically migrate up Hilton Creek seeking spawning habitat. Completion of the proposed modifications to the culvert would improve hydraulic conditions for steelhead passage, allowing passage during both low and high flows. As a result, it is expected that there will be frequent and abundant steelhead on upper Hilton Creek.

The increase in the frequency and number of steelhead on upper Hilton Creek on San Lucas Ranch due to both passage impediment projects cannot be accurately predicted. The projects will provide suitable hydraulic conditions for steelhead migration to upper Hilton Creek during normal and wet years. At this time, Reclamation and COMB cannot predict the spawning and rearing success rate in such years without more information about the hydrologic and habitat conditions along the upper creek, which is not available due to landowner prohibition on access.

It is possible that steelhead could access upper Hilton Creek and then fail to spawn. Even if spawning occurred, young fish could perish due to stranding if the creek dries during the summer. Spawning failure and mortality are natural events that are part of the population dynamics for steelhead throughout the lower Santa Ynez River. These events would not be unique to upper Hilton Creek. Failure to spawn and mortality along upper Hilton Creek would not have a significant impact on the entire population of the watershed, because other steelhead would seek out and occupy more favorable locations (e.g., lower Hilton Creek and Salsipuedes Creek). The species has persisted in the Santa Ynez River watershed for thousands of years due to its ability to withstand natural and man-made disturbances of greater magnitude than potential stranding along a single tributary of the lower watershed.

The potential periodic occurrence of steelhead on upper Hilton Creek would not, in and of itself, cause any effects on grazing in the watershed, the operations of the gravel mine, or the continued diversion of the creek. However, if steelhead were to spawn and rear on the upper creek more than on a rare basis, there is a potential for land use activities in the watershed to be affected. The federal Endangered Species Act prohibits the taking of such species, which is broadly defined to include direct harm or harassment, and certain habitat modifications. In this situation, the owners of San Lucas Ranch would need to determine if their current land uses could result in take, and if so, what actions the landowner should implement to avoid this take. These actions could range from fencing portions of the creek to exclude grazing, modification of the stream diversion, and continued sediment management at the mine. At this time, there is no evidence presented by the ranch owner, or discovered by Reclamation or COMB during the course of the EIS/EIR preparation, that the potential increased presence of steelhead on upper Hilton Creek would displace or significantly alter ongoing lawful activities on private land.

This conclusion is reasonable in light of the fact that most of the spawning and rearing habitat along the highly productive El Jaro and Salsipuedes creeks occur in lands used for grazing, crop cultivation, small scale quarrying, and rural residential uses. Furthermore, San Lucas Ranch extends along 5 miles of the Santa Ynez River downstream of the dam where steelhead routinely pass during migration to and from Hilton Creek, and apparently also spawn and rear on the mainstem (Entrix, pers. comm., 12/02). These examples indicate that existing land uses and environmental conditions in the watershed are not necessarily adversely affected by the presence of steelhead.

7.2.3 Mitigation Measures and Residual Impact

No potentially significant environmental impacts or land use conflicts are anticipated, and no impact threshold listed in Section 4.4 would be exceeded. Hence, no mitigation is required or considered necessary.

7.3 HILTON CREEK CHANNEL EXTENSION (Programmatic Analysis)

7.3.1 Potential Impacts

As described in Section 2.6.4, a low flow extension would be constructed along lower Hilton Creek on federal property to create additional steelhead rearing habitat, utilizing the benefits of the supplemental watering system. The project would involve the construction of a 1,500-foot long channel along the base of the steep bluffs on the south bank of the river. A flow control structure would be installed along Hilton Creek to divert low flows to the channel extension. The channel extension will be designed with a series of pools, runs, and riffles. The new channel will also include various habitat improvements to enhance rearing conditions, such as the placement of suitable gravel bed, occasional boulders, and woody debris. Riparian trees will be planted along the banks of the new channel.

A conceptual design for the project has not been developed. As such, the environmental impacts of the project can only be discussed at a programmatic level. A listing of potential impacts is provided below with an assessment of their significance.

- General construction disturbance due to increase human use, dust, noise, and equipment emissions that would discourage wildlife use in the adjacent area. **This impact is considered an adverse, but less than significant impact (Class III)** because it would be temporary and localized.

- Temporary increase in sediments, causing downstream erosion, due to excavation and filling activities during construction. This impact is not considered potentially significant because there will be few flows, if any, in the work area. **Hence, this impact is considered adverse, but not significant (Class III).** Impacts would be reduced by employing best management practices to reduce on-site erosion, stabilize the channel banks with appropriate material and vegetation, and isolate the channel from river flows to the extent feasible.

- Potential displacement of red-legged frogs from the channel extension alignment, requiring the need for capture and relocation. There is no evidence that red-legged frogs are present along the proposed alignment. **However, if this species were present, the temporary construction related impacts would be considered less than significant (Class III)** because a frog capture and relocation effort would be employed, similar to other efforts by the SYRTAC related to use of fish traps in the watershed. Past experience demonstrate that capture and relocation efforts can be implemented successfully, without significant mortality.

- Potential disturbance of roots of large riparian trees along the channel extension that could harm the trees. The depth of excavation to create the channel is unknown. Hence, the magnitude of this impact is unknown. **However, it is considered a potentially significant, but mitigable impact (Class II)** because it appears that there will be conflicts with the channel grading and mature trees along the alignment. Mitigation to reduce this impact includes avoidance of mature tree roots whenever feasible, and possible tree replacement.

- Temporary and permanent removal of riparian scrub and woodland habitat to create the channel. Creating the channel will require removal of well-established riparian vegetation. In essence, a riparian corridor with canopy trees and a dense understory will be converted to a streambed with perennial flows. The acreage and types of riparian habitats that would be temporarily and permanently disturbed are unknown. **Hence, this impact is considered significant, and potentially unmitigable (Class I) at this time**. The loss of high quality riparian habitat is typically considered a significant impact by local lead agencies. This impact may be downgraded once the magnitude of the impact can be quantified, mitigation measures can be developed, and the net benefit of the channel extension can be determined.

7.3.2 Mitigation Measures and Residual Impacts

The following mitigation measure would reduce impacts to less than significant levels, except for the loss of mature riparian vegetation along the channel extension alignment.

HC-1 The Hilton Creek Channel Extension project shall be designed to:

- Minimize the removal of native riparian vegetation, particularly large riparian and oak trees
- Avoid or minimize grading existing access roads or creating new access roads to the project site
- Include best management practices to divert stream flow around the work site, minimize erosion and sedimentation during and after construction, and provide for containment of accidental spills during construction
- Include a capture and relocation program for steelhead, red-legged frog, and western pond turtle that is prepared in coordination with resource agencies
- Include a post construction riparian restoration effort to replace vegetation and large trees removed from the channel alignment

8.0 ENVIRONMENTAL ANALYSIS – TRIBUTARY PASSAGE IMPEDIMENT PROJECTS

The incidental environmental impacts of various passage impediment removal projects along tributaries to the Santa Ynez River are addressed in this section, excluding the two passage impediment projects on Hilton Creek (see Section 7.0). Two projects are addressed at a project level – the Jalama Road Bridge project and the Quiota Creek project. All others are addressed at a programmatic level. The project numbers are derived from the list of all FMP/BO projects, presented in Table 2-1. Descriptions of the proposed projects are provided in Section 2.7.

12. Passage impediment on Jalama Road Bridge
13. Quiota Creek passage impediment projects (3 crossings to be completed by County)
14. Quiota Creek passage impediment projects (6 crossings not included in County plans)
15. Passage impediment on El Jaro Creek (abandoned at-grade crossing)
16. Passage impediment on Nojoqui Creek (grade control structure)

8.1 JALAMA ROAD BRIDGE PROJECT

Jalama Road Bridge is a County owned facility that crosses Salsipuedes Creek (Figure 2-7). A concrete and rock grade control structure is situated approximately 70 feet downstream of the Jalama Road. The structure is a physical barrier to steelhead trout passage under low flow conditions. The objective of the project is to improve passage for steelhead by constructing three step pools in the bedrock outcrop situated along the east bank and a one-foot high concrete wall along the top of the grade control structure. Construction is planned for summer and fall 2003.

8.1.1 Existing Conditions

The bridge is located in the County right-of-way, while the grade control structure is located in both the County right-of-way and on private property downstream of the right-of-way. Salsipuedes Creek at the project site is a deeply incised drainage with perennial flow. The creek bed consists of various fine sediments, gravels, and bedrock outcroppings. Riparian shrubs and small trees are rooted along the base of the banks, including willow, cottonwood, and alder trees. The steep banks are vegetated with a mixture of coyote brush, California sagebrush, laurel sumac, and quail bush. A large pool is located below the existing grade control structure.

The endangered southern steelhead migrate through the project site to upstream spawning and rearing locations, and may also oversummer in the pool at the project site (SYRTAC, 2000). The same pool also provides suitable habitat for the southwestern pond turtle, a state Species of Special Concern. The threatened red-legged frog occurs on Salsipuedes Creek. In 2000, the COMB biologist observed red-legged frogs at the confluence of Salsipuedes and El Jaro creeks. The project site provides suitable habitat conditions for this species. No other endangered or otherwise sensitive species is known or expected to occur at the project site.

8.1.2 Temporary Construction Related Impacts

As described in Section 2.7.2, the grade control structure downstream of the bridge will be modified by installing a concrete wall and several step pools. Construction will be accomplished by field crews working in the streambed using manual labor and portable equipment. Modification of the structure will not affect its integrity or its function of stabilizing the channel bed to protect the bridge.

During the construction of the step pools, streamflow will be diverted away from the east bank in order to isolate the step pool construction area. Upon completion of the step pools, streamflow will be diverted into the step pool area in order to isolate the crest of the grade control structure to allow for construction of the concrete diversion wall. Streamflow will be diverted using sandbags that will be filled and placed using hand tools and manual labor. The stream diversion will prevent fish from entering the work area without handling or harming them. The placement and relocation of sandbags can be accomplished without significantly disturbing the creek bottom, which consists primarily of bedrock at the project site. Hence, the diversion is only expected to cause minor, localized and temporary sedimentation during the placement and relocation of the sandbags**. This is considered an adverse, but not significant, impact (Class III).**

Work in the creekbed would temporarily disturb the creek substrate consisting primarily of bedrock. No riparian vegetation along the base of the banks is expected to be disturbed.

Construction of a trail on the east bank of the creek to allow foot traffic for construction would temporarily disturb coyote brush scrub vegetation. **This temporary disturbance to existing upland vegetation on the banks is considered adverse, but not significant (Class III)** because of the small area involved because the disturbed areas will be colonized or overgrown by native plants in the future through natural processes, and because of post-construction restoration described in Section 2.7.2.

Excavation of rock and pouring concrete could result in discharge of sediments and concrete to the creekbed, which in turn could adversely affect aquatic life if the material is introduced to the creek after construction or during an accidental spill. This impact would be avoided because Reclamation and COMB will implement an erosion control and spill contingency plan that will be prepared as part of the final design. The plan will specify measures to contain any accidental spills or construction wash water.

Work in the creek will involve excavation of rocks (probably with jackhammers), driving steel rods, constructing wood forms, and pouring concrete. All construction vehicles will be parked on top of the east bank in a roadside pull-out that is barren and covered with gravel. Construction activities would involve increased human presence at the project site, noise and emissions from vehicles and construction equipment. These construction-related impacts could discourage wildlife use near the project site during the day when construction is occurring. **This impact is considered an adverse, but less than significant impact (Class III)** because the magnitude of the construction related activities is very small, highly restricted in areal extent, and for only a short duration.

Prior to construction, Reclamation and COMB biologists would conduct surveys of the project site to search for red-legged frogs, western pond turtles, and steelhead trout. Two biologists would conduct a snorkel survey of the pool downstream of the concrete apron. Construction activities would not occur in the downstream pool. However, if these species are present in the pool, provisions would be made to prevent their entry into the work area by the use of exclusion nets and fencing.

If necessary, Reclamation and COMB would capture and relocate any steelhead/rainbow trout, western pond turtle, and red-legged frogs that are present at or near the work area. These species would be captured and relocated using agency-approved methods and personnel, and with the appropriate state and federal permits and approvals. The relocation of steelhead would be authorized under the BO. The relocation of the red-legged frogs would be authorized through a Section 7 consultation with USFWS associated with the Corps of Engineers 404 permit for the project. Reclamation and COMB would also need to acquire approval to capture and relocate steelhead/rainbow trout, western pond turtle, and red-legged frog as part of a CDFG 1601 Streambed Alteration Agreement for the proposed project.

Capture and relocation of these species is an environmental protection measure that is considered a standard operating procedure for the SYRTAC and has been successfully implemented on previous occasions in the watershed related to operating fish traps. Any disturbance or adverse effects to these species during relocation would be minimal and acceptable to the resource agencies. **As such, any incidental adverse impact of temporary relocation would be considered adverse, but not significant (Class III)**.

An investigation on the potential presence of archeological resources at the project site was conducted by Conejo Archeological Consultants (2002). All ground disturbances would occur in the stream channel which does not contain cultural deposits. No cultural resources (e.g., bedrock mortars) have been located at the project site. Hence, impacts to archeological resources are not anticipated.

8.1.3 Operations-Related Impacts

Modification of the grade control structure will improve passage conditions for steelhead along Salsipuedes Creek. The improved conditions could result in greater numbers of adults traveling up to El Jaro and Upper Salsipuedes creeks. Steelhead already occur in these reaches. Hence, additional steelhead use is not expected to cause any new indirect impacts on existing land uses.

8.1.4 Mitigation Measures and Residual Impacts

The project would not result in any potentially significant impacts. Reasonable and feasible environmental protection measures have been incorporated into the project. Hence, no mitigation measures are required or considered necessary. No impact thresholds listed in Section 4.4 would be exceeded.

8.2 QUIOTA CREEK PASSAGE PROJECTS

Quiota Creek is a main tributary of the lower Santa Ynez River located about 8.4 miles downstream of Bradbury Dam (Figure 1-3). Refugio Road is a County road that crosses the creek nine times along the middle of project reach (Figure 3-10). These at-grade crossings are in poor condition due to blocked culverts, bank undercutting, the formation of gullies related to roadway drainage, and general loss of structural integrity. The at-grade crossings represent passage impediments that limit the opportunities for steelhead spawning and rearing in upper Quiota Creek.

Reclamation and COMB propose to remove the passage impediments at five crossings along Quiota Creek, while the County of Santa Barbara proposes to modify three crossings.

8.2.1 Existing Conditions

Quiota Creek contains well developed riparian vegetation dominated by mature coast live oak, California bay laurel, California sycamore, big leaf maple and red alder. The creek contains high quality aquatic habitat. Water quality is relatively good along the project reach, with perennial flow and a nearly contiguous riparian cover resulting in cool water temperatures. Riffle, run, glide and pool habitats are well represented, with frequency and distribution consistent with typical, moderate to high gradient streams. Habitat features along the project reach include basking sites, sand, gravel and cobble bars, undercut banks, overhanging root wads, large boulders, emergent roots, and bedrock ledges.

The SYRTAC (2000) documented rainbow trout/steelhead along the middle and upper reaches of Quiota Creek. Suitable habitat conditions are present such as spawning substrate, stream gradient, instream cover, canopy cover, and over-summering habitat. Essex (2002) observed about 70 steelhead/rainbow trout at Crossing Nos. 2, 6, and 8 in May 2002.

Suitable habitat is also present along the project reach for the red-legged frog, a federal threatened species. There are no historic records or documented sightings of this species along the creek. However, 16 juvenile frogs were observed in the pool downstream of Crossing No. 8 during May 2002 biological surveys of the crossings for the County projects (Essex, 2002). The pool appears to be used for breeding. Sixteen juvenile frogs were also observed along the creek near Crossing No. 6 (Essex, 2002).

Suitable habitat is present for the southwestern pond turtle and two-striped garter snake, both state Species of Special Concern. These species have not been sighted during field surveys in spring 2002 for this EIR/EIS, and for the County projects (Essex, 2002).

The riparian vegetation along the creek is not sufficiently dense and wide enough to support the endangered least Bell's vireo or southwestern willow flycatcher.

8.2.2 Description of Individual Crossings

A summary of the physical conditions at each crossing is provided below from Entrix (2002). The locations are shown on Figure 2-10. Plan views of the existing crossings and photographs are presented in Appendix C.

Crossing No. 1 is the first crossing encountered on Refugio Road, located at the lowest elevation in the watershed. The average gradient of this reach is less than 2 percent. The channel bed is dominated by cobbles and gravels, with a lesser amount of small boulder-sized material. Fines are abundant in the wetted channel, while large cobbles and boulders dominate flood-prone areas. Riparian cover, of up to 80 percent, is provided by several coast live oak upstream of the crossing, while downstream of the crossing there is no riparian corridor for over 100 feet of stream length. Similarly, instream cover is totally absent in the downstream reach, while emergent roots from coast live oak and streamside vegetation provide adequate cover upstream. A large gully (intermittent tributary), which is actively headcutting into adjacent rangeland, enters Quiota Creek directly below the road crossing. An unimproved ranch road crosses the channel about 50-feet downstream of the crossing. Upstream, the ranch road is located on the upper bank well outside the riparian corridor. Currently, the hydraulic control for the downstream pool is a man-made berm of cobble and gravel bed material.

Crossing No. 2 has a functioning culvert below the road surface. This site has a very dramatic gradient change from the road surface to the downstream reach, resulting in a large downstream scour pool. Upstream channel gradient is less than 1 percent, with a slack water pool extending over 50-feet upstream. The downstream reach has a slightly higher gradient, though not exceeding 2 percent slope. The localized gradient change from the road surface to the water surface of the downstream reach is 3-5 percent depending on the length of the slope calculation. Bedrock is a significant bed material in the downstream reach, although the material is friable and easily weathered resulting in mobilization and deposition of silt and clay sized material. Cobble and boulder sized materials, with lesser amounts of gravels, compose the remainder of the bed. Riparian cover is approximately 10-15 percent for the entire reach, and decreasing to less than 5 percent directly above the downstream pool. The downstream pool provides fair habitat with the provision of good cover (large boulders, undercut apron, and undercut banks) and sufficient water depth. Salmonids were observed in a smaller pool just downstream which was located at the base of a large alder root ball and bedrock shelf. Cover is lacking in the upstream reach. Good vegetative cover and rooting by woody species has created moderate bank stability upstream, despite use of livestock travel corridors. The downstream reach is moderately stable except for a ranch access road extends along the top of a steep bank and then crosses the creek. Livestock have access to the entire reach and their impacts are visible. Stream flow at a depth of about 1.5 inches occurs over the road surface, with the majority of flow being transported through a 8-10 inch metal culvert. The jump height is calculated at 3.8 feet from the water surface to the top of the concrete footing.

Crossing No. 3 has a relatively low gradient (<2 percent) and is composed of bed materials in the cobble, gravel and small boulder size classes with a significant amount of fine sand and silt sized material. Riparian cover ranges from 20-40 percent, and is dominated by oak, willow, sycamore, and alder. A large canopy gap in the upstream reach causes the reduction of canopy cover to less than 20 percent. The downstream pool has about 800 square feet of surface area, with depths ranging from 1-2 feet. Instream cover is generally lacking in the entire reach, though the road crossing itself is deeply undercut and provides cover in the downstream pool. Banks are well vegetated, resulting in good to moderate bank stability. One segment of bank in the upstream reach is steep and poorly vegetated, and thus prone to failure. Significant anthropogenic effects include a livestock trail through the stream immediately downstream of the road crossing, and two very large, actively headcutting, roadside gullies. Approximately 300 feet above the crossing, a major landslide event has mobilized large amounts of sediment and initiated channel migration for several hundred feet. The jump height, measured from water surface at the downstream pool, to the surface of the road, is approximately 2.0 feet. Streamflow over the road surface was approximately 0.5-inches during December surveys, with an 8-10-inch culvert under the road surface transporting a flow of 1-3 cfs.

Crossing No. 4 has a channel gradient of 1-2 percent. Cobble, boulder and gravel sized materials dominate the channel bed. Riparian cover is approximately 25 percent in the upstream reach; and decreasing to 0-10 percent in downstream sections. The downstream pool has a maximum depth of 1.5-feet, and provides no cover, except for the undercut concrete apron. Cover is also lacking in the downstream reach due to the mortality of a large dominant coast live oak. Bank stability upstream is good to moderate, with sufficient rooting by herbaceous and woody species, despite lateral migration of the creek, creating near vertical banks. The entire left bank of the downstream reach, which borders active rangeland, is actively sloughing. A ranch access road/livestock trail crosses the creek approximately 20 feet upstream of the road crossing. Stream flow over the concrete road surface is 2.5-inches in depth, with the majority of flow being transported through a 8-10 inch metal culvert. The jump height from the water surface to the top of the concrete footing is rather insignificant at one-foot; although the depth of the downstream pool is insufficient for such a height. Water quality is poor in both up and downstream pools due to vehicular travel over the wetted crossing and livestock access.

Crossing No. 5 contains channel bed materials which are primarily cobble, small boulder and gravel sized, with lesser amounts of fines. Riparian cover is <80 percent upstream, 30-40 percent in the downstream reach, and <15 percent in the vicinity of the downstream pool. Common riparian species (alder, bay, willow, oak, and sycamore) are well represented. Although canopy cover for the downstream pool is lacking, the pool reaches depths of over 2.5-feet, and spans over 700 square feet. Instream cover is decent throughout the entire reach, consisting of emergent willows and other forbs, undercut banks, and low over-hanging roots and vegetation. Bank stability is generally good, though the road surface on the far left bank is actively undercutting due to accelerated run-off from a road side gully. A secondary, or overflow channel is being formed at the same location, causing road degradation and bank erosion throughout the upstream section of the left bank. The jump height, measured from water surface at the downstream pool to the surface of the road, is less than two feet. Water depth on the road surface was 1.5-inches during December surveys.

Crossing No. 6 also been converted to a temporary bridge, though the abandoned concrete crossing still occupies the channel bed under the bridge. Upstream channel gradient is less than 1 percent, with a slack water pool extending over 50-feet to a very low gradient riffle which originates at the tail of the downstream pool at crossing three. The downstream reach has a slightly higher gradient, though not exceeding 2 percent slope. Boulder and cobble sized materials dominate, with a matrix of fine/medium sand and silt. Riparian cover is approximately 25 percent in the upstream reach; 50-60 percent in the downstream reach; and about 75 percent directly above the downstream pool. The downstream pool provides only marginal habitat with a maximum depth of one-foot, and little to no cover, save two pieces of small woody debris, and the undercut concrete apron. Cover is also lacking in the upstream reach. Bank stability is good to moderate upstream, with sufficient rooting by woody species. The entire left bank of the downstream reach is near vertical and actively sloughing. A ranch access road extending along the top of the unstable bank is currently accelerating bank failure. Livestock grazing does occur in the vicinity of the downstream reach. The surface area occupied by the bridge and its associated concrete footing, is approximately 2,250 square feet. Stream flow is very shallow over the concrete footing with the majority of flow being transported through an 8-10 inch metal culvert. The jump height is calculated at 2.6 feet, from the water surface to the top of the concrete footing.

Crossing No. 7 exhibits is mostly composed of bed materials in the cobble and small boulder size classes, with a significant amount of fine sand and silt sized material acting as a matrix between larger bed materials. The entire project reach has very abundant levels of leaf litter and detritus material both in the active channel, and on adjacent banks. Riparian cover ranges from 75-80 percent, and is dominated by sycamore, maple, and bay, with lesser amounts of alder and oak. A large canopy gap in the upstream reach causes the reduction of canopy cover to less than 40 percent. The downstream pool has sufficient depth (2.5 feet at the thalweg) and covers an area of approximately 450 square feet. Instream cover is abundant in the downstream reach/pool, with extensive undercut banks, and low over-hanging roots and vegetation; however cover is comparatively lacking upstream. In general, bank stability is good to moderate with active erosion occurring on one segment unvegetated bank. Anthropogenic effects are limited to roadside tree cutting.

Crossing No. 8 contains a temporary bridge installed in 2001 by the County, with the abandoned Arizona crossing acting as the bridge footing. Despite stream flows of up to 3 cfs, the deposition of large boulder elements under the bridge causes flow to go subsurface for a linear distance of 6-8 feet. The reach at Crossing No. 8 has an average gradient of 4.5%, with small boulder, cobble, gravel and sand sized bed materials. Silt and small boulders dominate the downstream pool, while upstream bed materials are primarily bedrock, small boulders and gravels. Riparian cover ranges from 10-20%, and is composed primarily of alder, willow, sycamore, bay, and oak. The downstream pool covers an area of approximately 180 sq.ft., and has an average depth of 1.0 foot, which is insufficient for a jump height of 2-3 feet. Instream cover is abundant in the downstream pool and the associated reach. Undercut banks are deep and extensive with over-hanging root wads and some emergent vegetation; cover upstream consists of emergent roots, low-overhanging branches and small boulders. Small woody debris elements can be found throughout the entire reach. In general, bank stability is only moderate due to active undermining of rootwads and the presence of vertical, unvegetated banks. Anthropogenic effects include cattle grazing within 50 feet of the downstream reach, and the presence of an unimproved ranch access road in the near vicinity.

Crossing No. 9 is the uppermost crossing. The reach upstream of the existing road crossing is a low gradient reach (<1 percent) with a bed of cobbles, small boulders and gravel. The downstream reach has a gradient of 3-5 percent, composed of boulders, cobbles, gravel and sand sized bed materials. Riparian cover for both reaches ranges from 80-90 percent, and is composed of alders, willows, and sycamores. Although canopy cover for the downstream pool is largely absent, the pool is deep (2.8 feet at the thalweg) and covers an area of approximately 180 square feet (sq. ft.). Instream cover is abundant in the downstream reach/pool, with large boulders, emergent willows, undercut banks, and low over-hanging roots and vegetation; however cover is considerably lacking upstream. In general, bank stability is good to moderate with only one segment of active sloughing. Steep and or near vertical banks are well rooted with woody riparian species and forbs. Anthropogenic effects include cattle grazing (within 0-40 feet of entire reach), and road-side gully formation.

8.2.3 Temporary Construction Related Impacts

Erosion and Sedimentation

Construction activities in the creek bed and pouring concrete could result in discharge of sediments and concrete to the creek, which in turn could adversely affect aquatic life if the material is introduced to the creek after construction or during an accidental spill. **This impact is considered significant, but mitigable (Class II),** because Reclamation, COMB, and the County will (1) divert water around the work site to prevent direct erosion of disturbed areas during construction; and (2) implement erosion control and spill contingency plans to contain any accidental spills or construction wash water, and to stabilize the affected areas after construction has ended. Additional protection would be provided through application of Mitigation Measure QT-1.

Area of Impact and Habitats Affected

For the Reclamation and COMB crossings, the dimensions of the structures and estimated extent of work area for each rock ramp/riffle fishway to be installed at Crossing Nos. 3, 4, 5, 7, and 9 are summarized in Table 2-10. The work areas are shown on Figures 2-11 through 2-16. The fishways would generally extend about 50 feet downstream of the road; the boulder weirs at Crossing Nos. 5 and 7 would be located about 60 and 105 feet from the road, respectively.

The total temporary construction disturbance zone would range from 1,800 to 4,200 square feet at each Reclamation/COMB crossing. The total temporary disturbance zone for all five crossings would be 15,400 square feet or 0.35 acre. The total area of the rock fishways at all five crossings would be about 4,550 square feet. The habitats that would be affected by construction of the fishways include existing concrete aprons and debris associated with the crossings, aquatic habitat in the channel bottom, patches of emergent wetlands or riparian herbs along the channel bed margins, riparian trees and shrubs (e.g., oaks, willows and alders), and annual non-native grassland on the creek banks.

For the County crossings, the dimensions of the structures and estimated extent of work area for the bridges to be installed are shown on Figures 2-17 through 2-19. The work area will extend upstream and downstream about 75 to 100 feet at each crossing.

The total temporary construction disturbance zone would range from 9,000 to 14,000 square feet at each crossing. The total temporary disturbance zone for all three bridge crossings would be 0.75 acre. Installation of the bridges will include removal of the old roadbed and at-grade crossings; hence, the streambed under the bridge would be restored to natural conditions. The habitats that would be affected by construction include existing concrete aprons and debris associated with the crossings, aquatic habitat in the channel bottom, patches of emergent wetlands or riparian herbs along the channel bed margins, riparian trees and shrubs (e.g., oaks, willows and alders), and annual non-native grassland on the creek banks.

The temporary disturbance of riparian habitat at each crossing (consisting of scattered patches of perennial herbs and small shrubs such as mulefat, poison oak, blackberry, watercress, young willows) **is considered significant, but mitigable (Class II),** because the vegetation can be restored in the creek bed and on the adjacent banks after construction (see Mitigation Measure QT-2).

The permanent loss of aquatic bed habitat and existing concrete debris at the crossings to be modified with rock fishways is not considered to be an adverse impact, as the existing concrete aprons and debris on the downstream side of these crossings will be replaced with a more natural substrate which will channel flows more effectively for fish movement. The removal of the road bed and modification of the channel bed upstream and downstream of the road to create a suitable flow line under the bridges are not considered adverse impacts because the creek bed would be restored to natural conditions using on-site materials and the crossings would be more suitable for fish passage.

Effect on Native Trees

For the Reclamation and COMB crossings, several native trees adjacent to the road crossings would also be affected as listed in Table 2-10. Construction would require pruning an oak at Crossing No. 3, removal of small willows at Crossing Nos. 5 and 9 (five trees, 4” diameter), and pruning four alders at Crossing Nos. 5 and 7.

At the County crossings, the following trees would be affected: Crossing No. 2 – removal of a 28-inch diameter alder and pruning of a 40-inch diameter coast live oak; Crossing No. 6 – removal of a 30-inch diameter sycamore, 40-inch diameter coast live oak, and five 10-inch diameter alder trees; and Crossing No. 8 – removal of a 50-inch diameter coast live oak, 15- and 20-inch diameter willow trees, and four 8-10 inch diameter alders.

The loss of several mature native riparian trees, removal of several small trees, and pruning of several others is considered a significant, but mitigable impact (Class II). This impact can be mitigated to a less than significant level by replacing the affected trees at the work site with native riparian trees (Mitigation Measure QT-3).

<u>**Loss of Pool Habitat**</u>

Construction of the bridge at Crossing No. 6 would remove a pool upstream of the at-grade crossing. This would reduce available rearing habitat for rainbow/steelhead trout, red-legged frog, and western pond turtle. Installation of the rock fishway at Crossing No. 7 would reduce the size of a deep downstream pool that could be used by the same species. **These impacts are considered adverse, but not significant (Class III),** for the following reasons: (1) the loss of one pool and reduction in the size of another along this reach of Quiota Creek would be offset by the increased access to additional upstream pools that are currently inaccessible for steelhead; and (2) the loss of a single pool and reduction in the size of another would represent a minor effect on the total pool area along Quiota Creek.

<u>**Aquatic Species Capture and Relocation**</u>

Prior to construction, Reclamation, COMB, and County biologists would conduct surveys of the project site to search for red-legged frogs, western pond turtles, and steelhead trout. If necessary, any steelhead/rainbow trout, western pond turtle, and red-legged frogs that are present at or near the work areas would be relocated. These species will be captured and relocated using agency-approved methods and personnel, and with the appropriate state and federal permits and approvals. The relocation of steelhead would be authorized under the BO. The relocation of the red-legged frogs would be authorized through a Section 7 consultation with USFWS associated with the Corps of Engineers 404 permit for the projects. Reclamation, COMB, and the County would also need to acquire approval to capture and relocate steelhead/rainbow trout, western pond turtle, and red-legged frog as part of a CDFG 1601 Streambed Alteration Agreement for the proposed projects.

Capture and relocation of these species is an environmental protection measure that is considered a standard operating procedure for the SYRTAC and has been successfully implemented on previous occasions in the watershed related to operating fish traps. Any disturbance or adverse effects to these species would be minimal and acceptable to the resource agencies. **As such, any incidental adverse impact of temporary relocation would be considered adverse, but not significant (Class III)**.

<u>**Disturbance of Upland Habitats**</u>

Construction of engineered fill slopes for the bridge approaches at Crossing Nos. 2, 6, and 8 will temporarily disturb about 15,000 square feet of upland habitats consisting of annual grassland and oak woodland understory. About 5,000 square feet of the same habitat would be permanently removed. **The impacts to upland vegetation on the banks is considered adverse, but not**

significant (Class III), because of the small area involved and because the disturbed areas will be restored after construction. This impact does not include the loss of mature oak trees (see above)

Noise, Dust, Traffic Impacts

Construction activities would involve increased human presence along the project reach, and noise and emissions from vehicles and construction equipment. These construction-related impacts could discourage wildlife use along this portion of Quiota Creek during the day when construction is occurring. **This impact is considered an adverse, but less than significant impact (Class III)** because it would be restricted to daytime hours over one, and possibly two summers.

Cultural Resources

An investigation of the potential presence of archeological resources along the project reach was conducted by Conejo Archeological Consultants (2002). All ground disturbances would occur in and adjacent to the creek which does not contain cultural deposits. No cultural materials (e.g., bedrock mortars) have been observed at the crossings. Hence, impacts to archeological resources are not anticipated.

Interference with Cattle Grazing

Construction of the County projects is anticipated to require approximately three weeks per crossing or a total of nine weeks. Refugio Road would be closed during this period. The County will provide alternative access for landowners and grazing lessees. The road will not be closed during construction of the rock fishways at other crossings.

Fencing near the crossings will be temporarily relocated 5 to 20 feet to exclude cattle from the work area.

The existing ranch roads that cross Quiota Creek (at grade crossings) along the inside perimeter of the fences that cross the creek would not be removed or affected by construction work.

These temporary effects on cattle grazing operations along the creek are considered adverse but not significant (Class III).

8.2.4 Operations-Related Impacts

Modification of the existing crossings will improve passage conditions for steelhead along Quiota Creek. The improved conditions could result in greater numbers of adults traveling up Quiota Creek. Steelhead/rainbow trout already occur in the creek. Hence, additional trout use is not expected to cause any new indirect impacts on existing land uses.

8.2.5 Mitigation Measures and Residual Impacts

QT-1. A stream diversion and dewatering plan shall be prepared for each crossing to ensure that stream flows will by-pass the work site. In addition, an erosion control and spill contingency plan shall be prepared for each crossing, specifying best management practices to prevent erosion and sedimentation during and after construction, and procedures for containing and cleaning up spills of concrete or other materials during construction.

QT-2 Temporarily disturbed areas shall be restored by grading to match natural contours, stabilizing creek banks with biotechnical methods that include riparian plants, and revegetating with riparian herbs, shrubs, and trees that occur along the creek. Reclamation, COMB, and the County shall prepare and implement revegetation plans that include at least a 3–year maintenance period, and a 3-year plant survival performance standard of 85 percent.

QT-3 All large riparian trees over 12 inches in diameter that are removed shall be replaced at an appropriate initial planting ratio to ensure a 2:1 long-term replacement ratio. Replacement trees shall be planted at or near the crossings. Reclamation, COMB, and the County shall prepare and implement tree replacement programs that include at least a 3–year maintenance period, and a 3-year plant survival performance standard of 85 percent.

8.3 OTHER PASSAGE IMPEDIMENT REMOVAL PROJECTS (Programmatic)

8.3.1 Potential Impacts

Reclamation and COMB propose to remove passage impediments along El Jaro and Nojoqui creeks, as described in Sections 2.7.4 through 2.7.5. Conceptual plans have not been developed for these projects. Information about environmental conditions at each site is also unavailable at this time, as these projects occur on private land where access has not been granted to Reclamation or COMB. Hence, the impacts of these projects can only be identified at a programmatic level, as follows:

- Temporary and permanent removal of riparian and nearby upland vegetation at the work sites and along access road, including possible large trees. The acreage and types of riparian habitats that would be temporarily and permanently disturbed are unknown. **This impact is considered significant, but mitigable (Class II)** because it can be minimized by site design, and can be offset by post-construction restoration.

- Removal of passage impediments could result in the temporary and potential permanent loss of upstream pool habitat for steelhead/rainbow trout rearing, red-legged frogs, and western pond turtles because the barriers that create the pools would be removed. The size, usage, and importance of pools associated with the Nojoqui and El Jaro creeks passage impediments are unknown. **Hence, this impact is considered potentially significant and unmitigable (Class I) in the absence of site specific information.**

- General construction disturbance due to increased human use, dust, noise, and equipment emissions could discourage wildlife use in the adjacent area. **This impact is considered an adverse, but less than significant impact (Class III)** because it would be temporary and localized.

- Temporary increase in sediments, causing downstream erosion, due to excavation and filling activities during construction. This impact is considered potentially significant due to the large area involved, its proximity to the river, and the potential for large flood flows subsequent to the project to erode newly graded areas. **This impact is significant, but mitigable (Class II)** by employing best management practices to reduce on-site erosion, stabilizing the channel banks with appropriate material and vegetation, and isolating the channel from river flows to the extent feasible.

- Temporary impacts to steelhead/rainbow trout, red-legged frogs and western pond turtles (if present) due to capture and relocation during construction. **The impacts of relocation would be considered less than significant (Class III)** because it would occur with the approvals of NMFS, USFWS, and/or CDFG so that impacts would be minimized to the extent feasible.

- If new access roads are required for the passage removal project, it is possible that unknown archeological sites could be adversely affected. **This impact is considered significant, but**

mitigable (Class II) because the sites could be avoided or fully mitigated by additional investigations and data recovery.

- Removal of the passage barriers would occur on private property, necessitating temporary and/or permanent easements for access and construction activities. Construction would temporarily interfere with cattle grazing operations. This impact is likely to be short-term and localized. **As such, it would be considered adverse, but not significant (Class III).**

8.3.2 Mitigation Measures and Residual Impacts

The following mitigation measure would reduce impacts to less than significant levels.

TR-1 The passage impediment projects shall be designed to:

- Minimize the removal of native riparian vegetation, particularly large riparian trees
- Minimize removal of oak trees
- Avoid or minimize grading existing access roads or creating new access roads to the project site
- Include best management practices to divert stream flow around the work site, minimize erosion and sedimentation during and after construction, and provide for containment of accidental spills during construction
- Include a capture and relocation program for steelhead, red-legged frog, and western pond turtle that is prepared in coordination with resource agencies
- Avoid any cultural sites that could be affected in upland areas during access to the project sites
- Minimize interference with ongoing agricultural and cattle grazing operations

9.0 ENVIRONMENTAL ANALYSIS – TRIBUTARY AND MAINSTEM HABITAT ENHANCEMENT PROJECTS

9.1 OVERVIEW OF PROJECTS

Reclamation and COMB propose to conduct various habitat enhancement projects along tributaries to the lower Santa Ynez River and along the mainstem of the river, as described in Section 2.8. SYRTAC (2000) identified the following tributaries as candidates for in-stream habitat enhancement, listed in decreasing order of priority.

Priority 1: Hilton Creek (federal lands), Hilton Creek (above federal lands)
Priority 2: Quiota Creek, El Jaro Creek, Upper Salsipuedes Creek
Priority 3: Alisal Creek (below the dam), Alisal Creek (above the dam)
Priority 4: Nojoqui Creek
Priority 5: San Miguelito Creek

At this time, only one project has been developed – a stream bank stabilization demonstration project on El Jaro Creek. The environmental impacts of this project are addressed below at a project level. Environmental impacts of habitat enhancement projects in general are addressed in Section 9.3. Since the issuance of the FMP, Reclamation and COMB have determined that habitat enhancements along Nojoqui and San Miguelito creeks will not be pursued because only a limited response is expected on Nojoqui Creek, and because migration barriers prevent access for fish to Miguelito Creek.

9.2 EL JARO CREEK BANK STABILIZATION PROJECT

As described in Section 2.8.1, Reclamation and COMB have identified an initial habitat enhancement project along El Jaro Creek. It involves three projects to demonstrate methods to reduce sediment production from rangelands, and two public workshops to inform ranchers of technologically feasible and cost effective sediment management solutions. The overall objective of the project is to initiate long-term voluntary efforts by ranchers to reduce sediment input to El Jaro Creek which in turn, will improve habitat for steelhead. The demonstration projects involve removal of an undersized culvert and stabilization of the culvert area to prevent headcut migration, and stabilization of an exposed slope situated downstream of the culvert, and stabilization of an actively eroding streambank along El Jaro Creek. Environmental impacts of these projects are addressed below.

9.2.1 Potential Impacts

Indirect Impacts to Wildlife

All three projects will involve the use of work crews and vehicles in a remote area along El Jaro Creek. Hence, there will be temporary disturbances to wildlife habitat in the creek and adjacent uplands (oak woodland and annual grassland) due to human activity, dust, noise, and emissions from vehicles. **These temporary construction impacts to wildlife would be adverse, but not significant (Class III)** because the impacts would be temporary and localized.

Construction Related Impacts to Grazing Operations

All three projects will require temporary use of a construction staging and parking area, as shown on Figure 2-22. Two small cattle pastures will be temporarily used, which will preclude their use by cattle. The displacement is not considered an adverse impact because only a small area would be involved; duration of use would be very short (several weeks); and the pastures would not be permanently damaged.

Impacts of Construction Access

Construction equipment can readily access the culvert removal and sidedraw sites using existing dirt roads on the ranch. However, access to the El Jaro Creek site will require grading an abandoned road (about 100 feet long) to reach the creek, which will cause removal of riparian shrubs (primarily willows) that have grown over the road. Pruning the shrubs and trees along this road is not considered a significant impact because of the short distance involved, and because these plants will readily grow back.

Vehicles will also need to drive along El Jaro Creek to reach the project site. Only minor grading of the creek bed is anticipated. The work will occur in the summer when flows are very low. In addition, streamflow will be routed around the construction area using a pump through a hose or pipe. The diverted flow will be discharged downstream of the construction area into a settling basin in order to minimize downstream turbidity. No stream diversion will be required at the culvert removal and sidedraw project sites because the affected drainage has no flow in the summer.

Use of the creek bed for temporary access will result in the destruction of young willow and mulefat seedlings that typically colonize the creek bed after each winter. The loss of these small plants is not considered significant because they generally do not survive the summer and fall due to drought stress, and because these plants will readily colonize the disturbed areas in the following spring after winter streamflows have modified the creek bed.

In summary, the disturbance to riparian vegetation along the abandoned road and along El Jaro Creek is considered an adverse, but not significant impact (Class III) because the physical disturbances would be minor in nature and extent and because natural revegetation and plant recovery processes would restore the affected areas in one or two years.

Impacts of Stream Diversion on El Jaro Creek

Temporary stream diversion and construction work in El Jaro Creek would not have a significant impact on aquatic habitat and species because this portion of El Jaro Creek does not contain pools suitable for oversummering steelhead/rainbow trout and resident red-legged frogs or western pond turtle. The aquatic habitats at the bank stabilization site do not appear to be suitable for the red-legged frog and western pond turtle due to the absence of pools with overhanging vegetation and undercut banks, and because of habitat degradation due to bank erosion. Temporary impacts to aquatic habitat would be minor and temporary, affecting only common aquatic organisms. **As such, impacts to aquatic resources are considered adverse, but not significant (Class III).**

Aquatic Species Capture and Relocation

Prior to construction, Reclamation and COMB biologists would conduct surveys of the work area along El Jaro Creek to search for red-legged frogs, western pond turtles, and steelhead trout. If necessary, any steelhead/rainbow trout, western pond turtle, and red-legged frogs that are present at or near the work areas would be relocated. These species will be captured and relocated using agency-approved methods and personnel, and with the appropriate state and federal permits and approvals. The relocation of steelhead would be authorized under the BO. The relocation of the red-legged frogs would be authorized through a Section 7 consultation with USFWS associated with the Corps of Engineers 404 permit for the projects. Reclamation and COMB would also need to acquire approval to capture and relocate steelhead/rainbow trout, western pond turtle, and red-legged frog as part of a CDFG 1601 Streambed Alteration Agreement for the proposed projects.

Capture and relocation of these species is an environmental protection measure that is considered a standard operating procedure for the SYRTAC and has been successfully implemented on previous occasions in the watershed related to operating fish traps. Any disturbance or adverse effects to these species would be minimal and acceptable to the resource agencies. **As such, any incidental adverse impact of temporary relocation would be considered adverse, but not significant (Class III)**.

Temporary Erosion and Sedimentation

Construction activities in the sidedraw and in El Jaro Creek bed could result in discharge of sediments, which in turn could adversely affect aquatic life if the material is introduced to the creek after construction or during an accidental spill. **This impact is considered significant, but mitigable (Class II)** because Reclamation and COMB will (1) divert water around the El Jaro Creek work site to prevent direct erosion of disturbed areas during construction; (2) implement erosion control and spill contingency plans to contain any accidental spills or construction wash water, and to stabilize the affected areas after construction has ended; and (3) implement additional measures to reduce impacts as provided in Mitigation Measure EJ-1. It should be noted that the three projects are designed to stabilize and revegetate the banks along these drainages, and as such, would result in lower erosion and sedimentation rates after construction. The culvert removal and sidedraw work sites would be dry at the time of construction.

Cultural Resources

An archival search to identify potential archeological resources at the project sites was conducted by Conejo Archeological Consultants (2002). All ground disturbances would occur in and adjacent to the sidedraw or El Jaro Creek which do not appear to contain cultural deposits. Hence, no impacts to archeological resources are anticipated.

Interference with Cattle Grazing

Construction of the projects would cause the landowner to move cattle to other pastures to avoid conflict with work activities and vehicular traffic. The displacement of cattle would not cause an adverse impact to cattle operations because of the small area affected (which are not grazing lands), short duration of the work, and highly localized work areas. Reclamation and COMB will coordinate with the landowner and ranch manager to ensure that no significant disruption of grazing operation would occur.

Impacts to Riparian Habitat

The culvert removal site consists primarily of annual grasslands on the banks of the drainage, and cobbly, unvegetated creek bed. The sidedraw contains annual grassland on the tops of the banks with several very large coast live oak trees (which will be retained). El Jaro Creek consists of an open cobbly stream bed with small scattered willow and mulefat saplings in the channel bottom each summer, and a well developed corridor of willow and cottonwood trees along the margins of the banks, primarily on the west side, opposite the eroding bank which is barren. The proposed projects will not remove any riparian or wetland vegetation from the culvert removal and sidedraw project sites. Construction of the bank stabilization along El Jaro Creek may require removal of small willows and cottonwoods at the toe of the eroded bank during the placement of the boulders.

Effects of vehicular travel along the creek bed to access the site are addressed above. The loss of young willow and cottonwood trees at the bank stabilization site is not considered an adverse impact in light of the long-term objectives of the project - reduce sedimentation by bank stabilization, and create more riparian vegetation along this reach of El Jaro Creek due to post-construction revegetation.

9.2.2 Mitigation Measures and Residual Impacts

The following mitigation measure would reduce the erosion and sedimentation impact to a less than significant level:

EJ-1 A stream diversion and dewatering plan shall be prepared to ensure that stream flows will by-pass the work areas in El Jaro Creek. In addition, an erosion control and spill contingency plan shall be prepared, specifying best management practices to prevent erosion and sedimentation during and after construction, and procedures for containing and cleaning up spills of concrete or other materials during construction.

No other measures are necessary because no other significant impacts are anticipated. The project includes standard environmental avoidance and minimization procedures for construction; and the project is designed to result in an overall enhancement of riparian resources.

9.3 HABITAT ENHANCEMENTS AND CONSERVATION EASEMENTS

9.3.1 Proposed Actions

The tributaries where habitat enhancement projects would be pursued include Hilton Creek, Upper Salsipuedes Creek, Alisal Creek, and El Jaro Creek. With the exception of lower Hilton Creek, these streams occur on private lands. Protecting and enhancing steelhead habitat on these tributaries will require cooperation by landowners.

The proposed habitat enhancement on tributaries would consist of assisting landowners with implementing sound land conservation practices on private lands. A variety of measures could be used to enhance aquatic habitat. Tributary channels could be modified to create more rearing habitat. These modifications could include increasing cover and vegetative complexity over pool through riparian revegetation, and creating more pools through instream excavations. In addition, structures can be added to the pools to enhance cover, such as logs, root wads, and cobbles. The precise methods and extent of modifications would vary depending upon the landowner's wishes, the condition of the tributary, and the extent of the reach to be modified.

Reclamation and COMB also propose to enhance the existing pools between Bradbury Dam and Alisal Road to improve summer rearing conditions for steelhead. Additional structural elements would be added to selected pools such as boulders and woody debris that would provide refuge from predators. In addition, riparian vegetation would be planted around the perimeter of pools to reduce water temperature by shading. Most of the proposed projects along the mainstem would also occur on private property and would therefore, require cooperation from landowners. At this time, enhancements are only planned to occur at the Long Pool, located downstream of Bradbury Dam on federal lands. The enhancement would likely include the placement of additional large woody debris in the Long Pool to provide cover for fish.

In addition to habitat enhancement projects, Reclamation and COMB will also seek conservation easements from willing landowners. Easements would be used to manage land uses along tributaries and the mainstem in order to improve habitat conditions for fish, and to improve hydrologic and water quality conditions in the watershed of the Santa Ynez River. The location, size, and nature of the easements cannot be predicted at this time. Securing a conservation easement would likely include restrictions on the use of the land, such as modified grazing, road maintenance, and fuel management practices. Conservation easements would only be pursued with willing landowners. It is possible that third party land trust or conservation organizations would participate in acquiring the easement, or possibly in managing lands under easement.

In the Biological Assessment and FMP, Reclamation estimated that ten miles of conservation easements along El Jaro Creek could be acquired by 2003. The properties of interested landowners are currently being appraised. Negotiation with property owners will commence upon completion of the appraisal.

9.3.2 Potential Impacts

Potential impacts of instream habitat enhancement projects, as described above, are listed below. General impacts are identified below and addressed at a programmatic level because specific projects have not been identified nor evaluated.

- Disturbance of riparian and upland vegetation, including potential loss of mature trees. **Adverse, but not significant (Class III**). This impact could occur due to incidental disturbance to riparian vegetation during restoration activities, including impacts due to clearing access to remote areas and to work in a creek. In general, this type of impact would be minimized to the maximum extent feasible.

- Construction related erosion and sedimentation due to work in drainages. This impact would likely be avoided along most tributaries because construction would occur when flows are low or absent. However, work in the river may occur during periods of flow and require stream diversions. **This impact would typically be considered significant, but mitigable (Class II**).

- Noise, dust, and traffic impacts. These construction related impacts are considered **adverse, but less than significant impact (Class III)** because they are localized and temporary.

- Temporary impacts to red-legged frogs, steelhead/rainbow trout, and western pond turtles (if present) due to relocation procedures. This impact would be considered **adverse, but not significant (Class III)** in most situations because this work would be conducted by a qualified biologist with approval of USFWS and/or NMFS.

- Impacts to archeological sites, particularly along new access roads to the project sites. **Significant, but mitigable (Class II).**

- Interference with cattle grazing operations during construction work by loss of pasture areas or relocation of fencing or watering holes. This impact would be **considered adverse, but not significant (Class III)** because restoration projects would typically affect only a small portion of a grazing lease, and because the impacts would be temporary, localized, and reversible.

9.3.2 Mitigation Measures and Residual Impacts

The following mitigation measure would reduce impacts to less than significant levels.

EN-1 The tributary and mainstem habitat enhancement projects shall be designed to:

- Minimize the removal of native riparian vegetation, particularly large riparian trees
- Minimize removal of oak trees to the maximum extent feasible

- Avoid or minimize grading existing access roads or creating new access roads to the project site
- Include best management practices to divert stream flow around the work site, minimize erosion and sedimentation during and after construction, and provide for containment of accidental spills during construction
- Include a capture and relocation program for steelhead, red-legged frog, and western pond turtle that is prepared in coordination with resource agencies
- Avoid any cultural sites that could be affected in upland areas during access to the project sites
- Minimize interference with ongoing agricultural and cattle grazing operations

10.0 ALTERNATIVES

10.1 REQUIREMENTS TO EVALUATE ALTERNATIVES

10.1.1 CEQA Requirements

The key requirements under CEQA to identify and evaluate alternatives in an Environmental Impact Report are listed below:

- 15126.6(a) states that "*An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives.*"

- 15126.6 (b) states that "*...the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.*"

- 15126.6(c) states "*The range of potential alternatives to the proposed project shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects.*"

Under CEQA, COMB must identify feasible alternatives that will avoid, or at least lessen, any significant impact. COMB must determine what represents a feasible alternative, taking into account costs and engineering feasibility, and how the alternative may inhibit meeting the project objectives. An alternative cannot be dismissed simply because it prevents the project objectives from being fully realized. Any new environmental impacts of an alternative must also be considered.

10.1.2 NEPA Requirements

Section 1502.14 of the NEPA regulations require that an EIS explore and objectively evaluate all reasonable alternatives, including the No Action Alternative, as well as reasonable alternatives not within the jurisdiction of the lead agency. The analysis must provide sufficient information on the alternatives so that the public and decision makers may evaluate their comparative merits. The EIS should also discuss reasons for eliminating alternatives from detailed study. The EIS must also identify the federal lead agency's preferred alternative in the draft EIS (if it exists at that time), and identify such alternative in the final EIS under all circumstances. The proposed action may be, but is not necessarily, the agency's preferred alternative.

Reasonable alternatives must meet the project purpose and need, and must be practical or feasible from the technical and economic standpoint and using common sense. What constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case.

10.1.3 Alternatives Addressed in the EIR/EIS

A wide variety of alternatives are addressed in this section to meet the CEQA and NEPA requirements noted above. The lead agencies have included broad scale alternatives to the FMP/BO (as a whole), as well as alternatives to specific FMP/BO actions. To ensure that a wide range of alternatives has been considered, the lead agencies have also included several alternatives that do not meet the project purpose and need, are not considered feasible, and would not have the same benefits to downstream fish habitat as the proposed project. The following issues are evaluated for each alternative to provide the basis of comparison between the various alternatives and to the proposed FMP/BO:

- *To what extent does the alternative meet the project purpose and need and CEQA objectives (Section 1.2.1)?*

- *Do the lead agencies consider the alternative feasible based on technical, logistic, and economic considerations?* Technical considerations include engineering requirements and biological and hydraulic constraints. Logistic constraints include access to the project site, and the ability to acquire agreement with private landowners, if applicable.

- *Is the alternative consistent with the FMP/BO? If not, how are the objectives of the FMP/BO impeded?* It is assumed that any alternative that does not include all feasible elements of the FMP/BO (as described in Section 2.0) would require Reclamation to re-initiate a Section 7 endangered species consultation with the National Marine Fisheries Service (NMFS) to determine if such an alternative would comply with the Endangered Species Act and to request that a new or modified BO be issued. If NMFS determines that the alternative does not comply, it would be considered infeasible due to legal constraints. The feasibility of alternatives that do not include all the FMP/BO actions, or that are otherwise inconsistent with FMP/BO cannot be determined until a new consultation is completed. However, the lead agencies provide a preliminary assessment of whether these alternatives would be considered acceptable to NMFS in the EIR/EIS for discussion purposes.

- *Does the alternative avoid or reduce one or more significant impacts associated with the proposed FMP/BO?* The extent to which an alternative avoids or reduces the magnitude of Class I and Class II impacts is evaluated.

- *Does the alternative result in any other significant impacts that are not associated with the proposed project, or increase the magnitude of an impact of the proposed project?*

A list of the alternatives evaluated in the EIR/EIS is provided in Table 10-1. A complete description of each alternative is provided in the following subsections. A summary of the alternatives analyses is provided in Table 10-2. The extent to which the alternatives avoid or lessen significant impacts of the proposed project is summarized in Table 10-3.

TABLE 10-1
ALTERNATIVES ADDRESSED IN THE EIR/EIS

CEQA/NEPA Required Alternative
▪ No Action/Project
Surcharge Alternatives
▪ 0.75-foot Surcharging (current operations)
▪ 1.8-foot Surcharge
Rearing Flows Alternatives
▪ Lower Target Flows at Highway 154
▪ Higher Target Flows at Highway 154
▪ Higher Target Flows at Alisal Road
▪ Lower Target Flows at Alisal Road
Passage Flow Alternatives
▪ Reduced Passage Flows
▪ Increased Passage Flows
▪ Alternative Passage Flow Criteria
Alternative Suite of FMP/BO Actions
▪ No Passage Flows and 1.8-foot Surcharge
▪ No Upper Hilton Creek Passage Impediment Removal (Highway 154)
▪ No Tributary Passage Impediment or Habitat Enhancement Projects
▪ No Mainstem Habitat Enhancement Projects
Hilton Creek Channel Extension
▪ Alternative Channel Alignments
Salsipuedes Creek Passage Impediment Removal at Jalama Road
▪ Rock Weirs
Quiota Creek Passage Impediment Removal
▪ Bridge Alternative
El Jaro Creek Passage Impediment Project
▪ Alternative Passage Impediment Removal Methods
Nojoqui Creek Passage Impediment Project
▪ Alternative Passage Impediment Removal Methods
El Jaro Creek Bank Stabilization Project
▪ Alternative Bank Stabilization
Upper Basin Actions
▪ Protect Genetic Integrity of Trout on Lower River
▪ Increase Steelhead Production Through Use of Upper Basin Habitat

Based on the alternatives analysis presented in this chapter, Reclamation and COMB conclude the following:

- ❖ Alternatives that do not meet, or substantially meet, the project purpose and need and CEQA objectives are not considered viable and would not be pursued. However, the impacts of these alternatives are addressed in the EIR/EIS to provide the basis for dropping them from further consideration in the remainder of the environmental review process.

- ❖ Alternatives that meet, or substantially meet, the project purpose and need and CEQA objectives will be fully considered during the entire CEQA and NEPA environmental review process, and as such are presented in the Draft EIR/EIS for public comment. The following alternatives would meet, or substantially meet, the project purpose and need and CEQA objectives:

  - Lower Rearing Target Flows at Highway 154
  - Higher Rearing Target Flows at Highway 154
  - Higher Rearing Target Flows at Alisal Road
  - No Rearing Target Flows at Alisal Road
  - Reduced Passage Flows
  - No Upper Hilton Creek Passage Impediment Removal Project (Caltrans project)
  - Alternative Project Designs at Jalama Road, Quiota Creek, and El Jaro Creek

Reclamation and COMB believe that the proposed rearing target flows at Highway 154 and Alisal Road represent a reasonable balance of water use to meet the competing needs for fish and water supply. The rearing target flows in the FMP/BO were developed after extensive scientific investigations, and in consultation with National Marine Fisheries Services and the Department of Fish and Game. At this time, Reclamation does not believe that the alternative rearing target flows listed above are preferable to the proposed project. A final determination of on the status of the rearing flow alternatives will be presented in the Final EIR/EIS once Reclamation and COMB have considered public comments.

Reclamation and COMB believe that the Reduced Passage Flow Alternative should not be considered further, as the benefits of this alternative to fish passage would be minimal, particularly in the context of the water supply impacts. Hence, Reclamation and COMB propose to dismiss this alternative from further consideration. A final determination of on the status of this alternative will be presented in the Final EIR/EIS once Reclamation and COMB have considered public comments.

Reclamation and COMB believe that No Upper Hilton Creek Passage Impediment Removal Project Alternative should not be considered further, as this project would provide an important opportunity to increase spawning and rearing habitat for steelhead with very minimal effort and costs, and along a tributary with highly suitable conditions. This project would be implemented by Caltrans, and as such, that agency will make the final determination on whether to pursue this project. However, this project is included in the FMP/BO, Hence, Reclamation and COMB must make a recommendation to Caltrans in order to fulfill the obligation in the FMP/BO to implement, or cause to implement, this project. At this time, Reclamation and COMB propose to dismiss this alternative (i.e., the No Hilton Creek project) from further consideration. A final determination of on the status of this alternative will be presented in the Final EIR/EIS once Reclamation and COMB have considered public comments.

Reclamation and COMB have considered the alternative designs for the tributary passage impediment and habitat enhancement alternatives and concluded that these design alternatives do not provide environmental benefits compared to the proposed project designs, and would increase impacts. Hence, Reclamation and COMB propose to dismiss these alternatives from further consideration. A final determination of the status of these alternatives will be presented in the Final EIR/EIS once Reclamation and COMB have considered public comments.

Based on the results of the alternatives analyses presented in this chapter of the EIR/EIS, Reclamation and COMB conclude that the proposed FMP/BO represents the "environmentally superior alternative" under CEQA, and the "least environmentally damaging, practicable alternative" under NEPA. This conclusion is preliminary, and will be reevaluated once Reclamation and COMB have considered public comments on the Draft EIR/EIS.

TABLE 10-2
SUMMARY OF ALTERNATIVES

Alternative	Does it Meet the Purpose and Need and CEQA Project Objectives?	Is it Technically, Logistically, and Economically Feasible?	Is it Consistent with the FMP and BO?	Does it Avoid or Reduce One or More Significant Impacts Associated with the Proposed Project?	Does it Cause Other Significant Impacts or Increase Magnitude of Previously Identified Significant Impacts?
CEQA/NEPA Required Alternative					
No Action/Project	No, because steelhead would not be protected	Yes	No. Would not comply with Endangered Species Act	Yes	No
Surcharge Alternatives					
0.75-foot Surcharging	No, due to water supply impacts	Yes	Yes	Yes, no impacts to oak trees, recreational facilities, and arch. sites	Yes, more severe water supply impacts
1.8-foot surcharge	No, due to water supply impacts	Yes	Yes	Yes, less impact to oak trees, recreational facilities, and arch. sites	Yes, more severe water supply impacts
Rearing Flows Alternatives					
Lower Target Flows at Highway 154	Partially	Yes	No	Yes, reduced water supply impacts	No
Higher Target Flows at Highway 154	No, due to water supply impacts	Yes	Yes	No, greater water supply impacts	Yes, curtailment of SWP water deliveries
Higher Target Flows at Alisal Road	Yes	Yes	Yes	No, greater water supply impacts	Yes, curtailment of SWP water deliveries
No Target Flows at Alisal Road	Partially	Yes	No	No, impacts would be the same	No

Alternative	Does it Meet the Purpose and Need and CEQA Project Objectives?	Is it Technically, Logistically, and Economically Feasible?	Is it Consistent with the FMP and BO?	Does it Avoid or Reduce One or More Significant Impacts Associated with the Proposed Project?	Does it Cause Other Significant Impacts or Increase Magnitude of Previously Identified Significant Impacts?
Modified Passage Flow Alternatives					
Reduced Passage Flows	Partially	Yes	No	No	No
Increased Passage Flows	No, due to water supply impacts	Yes	Yes	No	Yes, more severe water supply impacts
Alternative Passage Flow Criteria	Yes	Yes	Yes	No	No
Alternative Suite of FMP/BO Actions					
No Passage Flows and 1.8' Surcharge	Partially	Yes	No	Yes, less impact to oak trees, recreational facilities, and arch. sites	No
No Upper Hilton Creek Passage Impediment Removal (Highway 154; Caltrans)	Partially	Yes	No	No	No
No Tributary Passage Impediment or Habitat Enhancement Projects	No	Yes	No	Yes, construction related impacts	No
No Mainstem Habitat Enhancement Projects	No	Yes	No	Yes, construction related impacts	No
Hilton Creek Channel Extension					
Alternative Channel Alignments	This project has not been developed sufficiently to identify alternatives				
Salsipuedes Creek Passage Impediment Removal at Jalama Road					
Rock Weirs	Yes	Yes	Yes	No	Yes, increased construction related impacts

Alternative	Does it Meet the Purpose and Need and CEQA Project Objectives?	Is it Technically, Logistically, and Economically Feasible?	Is it Consistent with the FMP and BO?	Does it Avoid or Reduce One or More Significant Impacts Associated with the Proposed Project?	Does it Cause Other Significant Impacts or Increase Magnitude of Previously Identified Significant Impacts?
Quiota Creek Passage Impediment Removal					
Bridge Alternative at Reclamation Crossings and Fishways at County Crossings	Yes	Yes	Yes	No	Yes, increased construction related impacts and tree loss
El Jaro Creek Passage Impediment Project					
Alternative Passage Impediment Removal Methods	This project has not been developed sufficiently to identify alternatives				
Nojoqui Creek Passage Impediment Project					
Alternative Passage Impediment Removal Methods	This project has not been developed sufficiently to identify alternatives				
El Jaro Creek Bank Stabilization Project					
Alternative Bank Stabilization	Yes	Yes	Yes	No	No
Upper Basin Actions					
Protect Genetic Integrity of Trout on Lower River	No	No	No	No	Yes. Multiple new impacts
Increase Steelhead Production Through Use of Upper Basin Habitat	No	No	No	No	Yes. Multiple new impacts

TABLE 10-3
AVOIDANCE OR REDUCTION OF THE PROPOSED PROJECT'S SIGNIFICANT IMPACTS BY THE ALTERNATIVES

Significant Impact of the Proposed Project (Class I and II Impacts)	Is this Impact Avoided or Reduced by the Alternative?																		
	No Action/ Project	0.75-foot Surcharge (current ops)	1.8-foot Surcharge	Lower Target Flows at Highway 154	Higher Target Flows at Highway 154	No Target Flows at Alisal Road	Higher Target Flows at Alisal Road	No Passage Flows an d 1.8" Surcharge	Reduced Passage Flows	Increased Passage Flows	No Upper Hilton Creek (Hwy 154) Passage Project	No Tributary Projects	No Mainstem Habitat Projects	Alt. Hilton Creek Channels	Jalama Road Passage Alt.	Quiota Creek Passage Alt.	El Jaro Creek Passage Alt.	Nojoqui Creek Passage Alt.	El Jaro Creek Bank Stab. Alt.
1. The combined effects of the past, current, and proposed releases for fish would result in a significant increase in the anticipated shortages in deliveries to the Member Units in drought years. (Class I cumulative impact)	Reduced but not avoided due to recent reduction in water supply from current releases	Increased Magnitude	Increased Magnitude	Decreased Magnitude	Increased Magnitude	Decreased Magnitude	Increased Magnitude	No change	Decreased Magnitude	Increased Magnitude	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
2. Surcharging will require relocation of various recreational facilities at the Cachuma Lake County Park, Certain recreational uses could be temporarily disrupted at the Park if relocation does not occur prior to the first full surcharge. (Class II impact)	Avoided	Avoided	Reduced magnitude	No change	No change	No change	No change	Reduced magnitude	No change	No change	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
3. Relocation of recreational facilities at Lake Cachuma County Park due to surcharging would remove 15 to 20 mature coast live oak trees and temporarily affect freshwater marsh habitat. (Class II impact)	Avoided	Avoided	Reduced magnitude	No change	No change	No change	No change	Reduced magnitude	No change	No change	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
4. Two prehistoric archaeological sites along the lake margins would be subject to increased erosion due to surcharging. (Class II impact)	Avoided	Avoided	Reduced magnitude	No change	No change	No change	No change	Reduced magnitude	No change	No change	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
5. Surcharging the lake could expose unknown buried archeological resources by eroding the lake margins over time. (Class II impact)	Avoided	Avoided	Reduced magnitude	No change	No change	No change	No change	Reduced magnitude	No change	No change	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
6. Relocation of the recreational facilities at Cachuma Lake County Park would not occur at or near any known archeological sites in the County Avoided Park. However, there is a potential to disturb unknown buried archeological sites during construction. (Class II cumulative impact)	Avoided	Avoided	Reduced magnitude	No change	No change	No change	No change	Reduced magnitude	No change	No change	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
7. Relocation of the recreational facilities at Cachuma Lake County Park would temporarily affect recreational uses due to closure during construction. (Class II cumulative impact)	Avoided	Avoided	Reduced magnitude	No change	No change	No change	No change	Reduced magnitude	No change	No change	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
8. For the Quiota Creek passage	Avoided	Not	Not	Not	Not applicable	Not	Not	Not	Not	Not	Not applicable	Reduced	Not	Not	Not	Increased	Not	Not	Not

Significant Impact of the Proposed Project (Class I and II Impacts)	Is this Impact Avoided or Reduced by the Alternative?																		
	No Action/ Project	0.75-foot Surcharge (current ops)	1.8-foot Surcharge	Lower Target Flows at Highway 154	Higher Target Flows at Highway 154	No Target Flows at Alisal Road	Higher Target Flows at Alisal Road	No Passage Flows an d 1.8" Surcharge	Reduced Passage Flows	Increased Passage Flows	No Upper Hilton Creek (Hwy 154) Passage Project	No Tributary Projects	No Mainstem Habitat Projects	Alt. Hilton Creek Channels	Jalama Road Passage Alt.	Quiota Creek Passage Alt.	El Jaro Creek Passage Alt.	Nojoqui Creek Passage Alt.	El Jaro Creek Bank Stab. Alt.
impediment project, riparian habitat at each crossing would be temporarily disturbed during construction. (Class II impact)		applicable	applicable	applicable		applicable	applicable	applicable	applicable	applicable		magnitude	applicable	applicable	applicable	magnitude	applicable	applicable	applicable
9. Construction of bridges on Quiota Creek would result in the loss of several mature native riparian trees, removal of several small trees, and pruning of several others. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Reduced magnitude	Not applicable	Not applicable	Not applicable	Increased magnitude	Not applicable	Not applicable	Not applicable
10. For the Quiota Creek passage impediment project, construction activities in the creek bed and pouring concrete could result in discharge of sediments and concrete to the creek. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Reduced magnitude	Not applicable	Not applicable	Not applicable	Increased magnitude	Not applicable	Not applicable	Not applicable
11. For the El Jaro Creek bank stabilization project, work in El Jaro Creek will require temporary stream diversion, and could result in discharge of sediments and concrete to the creek. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Reduced magnitude	Not applicable	Not applicable	Not applicable	Not applicable	Increased magnitude	Not applicable	Increased magnitude
12. For the Hilton Creek Channel Extension Project, riparian scrub and woodland habitats would be temporarily removed to create the channel. Creating the channel will require removal of well-established riparian vegetation. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Reduced magnitude	Not applicable	Insufficient information at this time	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
13. For the Hilton Creek Channel Extension Project, the roots of large riparian trees could be disturbed during construction which could harm the trees. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Reduced magnitude	Not applicable	Insufficient information at this time	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
14. For the passage impediment removal projects on Salsipuedes, Quiota, El Jaro, and Nojoqui creeks, pool habitat for steelhead rearing, red-legged frogs, or pond turtles could be temporarily and permanently disturbed due to creek modifications associated with removal of the passage impediments. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Decreased magnitude	Not applicable	Not applicable	Increased magnitude	Increased magnitude	Increased magnitude	Increased magnitude	Not applicable
15. For all tributary projects except along Hilton Creek, riparian and upland vegetation would be disturbed during construction, including the potential loss of	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Decreased magnitude	Not applicable	Not applicable	Increased magnitude	Increased magnitude	Increased magnitude	Increased magnitude	Increased magnitude

Significant Impact of the Proposed Project (Class I and II Impacts)	Is this Impact Avoided or Reduced by the Alternative?																	
	No Action/ Project	0.75-foot Surcharge (current ops)	1.8-foot Surcharge	Lower Target Flows at Highway 154	Higher Target Flows at Highway 154	No Target Flows at Alisal Road	Higher Target Flows at Alisal Road	No Passage Flows an d 1.8" Surcharge	Reduced Passage Flows	Increased Passage Flows	No Upper Hilton Creek (Hwy 154) Passage Project	No Tributary Projects	No Mainstem Habitat Projects	Alt. Hilton Creek Channels	Jalama Road Passage Alt.	Quiota Creek Passage Alt.	El Jaro Creek Passage Alt.	Nojoqui Creek Passage Alt.	El Jaro Creek Bank Stab. Alt.
mature trees. (Class II impact)																			
16. For all tributary projects except along Hilton Creek, there is a slight possibility that unknown archeological sites could be inadvertently disturbed during construction. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Decreased magnitude	Not applicable	Not applicable	Increased magnitude	Increased magnitude	Increased magnitude	Increased magnitude	Increased magnitude
17. For all tributary projects except along Hilton Creek, construction activities could cause short-term localized in creases in turbidity due to construction related erosion and sedimentation. (Class II impact)	Avoided	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Decreased magnitude	Not applicable	Not applicable	Increased magnitude	Increased magnitude	Increased magnitude	Increased magnitude	Increased magnitude

10.2 NO PROJECT/ACTION ALTERNATIVE

10.2.1 Description of Alternative

CEQA and NEPA require an analysis of the No Project/Action Alternative. Under this alternative, the current releases for interim rearing target flows at Highway 154 and the revised ramp-down schedule for water rights release would continue as described in Section 3.4. However, no other FMP/BO actions would be implemented, including the 3.0-foot surcharge, releases for long-term rearing flows and passage flows, and the various tributary and mainstem projects. The reservoir would continue to be surcharged at 0.75 feet, as it is under current operations.

10.2.2 Feasibility Considerations

The No Project/Action Alternative would not meet the project purpose and need. It is considered feasible based on solely on technical, logistical, and economic considerations. However, this alternative would not be consistent with the FMP/BO, and in fact, would be contrary to the objectives of the FMP and the mandated terms and conditions of the BO. As such, it would require a new Endangered Species Act Section 7 consultation between Reclamation and NMFS. Reclamation does not believe that this alternative would be acceptable to NMFS because operations of the Cachuma Project would not comply with the Endangered Species Act requirements to minimize take of the southern steelhead and avoid adverse modification of designated critical habitat.

10.2.3 Environmental Impacts

Under this alternative, current conditions for fish, aquatic species, and riparian habitat downstream of Bradbury Dam would be maintained. The releases for the interim rearing target flows that began in 2000 have improved conditions on the river downstream of Bradbury Dam compared to recent historic operations. Hence, this alternative would not cause any adverse environmental impact, nor degrade current habitat conditions for the southern steelhead in the watershed. Instead, it would forego the opportunity to further improve fish and habitat conditions along the lower Santa Ynez River.

All but one of the project-specific and cumulative significant impacts (Class I and II) associated with the proposed FMP/BO would be avoided under this alternative, as summarized in Table 10-3. The No Project/No Action Alternative would not avoid a significant cumulative impact on Member Units' water supply from the Cachuma Project. Current operations that would continue under this alternative have resulted in a significant increase in the anticipated shortages in deliveries from the Cachuma Project to the Member Units in drought years. The shortages are due to the effects of the historic and current fish releases to maintain interim rearing flows. This alternative would not include the offsetting effects of a surcharge.

10.2.4 Summary of the Alternative

This alternative would not meet the project purpose and need, it would be inconsistent with the FMP/BO, it is considered technically and economically feasible, and would avoid most significant impacts of the proposed project. Under this alternative, the environmental benefits of the FMP/BO actions on aquatic and riparian habitats along the Santa Ynez River below Bradbury Dam would not be realized.

10.3 SURCHARGE ALTERNATIVES

10.3.1 0.75-Foot Surcharge Alternative (Current Operations)

10.3.1.1 Description of the Alternative

This alternative consists of operations of the proposed project described in Section 2.0, including downstream releases to meet long-term rearing and passage target flows for steelhead, as well as various tributary and mainstem projects. Under this alternative, the long-term rearing and passage releases would be derived from the current 0.75-foot surcharge and project yield rather than from a 3.0-foot surcharge, as proposed. The 0.75-foot surcharge produces about 2,300 acre-feet when the lake spills, which occurs on average every three years. The proposed 3.0-foot surcharge produces about 9,200 acre-feet in a surcharge event. (Note: the 3.0-foot surcharging does not fully offset the anticipated water needs for rearing flows).

10.3.1.2 Feasibility Considerations

The No Surcharge Alternative would not fully meet the project purpose and need and the CEQA project objectives because it would cause a significant project-specific impact on water supply (see below), which would be contrary to one of the key elements of the CEQA objectives ("The actions must not substantially affect the Cachuma Project yield…") and the purpose and need statement ("…not affect project yield in a meaningful way."). However, this alternative is considered feasible based solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO because it would provide the planned rearing and passage flows even with only the current lake surcharge of 0.75 feet.

10.3.1.3 Environmental Impacts

<u>Lake Levels</u>

Under this alternative, median lake levels would be slightly lower than under the proposed project due to greater releases without an offsetting increase from surcharging (see Table 10-4). In addition, the 0.75-foot alternative would exhibit lower lake levels than under current operations.

TABLE 10-4
MEDIAN LAKE LEVEL FOR SURCHARGING ALTERNATIVES

Occurrence	Median Water Elevation (feet)			
	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Releases for Long-term Rearing Target Flows and Passage Flows with 0.75' Surcharge (0.75' ALTERNATIVE)	Releases for Long-term Rearing Target Flows and Passage Flows with 1.8' Surcharge (1.8' ALTERNATIVE)	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge (PROP. PROJECT)
Annual	733.7	732.3	733.3	734.6
Feb	737.2	735.5	736.7	738.1
Aug	732.2	732.3	733.6	735.0

Based on modeling by Stetson Engineers (2001) for period of record 1918-1993.

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2001), the 0.75-foot alternative would exhibit higher average spill amounts than the proposed project with a 3-foot surcharge (Table 10-5). The number of spill months would be slightly higher than under the proposed project. The average water rights and fish releases and number of spill years would be the same for the 0.75-foot and 3-foot surcharge.

TABLE 10-5
KEY HYDROLOGIC CHARACTERISTICS OF SURCHARGE ALTERNATIVES

Spill and Release	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Releases for Long-term Rearing Target Flows and Passage Flows with 0.75' Surcharge (0.75' ALTERNATIVE)	Releases for Long-term Rearing Target Flows and Passage Flows with 1.8' Surcharge (1.8' ALTERNATIVE)	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge (PROP. PROJECT)
Average spills/leakage (AFY)	36,693	36,037	35,784	35,415
Average 89-18 releases (AFY)	6,023	5,658	5,682	5,737
Average fish releases (AFY)	1,362	2,690	2,701	2,715
Total discharges from the dam (AFY)	44,078	44,385	44,167	43,867
No. of spill months	82	80	79	78
No. of spill water years	26	25	25	25
No. of spill water years >20,000 acre-feet	16	15	15	15

Based on modeling by Stetson Engineers (2001) for period of record 1918-1993.

The flow regime below the dam due to spills and downstream water rights and fish releases would be essentially the same for the 0.75-foot surcharge alternative and the proposed project (see Tables 10-6 and 10-7). There would be no difference in the downstream flows between the 0.75-foot and the proposed 3.0-foot surcharge project because the same amount of water must be released under all three operational scenarios (including the 1.8-foot alternative) to meet water rights requirements and the flow requirements under the FMP/BO.

TABLE 10-6
FLOWS FROM BRADBURY DAM
DUE TO SPILLS AND DOWNSTREAM RELEASES

Flow (cfs)	Percentage of Time Spills and Downstream Releases are at or **ABOVE** the Indicated Flow (Simulation, 1918-1993)			
	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Releases for Long-term Rearing Target Flows and Passage Flows with 0.75' Surcharge (0.75' ALTERNATIVE)	Releases for Long-term Rearing Target Flows and Passage Flows with 1.8' Surcharge (1.8' ALTERNATIVE)	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge (PROPOSED PROJECT)
2	99 %	99 %	99 %	99 %
5	42 %	67 %	67 %	68 %
10	30 %	37 %	36 %	36 %
20	26 %	27 %	27 %	27 %
50	13 %	12 %	12 %	12 %

Based on modeling by Stetson Engineers (2001) for period of record 1918-1993.

Impact on Flood Hazards along the River

As noted above, the 0.75-foot surcharge alternative would result in the same downstream flow regime as the proposed project. Hence, it would result in the same minor impact on vegetation conditions in the river channel and associated flooding hazard – an adverse, but not significant impact (Class III).

TABLE 10-7
STREAM FLOWS DOWNSTREAM OF BRADBURY DAM

Flow (cfs)	Percentage of Time That Streamflows are at or **ABOVE** the Indicated Flow (Simulation, 1918-1993)			
	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Releases for Long-term Rearing Target Flows and Passage Flows with 0.75' Surcharge (0.75' ALTERNATIVE)	Releases for Long-term Rearing Target Flows and Passage Flows with 1.8' Surcharge (1.8' ALTERNATIVE)	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge (PROPOSED PROJECT)
Below Hilton Creek				
2	99 %	99 %	99 %	99 %
5	47 %	74 %	74 %	75 %
10	33 %	39 %	39 %	39 %
20	26 %	28 %	28 %	28 %
50	13 %	12 %	12 %	12 %
Highway 154				
2	82 %	99 %	99 %	99 %
5	48 %	77 %	77 %	78 %
10	34 %	39 %	39 %	39 %
20	27 %	29 %	28 %	28 %
50	12 %	12 %	12 %	12 %
Alisal Road				
2	53 %	68 %	69 %	69 %
5	43 %	49 %	49 %	49 %
10	34 %	36 %	36 %	36 %
20	23 %	25 %	25 %	25 %
50	12 %	12 %	12 %	12 %
Near Buellton				
2	51 %	57 %	57 %	57 %
5	41 %	44 %	44 %	44 %
10	32 %	34 %	34 %	34 %
20	24 %	26 %	26 %	26 %
50	12 %	12 %	12 %	12 %
Salsipuedes Creek				
2	39 %	43 %	42 %	43 %
5	35 %	36 %	37 %	37 %
10	30 %	32 %	32 %	32 %
20	25 %	26 %	26 %	26 %
50	12 %	13 %	13 %	13 %
The Narrows				
2	45 %	48 %	48 %	48 %
5	38 %	41 %	41 %	41 %
10	33 %	35 %	35 %	35 %
20	28 %	29 %	29 %	29 %
50	14 %	14 %	14 %	14 %

Based on modeling by Stetson Engineers (2001) for period of record 1918-1993.

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units would be reduced under the 0.75-foot surcharge alternative because surcharging would not be available to partially offset the additional releases for steelhead rearing and passage. Hence, releases for fish purposes would be derived from project yield. The magnitude of the reduction in project yield is summarized in Table 10-8 and below:

- The 0.75-foot surcharge alternative would result in a minor reduction in the average annual deliveries from the Cachuma Project to the Member Units compared to the proposed project with a 3-foot surcharge (Table 10-8).

- The 0.75-foot surcharge alternative would increase the number of years with shortage in water supply deliveries of 10 percent or more compared to the proposed project. It will also increase the number of months with shortages within each year with shortages.

- The shortage in deliveries during the critical drought year would be 19 percent higher under the 0.75-foot surcharge alternative compared to the shortage amount under the proposed project.

- The deliveries during a 3-year drought period would be less under the 0.75-foot surcharge alternative compared to the proposed project. The shortage in delivery during the critical drought years would be 25 percent higher compared to the shortage amount under the proposed project.

The reduction in project deliveries to the Member Units is considered a significant, unmitigable cumulative impact (Class I) for the following reasons.

1. The actual reduction in deliveries would be greater than described above because the Member Units have already incurred a reduction in deliveries through the implementation of current operations with the interim releases for steelhead rearing under the FMP/BO which began in 2000, and voluntary releases that began in 1993. The FMP/BO operations currently involve releases to meet rearing target flows at Highway 154 bridge. These releases have caused a reduction in the project yield, as shown in Table 10-8. For example, current operations have reduced the average annual project yield, increased the anticipated frequency of shortages of 10 percent or more, reduced the deliveries during the critical drought period by 10 percent, and reduced the deliveries during the 3-year drought period. These reductions should be added to the reductions in deliveries associated with the 0.75-foot surcharge alternative. The cumulative reductions in deliveries to the Member Units represent a substantial shortage.

TABLE 10-8
IMPACTS OF SURCHARGING ALTERNATIVES ON PROJECT DELIVERIES TO MEMBER UNITS

Water Supply and Shortage	Recent Historic Operations Under WR 89-18 (HISTORIC OPS)	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Releases for Long-term Rearing Target Flows and Passage Flows with 0.75' Surcharge (0.75' ALTERNATIVE)	Releases for Long-term Rearing Target Flows and Passage Flows with 1.8' Surcharge (1.8' ALTERNATIVE)	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge (PROPOSED PROJECT)
Average Annual Deliveries and Years of Shortages (Simulation Period 1918-1993)					
Average annual delivery (includes 2,000 AFY from Tecolote Tunnel)	25,308	25,115	24,901	24,986	25,122
No. of years with 10% or more shortage over the 76-year simulation period	5 years	6 years	8 years	7 years	6 years
Critical Drought Year (Simulation of Historic Worst Drought Year – 1951)					
Shortage in critical drought year (acre-feet)	7,070	9,810	11,810	11,260	9,890
Shortage as a percentage of current annual operational yield of 25,714 AFY	27%	38%	46 %	44 %	38%
Critical 3-year Drought Period (based on simulation of 1949-51 drought)					
Shortage in critical drought years (acre-feet)	14,210	20,130	24,850	23,370	19,920
Shortage as a percentage of current annual operational yield of 25,714 AFY for three years	18%	26%	32 %	30 %	26%

Source: Stetson Engineers (2001) for the period of record 1918-1993.

2. The reduction in project yield due to the 0.75-foot surcharge alternative would require the Member Units to acquire alternative water supplies during dry years. Alternative water supplies include State Water Project and local groundwater basins. The Member Units' long-term water supply plans already incorporate the use of the State Water Project as a supplemental water supply. As such, it cannot be used to offset new and unanticipated reductions in currently available local surface water supplies. Hence, the State Water Project is not considered an alternative water supply under this alternative. Local groundwater may represent a potentially viable alternative water supply for certain Member Units due to available storage conditions. However, increasing groundwater pumping to offset a

permanent reduction in local water supply would not be considered feasible by the City of Santa Barbara and Goleta Water District for several reasons. One, increased groundwater pumping can cause other undesirable environmental impacts. Two, both agencies already include local groundwater in their long-term water supply plans as a drought buffer, and therefore, would not consider it feasible to increase reliance on local groundwater due to inadequate availability, and legal constraints on additional long-term production.

3. The predicted reductions in project yield during drought years by Stetson Engineers (2001) are based on the historic records and a previously experienced drought period. In real-time planning for water supply during a prolonged drought, the Member Units do not know if they are in the last year of a drought (because forecasting runoff in the next year is not perfect). Hence, Member Units must plan each year of the drought as if the next year will be another dry year. In practice, the Member Units would be placing reserves aside during each year of the drought. As such, there would be lower deliveries in dry years than predicted by the model. This results in a 30 to 40 percent greater reduction in project deliveries during a drought period than shown in Table 10-8 for all current operations and all surcharging alternatives. As a consequence, the reduction in deliveries due to the 0.75-foot surcharge compared to the proposed project will cause even greater impacts on Member Units' water supply than predicted in Table 10-8.

Effect on the Above Narrows Alluvial Aquifer

There would be no significant difference in the dewatered storage in the Above Narrows Alluvial Aquifer between the 0.75-foot surcharge alternative and the proposed 3.0-foot surcharge project because the same amount of water must be released under both operational scenarios to meet water rights requirements and the flow requirements under the FMP/BO (see Table 10-9).

TABLE 10-9
MONTHLY DEWATERED STORAGE
IN THE ABOVE NARROWS ALLUVIAL BASIN

Dewatered Storage	Acre-feet for each Alternative based on Simulation (1918-1993)		
	Releases for Long-term Rearing Target Flows and Passage Flows with 0.75' Surcharge (0.75' ALTERNATIVE)	Releases for Long-term Rearing Target Flows and Passage Flows with 1.8' Surcharge (1.8' ALTERNATIVE)	Proposed Releases for Long-term Rearing Target Flows and Passage Flows with 3' Surcharge (PROPOSED PROJECT)
Mean	10,332	10,310	10,281
Median	10,102	10,099	10,081
Minimum	2,314	2,315	2,315

Based on modeling by Stetson Engineers (2001).

Water Quality Impacts in the Lake and along the River

There would be no difference in the concentration of total dissolved solids (TDS) in Cachuma Lake between the 0.75-foot surcharge alternative and the proposed 3.0-foot surcharge project (Stetson Engineers, 2001). The amount of SWP water delivered to the reservoir under this alternative and proposed project would be the same. The salinity modeling results also showed no difference in TDS concentrations in water rights releases at the dam and at the Narrows between the 0.75-foot surcharge alternative and the 3.0-foot surcharge project (Stetson Engineers, 2001).

Water Quality Impacts in the Lompoc Basin

The modeling results by Stetson Engineers (2001) indicate that TDS levels in the groundwater of the Lompoc Basin would be essentially the same for the 0.75-foot surcharge alternative and the proposed 3.0-foot surcharge project. In both cases, there would be a minor improvement in TDS levels, particularly in the western and eastern portions of the basin. The modeling results showed no significant difference between the two operational scenarios because the same amount of water is released to the below Narrows area for both alternatives.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2001) indicated that there was no significant difference in spawning and rearing habitats at Cachuma Lake and along the river between the 0.75-foot surcharge alternative and the proposed 3.0-foot surcharge project. In both cases, there would be an enhancement of river habitat conditions due to releases from Bradbury Dam, and no adverse impacts to lake fish habitat.

Impacts on Lakeshore Vegetation and Oak Trees

The 0.75-foot surcharge represents current operations, and as such, would not result in any loss of oak trees and upland vegetation along the lake margins, as would the proposed project.

Impacts on Recreational Facilities at the County Park

The 0.75-foot surcharge represents current operations, and as such, would not result in any adverse effects to recreational facilities at Cachuma Lake County Park as would the proposed project.

Cultural Resources

The 0.75-foot surcharge represents current operations, and as such, would not result in any adverse effects to cultural resources along the margins of Cachuma Lake as would the proposed project.

Summary of Impacts of the 0.75-foot Surcharge Alternative

A comparison of the environmental impacts of the 0.75-foot surcharge alternative and the proposed 3.0-foot surcharge project is presented in Table 10-10.

TABLE 10-10
COMPARATIVE IMPACTS OF THE SMALLER SURCHARGE ALTERNATIVES

Impact and Classification	Magnitude and Significance of Impact Relative to Proposed 3.0-foot Surcharge	
	Releases for Long-term Rearing Target Flows and Passage Flows with 0.75' Surcharge (0.75' ALTERNATIVE)	Releases for Long-term Rearing Target Flows and Passage Flows with 1.8' Surcharge (1.8' ALTERNATIVE)
Flooding hazards along the river (Class III)	No difference	No difference
Water supply (shortages during drought years) (Class I)	Increased magnitude of this significant impact	Increased magnitude of this significant impact
Above Narrows Alluvial Aquifer conditions (Class IV)	No difference	No difference
River and lake water quality (no impact)	No difference	No difference
Water quality in the Lompoc Basin (Class IV)	No difference	No difference
Fish in the lake and along the river (Class IV)	No difference	No difference
Lakeshore vegetation and oak trees (Class II)	No impact	Fewer oak trees, but still considered Class II impact
Recreational facilities at the lake (Class II)	No impact	Only one critical facility needs to be relocated (but still considered a Class II impact)
Archeological resources (Class II)	No impact	Slightly less, but still considered Class II impact

The 0.75-foot surcharge alternative would avoid three significant (Class II) associated with surcharging – impacts to oak tree, recreational facilities, and cultural resources. However, it would increase the magnitude of a significant, unmitigable impact (Class I) associated with the proposed project – shortage in water deliveries during drought years due to the use of water for fish releases from water supply storage.

10.3.1.4 Summary of the Alternative

This alternative would not meet the project purpose and need and CEQA project objectives, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would avoid three significant impacts of the proposed project, and it would increase the magnitude of one significant impact of the proposed project. Reclamation and COMB do not consider this alternative to be preferable to the proposed project because it would result in greater water supply impacts and would not reasonably balance the competing needs for fish and water supply.

10.3.2 1.8-FOOT SURCHARGE ALTERNATIVE

10.3.2.1 Description of the Alternative

This alternative consists of operations of the proposed project described in Section 2.0, including downstream releases to meet long-term rearing and passage target flows for steelhead. Under this alternative, the long-term rearing and passage releases would be derived in part from a 1.8-foot surcharge and from project yield. The 1.8-foot surcharge produces about 5,500 acre-feet when the lake spills, which occurs on average every three years. The proposed 3.0-foot surcharge produces about 9,200 acre-feet in a surcharge event (Note: the 3.0-foot surcharging does not fully offset the anticipated water needs for rearing flows). A 1.8-foot surcharge would be accomplished by either installing the proposed 3-foot high flashboards on the spillway gates and only operating them to 1.8-foot height, or installing custom flashboards with a height of 1.8 feet plus freeboard.

10.3.2.2 Feasibility Considerations

The 1.8-foot Surcharge Alternative would not fully meet the project purpose and need and CEQA project objectives because it would cause a significant project-specific impact on water supply (see below), which would be contrary to a key element of the CEQA objectives ("The actions must not substantially affect the Cachuma Project yield…") and the purpose and need statement ("…not affect project yield in a meaningful way."). However, this alternative is considered feasible based solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO because it would provide the planned rearing and passage flows even with only the current lake surcharge of 1.8 feet.

10.3.2.3 Environmental Impacts

Lake Levels

Under the 1.8-foot surcharge alternative, median lake levels would be slightly lower than under the proposed project due to greater releases without an offsetting increase from surcharging (see Table 10-4). In addition, the 1.8-foot alternative would exhibit lower lake levels than under current operations.

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2001), the 1.8-foot surcharge alternative would exhibit higher average spill amounts than the proposed project with a 3-foot surcharge (Table 10-5). The number of spill months would be slightly higher than under the proposed project. The average water rights and fish releases and number of spill years would be about the same for the 1.8-foot and 3-foot surcharge.

The flow regime below the dam due to spills and downstream water rights and fish releases would be essentially the same for the 1.8-foot surcharge alternative and the proposed project (see Tables 10-6 and 10-7). There would be no difference in the downstream flows between the 1.8-foot and the proposed 3.0-foot surcharge project because the same amount of water must be released under all three operational scenarios to meet water rights requirements and the flow requirements under the FMP/BO.

Impact on Flood Hazards along the River

As noted above, the 1.8-foot surcharge alternative would result in the same downstream flow regime as the proposed project. Hence, it would result in the same minor impact on vegetation conditions in the river channel and associated flooding hazard – an adverse, but not significant impact (Class III).

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units would be reduced under the 1.8-foot surcharge alternative because surcharging would not be available to partially offset the additional releases for steelhead rearing and passage. Hence, releases for fish purposes would be derived from project yield. The magnitude of the reduction in project yield is summarized in Table 10-8 and below:

- The 1.8-foot surcharge alternative would result in a minor reduction in the average annual deliveries from the Cachuma Project to the Member Units compared to the proposed project with a 3-foot surcharge (Table 10-8).
- The 1.8-foot surcharge alternative would increase the number of years with shortage in water supply deliveries of 10 percent of more compared to the shortage amount under the proposed project. It will also increase the number of months with shortages within each year with shortages.
- The shortage in deliveries during the critical drought year would be 14 percent higher under the 1.8-foot surcharge alternative compared to the shortage amount under the proposed project.
- The deliveries during a 3-year drought period would be less under the 1.8-foot surcharge alternative compared to the proposed project. The shortage in delivery during the critical drought years would be 17 percent higher compared to the shortage amount under the proposed project.

The reduction in project deliveries to the Member Units is considered a significant, unmitigable cumulative impact (Class I) for the same reasons presented in Section 10.3.1.3. The 1.8-foot surcharge alternative would not create sufficient additional storage to offset the water supply impacts of the additional releases for fish under the FMP/BO. (It should be noted that the 3.0-foot surcharge also does not fully offset the impacts of the proposed releases.)

Effect on the Above Narrows Alluvial Aquifer

There would be no difference in the dewatered storage in the Above Narrows Alluvial Aquifer between the 1.8-foot surcharge alternative and the proposed 3.0-foot surcharge project because the same amount of water must be released under both operational scenarios to meet water rights requirements and the flow requirements under the FMP/BO (see Table 10-9).

Water Quality Impacts in the Lake and along the River

There would be no difference in the concentration of total dissolved solids in Cachuma Lake between the 1.8-foot surcharge alternative and the proposed 3.0-foot surcharge project (Stetson Engineers, 2001). The amount of SWP water delivered to the reservoir under this alternative and proposed project would be the same. The salinity modeling results also showed no difference in TDS concentrations in water rights releases at the dam and at the Narrows between the 1.8-foot surcharge alternative and the 3.0-foot surcharge project (Stetson Engineers, 2001).

Water Quality Impacts in the Lompoc Basin

The modeling results by Stetson Engineers (2001) indicate that TDS levels in the groundwater of the Lompoc Basin would be the same for the 1.8-foot surcharge alternative and the proposed 3.0-foot surcharge project. In both cases, there would be a minor improvement in TDS levels, particularly in the western and eastern portions of the basin. The modeling results showed no difference between the two operational scenarios because the same amount of water is released to the below Narrows area for both alternatives.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2001) indicated that there was no significant difference in spawning and rearing habitats at Cachuma Lake and along the river between the 1.8-foot surcharge alternative and the proposed 3.0-foot surcharge project. In both cases, there would be an enhancement of river habitat conditions due to releases from Bradbury Dam, and no adverse impacts to lake fish habitat.

Impacts on Lakeshore Vegetation and Oak Trees

The 1.8-foot surcharge alternative would inundate native vegetation along the margins of Cachuma Lake when the lake is full. Approximately 42 acres would be inundated, less than the 91 acres that would be affected by the proposed 3.0-foot surcharge (Table 10-11). This impact is considered adverse, but not significant (Class III) because of the small acreage involved compared to the total acreage of these common vegetation types in the area. The impact conclusion is the same as for the proposed project (Section 6.4.3).

TABLE 10-11
LAKESHORE VEGETATION AFFECTED BY SURCHARGING

Vegetation	% of Lake Margin Vegetation	Acres Affected by Periodic Flooding above 750.75’	
		1.8’ Inundation Zone	3.0’ Inundation Zone
Chaparral	39.5	16.6	35.9
Oak woodland	26.5	11.1	24.1
Freshwater marsh	25.3	10.6	23.0
Coastal sage scrub	2.7	1.1	2.5
Grassland	2.4	1.0	2.2
Barren slopes	1.8	0.76	1.6
County Park (turf, bare slope)	1.8	0.76	1.6
TOTAL		41.9	90.9

The 1.8-foot surcharge alternative would result in the loss of about 271 coast live oak trees over time, less than under the proposed project (see Table 10-12). The loss of oak trees associated with the 1.8-foot surcharge alternative is considered a significant, but mitigable impact (Class II). The significance of this impact under the 1.8-foot surcharge is the same as for the proposed project; however, fewer trees would be affected under this alternative. The oak tree restoration program for the proposed project (described Section 6.4.3) would also apply to this alternative. The objective of an oak tree replacement program would be to replace coast live and valley oak trees lost due to periodic surcharging in a phased manner linked to the incremental loss of oak trees over time. Trees would be planted at the County Park. The loss of oak trees is considered significant and unmitigable until such time that the replacement trees have become well established and self-sustaining, which is estimated to be about 10 years.

TABLE 10-12
ESTIMATE OF OAK TREES AFFECTED IN INUNDATION ZONES

Alternative	Number of Oak Trees Affected. (All coast live oak except for Valley Oaks shown in parentheses)		
	Direct Inundation	Indirect Impacts due to Wave Action (approx.)	Total
1.8’ surcharge	158 (14)	113 (10)	248.8 (24)
3.0’ surcharge	339 (30)	113 (10)	415 (40)

Impacts on Recreational Facilities at the County Park

As described in Section 6.6.2, the 3-foot surcharge of the reservoir would result in periodic higher lake levels would affect recreational facilities at the County Park. Inundation of certain critical recreational facilities could disrupt recreational activities. The magnitude and significance of the impact on recreation depend on the facilities affected and the duration of impact that causes disruption of recreation.

An assessment of the potential effect of surcharging on facilities was prepared by County Parks and presented in Flowers & Associates (2000). The assessment included an inventory of the base elevations of various facilities to determine if higher lake levels could flood the facilities or otherwise affect their functions. As described in Section 6.6.2, URS Corporation conducted a review the Flowers & Associates (2000) report and topographic maps of the County Park to identify facilities that would be affected under two conditions: (1) still water conditions with a full reservoir at 753 feet; and (2) a full reservoir with 3-foot high storm generated waves, at 756 feet elevation. The results shown in Table 6-15 indicate that most facilities would not need to be relocated if County Parks determined that occasional high water levels with wave action would not damage the facilities, nor cause an unacceptable impact on recreation. However, several key facilities would be affected by a 3-foot surcharge with no wave action, including the water treatment plant, boat launch ramp, and marina path and docks.

A similar analysis of the effects of a 1.8-foot surcharge on recreational facilities at the County Park was conducted using two lake levels: (1) maximum lake level at 751.8 feet with still water; and (2) maximum lake level with 3-foot waves, for a level of 754.8 feet. The results are presented in Table 10-10, which also includes the results of the analysis for the proposed 3-foot surcharge for comparison.

Facilities that would be inundated by a 1.8-foot surcharge with no wave action include the boat launch ramp, Teepee Island footbridge, and boat shop picnic area. All other facilities would not be inundated by a 1.8-foot surcharge if there were no waves. Facilities that would be affected by a 1.8-foot surcharge with a 3-foot wave surge include water treatment plant, sewer lift station 3, marina path and docks, boat launch ramp, marina overflow parking lot, Harvey's Cove path, Teepee Island footbridge, Barona Shores trail, Sweetwater trail, and Mohawk overflow parking. The need to relocate these facilities to protect from wave action must be determined by County Parks based on the level of risk that they are willing to take regarding each facility.

For many facilities located at or near 753 feet elevation, inundation due to a 3-foot surcharge with wave action could be tolerated because the facilities would not be damaged and the duration of the wave action would be limited to hours or a day, and because the public can be excluded from these areas of the park during the storm period when there are high waves.

The 1.8-foot surcharge would affect fewer recreational facilities than the proposed 3-foot surcharge. Based on only the still water lake levels, the 1.8-foot surcharge would only affect one critical facility – the boat launch ramp. In contrast, the proposed 3-foot surcharge (still water conditions) would affect three critical facilities: water treatment plant, boat launch ramp, and marina path and docks. Nevertheless, the potential disruption of recreational uses at the lake (albeit only one critical facility) is still considered a significant but mitigable impact (Class II), identical to the proposed project. Under this alternative, the time to acquire funding, complete design, and relocate the facilities would likely be less than under the proposed project due to fewer affected facilities.

Cultural Resources

The two prehistoric archaeological sites along the lake margins would be subject to slightly less erosion under the 1.8-foot surcharging alternative compared to proposed 3.0-foot surcharge. The magnitude of this impact would be less than for the proposed project, but it is still considered a significant, but mitigable impact (Class II), identical to the proposed project.

Summary of Impacts of the 1.8-foot Surcharge Alternative

A comparison of the environmental impacts of the 1.8-foot surcharge alternative and the proposed 3.0-foot surcharge project is presented in Table 10-10.

The 1.8-foot surcharge alternative would reduce the magnitude of three significant but mitigable impacts (Class II) – impacts to oak tree, recreational facilities, and cultural resources. However, it would increase the magnitude of a significant, unmitigable impact (Class I) associated with the proposed project – shortage in water deliveries during drought years due to the use of water for fish releases from water supply storage.

10.3.2.4 Summary of the Alternative

This alternative would not meet the project purpose and need and CEQA project objectives, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would reduce the magnitude of three significant impacts of the proposed project, and it would increase the magnitude of one significant impact of the proposed project. Reclamation and COMB do not consider this alternative to be preferable to the proposed project because it would result in greater water supply impacts and would not reasonably balance the competing needs for fish and water supply.

TABLE 10-13
RECREATIONAL FACILITIES AFFECTED BY DIFFERENT LEVELS OF SURCHARGING

Facility (see Figure 6-7)	Current Base Elevation (Est. in feet)	1.8' Surcharge		3' Surcharge	
		751.8' No Wave Surge	754.8' With Wave Surge	753' No Wave Surge	756' With Wave Surge
Critical Facilities					
Drinking Water Intake	755	No	**Yes**	No	**Yes**
Drinking Water Treatment Plant	753	No	**Yes**	**Yes**	**Yes**
Sewer Lift No. 2	759	No	No	No	**Yes**
Sewer Lift No. 3	758	No	**Yes**	No	**Yes**
Marina Path and Stairs and Floating Docks	753	No	**Yes**	**Yes**	**Yes**
Boat Launch Ramp	750	**Yes**	**Yes**	**Yes**	**Yes**
Bait and Tackle Shop, Snack Bar, retaining wall	756	No	No	No	**Yes**
Marina Overflow Parking	753	No	**Yes**	No	**Yes**
Non-Critical Facilities					
Mohawk Road	756	No	No	No	**Yes**
Harvey's Cove Picnic Area	755	No	No	No	**Yes**
Harvey's Cove Path	754	No	**Yes**	No	**Yes**
Barona Shores Trail	755	No	**Yes**	**Yes**	**Yes**
Teepee Island foot bridge	752	**Yes**	**Yes**	**Yes**	**Yes**
Sweetwater Trail	755	No	**Yes**	No	**Yes**
Boat Works Shop	760	No	No	No	**Yes?**
Picnic Area Adjacent to Shop	751	**Yes**	**Yes**	**Yes**	**Yes**
UCSB Crew Building and Ramp	756	No	No	No	**Yes**
Mohawk Overflow Area and Road	754	No	**Yes**	No	**Yes**

10.4 REARING FLOW ALTERNATIVES

10.4.1 Lower Target Flows at Highway 154

10.4.1.1 Description of the Alternative

Under this alternative, the target flows for rearing habitat at Highway 154 would be reduced to lessen the impact of such releases on water supply. The timing and ramping regime for these releases would be the same as for the proposed project. All other elements of the proposed FMP/BO would remain the same, including the rearing target flows at Alisal Road and 3.0-foot surcharging. The target flows under this alternative are shown in Table 10-14, along with those of the proposed project. This alternative would maintain the current releases for rearing target flows at Highway 154 that were considered "interim" in the FMP/BO (until surcharging was implemented), and would include long-term rearing target flows at Alisal Road.

TABLE 10-14
LOWER REARING HABITAT TARGET FLOWS AT HIGHWAY 154

Lake Storage Conditions (acre-feet)	Reservoir Spill? (AF = acre-feet)	Long Term Target Flow (cfs) under this Alternative	Long Term Target Flow (cfs) under Proposed Project	Long Term Target Site
> 120,000	Spill is greater than 20,000 AF	5	10	Highway 154
> 120,000	Spill is greater than 20,000 AF	1.5 (if steelhead present)*	1.5 (if steelhead present)*	Alisal Road
> 120,000	No spill or spill is less than 20,000 AF	2.5	5	Highway 154
> 120,000	If spill is greater than 20,000 AF in <u>previous year</u>	1.5 (if steelhead present)*	1.5 (if steelhead present)*	Alisal Road
30,000 - 120,000	No spill	1.5	2.5	Highway 154
< 30,000	No spill	Periodic release; < or = 30 AF/month**	Periodic release; < or = 30 AF/month**	Stilling basin & long pool

* Only if steelhead are present in the Alisal Reach.
** Reclamation must also consult with NMFS in this situation.

10.4.1.2 Feasibility Considerations

The Lower Target Flows at Highway 154 Alternative would partially meet the project purpose and need and CEQA project objectives because it would improve rearing habitat for fish below Bradbury Dam compared to historic conditions, and all other non-flow FMP/BO actions would be implemented on the mainstem and tributaries. This alternative is considered feasible based solely on technical, logistical, and economic considerations. However, this alternative would not be consistent with the FMP/BO because it would not provide the rearing flows required in the BO.

10.4.1.3 Environmental Impacts

Lake Levels

Under this alternative, median lake levels would be slightly higher than under the proposed project due to lower releases for rearing flows (see Table 10-15).

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2003), the Lower Target Flows at Highway 154 Alternative would exhibit higher average spill amounts than the proposed project with a 3-foot surcharge (Table 10-16). The number of spill months and years would be slightly higher than under the proposed project.

The average annual water rights releases would be the same as for the proposed project. However, the amount released for fish would be less under this alternative. The total average annual discharge from the dam due to all releases and spills would be slightly less for the Lower Target Flows at Highway 154 Alternative compared to the proposed project (Table 10-16).

The flow regime below the dam due to spills and downstream water rights and fish releases under the Lower Target Flows at Highway 154 Alternative would differ from the proposed project (see Table 10-17). There would be fewer low flows (5 cfs or less) between the dam and Highway 154 because of the reduced target flows.

Impact on Flood Hazards along the River

The Lower Target Flows at Highway 154 Alternative would have fewer low flows between the dam and Highway 154 compared to the proposed project due to reduced target flows. The total average annual discharge from the dam due to all releases and spills would also be slightly less (Table 10-16). Hence, this alternative would have less effect on stimulating growth of riparian vegetation in the river channel along this reach. This impact is still considered adverse, but not significant (Class III), the same as for the proposed project.

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units would be slightly greater under the Lower Target Flows at Highway 154 Alternative because the rearing target flows would be lower than under the proposed project. The increase in average annual yield is very small. More important is that predicted shortages in critical drought years would be less under this alternative compared to the proposed project as shown in Table 10-18.

TABLE 10-15
MEDIAN LAKE LEVEL FOR MODIFIED REARING TARGET FLOW ALTERNATIVES

Occurrence	Median Water Elevation (feet)					
	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	Higher Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	No Rearing Target Flows at Alisal Road (ALTERNATIVE)	Higher Rearing Target Flows at Alisal Road (ALTERNATIVE)
Annual	733.7	734.6	735.2	733.3	734.6	734.6
Feb	737.2	738.1	738.6	736.8	738.1	738.0
Aug	732.2	735.0	735.3	733.7	735.0	734.9

Based on modeling by Stetson Engineers (2003) for the period of record 1918-1993. The proposed project and all alternatives listed above would have a 3-foot surcharge.

TABLE 10-16
KEY HYDROLOGIC CHARACTERISTICS OF REARING TARGET FLOW ALTERNATIVES

Spill and Release	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	Higher Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	No Rearing Target Flows at Alisal Road (ALTERNATIVE)	Higher Rearing Target Flows at Alisal Road (ALTERNATIVE)
Average spills/leakage (AFY)	36,693	35,415	35,924	34,380	35,445	35,385
Average 89-18 releases (AFY)	6,023	5,737	5,774	5,478	5,731	5,743
Average fish releases (AFY)	1,362	2,715	2,003	4,411	2,688	2,777
Total discharges from the dam (AFY)	44,078	43,867	43,701	44,269	43,864	43,906
No. of spill months	82	78	80	74	78	78
No. of spill water years	26	25	26	25	25	25
No. of spill water years >20,000 acre-feet	16	15	15	14	15	15

Based on modeling by Stetson Engineers (2003) for the period of record 1981-1993. The proposed project and all alternatives listed above would have a 3-foot surcharge.

TABLE 10-17
STREAM FLOWS DOWNSTREAM OF BRADBURY DAM UNDER THE TARGET FLOW ALTERNATIVES

Flow (cfs)	Percentage of Time Streamflows are at or **ABOVE** the Indicated Flow (simulation, 1918-1993).					
	Current Operations Interim Rearing Target Flows with 0.75 Surcharge	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	Higher Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	No Rearing Target Flows at Alisal Road (ALTERNATIVE)	Higher Rearing Target Flows at Alisal Road (ALTERNATIVE)
Below Hilton Creek						
2	99 %	99 %	99 %	99 %	99 %	99 %
5	47 %	75 %	53 %	96 %	76 %	75 %
10	33 %	39 %	34 %	68 %	39 %	40 %
20	26 %	28 %	28 %	27 %	28 %	28 %
50	13 %	12 %	12 %	12 %	12 %	12 %
Highway 154						
2	82 %	99 %	83 %	99 %	99 %	98 %
5	48 %	78 %	52 %	99 %	78 %	78 %
10	34 %	39 %	36 %	55 %	38 %	39 %
20	27 %	28 %	29 %	28 %	28 %	29 %
50	12 %	12 %	12 %	11 %	12 %	12 %
Alisal Road						
2	53 %	69 %	53 %	84 %	69 %	72 %
5	43 %	49 %	45 %	71 %	49 %	49 %
10	34 %	36 %	36 %	42 %	36 %	36 %
20	23 %	25 %	25 %	25 %	24 %	25 %
50	12 %	12 %	12 %	11 %	12 %	12 %
Near Buellton						
2	51 %	57 %	51 %	74 %	57 %	58 %
5	41 %	44 %	42 %	56 %	44 %	44 %
10	32 %	34 %	34 %	38 %	34 %	35 %
20	24 %	26 %	25 %	27 %	26 %	26 %
50	12 %	12 %	12 %	12 %	12 %	12 %
Salsipuedes Creek						
2	39 %	43 %	40 %	52 %	42 %	43 %

Flow (cfs)	Percentage of Time Streamflows are at or **ABOVE** the Indicated Flow (simulation, 1918-1993).					
	Current Operations Interim Rearing Target Flows with 0.75 Surcharge	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	Higher Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	No Rearing Target Flows at Alisal Road (ALTERNATIVE)	Higher Rearing Target Flows at Alisal Road (ALTERNATIVE)
5	35 %	37 %	35 %	43 %	36 %	41 %
10	30 %	32 %	31 %	35 %	32 %	35 %
20	25 %	26 %	26 %	28 %	26 %	29 %
50	12 %	13 %	13 %	12 %	13 %	14 %
The Narrows						
2	45 %	48 %	45 %	55 %	48 %	49 %
5	38 %	41 %	38 %	46 %	41 %	41 %
10	33 %	35 %	33 %	38 %	35 %	35 %
20	28 %	29 %	28 %	31 %	29 %	29%
50	14 %	14 %	14 %	14 %	14 %	14 %

Based on modeling by Stetson Engineers (2003).

TABLE 10-18
IMPACTS OF REARING TARGET FLOW ALTERNATIVES ON PROJECT DELIVERIES TO MEMBER UNITS

Water Supply and Storage	Recent Historic Operations Under WR 89-18 (HISTORIC OPS)	Current Operations with Interim Rearing Target Flows and 0.75 Surcharge (CURRENT OPS)	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	Higher Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	No Rearing Target Flows at Alisal Road (ALTERNATIVE)	Higher Rearing Target Flows at Alisal Road (ALTERNATIVE)
Average Annual Deliveries and Years of Shortages (Simulation Period 1918-1993)							
Average annual delivery (includes 2,000 AFY from Tecolote Tunnel)	25,308	25,115	25,123	25,220	24,835	25,122	24,094
No. of years with 10% or more shortage over the 76-year simulation period	5 years	6 years	6 years	6 years	8 years	6 years	7 years
Critical Drought Year (Simulation of Historic Worst Drought Year – 1951)							
Shortage in critical drought year (acre-feet)	7,070	9,810	9,890	8,920	12,790	9,890	10,423
Shortage as a percentage of current annual operational yield of 25,714 AFY	27%	38%	38%	35%	50%	38%	41%
Critical 3-year Drought Period (based on simulation of 1949-51 drought)							
Shortage in critical drought years (acre-feet)	14,210	20,130	19,920	17,690	26,950	19,920	21,213
Shortage as a percentage of current annual operational yield of 25,714 AFY for three years	18%	26%	26%	23%	35%	26%	27%

Source: Stetson Engineers (2003).

TABLE 10-19
MONTHLY DEWATERED STORAGE
IN THE ABOVE NARROWS ALLUVIAL BASIN FOR REARING TARGET FLOW ALTERNATIVES

Dewatered Storage	Acre-feet					
	Current Operations with Interim Rearing Target Flows and 0.75 Surcharge (CURRENT OPS)	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	Higher Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	No Rearing Target Flows at Alisal Road (ALTERNATIVE)	Higher Rearing Target Flows at Alisal Road (ALTERNATIVE)
Mean	10,769	10,281	10,630	9,660	10,291	10,257
Median	10,517	10,081	10,372	9,583	10,096	10,003
Minimum	2,324	2,315	2,323	2,313	2,315	2,317

Based on modeling by Stetson Engineers (2003) for period of record 1918-1993.

However, this alternative would still cause a reduction in project deliveries to the Member Units and increased shortages in drought years compared to current and historic operations. Hence, the water supply impact is considered a significant, unmitigable cumulative impact (Class I), the same as for the proposed project.

Effect on the Above Narrows Alluvial Aquifer

There would be a slight increase in the dewatered storage in the Above Narrows Alluvial Aquifer due to the Lower Target Flows at Highway 154 Alternative because the rearing target flows would be lower than under the proposed project (see Table 10-19).

Water Quality Impacts in the Lake, along the River, and in the Lompoc Basin

The Lower Rearing Target Flow Alternative is not expected to significantly differ from the proposed project regarding the average annual concentration of total dissolved solids in Cachuma Lake, along the river downstream of the dam, and in the Lompoc Basin because of the following reasons: (1) the amount of higher quality SWP water delivered to the reservoir under this alternative and proposed project would be the same; and (2) the total amount of water discharged from the dam due to water rights releases, fish releases, and spills is not sufficiently different from the proposed project to cause a measurable effect on TDS concentrations.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2003) indicated that there was no significant difference in spawning and rearing habitats at Cachuma Lake between the Lower Rearing Target Flow Alternative and the proposed project.

The Entrix (2003) analysis indicated that the frequency of years with higher quality spawning habitat (score “5”) at Highway 154 would not be reduced by this alternative (see Table 10-20). However, there would be more years with very poor spawning conditions (scores “1” and “0”) compared to the proposed project. However, this alternative would still result in more frequent years with suitable spawning habitat at Highway 154 compared to current conditions.

The Entrix (2003) analysis also indicated that the frequency of years with moderate to high quality fry and juvenile rearing habitat (scores “2” to “4”) at Highway 154 would be reduced by this alternative (see Tables 10-21 and 22). However, this alternative would still result in more frequent years with suitable rearing habitat at Highway 154 compared to current conditions.

Impacts on Lakeshore Vegetation and Oak Trees

The Lower Rearing Target Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on oak trees and upland vegetation along the lake margins as the proposed project.

TABLE 10-20
AVERAGE HABITAT SCORES FOR SPAWNING AT HIGHWAY 154 FOR REARING TARGET FLOW ALTERNATIVES

Alternatives	Frequency of Annual Scores over Historic Period (Simulation 1918-1993)						
	best					worse	
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Current Operations	23	5	5	11	22	10	2.6
Proposed Project	23	7	17	18	9	2	3.1
Lower Rearing Target Flows at Highway 154	23	5	15	13	12	8	2.9
Higher Rearing Target Flows at Highway 154	22	19	15	19	0	1	3.5
Higher Rearing Target Flows at Alisal Road	23	6	18	18	9	2	3.1
No Rearing Target Flows at Alisal Road	23	7	17	18	9	2	3.1

Habitat scores based on modeling by Entrix (2003) in which a score of “5” represents good spawning habitat (e.g., suitable flows at the right time of year), and a score of “0” is very poor habitat. Scores are assigned based on simulated flows during each year of the simulation period.

TABLE 10-21
AVERAGE HABITAT SCORES FOR FRY REARING AT HIGHWAY 154 FOR REARING TARGET FLOW ALTERNATIVES

Alternatives	Frequency of Annual Scores over Historic Period (Simulation 1918-1993)						
	best					worse	
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Current Operations	1	16	38	21	0	1	2.9
Proposed Project	0	54	21	0	0	1	3.7
Lower Rearing Target Flows at Highway 154	0	15	40	20	0	1	2.9
Higher Rearing Target Flows at Highway 154	15	60	0	0	0	1	4.1
Higher Rearing Target Flows at Alisal Road	0	54	21	0	0	1	3.7
No Rearing Target Flows at Alisal Road	0	54	21	0	0	1	3.7

Habitat scores based on modeling by Entrix (2003) in which a score of “5” represents good rearing habitat (e.g., suitable flows at the right time of year), and a score of “0” is very poor habitat. Scores are assigned based on simulated flows during each year of the simulation period.

TABLE 10-22
AVERAGE HABITAT SCORES FOR JUVENILE REARING AT HIGHWAY 154 FOR REARING TARGET FLOW ALTERNATIVES

Alternatives	Frequency of Annual Scores over Historic Period (Simulation 1918-1993)						
	best					worse	
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Current Operations	0	15	39	20	0	2	2.6
Proposed Project	0	41	33	0	0	2	3.5
Lower Rearing Target Flows at Highway 154	0	1	43	30	0	2	2.5
Higher Rearing Target Flows at Highway 154	1	73	0	0	0	2	3.9
Higher Rearing Target Flows at Alisal Road	0	41	33	0	0	2	3.5
No Rearing Target Flows at Alisal Road	0	41	33	0	0	2	3.5

Habitat scores based on modeling by Entrix (2003) in which a score of “5” represents good rearing habitat (e.g., suitable flows at the right time of year), and a score of “0” is very poor habitat. Scores are assigned based on simulated flows during each year of the simulation period.

Impacts on Recreational Facilities at the County Park

The Lower Rearing Target Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on recreational facilities as the proposed project.

Cultural Resources

The Lower Rearing Target Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on shoreline cultural resources as the proposed project.

Summary of Impacts of the Lower Rearing Target Flow Alternative

A comparison of the environmental impacts of the Lower Rearing Target Flow Alternative and the proposed project is presented in Table 10-23. The alternative would reduce the magnitude of the water supply impacts associated with the proposed project, but the level of significance would remain the same (Class I). The magnitude of the flood hazard impact (a less than significant impact) would also be reduced. The alternative would enhance spawning and rearing habitat conditions for steelhead between the dam and Highway 154 compared to current conditions, but the degree of improvement would be less than under the proposed project.

10.3.1.4 Summary of the Alternative

This alternative would not fully meet the project purpose and need, it would not be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid any significant impacts of the proposed project, and it would reduce the magnitude of one significant impact of the proposed project. It is not considered desirable by Reclamation and COMB because it would not provide a reasonable balance of the competing needs for fish and water supply.

10.4.2 Higher Target Flows at Highway 154

10.4.2.1 Description of the Alternative

Under this alternative, the target flows for rearing habitat at Highway 154 would be increased to provide more frequent high quality rearing habitat downstream of Bradbury Dam. The timing and ramping regime for these releases would be the same as for the proposed project, although the target flows would increase. For example, when Cachuma Lake is near full, the target flows would be 15 cfs under this alternative, compared to 10 cfs under the proposed project. All other elements of the FMP/BO would remain the same under this alternative, including the 3.0-foot surcharge. The target flows under this alternative are shown in Table 10-24, along with those of the proposed project.

TABLE 10-23
COMPARATIVE IMPACTS OF THE REARING TARGET FLOW ALTERNATIVES

Impact and Classification	Magnitude and Significance of Key Impacts Relative to Proposed Project			
	Lower Long-term Rearing Target Flows at Highway 154	Higher Long-term Rearing Target Flows at Highway 154	No Rearing Target Flows at Alisal Road	Higher Rearing Target Flows at Alisal Road
Flooding hazards along the river (Class III)	Lower magnitude of impact, but same level of significance	Possibly higher magnitude but same level of significance	No difference	No difference
Water supply (predicted shortages in drought years) (Class I)	Lower magnitude of impact, but same level of significance	Higher magnitude but same level of significance	No difference	Slightly higher magnitude but same level of significance
Water supply (curtailment of SWP water deliveries)	No impact	New significant impact	No impact	No significant difference
Above Narrows Alluvial Aquifer conditions (Class IV)	No significant difference	No significant difference	No significant difference	No significant difference
Water quality in lake, along river, and in Lompoc Basin (Class IV)	No significant difference	No significant difference	No significant difference	No significant difference
Fish in the lake (no impact)	No difference	No difference	No difference	No difference
Fish spawning and rearing habitat along the river below dam (Class IV)	Enhanced habitat compared to current conditions, but magnitude of enhancement is less than proposed project	Enhanced habitat compared to current conditions and proposed project	Enhanced habitat compared to current conditions, but magnitude of enhancement is less than proposed project	Possible improved rearing habitat between Hwy 154 and Alisal compared to proposed project
Lakeshore vegetation and oak trees (Class II)	No difference	No difference	No difference	No difference
Recreational facilities at the lake (Class II)	No difference	No difference	No difference	No difference
Cultural resources (Class II)	No difference	No difference	No difference	No difference

10.4.2.2 Feasibility Considerations

The Higher Target Flows at Highway 154 Alternative would not fully meet the project purpose and need and CEQA project objectives because it would cause a significant project-specific impact on water supply (see below), which would be contrary to a key element of the CEQA objectives ("The actions must not substantially affect the Cachuma Project yield…") and the purpose and need statement ("…not affect project yield in a meaningful way."). However, this alternative is considered feasible based on solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO although it would provide more than the planned rearing flows.

TABLE 10-24
HIGHER REARING HABITAT TARGET FLOWS AT HIGHWAY 154

Lake Storage Conditions (acre-feet)	Reservoir Spill? (AF = acre-feet)	Long Term Target Flow (cfs) under this Alternative	Long Term Target Flow (cfs) under Proposed Project	Long Term Target Site
> 120,000	Spill is greater than 20,000 AF	15	10	Highway 154
> 120,000	Spill is greater than 20,000 AF	1.5 (if steelhead present)*	1.5 (if steelhead present)*	Alisal Road
> 120,000	No spill or spill is less than 20,000 AF	10	5	Highway 154
> 120,000	If spill is greater than 20,000 AF in previous year	1.5 (if steelhead present)*	1.5 (if steelhead present)*	Alisal Road
30,000 - 120,000	No spill	5	2.5	Highway 154
< 30,000	No spill	Periodic release; < or = 30 AF/month**	Periodic release; < or = 30 AF/month**	Stilling basin & long pool

* Only if steelhead are present in the Alisal Reach.
** Reclamation must also consult with NMFS in this situation.

10.4.2.3 Environmental Impacts

Lake Levels

Under this alternative, median lake levels would be slightly lower than under the proposed project due to greater releases for rearing flows (see Table 10-15).

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2003), the Higher Target Flows at Highway 154 Alternative would exhibit lower average spill amounts than the proposed project with a 3-foot surcharge (Table 10-16). The number of spill months and years would be lower than under the proposed project.

The average annual water rights releases would be less than for the proposed project due to the greater releases for fish. The total average annual discharge from the dam due to all releases and spills would be slightly greater for the Higher Target Flows at Highway 154 Alternative compared to the proposed project (Table 10-16).

The flow regime below the dam due to spills and downstream water rights and fish releases under the Higher Target Flows at Highway 154 Alternative would differ from the proposed project (see Table 10-17). This alternative would have a higher frequency of low to moderate flows (10 cfs or less) between the dam and Alisal Road because of the higher target flows at Highway 154.

Impact on Flood Hazards along the River

The Higher Target Flows at Highway 154 Alternative would have more frequent low to moderate flows between the dam and Highway 154 compared to the proposed project due to higher target rearing flows. The total average annual discharge from the dam due to all releases and spills would also be greater (Table 10-16). Hence, this alternative would have a greater effect on stimulating growth of riparian vegetation in the river channel along this reach. This impact is still considered adverse, but not significant (Class III), the same as for the proposed project.

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units would be slightly less under the Higher Target Flows at Highway 154 Alternative because the rearing target flows would be greater than under the proposed project. The reduction in average annual yield is relatively small. However, the predicted shortages in critical drought years would be substantially greater under this alternative compared to the proposed project as shown in Table 10-18. This water supply impact is considered a significant, unmitigable cumulative impact (Class I), the same as for the proposed project.

Effect on SWP Water Deliveries

Releases for rearing target flows will be made through the Hilton Creek supplemental watering system which will have a full capacity of 10 cfs upon installation of a flexible intake and pump system in 2003. Under the proposed project, releases for the rearing target flows will only occur from the Hilton Creek supplemental watering system and will not exceed 10 cfs. This maximum release will not be sufficient to meet the downstream target flows for this alternative. Hence, there will be periods when releases for rearing target flows from Hilton Creek must be supplemented by releases from the outlet works.

State Water Project (SWP) water is delivered to the outlet works to Bradbury Dam. Deliveries are not made when Cachuma Lake is spilling (in order to prevent the waste of SWP water), or when water is discharged through the outlet works from December to June and flow is continuous in the river. Otherwise, SWP water deliveries are limited to 50 percent of the outlet releases.

Under the Higher Target Flows at Highway 154 Alternative, supplemental releases for rearing flows may occur from the dam outlet works when releases greater than 10 cfs are needed to meet the proposed higher rearing target flows at Highway 154. Based on the simulation modeling by Stetson Engineers (2001, 2003), SWP water deliveries would be precluded (due to spills or supplemental releases from the outlet works to meet the higher rearing target flows at Highway 154) for an average of 2.7 months per year (Table 10-25), compared to 1.4 months per year under the proposed project. During releases or spills in the period December to June, no SWP water deliveries would be made. However, SWP deliveries could be made up at a later time. The average annual number of months that SWP water deliveries would be limited to 50 percent of outlet releases would be 4.2 months under this alternative, compared to 2.9 months under the proposed project (Table 10-25). The increased restrictions on SWP water deliveries would prevent the full delivery of SWP water, and as such, would represent a significant water supply impact (Class I).

Effect on the Above Narrows Alluvial Aquifer

There would be a substantial decrease in the dewatered storage in the Above Narrows Alluvial Aquifer due to the Higher Target Flows at Highway 154 Alternative because the rearing target flows would be greater than under the proposed project (see Table 10-19). A decrease in dewatered storage indicates this alternative would result in higher groundwater conditions, a beneficial impact.

Water Quality Impacts in the Lake, along the River, and in the Lompoc Basin

The Higher Rearing Target Flows at Highway 154 Alternative is not expected to significantly differ from the proposed project regarding the average annual concentration of total dissolved solids in Cachuma Lake, along the river downstream of the dam, and in the Lompoc Basin because of the following reasons: (1) the amount of higher quality SWP water delivered to the reservoir under this alternative and proposed project would be the same; and (2) the total amount of water discharged from the dam due to water rights releases, fish releases, and spills is not sufficiently different from the proposed project to cause a measurable effect on TDS concentrations.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2003) indicated that there was no significant difference in spawning and rearing habitats in Cachuma Lake between the Higher Rearing Target Flows at Highway 154 Alternative and the proposed project.

TABLE 10-25
NUMBER OF MONTHS THAT SWP WATER DELIVERIES WOULD BE AFFECTED BY PROJECT ALTERNATIVES

Average Annual Number of Months that SWP Water Deliveries to Bradbury Dam would be Affected under each Alternative based on Simulation (1918-1993)					
Current Operations with Interim Rearing Target Flows and 0.75 Surcharge (CURRENT OPS)	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	Higher Long-term Rearing Target Flows at Highway 154 (ALTERNATIVE)	No Rearing Target Flows at Alisal Road (ALTERNATIVE)	Higher Rearing Target Flows at Alisal Road (ALTERNATIVE)
SWP Water Deliveries are Precluded because of a Spill or because the Outlet is Being Used for Rearing or Passage Flows(1)					
1.1 (spills only; no passage flows)	1.4 (spills and releases for passage)	1.4 (spills and releases for passage)	2.7 (spills; passage and rearing flow releases)	1.4 (spills and releases for passage)	1.4 (spills; passage and rearing flow releases)
SWP Water Deliveries are Limited to 50 % of Outlet Releases because the Outlet is Being Used for Water Rights, Rearing or Passage Flows					
3.0	2.9	2.9	4.2	2.9	3.1

Based on modeling by Stetson Engineers (2003). (1) SWP water deliveries cannot be released into the river during December through June if flow is continuous in the mainstem of the river per the BO.

The Higher Rearing Target Flows at Highway 154 Alternative would substantially increase the frequency of years with moderate to high quality spawning habitat (scores "3" to "5") (see Table 10-20), as predicted by Entrix (2003). The Entrix (2003) analysis also indicated that the frequency of years with moderate to high quality fry and juvenile rearing habitat (scores "2" to "4") at Highway 154 would also be substantially increased by this alternative (see Tables 10-21 and 22).

Impacts on Lakeshore Vegetation and Oak Trees

The Higher Rearing Target Flows at Highway 154 Alternative would include 3-foot surcharging. Hence, it would have the same effect on oak trees and upland vegetation along the lake margins as the proposed project.

Impacts on Recreational Facilities at the County Park

The Higher Rearing Target Flows at Highway 154 Alternative would include 3-foot surcharging. Hence, it would have the same effect on recreational facilities as the proposed project.

Cultural Resources

The Higher Rearing Target Flows at Highway 154 Alternative would include 3-foot surcharging. Hence, it would have the same effect on shoreline cultural resources as the proposed project.

Summary of Impacts of the Higher Rearing Target Flow Alternative

A comparison of the environmental impacts of the Higher Rearing Target Flows at Highway 154 Alternative and the proposed project is presented in Table 10-23. The alternative would increase the magnitude of the water supply impacts (due to shortages during drought years) associated with the proposed project; the level of significance would remain the same (Class I). This alternative would also cause a new significant impact (Class I) on water supply by curtailing SWP water deliveries to Cachuma Lake. The magnitude of the flood hazard impact (a less than significant impact) would also be increased. The alternative would enhance spawning and rearing habitat conditions for steelhead between the dam and Highway 154 compared to the proposed project.

10.4.2.4 Summary of the Alternative

This alternative would not fully meet the project purpose and need and CEQA project objectives, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid any significant impacts of the proposed project, it would increase the magnitude of one significant impact of the proposed project, and it would create a new significant impact. Reclamation and COMB do not consider this alternative to be preferable to the proposed project because it would not provide a reasonable balance between the competing needs for fish and water supply.

10.4.3 Higher Rearing Target Flows at Alisal Road

10.4.3.1 Description of the Alternative

Under this alternative, the target flows for rearing habitat at Alisal Road would be increased from 1.5 cfs to 3.0 cfs in spill years and in years following a spill. The timing and ramping regime for these releases would be the same as for the proposed project, although the amount would increase. All other elements of the FMP/BO would remain the same as the proposed project, including rearing target flows at Highway 154 and the 3.0-foot surcharge. The target flows under this alternative are shown in Table 10-26.

TABLE 10-26
LOWER REARING HABITAT TARGET FLOWS AT ALISAL

Lake Storage Conditions (acre-feet)	Reservoir Spill? (AF = acre-feet)	Long Term Target Flow (cfs) under this Alternative	Long Term Target Flow (cfs) under Proposed Project	Long Term Target Site
> 120,000	Spill is greater than 20,000 AF	10	10	Highway 154
> 120,000	Spill is greater than 20,000 AF	3.0 (if steelhead present)*	1.5 (if steelhead present)*	Alisal Road
> 120,000	No spill or spill is less than 20,000 AF	5	5	Highway 154
> 120,000	If spill is greater than 20,000 AF in previous year	3.0 (if steelhead present)*	1.5 (if steelhead present)*	Alisal Road
30,000 - 120,000	No spill	2.5	2.5	Highway 154
< 30,000	No spill	Periodic release; < or = 30 AF/month**	Periodic release; < or = 30 AF/month**	Stilling basin & long pool

* Only if steelhead are present in the Alisal Reach.
** Reclamation must also consult with NMFS in this situation.

10.4.3.2 Feasibility Considerations

The Higher Target Flows at Alisal Road Alternative would meet not the project purpose and need and CEQA project objectives because it would cause a significant project-specific impact on water supply (see below), which would be contrary to a key element of the CEQA objectives ("The actions must not substantially affect the Cachuma Project yield…") and the purpose and need statement ("…not affect project yield in a meaningful way."). This alternative is considered feasible based solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO although it would provide slightly more rearing habitat than planned.

10.4.3.3 Environmental Impacts

Lake Levels

Under this alternative, median lake levels would be about the same as for the proposed project (see Table 10-15).

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2003), the Higher Target Flows at Alisal Road Alternative would exhibit the same average spill amounts than the proposed project with a 3-foot surcharge (Table 10-16). The number of spill months and years would also be the same as the proposed project.

The average annual water rights releases would be essentially the same as for the proposed project. The total average annual discharge from the dam due to all releases and spills would also be the same as for proposed project (Table 10-16).

The flow regime below the dam due to spills and downstream water rights and fish releases under the Higher Target Flows at Alisal Road Alternative would not significantly differ from the proposed project (see Table 10-17) because the higher target flows would occur in wet years when flows in the river are very high, which will mask the hydrologic effects of the increased releases of 1.5 cfs.

Impact on Flood Hazards along the River

The Higher Target Flows at Alisal Road Alternative would result in essentially the same downstream flow regime as the proposed project. Hence, it would result in the same minor impact on vegetation conditions in the river channel and associated flooding hazard – an adverse, but not significant impact (Class III).

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units would be less under the Higher Target Flows at Alisal Road Alternative because there would be higher releases to meet the rearing target flows at a greater distance from the dam compared to the proposed project. There would be a reduction in average annual yield. In addition, the predicted shortages in critical drought years would be greater under this alternative compared to the proposed project as shown in Table 10-18. Although the magnitude of the water supply impacts is small, the impact is considered a significant, unmitigable cumulative impact (Class I), the same as for the proposed project.

Effect on SWP Water Deliveries

Under the Higher Target Flows at Alisal Road Alternative, supplemental releases for rearing flows may occur from the dam outlet works when releases greater than 10 cfs are needed to meet the proposed rearing target flows. Based on the simulation modeling by Stetson Engineers (2001, 2003), the need to for releases from the dam outlet works would be about the same as for the proposed project (see Table 10-25). Hence, this alternative would not significantly affect SWP water deliveries.

Effect on the Above Narrows Alluvial Aquifer

There would be a substantial decrease in the dewatered storage in the Above Narrows Alluvial Aquifer due to the Higher Target Flows at Alisal Road Alternative because the rearing target flows would be greater than under the proposed project (see Table 10-19). A decrease in dewatered storage indicates this alternative would result in higher groundwater conditions, a beneficial impact.

Water Quality Impacts in the Lake, along the River, and in the Lompoc Basin

The Higher Target Flows at Alisal Road Alternative is not expected to significantly differ from the proposed project regarding the average annual concentration of total dissolved solids in Cachuma Lake, along the river downstream of the dam, and in the Lompoc Basin because of the following reasons: (1) the amount of higher quality SWP water delivered to the reservoir under this alternative and proposed project would be the same; and (2) the total amount of water discharged from the dam due to water rights releases, fish releases, and spills is not sufficiently different from the proposed project to cause a measurable effect on TDS concentrations.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2003) indicated that there was no significant difference in spawning and rearing habitats at Cachuma Lake between the Higher Target Flows at Alisal Road Alternative and the proposed project.

The Higher Target Flows at Alisal Road Alternative would result in about the same frequency of years with moderate to high quality spawning habitat (scores “2” to “5”) (see Table 10-20) at Highway 154, as predicted by Entrix (2003). The Entrix (2003) analysis also indicated that the frequency of years with moderate to high quality fry and juvenile rearing habitat (scores “2” to “5”) at Highway 154 would also be about the same under this alternative (see Tables 10-21 and 22). The frequency of suitable rearing habitat between Highway 154 and Alisal Road is expected to increase compared to the proposed project. This reach was not modeled by Entrix (2003).

Impacts on Lakeshore Vegetation and Oak Trees

The Higher Target Flows at Alisal Road Alternative would include 3-foot surcharging. Hence, it would have the same effect on oak trees and upland vegetation along the lake margins as the proposed project.

Impacts on Recreational Facilities at the County Park

The Higher Target Flows at Alisal Road Alternative would include 3-foot surcharging. Hence, it would have the same effect on recreational facilities as the proposed project.

Cultural Resources

The Higher Target Flows at Alisal Road Alternative would include 3-foot surcharging. Hence, it would have the same effect on shoreline cultural resources as the proposed project.

Summary of Impacts of the Higher Target Flows at Alisal Road Alternative

A comparison of the environmental impacts of the Target Flows at Alisal Road Alternative and the proposed project is presented in Table 10-23. The alternative would increase the magnitude of the water supply impacts associated with the proposed project; the level of significance would remain the same (Class I). The alternative may enhance rearing habitat conditions for steelhead between Highway 154 and Alisal Road compared to the proposed project.

10.4.3.4 Summary of the Alternative

This alternative would not meet the project purpose and need and CEQA project objectives, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid any significant impacts of the proposed project, and it would slightly increase the magnitude of one significant impact of the proposed project. Reclamation and COMB do not consider this alternative to be preferable to the proposed project because it would not provide a reasonable balance between the competing needs for fish and water supply.

10.4.4 No Rearing Target Flows at Alisal Road

10.4.4.1 Description of the Alternative

Under this alternative, target flows for rearing habitat would not be observed at Alisal Road in order to reduce the impact of releases on water supply. All other elements of the FMP/BO would remain the same, including releases to meet target rearing flows at Highway 154. The target flows under this alternative are shown in Table 10-27.

10.4.4.2 Feasibility Considerations

The No Target Flows at Alisal Road Alternative would partially meet the project purpose and need and CEQA project objectives because it would improve rearing habitat for fish below Bradbury Dam compared to historic conditions, and all other non-flow FMP/BO actions would be implemented on the mainstem and tributaries. This alternative is considered feasible based solely on technical, logistical, and economic considerations. However, this alternative would not be consistent with the FMP/BO because it would not provide the rearing flows required in the BO.

TABLE 10-27
NO REARING HABITAT TARGET FLOWS AT ALISAL ROAD

Lake Storage Conditions (acre-feet)	Reservoir Spill? (AF = acre-feet)	Long Term Target Flow (cfs) under this Alternative	Long Term Target Site
> 120,000	Spill is greater than 20,000 AF	10	Highway 154
> 120,000	No spill or spill is less than 20,000 AF	5	Highway 154
30,000 - 120,000	No spill	2.5	Highway 154
< 30,000	No spill	Periodic release; < or = 30 AF/month**	Stilling basin & long pool

* Only if steelhead are present in the Alisal Reach.
** Reclamation must also consult with NMFS in this situation.

10.4.4.3 Environmental Impacts

Lake Levels

Under this alternative, median lake levels would be the same as under the proposed project (see Table 10-15).

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2003), the No Target Flows at Alisal Road Alternative would exhibit very similar average spill amounts as the proposed project (Table 10-16). The number of spill months and years would also be the same as under the proposed project.

The average annual water rights releases would be very similar to the proposed project. The total average annual discharge from the dam due to all releases and spills would also be very similar to the No Target Flows at Alisal Road Alternative and proposed project (Table 10-16).

The flow regime below the dam due to spills and downstream water rights and fish releases under the Target Flows at Alisal Road Alternative would be very similar to proposed project (see Table 10-17).

Impact on Flood Hazards along the River

The No Target Flows at Alisal Road Alternative would have the same flow regime between the dam and Highway 154 as for the proposed project. Hence, this alternative would have the same effect on riparian vegetation in the river channel as the proposed project.

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units would be the same under the No Target Flows at Alisal Road Alternative. There would be no change in the predicted shortages in critical drought years compared to the proposed project as shown in Table 10-18. The water supply impact would still be considered a significant, unmitigable cumulative impact (Class I), same as for the proposed project.

Effect on the Above Narrows Alluvial Aquifer

There would be no change in the dewatered storage in the Above Narrows Alluvial Aquifer under the No Target Flows at Alisal Road Alternative (see Table 10-19).

Water Quality Impacts in the Lake, along the River, and in the Lompoc Basin

The No Target Flows at Alisal Road Alternative is not expected to significantly differ from the proposed project regarding the average annual concentration of total dissolved solids in Cachuma Lake, along the river downstream of the dam, and in the Lompoc Basin because of the following reasons: (1) the amount of higher quality SWP water delivered to the reservoir under this alternative and proposed project would be the same; and (2) the total amount of water discharged from the dam due to water rights releases, fish releases, and spills is the same as the proposed project.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2003) indicated that there was no significant difference in spawning and rearing habitats in Cachuma Lake between the No Target Flows at Alisal Road Alternative and the proposed project.

The No Target Flows at Alisal Road Alternative would result in the same frequency of years with moderate to high quality spawning habitat (scores “2” to “5”) (see Table 10-20) at Highway 154, as predicted by Entrix (2003). The Entrix (2003) analysis also indicated that the frequency of years with moderate to high quality fry and juvenile rearing habitat (scores “2” to “5”) at Highway 154 would also be the same under this alternative (see Tables 10-21 and 22). The frequency of suitable rearing habitat between Highway 154 and Alisal Road is expected to decrease compared to the proposed project. This reach was not modeled by Entrix (2003).

Impacts on Lakeshore Vegetation and Oak Trees

The No Target Flows at Alisal Road Alternative would include 3-foot surcharging. Hence, it would have the same effect on oak trees and upland vegetation along the lake margins as the proposed project.

Impacts on Recreational Facilities at the County Park

The No Target Flows at Alisal Road Alternative would include 3-foot surcharging. Hence, it would have the same effect on recreational facilities as the proposed project.

Cultural Resources

The No Target Flows at Alisal Road Alternative would include 3-foot surcharging. Hence, it would have the same effect on shoreline cultural resources as the proposed project.

Summary of Impacts of the No Target Flows at Alisal Road Alternative

A comparison of the environmental impacts of the No Target Flows at Alisal Road Alternative and the proposed project is presented in Table 10-23. The alternative would reduce the magnitude of the flood hazard impact (a less than significant impact). Spawning and rearing habitat conditions for steelhead between the dam and Highway 154 under this alternative would be the same as the proposed project. However, the quality of spawning and rearing habitat between Highway 154 and Alisal Road would be less under this alternative.

10.4.4.4 Summary of the Alternative

This alternative would not fully meet the project purpose and need and CEQA project objectives, it would not be consistent with the FMP/BO, it is considered technically and economically feasible, and it would not avoid any significant impacts of the proposed project. Reclamation and COMB do not consider this alternative to be preferable to the proposed project because the target rearing flows at Alisal Road provide potential habitat enhancement for fish without additional significant environmental impacts.

10.5 MODIFIED PASSAGE FLOW ALTERNATIVES

Under the proposed project (see Section 2.4.4), water will be released from Bradbury Dam during the period January through May to extend the receding limb of naturally occurring storm hydrographs once the sandbar at the mouth of the river has been naturally breached. Releases would be made once storm flows have receded to 150 cfs at Solvang, or if a storm peaks between 25 and 150 cfs at Solvang. A specified release regime has been developed by NMFS in discussions with Reclamation and adopted by the SYRTAC that was designed to create a flow recession downstream of Bradbury Dam.

Water will only be released to supplement passage beginning in the year following a surcharge year, and in subsequent years until the account has been depleted. A Fish Passage Account will be established which will allocate 3,200 acre-feet in years when the reservoir surcharges to 3 feet. A 500-acre-foot Adaptive Management Account will be established in years when the reservoir surcharges 3 feet. The account will be used at the discretion of the Adaptive Management Committee to benefit steelhead and their habitat as determined by the committee. The account water can provide additional water for passage flows, as well as for mainstem rearing or provide additional flows to Hilton Creek.

A "passage day" has been defined by NMFS as a day with a flow of greater than or equal to 25 cfs at the Alisal Road bridge. NMFS (2000) considered 14 days of passage in a particular year to be an adequate passage opportunity for steelhead to reach the upper portions the river below Bradbury Dam. Hence, the proposed passage flow supplementation approach is based on providing 14 days of passage days.

The combination of natural flows and the Fish Passage Account releases will provide 14 days or more of passable flows to facilitate steelhead migration to the mainstem and tributaries above Alisal Road (Reclamation, 2000). In the event that storms do not produce 150 cfs at Solvang, the releases of up to 150 cfs would be made through the outlet works at Bradbury Dam. The descending limb of this storm event will be monitored at two locations, one downstream of the dam and one upstream of Cachuma Lake.

Three passage alternatives are presented below: (1) lower frequency and duration of supplemental passage flows due to reduction in the Fish Passage Account; (2) greater frequency and duration of supplemental passage flows due to an increase in the Fish Passage Account; and (3) modified release criteria for supplemental passage flows.

10.5.1 Reduced Passage Flows

10.5.1.1 Description of the Alternative

Under this alternative, the combined Fish Passage Account and Adaptive Management Account would be reduced from 3,700 acre-feet to 1,850 acre-feet, a 50 percent reduction. Use of these accounts would follow the same criteria as the proposed project; however, the frequency and duration of the fish passage supplementation release would be less than for the proposed project. Based on the simulation modeling by Stetson Engineers (2003), there would be 14 years during the simulation period 1942- 1993 that fish passage supplementation releases would be made under the proposed project based on the BO release criteria. In each of these years, 14 consecutive passage days would be achieved by a combination of natural flows and supplemental flows. In contrast, under this alternative, the number of years with fish passage supplementation releases would be reduced to 12 years. In addition, 14 consecutive passage days would only be achieved during nine of those years.

10.5.1.2 Feasibility Considerations

The Reduced Passage Flow Alternative would partially meet the project purpose and need because it would improve rearing habitat for fish below Bradbury Dam compared to historic conditions, and all other non-flow FMP/BO actions would be implemented on the mainstem and tributaries. This alternative is considered feasible based on solely on technical, logistical, and economic considerations. However, this alternative would be not consistent with the FMP/BO because it would not provide the passage flows determined to be appropriate under the FMP/BO.

10.5.1.3 Environmental Impacts

Lake Levels

Median lake levels under this alternative would be about the same as under the proposed project (see Table 10-28).

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2003), the Reduced Passage Flow Alternative would exhibit about the same hydrologic regime downstream of Bradbury Dam as the proposed project Table 10-29).

Impact on Flood Hazards along the River

The Reduced Passage Flow Alternative would have the same frequency of low to moderate flows between the dam and Highway 154 as the proposed project (Table 10-30).

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units under the Reduced Passage Flow Alternative would be about the same as the proposed project (Table 10-31).

TABLE 10-28
MEDIAN LAKE LEVEL FOR MODIFIED PASSAGE FLOW ALTERNATIVES

Occurrence	Median Water Elevation (feet)			
	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	Lower Passage Flows (ALTERNATIVE)	Higher Passage Flows (ALTERNATIVE)
Annual	733.7	734.6	734.9	734.4
Feb	737.2	738.1	738.3	738.6
Aug	732.2	735.0	735.2	734.6

Based on modeling by Stetson Engineers (2003) for the period of record 1918-1993. The proposed project and all alternatives listed above would have a 3-foot surcharge.

TABLE 10-29
KEY HYDROLOGIC CHARACTERISTICS OF MODIFIED PASSAGE FLOW ALTERNATIVES

Spill and Release	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	Lower Passage Flows (ALTERNATIVE)	Higher Passage Flows (ALTERNATIVE)
Average spills/leakage (AFY)	36,693	35,415	35,479	35,368
Average 89-18 releases (AFY)	6,023	5,737	5,817	5,626
Average fish releases (AFY)	1,362	2,715	2,511	2,967
Total discharges from the dam (AFY)	44,078	43,867	43,807	43,961
No. of spill months	82	78	78	78
No. of spill water years	26	25	25	25
No. of spill water years >20,000 acre-feet	16	15	15	15

Based on modeling by Stetson Engineers (2003) for the period of record 1918-1993. The proposed project and all alternatives listed above would have a 3-foot surcharge.

TABLE 10-30
STREAM FLOWS DOWNSTREAM OF BRADBURY DAM UNDER THE MODIFIED PASSAGE FLOW ALTERNATIVES

Flow (cfs)	Percentage of Time Streamflows are at or **ABOVE** the Indicated Flow (simulation, 1981-1993)			
	Current Operations Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	Lower Passage Flows (ALTERNATIVE)	Higher Passage Flows (ALTERNATIVE)
Below Hilton Creek				
2	99 %	99 %	99 %	99 %
5	47 %	75 %	75 %	75 %
10	33 %	39 %	38 %	38 %
20	26 %	28 %	27 %	27 %
50	13 %	12 %	12 %	13 %
Highway 154				
2	82 %	99 %	99 %	99 %
5	48 %	78 %	78 %	77 %
10	34 %	39 %	36 %	37 %
20	27 %	28 %	28 %	29 %
50	12 %	12 %	12 %	12 %
Above Alisal Road				
2	53 %	69 %	69 %	68 %
5	43 %	49 %	49 %	48 %
10	34 %	36 %	35 %	36 %
20	23 %	25 %	24 %	25 %
50	12 %	12 %	12 %	12 %
Near Buellton				
2	51 %	57 %	57 %	56 %
5	41 %	44 %	44 %	44 %
10	32 %	34 %	34 %	34 %
20	24 %	26 %	26 %	26 %
50	12 %	12 %	12 %	12 %

Flow (cfs)	Percentage of Time Streamflows are at or **ABOVE** the Indicated Flow (simulation, 1981-1993)			
	Current Operations Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	Lower Passage Flows (ALTERNATIVE)	Higher Passage Flows (ALTERNATIVE)
Above Salsipuedes Creek				
2	39 %	43 %	42 %	42 %
5	35 %	37 %	36 %	37 %
10	30 %	32 %	31 %	32 %
20	25 %	26 %	26 %	27 %
50	12 %	13 %	13 %	13 %
Narrows				
2	45 %	48 %	48 %	48 %
5	38 %	41 %	40 %	41 %
10	33 %	35 %	35 %	35 %
20	28 %	29 %	29 %	29 %
50	14 %	14 %	14 %	14 %

Based on modeling by Stetson Engineers (2003).

TABLE 10-31
IMPACTS OF MODIFIED PASSAGE FLOW ALTERNATIVES ON PROJECT DELIVERIES TO MEMBER UNITS

Water Supply and Shortage	Recent Historic Operations Under WR 89-18 (HISTORIC OPS)	Current Operations with Interim Rearing Target Flows and 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	Lower Passage Flows (ALTERNATIVE)	Higher Passage Flows (ALTERNATIVE)
Average Annual Deliveries and Years of Shortages (Simulation Period 1918-1993)					
Average annual delivery (includes 2,000 AFY from Tecolote Tunnel)	25,308	25,115	25,122	25,166	25,047
No. of years with 10% or more shortage over the 76-year simulation period	5 years	6 years	6 years	6 years	7 years
Critical Drought Year (Simulation of Historic Worst Drought Year – 1951					
Shortage in critical drought year (acre-feet)	7,070	9,810	9,890	9,220	10,940
Shortage as a percentage of current annual operational yield of 25,714 AFY	27%	38%	38%	36%	43%
Critical 3-year Drought Period (based on simulation of 1949-51 drought					
Shortage in critical drought years (acre-feet)	14,210	20,130	19,920	18,570	22,380
Shortage as a percentage of current annual operational yield of 25,714 AFY for three years	18%	26%	26%	24%	29%

Source: Stetson Engineers (2003).

TABLE 10-32
MONTHLY DEWATERED STORAGE
IN THE ABOVE NARROWS ALLUVIAL BASIN FOR THE MODIFIED PASSAGE FLOW ALTERNATIVES

Dewatered Storage	Acre-feet			
	Current Operations with Interim Rearing Target Flows and 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	Lower Passage Flows (ALTERNATIVE)	Higher Passage Flows (ALTERNATIVE)
Mean	10,769	10,281	10,310	10,269
Median	10,517	10,081	10,005	10,099
Minimum	2,324	2,315	2,315	2,318

Based on modeling by Stetson Engineers (2003) for period of record 1918-1993.

Effect on the Above Narrows Alluvial Aquifer

The dewatered storage in the Above Narrows Alluvial Aquifer under the Reduced Passage Flow Alternative would be the same as the proposed project (see Table 10-32).

Water Quality Impacts in the Lake, along the River, and in the Lompoc Basin

The Reduced Passage Flow Alternative is not expected to significantly differ from the proposed project regarding the average annual concentration of total dissolved solids in Cachuma Lake, along the river downstream of the dam, and in the Lompoc Basin because of the following reasons: (1) the amount of higher quality SWP water delivered to the reservoir under this alternative and proposed project would be the same; and (2) the total amount of water discharged from the dam due to water rights releases, fish releases, and spills is not sufficiently different from the proposed project to cause a measurable effect on TDS concentrations.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2003) indicated that there was no significant difference in spawning and rearing habitats at Cachuma Lake between the Reduced Passage Flow Alternative and the proposed project.

The frequency of years with moderate to high quality rearing and spawning habitats would be the same as for the proposed project (see Tables 10-33 to 10-35).

Impacts on Lakeshore Vegetation and Oak Trees

The Reduced Passage Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on oak trees and upland vegetation along the lake margins as the proposed project.

Impacts on Recreational Facilities at the County Park

The Reduced Passage Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on recreational facilities as the proposed project.

Cultural Resources

The Reduced Passage Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on shoreline cultural resources as the proposed project.

Summary of Impacts of the Reduced Passage Flow Alternative

A comparison of the environmental impacts of the Reduced Passage Flow Alternative and the proposed project is presented in Table 10-36. The environmental impacts of this alternative would be the about same as the proposed project, although the alternative would reduce the passage opportunities compared to the proposed project.

10.5.1.4 Summary of the Alternative

This alternative would not fully meet the project purpose and need, it would not be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid any significant impacts of the proposed project, and it would not cause any new significant impacts. Reclamation and COMB do not consider this alternative to be preferable to the proposed project because it would not provide passage flows required in the BO.

10.5.2 Increased Passage Flows

10.5.2.1 Description of the Alternative

Under this alternative, the combined Fish Passage Account and Adaptive Management Account would be increased from 3,700 acre-feet to 5,550 acre-feet. Use of these accounts would follow the same criteria as the proposed project. Based on the simulation modeling by Stetson Engineers (2003), there would be 14 years during the simulation period 1942-1993 that fish passage supplementation releases would be made under the proposed project based on the BO release criteria. In each of these years, 14 consecutive passage days would be achieved by a combination of natural flows and supplemental flows.

Under this alternative, fish passage supplementation releases would be made during the same number of years as the proposed project. In addition, this alternative would provide more than 14 consecutive passage days during each these years. Each fish passage flow release would extend longer than 14 days because the additional account water under this alternative would otherwise be spilled. Under this alternative, it would be prudent to extend the fish passage flows for a longer duration than required in the BO in order to avoid spilling the account water prior to the storm event that triggers the supplemental passage flows.

In summary, this alternative would have the same frequency of fish passage supplementation releases as the proposed project, and would meet the target number of days for fish passage (i.e., 14 consecutive passage days) specified in the BO, the same as for the proposed project. The additional passage days may or may not have a beneficial impact on migrating steelhead.

10.5.2.2 Feasibility Considerations

The Increased Passage Flow Alternative would not meet the project purpose and need because it would cause a significant project-specific impact on water supply (see below), which would be contrary to a key element of the CEQA objectives ("The actions must not substantially affect the Cachuma Project yield…") and the purpose and need statement ("…not affect project yield in a meaningful way."). This alternative is considered feasible based on solely on technical, logistical,

TABLE 10-33
AVERAGE HABITAT SCORES FOR SPAWNING AT HIGHWAY 154 FOR THE MODIFIED PASSAGE FLOW ALTERNATIVES

Alternatives	Frequency of Annual Scores over Historic Period (Simulation 1918-1993)					
	best				worse	
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Current Operations	23	5	5	11	22	10	2.6
Proposed Project	23	7	17	18	9	2	3.1
Lower Passage Flows	23	6	14	22	9	2	3.1
Higher Passage Flows	23	20	6	17	8	2	3.4

Habitat scores based on modeling by Entrix (2003) in which a score of “5” represents good spawning habitat (e.g., suitable flows at the right time of year), and a score of “0” is very poor habitat. Scores are assigned based on simulated flows during each year of the simulation period, using historic flows.

TABLE 10-34
AVERAGE HABITAT SCORES FOR FRY REARING AT HIGHWAY 154 FOR THE MODIFIED PASSAGE FLOW ALTERNATIVES

Alternatives	Frequency of Annual Scores over Historic Period (Simulation 1918-1993)						
	best					worse	
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Current Operations	1	16	38	21	0	1	2.9
Proposed Project	0	54	21	0	0	1	3.7
Lower Passage Flows	0	55	20	0	0	1	3.7
Higher Passage Flows	0	54	21	0	0	1	3.7

Habitat scores based on modeling by Entrix (2003) in which a score of "5" represents good rearing habitat (e.g., suitable flows at the right time of year), and a score of "0" is very poor habitat. Scores are assigned based on simulated flows during each year of the simulation period, using historic flows.

TABLE 10-35
AVERAGE HABITAT SCORES FOR JUVENILE REARING AT HIGHWAY 154 FOR THE MODIFIED PASSAGE FLOW ALTERNATIVES

Alternatives	Frequency of Annual Scores over Historic Period (Simulation 1918-1993)						
	best					worse	
	(5)	(4)	(3)	(2)	(1)	(0)	(AVG)
Current Operations	0	15	39	20	0	2	2.6
Proposed Project	0	41	33	0	0	2	3.5
Lower Passage Flows	0	42	32	0	0	2	3.5
Higher Passage Flows	0	40	34	0	0	2	3.4

Habitat scores based on modeling by Entrix (2003) in which a score of “5” represents good rearing habitat (e.g., suitable flows at the right time of year), and a score of “0” is very poor habitat. Scores are assigned based on simulated flows during each year of the simulation period, using historic flows.

TABLE 10-36
COMPARATIVE IMPACTS OF THE MODIFIED PASSAGE FLOW ALTERNATIVES

Impact and Classification	Magnitude and Significance of Key Impacts Relative to Proposed Project	
	Lower Passage Flows	Higher Passage Flows
Flooding hazards along the river (Class III)	No difference	No difference
Water supply (predicted shortages in drought years) (Class I)	Slightly lower magnitude of impact but still Class I	Slightly higher magnitude of impact
Water supply (curtailment of SWP water deliveries) (Class I)	No impact	No impact
Above Narrows Alluvial Aquifer conditions (Class IV)	No difference	No difference
Water quality in lake, along river, and in Lompoc Basin (Class IV)	No difference	No difference
Fish in the lake (no impact)	No difference	No difference
Fish spawning and rearing habitat along the river below dam (Class IV)	Reduced passage opportunities compared to proposed project	The same frequency of passage opportunities as the proposed project
Lakeshore vegetation and oak trees (Class II)	No difference	No difference
Recreational facilities at the lake (Class II)	No difference	No difference
Cultural resources (Class II)	No difference	No difference

and economic considerations. This alternative would be consistent with the FMP/BO although it would provide more than the planned passage flows.

10.5.2.3 Environmental Impacts

Lake Levels

Median lake levels under this alternative would be about the same as under the proposed project (see Table 10-28).

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2003), the Increased Passage Flow Alternative would exhibit about the same hydrologic regime downstream of Bradbury Dam as the proposed project Table 10-29).

Impact on Flood Hazards along the River

The Increased Passage Flow Alternative would have the same frequency of low to moderate flows between the dam and Highway 154 as the proposed project (Table 10-30).

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units would be less under the Increased Passage Flow Alternative because there would be slightly more frequent releases to meet the passage target flows compared to the proposed project. The reduction in average annual yield would be relatively small. However, the predicted shortages in critical drought years would be greater under this alternative compared to the proposed project as shown in Table 10-31. This water supply impact is considered a significant, unmitigable cumulative impact (Class I), the same as for the proposed project.

Effect on the Above Narrows Alluvial Aquifer

The dewatered storage in the Above Narrows Alluvial Aquifer under the Increased Passage Flow Alternative would be the same as the proposed project (see Table 10-32).

Water Quality Impacts in the Lake, along the River, and in the Lompoc Basin

The Increased Passage Flow Alternative is not expected to significantly differ from the proposed project regarding the average annual concentration of total dissolved solids in Cachuma Lake, along the river downstream of the dam, and in the Lompoc Basin because of the following reasons: (1) the amount of higher quality SWP water delivered to the reservoir under this alternative and proposed project would be the same; and (2) the total amount of water discharged from the dam due to water rights releases, fish releases, and spills is not sufficiently different from the proposed project to cause a measurable effect on TDS concentrations.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2003) indicated that there was no significant difference in spawning and rearing habitats at Cachuma Lake between the Increased Passage Flow Alternative and the proposed project.

The frequency of years with moderate to high quality rearing and spawning habitats would be the same as for the proposed project (see Tables 10-33 to 10-35).

Additional passage days will be available during years with fish passage supplementation releases, which may or may not have a beneficial impact on migrating steelhead.

Impacts on Lakeshore Vegetation and Oak Trees

The Increased Passage Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on oak trees and upland vegetation along the lake margins as the proposed project.

Impacts on Recreational Facilities at the County Park

The Increased Passage Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on recreational facilities as the proposed project.

Cultural Resources

The Increased Passage Flow Alternative would include 3-foot surcharging. Hence, it would have the same effect on shoreline cultural resources as the proposed project.

Summary of Impacts of the Increased Passage Flow Alternative

A comparison of the environmental impacts of the Increased Passage Flow Alternative and the proposed project is presented in Table 10-36. The alternative would increase the magnitude of the water supply impacts associated with the proposed project; the level of significance would remain the same (Class I). No new significant impacts would occur.

10.5.2.4 Summary of the Alternative

This alternative would not meet the project purpose and need, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid any significant impacts of the proposed project, and it would increase the magnitude of one significant impact of the proposed project. Reclamation and COMB do not consider it preferable to the proposed project because it would not provide a reasonable balance between the competing needs for fish and water supply.

10.5.3 Modified Passage Flow Criteria

10.5.3.1 Description of the Alternative

The Fish Passage Account and Adaptive Management Account would not change under this alternative. However, the timing and amount of water released from the accounts to supplement passage flows would be modified based on recommendations by the Adaptive Management Committee. Releases would still be made during the period January through May to extend the receding limb of naturally occurring storm hydrographs once the sandbar at the mouth of the river has been naturally breached. However, the release criteria could change. For example, releases may start when flows have receded to 100 cfs at Solvang, rather than the proposed 150 cfs "trigger flow." Or the recession curve for the release could be modified from its current shape which was based on measured flows upstream of Lake Cachuma. The criteria could also be changed so that if flows at Solvang do not reach 150 cfs without supplemental releases, no fish passage supplementation releases would be made.

Given the experimental nature of the fish passage supplementation releases, the release regime will be monitored closely to provide information to the Adaptive Management Committee to determine if adjustments are needed. The Adaptive Management Committee is currently evaluating the proposed release regime, pursuant to Terms and Condition No. 3 of the BO. Hence, some form of this alternative is likely to be developed over time as part of the adaptive management approach of the FMP/BO. Any changes would be developed with the concurrence of NMFS and within the bounds of the overall FMP/BO and this EIR/EIS. At this time, such modifications to the passage flow criteria cannot be predicted because fish passage supplementation has not commenced, because of the experimental nature of these releases, and because of the need to monitor the results to determine their effectiveness. However, for the sake of environmental analysis, the types of changes are expected to similar in nature and magnitude as the examples provided above.

10.5.3.2 Feasibility Considerations

The Modified Passage Flow Criteria would meet the project purpose and need because such changes would be developed to improve the effectiveness of this element of the FMP/BO, and within the constraints of the Fish Passage and Adaptive Management Accounts. This alternative is considered feasible based solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO.

10.5.3.3 Environmental Impacts

No new significant environmental impacts are expected to occur under this alternative, nor would the magnitude of any significant impacts associated with the proposed project be increased. The changes in hydrologic conditions due to modifications of the passage flow criteria would not be substantial enough to significantly change environmental conditions in Cachuma Lake, along the river downstream of Bradbury Dam, in the Above Narrows Alluvial Aquifer, and in water supply conditions. This alternative would not require additional water. The passage flows would occur in years following spills when there is an abundance of water in the lake and river system, such that modifications in the timing and rate of release would not have a significant impact.

10.5.3.4 Summary of the Alternative

This alternative would meet the project purpose and need, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid any significant impacts of the proposed project, and it would not cause any new significant impacts. It is already considered an element of the FMP/BO which allows for changes in the passage flow criteria through adaptive management to improve the effectiveness of this element of the FMP/BO. Hence, this alternative cannot be distinguished from the proposed project, and is therefore, no longer considered further in the environmental review process for the FMP/BO.

10.6 ALTERNATIVE SETS OF FMP/BO ACTIONS

As described in Section 2.0, the FMP management actions were developed to benefit steelhead and other aquatic species directly and indirectly by: (1) creating new habitat and improving existing habitat in the lower river and tributaries; (2) improving access to spawning and rearing habitats in the lower river and tributaries; and (3) increasing public awareness and support for beneficial actions on private lands.

The FMP/BO identifies specific reaches of the mainstem and tributaries for habitat protection and improvement. The highest priority has been assigned to lower Hilton Creek, which is located on Reclamation property, and the mainstem of the river between Bradbury Dam and Highway 154. Habitat conditions in these areas are relatively good, and water releases have the highest potential to benefit aquatic habitat. A high priority is also assigned to enhancing habitats on the following tributaries which have favorable flows and habitat conditions for aquatic resources: Quiota, El Jaro, and Salsipuedes creeks.

The FMP/BO includes various elements or actions to achieve its objectives. Many of these elements are interdependent, while others can be implemented independent of one another. There are four FMP/BO actions that are clearly interdependent, which are listed below:

- The 1.8-foot surcharge was designed to provide water for rearing flows, and the 3.0-foot surcharge was designed to provide water for passage flows. The releases for rearing and passage are dependent upon surcharging

- Fish passage supplementation releases enhance opportunities for steelhead to reach the mainstem above Highway 154 and Hilton Creek where high quality spawning and rearing habitat is available due to the rearing target flow releases through the existing Hilton Creek Supplementary Watering System

- Removal of passage impediment on Lower Hilton Creek on Reclamation property (e.g., bedrock chute) is needed to fully realize the benefits of removing the Highway 154 passage impediment upstream.

- Removal of the passage impediment on lower Hilton Creek on Reclamation property is need to fully realize the benefits of the upper release point of the existing Hilton Creek Supplemental Watering System

All other FMP/BO actions or projects can be implemented independent of one another, and would function independent of the other actions. For example, the tributary passage impediment removal projects would enhance fish habitat along individual streams (i.e., Hilton, Quiota, Salsipuedes, and El Jaro creeks). Completion of one project is not dependent upon another for its success, nor would the benefits of one project affect the passage conditions in another tributary.

For the following alternatives, several elements of the FMP/BO are eliminated. The environmental impacts avoided by removing one or more FMP/BO actions are evaluated below, along with the reduced benefits to fish habitat in the lower Santa Ynez River watershed.

10.6.1 No Passage Flows (Combined with 1.8-foot Surcharging)

This alternative was included because the fish passage supplementation releases are considered experimental. If such flows are determined to have limited or no benefit over time, then this alternative may be desirable. Furthermore, this alternative would reduce impacts of passage releases on water supply and a 3.0-foot surcharge.

10.6.2.1 Description of the Alternative

Under this alternative, no passage flows would be provided and only a 1.8-foot surcharge would be implemented. All other elements of the proposed FMP/BO would be implemented.

10.6.2.2 Feasibility Considerations

The No Passage Flow Alternative would partially meet the project purpose and need (even though a portion of the FMP/BO is not implemented) because other elements of the FMP/BO would improve habitat conditions for the southern steelhead in the lower watershed compared to historic conditions. This alternative is considered feasible based on solely on technical, logistical, and economic considerations. However, this alternative would not be consistent with the FMP/BO because it would not provide the passage opportunities included in the FMP and required in the BO.

10.6.1.3 Environmental Impacts

Lake Levels

Median lake levels would be slightly lower under the No Passage Flow Alternative compared to the proposed project due to greater releases without an offsetting increase from surcharging (see Table 10-37).

Surface Water Hydrology

Based on the hydrologic simulation modeling by Stetson Engineers (2001), this alternative would exhibit higher average spill amounts than the proposed project with a 3-foot surcharge (Table 10-38). The number of spill months would be slightly higher than under the proposed project. The average water rights would be higher and the average fish releases would be lower than for the proposed project.

The flow regime below the dam due to spills and downstream water rights and fish releases would be essentially the same for the No Passage Flow Alternative and the proposed project (see Table 10-39).

TABLE 10-37
MEDIAN LAKE LEVEL FOR THE NO PASSAGE FLOW ALTERNATIVE

Occurrence	Median Water Elevation (feet)		
	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge	Proposed Long-term Rearing Target Flows (PROP. PROJECT)	1.8' Surcharge and No Passage Flows (ALTERNATIVE)
Annual	733.7	734.6	733.9
Feb	737.2	738.1	737.1
Aug	732.2	735.0	733.0

Based on modeling by Stetson Engineers (2003) for the period of record 1918-1993.
The proposed project would have a 3-foot surcharge.

TABLE 10-38
KEY HYDROLOGIC CHARACTERISTICS OF THE NO PASSAGE FLOW ALTERNATIVE

Spill and Release	Current Operations with Releases for Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	1.8' Surcharge and No Passage Flows (ALTERNATIVE)
Average spills/leakage (AFY)	36,693	35,415	35,981
Average 89-18 releases (AFY)	6,023	5,737	5,918
Average fish releases (AFY)	1,362	2,715	2,199
Total discharges from the dam (AFY)	44,078	43,867	44,098
No. of spill months	82	78	80
No. of spill water years	26	25	25
No. of spill water years >20,000 acre-feet	16	15	16

Based on modeling by Stetson Engineers (2003) for the period of record 1918-1993. The proposed would have a 3-foot surcharge.

TABLE 10-39
STREAM FLOWS DOWNSTREAM OF BRADBURY DAM UNDER THE NO PASSAGE FLOW ALTERNATIVE

Flow (cfs)	Percentage of Time Streamflows are at or **ABOVE** the Indicated Flow (simulation, 1981-1993)		
	Current Operations Interim Rearing Target Flows with 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	1.8' Surcharge and No Passage Flows (ALTERNATIVE)
Below Hilton Creek			
2	99 %	99 %	99 %
5	47 %	75 %	73 %
10	33 %	39 %	37 %
20	26 %	28 %	26 %
50	13 %	12 %	12 %
Highway 154			
2	82 %	99 %	99 %
5	48 %	78 %	77 %
10	34 %	39 %	36 %
20	27 %	28 %	27 %
50	12 %	12 %	12 %
Above Alisal Road			
2	53 %	69 %	68 %
5	43 %	49 %	49 %
10	34 %	36 %	35 %
20	23 %	25 %	23 %
50	12 %	12 %	12 %
Near Buellton			
2	51 %	57 %	57 %
5	41 %	44 %	44 %
10	32 %	34 %	33 %
20	24 %	26 %	25 %
50	12 %	12 %	12 %
Above Salsipuedes Creek			
2	39 %	43 %	43 %
5	35 %	37 %	36 %
10	30 %	32 %	31 %
20	25 %	26 %	26 %
50	12 %	13 %	12 %
Narrows			
2	45 %	48 %	48 %
5	38 %	41 %	41 %
10	33 %	35 %	35 %
20	28 %	29 %	28 %
50	14 %	14 %	14 %

Based on modeling by Stetson Engineers (2003).

Impact on Flood Hazards along the River

The No Passage Flow Alternative would have the same frequency of low to moderate flows between the dam and Highway 154 as the proposed project (Table 10-39). Hence, it would result in the same minor impact on vegetation conditions in the river channel and associated flooding hazard – an adverse, but not significant impact (Class III).

Impact on Water Supply Conditions

Water deliveries from the Cachuma Project to the Member Units under the No Passage Flow Alternative would be about the same as the proposed project (Table 10-40).

Effect on the Above Narrows Alluvial Aquifer

The dewatered storage in the Above Narrows Alluvial Aquifer under the No Passage Flow Alternative would be about the same as the proposed project (see Table 10-41).

Water Quality Impacts in the Lake, along the River, and in the Lompoc Basin

The No Passage Flow Alternative is not expected to significantly differ from the proposed project regarding the average annual concentration of total dissolved solids in Cachuma Lake, along the river downstream of the dam, and in the Lompoc Basin because of the following reasons: (1) the amount of higher quality SWP water delivered to the reservoir under this alternative and proposed project would be the same; and (2) the total amount of water discharged from the dam due to water rights releases, fish releases, and spills is not sufficiently different from the proposed project to cause a measurable effect on TDS concentrations.

Impacts on Fish in Cachuma Lake and along the River

The analysis of impact to fish habitat due to surcharging and downstream releases by Entrix (2003) indicated that there was no significant difference in spawning and rearing habitats at Cachuma Lake between the Reduced Passage Flow Alternative and the proposed project. The frequency of years with moderate to high quality rearing and spawning habitats is expected to be same as for the proposed project.

Impacts on Lakeshore Vegetation and Oak Trees

The No Passage Flow Alternative with a 1.8-foot surcharge would inundate native vegetation along the margins of Cachuma Lake when the lake is full. Approximately 42 acres would be inundated, less than the 91 acres that would be affected by the proposed 3.0-foot surcharge (Table 10-11). This impact is considered adverse, but not significant (Class III) because of the small acreage involved compared to the total acreage of these common vegetation types in the area. The impact conclusion is the same as for the proposed project (Section 6.4.3).

TABLE 10-40
IMPACTS OF NO PASSAGE FLOW ALTERNATIVE ON PROJECT DELIVERIES TO MEMBER UNITS

Water Supply and Shortage	Recent Historic Operations Under WR 89-18 (HISTORIC OPS)	Current Operations with Interim Rearing Target Flows and 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	1.8' Surcharge and No Passage Flows (ALTERNATIVE)
Average Annual Deliveries and Years of Shortages (Simulation Period 1918-1993)				
Average annual delivery (includes 2,000 AFY from Tecolote Tunnel)	25,308	25,115	25,122	25,104
No. of years with 10% or more shortage over the 76-year simulation period	5 years	6 years	6 years	6 years
Critical Drought Year (Simulation of Historic Worst Drought Year – 1951				
Shortage in critical drought year (acre-feet)	7,070	9,810	9,890	9,845
Shortage as a percentage of current annual operational yield of 25,714 AFY	27%	38%	38%	38%
Critical 3-year Drought Period (based on simulation of 1949-51 drought				
Shortage in critical drought years (acre-feet)	14,210	20,130	19,920	20,016
Shortage as a percentage of current annual operational yield of 25,714 AFY for three years	18%	26%	26%	26%

Source: Stetson Engineers (2003).

The No Passage Flow Alternative would result in the loss of about 271 coast live oak trees over time, less than under the proposed project (see Table 10-12). The loss of oak trees associated with this alternative is considered a significant, but mitigable impact (Class II). The significance of this impact is the same as for the proposed project; however, fewer trees would be affected under this alternative.

TABLE 10-41
MONTHLY DEWATERED STORAGE IN THE ABOVE NARROWS ALLUVIAL BASIN FOR THE NO PASSAGE FLOW ALTERNATIVE

Dewatered Storage	Acre-feet		
	Current Operations with Interim Rearing Target Flows and 0.75 Surcharge (CURRENT OPS)	Proposed Passage Flows (PROP. PROJECT)	1.8' Surcharge and No Passage Flows (ALTERNATIVE)
Mean	10,769	10,281	10,363
Median	10,517	10,081	10,059
Minimum	2,324	2,315	2,313

Based on modeling by Stetson Engineers (2003) for period of record 1918-1993.

Impacts on Recreational Facilities at the County Park

The No Passage Flow Alternative with a 1.8-foot surcharge would affect fewer recreational facilities than the proposed 3-foot surcharge. Based on only the still water lake levels, the 1.8-foot surcharge would only affect one critical facility – the boat launch ramp. In contrast, the proposed 3-foot surcharge (still water conditions) would affect three critical facilities: water treatment plant, boat launch ramp, and marina path and docks. Nevertheless, the potential disruption of recreational uses at the lake (albeit only one critical facility) is still considered a significant but mitigable impact (Class II), identical to the proposed project.

Cultural Resources

The two prehistoric archaeological sites along the lake margins would be subject to slightly less erosion under the No Passage Flow Alternative compared to proposed project. The magnitude of this impact would be less than for the proposed project, but it is still considered a significant, but mitigable impact (Class II), identical to the proposed project.

Summary of Impacts of the No Passage Flow Alternative

A comparison of the environmental impacts of the No Passage Flow Alternative and the proposed project is presented in Table 10-42. This alternative would reduce the magnitude of three significant but mitigable impacts (Class II) – impacts to oak tree, recreational facilities, and cultural resources. However, it would increase the magnitude of a significant, unmitigable impact (Class I) associated with the proposed project – shortage in water deliveries during drought years due to the use of water for fish releases from water supply storage. This alternative would reduce the passage opportunities for steelhead compared to the proposed project.

TABLE 10-42
COMPARATIVE IMPACTS OF THE ALTERNATIVE SETS OF FMP/BO ACTIONS

Impact and Classification	Magnitude and Significance of Key Impacts Relative to Proposed Project			
	No Passage Flows with 1.8' Surcharge	No Upper Hilton Creek Passage Impediment Removal Project	No Tributary Passage Impediment or Habitat Enhancement Projects	No Mainstem Habitat Enhancement Projects
Flooding hazards along the river (Class III)	No difference	Not applicable	Not applicable	No difference
Water supply (predicted shortages in drought years) (Class I)	No difference	Not applicable	Not applicable	No difference
Water supply (curtailment of SWP water deliveries) (Class I)	No impact	Not applicable	Not applicable	No impact
Above Narrows Alluvial Aquifer conditions (Class IV)	No difference	Not applicable	Not applicable	No difference
Water quality in lake, along river, and in Lompoc Basin (Class IV)	No difference	Not applicable	Not applicable	No difference
Fish in the lake (no impact)	No difference	Not applicable	Not applicable	No difference
Fish spawning and rearing habitat along the river below dam (Class IV)	Reduced passage opportunities and fish habitat compared to proposed project	Not applicable	Not applicable	Reduced spawning and rearing opportunities and fish habitat compared to proposed project
Lakeshore vegetation and oak trees (Class II)	Reduced magnitude, but still Class II impact	Not applicable	Not applicable	No difference
Recreational facilities at the lake (Class II)	Reduced magnitude, but still Class II impact	Not applicable	Not applicable	No difference
Cultural resources (Class II)	Reduced magnitude, but still Class II impact	No difference	Avoid potential disturbance to unknown archeological sites at work areas	Avoid potential disturbance to unknown archeological sites at work areas
Temporary habitat disturbance and erosion at work sites due to construction activities (Class II)	Not applicable	Impacts avoided	Impacts avoided	Impacts avoided

10.6.1.4 Summary of the Alternative

This alternative would not fully meet the project purpose and need, it would not be consistent with the FMP/BO, it is considered technically and economically feasible, it would reduce the magnitude of three significant impacts of the proposed project, and it would not cause any new significant impacts. This alternative would be preferable to the proposed project if it were determined that passage flows did not have appreciable benefits to steelhead, and/or the 3-foot surcharge was determined to be infeasible.

10.6.2 No Upper Hilton Creek Passage Impediment Removal Project (Highway 154 Culvert)

10.6.2.1 Description of the Alternative

As described in Section 2.6.3, Caltrans proposes to modify the culvert under Highway 154 to remove a fish passage impediment. The objective of the project is to improve hydraulic conditions to allow steelhead and rainbow trout passage to upper Hilton Creek which contains suitable spawning and rearing habitat under favorable hydrologic conditions (SYRTAC, 2001; Engblom, 2003). The project would be designed, permitted, and constructed by Caltrans using state funds. All work would occur on state lands, although the project would provide enhanced passage to upper Hilton Creek which occurs on private property (the San Lucas Ranch).

Under this alternative, Caltrans would not modify the Highway 154 culvert. Reclamation and COMB would remove the fish passage barrier on lower Hilton Creek downstream of the Highway 154 culvert, as described in Section 2.6.2.

10.6.2.2 Feasibility Considerations

The No Upper Hilton Creek Passage Impediment Removal Alternative would partially meet the project purpose and need (even though a portion of the FMP/BO is not implemented) because other elements of the FMP/BO would improve habitat conditions for the southern steelhead in the lower watershed compared to historic conditions. This alternative is considered feasible based solely on technical, logistical, and economic considerations. However, this alternative would not be consistent with the FMP/BO because it would not provide the passage opportunities to upper Hilton Creek included in the BO.

Providing increased passage opportunities within the creek would have several benefits to steelhead in the lower watershed that would be critical to its continued existence. The project would facilitate greater access to suitable spawning and rearing habitat, thereby potentially increasing the reproductive success of steelhead. Increasing the production of fish in the lower watershed provides greater assurances that a population will persist and withstand mortality from natural events (e.g., droughts) and human factors (e.g., non-native predators). In addition, by substantially increasing the frequency with which steelhead will be able to access upper Hilton Creek, this habitat will be used more frequently. This condition will provide additional protection from the loss of spawning and rearing habitat in other tributaries due to catastrophes that eliminate habitat on other tributaries (e.g., wildfires and major post-fire sedimentation).

Most of the FMP/BO objectives would be met under this alternative. However, a major opportunity to enhance fish habitat with comparatively little effort would be forgone under this alternative. The presence of year-round flows and suitable spawning and rearing habitat along lower Hilton Creek (on federal land) ensures the persistence of steelhead on the lower portions of the creek, and make it easy to expand such habitat at very little cost.

10.6.2.3 Environmental Impacts

No new significant environmental impacts are expected to occur under this alternative, nor would the magnitude of any significant impacts associated with the proposed project be increased. A comparison of the environmental impacts of the No Upper Hilton Creek Passage Impediment Removal Alternative and the proposed project is presented in Table 10-42.

10.6.2.4 Summary of the Alternative

This alternative would partially meet the project purpose and need, it would not be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid any significant impacts of the proposed project, and it would not cause any new significant impacts.

10.6.3 No Tributary Passage Impediment or Habitat Enhancement Projects

10.6.3.1 Description of the Alternative

As described in Section 2.0, the FMP/BO includes passage impediment removal and habitat enhancement projects on tributaries below Bradbury Dam. Passage impediment removal projects are planned for Hilton Creek, Quiota Creek, El Jaro Creek, Salsipuedes Creek, and Nojoqui Creek. Only one tributary habitat enhancement project has been identified at this time – the El Jaro Creek Bank Stabilization Project. Others may be identified and pursued in the future as opportunities with private landowners become available. Under this alternative, none of the passage impediment removal and habitat enhancement projects would be implemented.

10.6.3.2 Feasibility Considerations

The No Tributary Passage Impediment or Habitat Enhancement Projects Alternative would not meet the project purpose and need because a substantial and important element of the FMP/BO would not occur. This alternative is considered feasible based solely on technical, logistical, and economic considerations. However, this alternative would not be consistent with the FMP/BO because tributary projects are required in the BO.

Increasing and improving habitat in tributaries are fundamental strategies of the FMP/BO. Spawning and rearing habitat is most abundant, exhibits the highest quality, and is most reliable on tributaries compared to the mainstem of the river. Excluding the tributaries on the south side of the river from the FMP/BO would remove one of the most important elements of the project.

10.6.3.3 Environmental Impacts

No new significant environmental impacts are expected to occur under this alternative, nor would the magnitude of any significant impacts associated with the proposed project be increased. The significant, but mitigable impacts associated with temporary construction activities on tributaries (e.g., temporary removal of creek side vegetation, temporary erosion from work areas, possible effects to unknown archeological sites) would be avoided. A comparison of the environmental impacts of the No Tributary Passage Impediment or Habitat Enhancement Projects Alternative and the proposed project is presented in Table 10-42.

10.6.3.4 Summary of the Alternative

This alternative would not meet the project purpose and need, it would not be consistent with the FMP/BO, it is considered technically and economically feasible, it would avoid two significant impacts of the proposed project, and it would not cause any new significant impacts.

10.6.4 No Mainstem Habitat Enhancement Projects

10.6.4.1 Description of the Alternative

As described in Section 2.8, the FMP/BO includes enhancement of existing pools between Bradbury Dam and Alisal Road to improve summer rearing conditions for steelhead. Additional structural elements would be added to selected pools such as boulders and woody debris that would provide refuge from predators. In addition, riparian vegetation would be planted around the perimeter of pools to reduce water temperature by shading. These enhancements would not occur under this alternative.

10.6.4.2 Feasibility Considerations

The No Mainstem Habitat Enhancement Projects Alternative does not fully meet the project purpose and need because an element of the FMP/BO would not be implemented. This alternative is considered feasible based solely on technical, logistical, and economic considerations. However, this alternative would not be fully consistent with the FMP/BO. Improving rearing habitat on the mainstem will contribute to the overall success of the FMP/BO even though the quality of the mainstem habitat is lower than in the tributaries.

10.6.4.3 Environmental Impacts

No new significant environmental impacts are expected to occur under this alternative, nor would the magnitude of any significant impacts associated with the proposed project be increased. The significant, but mitigable impacts associated with temporary construction activities on the mainstem (e.g., temporary removal of creek side vegetation, temporary erosion from work areas, possible effects to unknown archeological sites) would be avoided. A comparison of the environmental impacts of the No Mainstem Habitat Enhancement Projects Alternative and the proposed project is presented in Table 10-42.

10.6.4.4 Summary of the Alternative

This alternative would not meet the project purpose and need, it would not be consistent with the FMP/BO, it is considered technically and economically feasible, it would avoid two significant impacts of the proposed project, and it would not cause any new significant impacts.

10.7 HILTON CREEK CHANNEL EXTENSION ALTERNATIVES

The FMP/BO includes an extension of lower Hilton Creek to create additional steelhead rearing habitat, utilizing the benefits of the newly installed supplemental watering system. A new channel about 1,200 feet long would be constructed on federal property from approximately the base of the bedrock canyon to a new confluence with the Santa Ynez River downstream of the existing confluence. A flow control structure would be installed along Hilton Creek to divert low flows to the channel extension. The channel would be designed to provide rearing habitat for steelhead using the water released to Hilton Creek from the supplemental watering system. The flow control structure on Hilton Creek would divert flows up to 15 cfs to the channel extension; higher flows would remain in the existing Hilton Creek channel. The channel extension would be designed with a series of pools, runs, and riffles. The new channel will also include various habitat improvements to enhance rearing conditions, such as the placement of suitable gravel bed, occasional boulders, and woody debris. Riparian trees will be planted along the banks of the new channel.

The project has only been developed to a conceptual stage, and is addressed in this EIR/EIS at a programmatic level. At this time, there is no information on the precise channel alignment, depth, and width. In addition, the grading requirements are also unknown. Access to the work area, the construction staging area, and work limits are also undefined at this time.

As described in Section 7.3.1, creating the Hilton Creek channel extension will require removal of well-established riparian vegetation. In essence, a riparian corridor with canopy trees and a dense understory will be converted to a streambed with perennial flows. The acreage and types of riparian habitats that would be temporarily and permanently disturbed are unknown. To be conservative, this impact is considered significant, and potentially unmitigable (Class I). The significance of this impact may be reduced once the magnitude of the impact can be quantified.

Four channel extension alternatives were evaluated. The preferred alternative (Alternative B in the FMP) consists of a 1,500-foot long channel excavated located along the base of the steep bluffs on the south bank of the river (Figure 2-1). This alternative would result in an additional 1,215 feet of rearing habitat compared to current conditions (SYRTAC, 2000).

Appendix D of the FMP contains a preliminary evaluation of three channel extension alternatives: Alternative A, Alternative B (the currently proposed project), and the "Former Alignment Alternative." The SYRTAC was unable to provide a definitive comparison of the relative feasibility and benefits of these alternatives in the FMP, and indicated in the FMP that additional technical studies would be necessary. Hence, the availability and feasibility of alternative channel extension are unknown, and will be subject of a supplemental environmental analysis and report as this project is pursued in the future.

10.8 JALAMA ROAD PASSAGE IMPEDIMENT REMOVAL PROJECT

10.8.1 Description of the Alternative

As described in Section 2.7.2, this project involves modification of a concrete and rock grade control structure associated with the Jalama Road bridge over Salsipuedes Creek which contains spawning and rearing habitat for steelhead in its upper reaches. The modification involves two elements: (1) Three step pools would be constructed in the bedrock outcrop situated along the east bank; and (2) A one-foot high concrete wall would be constructed along the top of the grade control structure. During low flows, the concrete wall will divert flow into the constructed pools. During high flows, a portion of the streamflow will continue to flow through the pools as well as over the concrete wall on the crest of the grade control structure.

An alternative design would be to construct a series of rock weirs across the channel downstream of the grade control structure that would create vertical channel bed differences of 15 inches or less. The rock weirs would be placed in the channel bed and create 2-foot deep pools behind them for fish to rest. Four weirs spaced at 25-foot intervals would provide four vertical jumps for fish to navigate at flows of 10 cfs, which would be an improvement compared to the current vertical jump of 5 feet. Construction of this alternative design would require placement of concrete foundations under each rock weir. It would require substantial in-channel excavation and disturbance of the riparian vegetation on the creek bank. In addition, the alternative would result in the permanent loss of creek aquatic habitat due to the rock weir structures.

10.8.2 Feasibility Considerations

The Alternative Jalama Road Passage Impediment Removal Project would meet the project purpose and need because it would improve passage on Salsipuedes Creek. This alternative is considered feasible based solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO.

10.8.3 Environmental Impacts

The alternative passage structure would have greater impacts to aquatic habitat and riparian vegetation than the proposed project. This alternative would result in a new significant environmental impact – loss of aquatic habitat. In addition, the magnitude of significant construction related impacts associated with this project would increase due to the greater in-channel work.

10.8.4 Summary of the Alternative

This alternative would meet the project purpose and need, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would no avoid several significant impacts of the proposed project, and it would cause a new significant impact.

10.9 QUIOTA CREEK PASSAGE IMPEDIMENT REMOVAL PROJECT

10.9.1 Description of Alternative

As described in Section 2.7.3, eight at-grade crossings of Quiota Creek by Refugio Road would be modified to improve fish passage, and allow steelhead to better access the upper creek where there is suitable spawning and rearing habitat. Reclamation and COMB propose to construct rock fishways at five crossing. In a separate but parallel effort, the County of Santa Barbara will install permanent bridges at three crossings. Reclamation and the County will use different designs. Reclamation and COMB will utilize rock fishways that retain the existing at-grade crossings, while the County will remove the at-grade crossings and construct a span bridge at each crossing. Bridges will be used at the County crossings because the vertical grades at these crossings are more severe than at other crossings.

The following alternative designs could be used by Reclamation and the County: (1) The County could utilize the rock fishway design at the County crossings, described in Section 2.7.3. (2) Reclamation/COMB could utilize bridges at the five crossings to be modified instead of the rock fishways.

10.9.2 Feasibility Considerations

The Quiota Creek Passage Impediment Removal Alternative would meet the project purpose and need because it would improve fish passage on the creek. This alternative is considered feasible based solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO.

10.9.3 Environmental Impacts

The County crossings have substantially greater vertical drops compared to the Reclamation/COMB crossings. Hence, use of the rock fishway designs at the County crossings would require significant grading of the creeks upstream and downstream of the crossing. It is estimated that the creeks would be graded 75 to 100 feet upstream and downstream of the crossing to create a suitable creek profile. This action would temporarily and permanently remove aquatic habitat (e.g., pools) at these crossings – an impact that would not occur with the bridges. In addition, several large riparian trees along the margins of the creek near these crossings would also be removed. The trees that would be removed at the bridge abutments would not be affected; however, an equal number would be removed to install the fishways.

Use of bridges at the five Reclamation/COMB crossings would avoid the temporary impacts to aquatic habitat in the creek bed due to the installation of rock fishways. However, construction of bridges would result in the removal of 5 to 10 mature riparian trees (oaks and sycamores) that would not occur with the proposed fishways. This alternative would increase the magnitude of the significant, but mitigable impact (Class II) due to tree removal associated with the entire Quiota Creek project.

10.9.4 Summary of Alternative

This alternative would meet the project purpose and need, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid several significant impacts of the proposed project, it would increase the magnitude of one significant impact, and would not cause any new significant impacts.

10.10 EL JARO CREEK PASSAGE IMPEDIMENT REMOVAL PROJECT

As described in Section 2.7.3, an abandoned fair weather-type crossing on El Jaro Creek would be modified to improve fish passage. The existing crossing is an abandoned at-grade concrete vehicle crossing. The proposed project would involve removal of the crossing and modification of the stream channel in the vicinity of the crossing to create a gradual flow line. The proposed project would occur on private property and require approval by the landowner.

At this time, the structure has been examined by Reclamation and COMB personnel, but preliminary project plans have not been prepared. A feasibility study is currently being conducted. There is no information on the type of structural modifications or the extent of creek work. Access to the work area, the construction staging area, and work limits are also undefined at this time. As a result, the environmental impacts of this project are only addressed in this EIR/EIS at a programmatic level. Once Reclamation and COMB have developed preliminary plans for the project, a subsequent CEQA and NEPA environmental review will be completed, tiering from this EIR/EIS. Hence, the availability and feasibility of alternative passage projects are unknown, and will be subject of a supplemental environmental analysis and report as this project is pursued in the future.

10.11 NOJOQUI CREEK PASSAGE IMPEDIMENT REMOVAL PROJECT

As described in Section 2.7.4, the objective of the project is to improve steelhead passage over an existing concrete grade control structure on Nojoqui Creek. The proposed project would reduce the jump height between the downstream pool and the crest of the structure by constructing a series of step pools using concrete and boulders. The proposed project would occur on private property and require approval by the landowner.

The structure has been examined by Reclamation and COMB personnel and preliminary project, but plans have not been prepared. There is no information on the type of structural modifications or the extent of creek work. Access to the work area, the construction staging area, and work limits are also undefined at this time. As a result, the environmental impacts of this project are only addressed in this EIR/EIS at a programmatic level. A feasibility study is currently being conducted by COMB. Depending on the results of the study, Reclamation and COMB may develop preliminary plans for the project. A subsequent CEQA and NEPA environmental review would then be completed, tiering from this EIR/EIS. Hence, the availability and feasibility of alternative passage projects are unknown, and will be subject of a supplemental environmental analysis and report as this project is pursued in the future.

10.12 EL JARO CREEK BANK STABILIZATION PROJECT

10.12.1 Description of the Alternative

As described in Section 2.8.1, Reclamation and COMB propose to implement a demonstration project on El Jaro Creek to reduce bank erosion and sedimentation associated with grazing. The project will involve three elements: (1) the removal of an undersized culvert and stabilization of the stream channel and adjacent stream banks within a small ephemeral drainage; (2) stabilization of an exposed side-draw located approximately 100 feet downstream of the existing culvert; and, (3) stabilization of an eroding stream bank along El Jaro Creek.

Reclamation and COMB have only identified one feasible alternative that would meet the project objectives of reducing ongoing bank erosion at the three project sites. This alternative would involve stabilizing both the bottom and banks of the side-draw downstream of the existing culvert instead of just stabilizing the channel banks as proposed. Under this alternative, a “Geoweb” erosion control blanket would be placed in stacks on the channel bottom, each layer filled with cobbles. Geoweb is a plastic textile with individual cells where soil and rock can be placed. The advantage of this alternative is that the channel bottom on the eroding sidedraw would be fully stabilized, and thereby, provide additional bank stabilization than under the proposed project.

10.12.2 Feasibility Considerations

The El Jaro Creek Bank Stabilization Alternative would meet the project purpose and need because it would reduce erosion on the creek. This alternative is considered feasible based solely on technical, logistical, and economic considerations. This alternative would be consistent with the FMP/BO.

10.12.3 Environmental Impacts

This alternative would involve slightly greater impacts to the channel bottom than the proposed project because the erosion control blanket with rock will be placed on the channel bottom instead of just along the banks. No aquatic habitat or wetlands would be displaced, as the channel bottom consists of loose, highly erodible silt and cobbles. Stabilizing the channel bottom would reduce channel bed and bank erosion, and thereby allow development of riparian vegetation. Hence, no additional impacts are anticipated with this alternative.

10.12.4 Summary of Alternative

This alternative would meet the project purpose and need, it would be consistent with the FMP/BO, it is considered technically and economically feasible, it would not avoid several significant impacts of the proposed project, it would not increase the magnitude of any significant impacts, and it would not cause any new significant impacts.

10.13 UPPER BASIN ALTERNATIVES

10.13.1 Background Information

The SYRTAC developed various management actions to benefit steelhead in the Santa Ynez River watershed through a consensus-based process that included local, state and federal agencies, environmental groups, landowners and other interested parties. Among the upper basin actions considered were steelhead access above Bradbury Dam (the upper basin) and protection of the genetic integrity of local stocks. Before construction of Bradbury Dam (completed in 1953), the upper basin provided most of the suitable spawning and rearing habitat in the Santa Ynez River basin. In 1997, the National Marine Fisheries Service (NMFS) listed steelhead downstream of impassible barriers (including Bradbury Dam) as endangered under the federal Endangered Species Act (ESA).

Through the SYRTAC process, a variety of upper basin actions were identified that might benefit rainbow trout/steelhead populations throughout the basin. These actions were first described in the 1998 Management Alternatives Plan (SYRTAC 1998). In order to evaluate the feasibility and the potential benefit to steelhead populations in the basin, the SYRTAC created the Upper Basin Work Group. The results of the work group’s analysis were presented in Appendix E of the Final FMP.

The Upper Basin Work Group evaluated three actions for the upper basin that could benefit the listed, anadromous steelhead population: genetic protection, providing access to upper basin habitat, and providing upper basin fish access to the lower basin for out-migration. The latter two actions have since been grouped under a single goal which is to increase steelhead production in the Santa Ynez River basin through use of upper basin habitat. These actions are listed below and evaluated in the following subsections.

- ***Genetic Protection*** – The rainbow trout planted to support the put-and-take fishery in Cachuma Lake and below Gibraltar Dam are derived from non-native stocks. Some stocked fish survive and may be washed over the dam in spill years. These fish may then interbreed with native stocks and thereby reduce the fitness of the resulting progeny in the Santa Ynez River. The Upper Basin Work Group evaluated two methods to prevent the introgression of non-native stocks into the native steelhead population, while protecting the recreational fishery in Lake Cachuma and below Gibraltar Dam: develop a broodstock of fish with appropriate genetic make up, or stock Cachuma Lake with sterile trout.

- ***Increase Steelhead Production Through Use of Upper Basin Habitat*** – Prior to the construction of Bradbury Dam, the tributaries upstream of Bradbury Dam provided the majority of the quality spawning and rearing habitat for steelhead. The upper basin tributaries historically maintained perennial flow and cooler water temperatures than areas in the lower basin. The Upper Basin Work Group evaluated methods to provide adult steelhead access to historical habitat above the dam. In addition, the Upper Basin Work Group also evaluated the feasibility of providing an outmigration corridor for juveniles migrating downstream (smolt).

Entrix (2002) recently updated the work group's evaluation of upper basin alternatives, incorporating relevant new information. The upper basin actions were evaluated in terms of benefit to the steelhead population, technical feasibility, and institutional feasibility. The results of this updated analysis are summarized in this section of the EIR/EIS. These results are included in the EIR/EIS to provide the technical basis for dismissing infeasible alternatives. As such, the upper basin actions are not considered potential management actions to supplement the FMP/BO, or as alternative approaches to protecting and enhancing steelhead in the watershed instead of the approach underlying the FMP/BO (that is, enhancement of the mainstem and key tributaries downstream of Bradbury Dam).

10.13.2 Protection of Genetic Integrity of Southern California Steelhead

Two measures have been identified to offset the potential genetic effects of stocking northern rainbow trout in Lake Cachuma and in the Santa Ynez below Gibraltar Dam, to support the existing recreational fishery:

- Replace the northern-origin rainbow trout currently used for stocking with an equal quantity of rainbow trout having a genetic profile more typical of Southern California steelhead. This would require use of a hatchery to create a southern broodstock.

- Replace the fish currently stocked with an equal quantity of sterile rainbow trout or another sterile trout hybrid.

Create a Broodstock with a Hatchery

The Upper Basin Work Group explored the possibility of developing and maintaining a broodstock in one of the existing hatcheries, as discussed below.

- ***Fillmore Hatchery*** – The Fillmore Hatchery is currently supplying 31,000 pounds of fish to stock the Santa Ynez River. It is a rearing facility and lacks the capabilities and capacity for the development and maintenance of a broodstock (J. Adams, CDFG Fillmore Hatchery, pers. comm.). For this facility to be used as a broodstock and rearing facility, a water treatment system would have to be developed to provide water of suitable temperature and quality for spawning and incubating rainbow trout. The capacity of the Fillmore Hatchery would also need to be increased to provide space for the southern broodstock.

- ***Mt. Whitney Hatchery*** – The Mt. Whitney Hatchery is currently involved in the golden trout stocking program. The Mt. Whitney Hatchery is not suitable for maintaining a southern broodstock because of two problems. First, it has an ongoing problem with whirling disease (M. Waters, CDFG Mt. Whitney Hatchery, pers. comm.), which is difficult to eradicate and could endanger the existing steelhead and rainbow trout populations in the Santa Ynez River. Second, the Mt. Whitney Hatchery is located in the Owens River basin, which has a substantially different climate than the Santa Ynez River.

- ***Several other hatcheries*** were also considered including Whale Rock, Hot Creek, Shasta-Pit and Lassen. In all cases, the problems of hatchery size, climate and distance from the Santa Ynez river were too great to warrant further investigation.

Due to the difficulties associated with using an existing hatchery, it is likely that the construction of a new hatchery facility or expansion of an existing facility would be required if the genetic integrity of Santa Ynez River stocks were to be protected by planting southern stocks. Ideally, a southern stock hatchery would be developed within the ESU to best emulate the environmental conditions of the Santa Ynez basin. There are many factors to consider when locating such a facility. It must have sufficient space (about 20 acres), and suitable water source with appropriate temperatures. Water use is very high. For example, Fillmore Hatchery currently uses approximately 39.8 acre-feet of water per day to produce 427,000 pounds of rainbow trout (J. Urrutia, CDFG, pers. comm.). The capital costs of a new facility would be several million dollars. Locating and acquiring land and water resources for a new hatchery would be a significant challenge, and would involve additional costs beyond the capital costs of the facilities.

If the Fillmore Hatchery were to be used for the southern-stock program, the existing facilities would have to be expanded to include broodstock facilities and re-designed to separate local stocks from northern stocks. Even expanding an existing hatchery would be very expensive. For example, a conceptual-level cost estimate for adding broodstock development facilities to an existing anadromous fish hatchery in the Russian River (FishPro and ENTRIX 2001) is approximately $4,400,000 for a facility that would ultimately produce 300,000 yearling fish. Annual operational costs of a hatchery would be very high. Fillmore Hatchery currently requires nine people to operate and stock fish (J. Urrutia, CDFG, pers. comm.), and it is estimated that the broodstock program would require a minimum of four additional staff (J. Adams, CDFG, pers. comm.).

Based on the technical, logistic, and financial challenges noted above, the Upper Basin Work Group determined that a broodstock hatchery was not feasible. Additional information on the technical, biological, and institutional obstacles are provided in Entrix (2002).

Stocking Sterile Trout

The second action that might be implemented to avoid the genetic introgression of native steelhead and rainbow trout with exotic strains would be to replace the rainbow trout currently planted in the lake and mainstem below Gibraltar Dam with sterile rainbow trout.

An option for developing a sterile trout for planting would be to use a process which produces triploid fish. The extra set of chromosomes makes these fish sterile. The process to produce these fish has shown highly variable results in the past (M. Seefeldt, CDFG Mt. Whitney Hatchery, pers. comm.), although study and further work continues to improve this process. Just recently, CDFG has initiated a test program for the Rose Valley Reservoir which will use triploid rainbow trout eggs purchased from a private Washington-based aquaculture source. Until the reliability of this process can be proved, it would not be suitable for use in the Santa Ynez River. Because of the experimental nature of using triploid fish, the proposed stocking of sterile trout does not appear to be technically feasible at this time, although it may be feasible in the future. Once the technology has been adequately developed, there will be an additional delay involved in getting this technology geared up to a production level capable of producing the desired number of fish.

This measure, while currently technically infeasible, has the potential to avoid possible genetic introgression with steelhead and support the continuation of the Lake Cachuma fishery. This measure would also avoid any potential adverse genetic effects associated with the development of a broodstock program. Based on the likely need to construct a new hatchery for southern steelhead if a southern steelhead broodstock were to be developed, the sterile trout hatchery program could likely be attained at a considerable cost savings. In the FMP, the SYRTAC recommends that the Adaptive Management Committee keep abreast of the progress of this research and consider implementation of this option if it proves technically feasible in the years ahead.

This program, if ultimately deemed feasible, would reduce a potential adverse effect (i.e. genetic introgression) on the southern California steelhead population found downstream of Bradbury Dam, although it would not directly affect the number of listed fish found in the watershed. However, at this time, this measure is not considered a feasible alternative to the FMP/BO approach.

10.13.3 Increase Steelhead Production Through Use of Upper Basin Habitat

Actions to use upper basin habitats to increase the Southern California steelhead population in the Santa Ynez River were also considered. These actions were considered because the majority of the historic steelhead producing habitat in the watershed is located upstream of the Bradbury Dam. Also, these habitats are in good condition and lie within the Los Padres National Forest.

In order for the upper basin actions to be successful at increasing steelhead populations in the Santa Ynez River they must result in adult steelhead gaining access to the upper basin spawning habitats and the progeny of these adults gaining access to lower river and salt water habitats. Four alternative actions were considered by the SYRTAC to provide fish passage around Bradbury

Dam: (1) a fish ladder from the Bradbury Dam Stilling Basin to Lake Cachuma, (2) a fish ladder from Hilton Creek to Lake Cachuma, (3) a bio-engineered fish passage channel that would pass fish into or around Lake Cachuma, and (4) trap-and-truck operations. These actions were evaluated for technical, biological, and institutional feasibility. Because the first three alternatives all involve passage over Bradbury Dam and therefore share similar feasibility issues, they are addressed together.

Fish Passage At Bradbury Dam

Description of Action

Because fish ladders are installed under a wide range of physical conditions (inlet and outlet elevations, flow rates, fluctuating or non-fluctuating upstream water surface elevations, space in which to construct the ladder) several different types of fish ladders are in common use. Although considerable overlap occurs, each type of ladder is best suited for a particular set of physical conditions. Also, there is a finite limit to the elevation and the range of stream flow over which any ladder can pass fish (Bates 2000).

A fish ladder at Bradbury Dam would need to raise fish approximately 210 feet in elevation, provide passable upstream exit conditions over at least a 50 to 60 foot range of reservoir elevations and provide attractive downstream entrance conditions over a range of stream flows from 5 to 15 cfs. In addition the ladder would need to be an independent, self-supporting structure capable of withstanding seismic loads and not jeopardizing the stability of the dam.

Another option would construct a bio-engineered fish channel to allow steelhead to pass around the dam and all or a portion of the lake depending on the alignment. This would be a structure with a lower gradient (typically 1 to 5%) than a fish ladder, but would likely be several miles in length. Manmade materials would most likely be used for the bed of the channel, with riparian vegetation planted on the stream banks. Structures would be built into the channel to provide resting areas and cover.

Fish passage channels are usually constructed starting immediately below the barrier being bypassed so that attraction into the fish passage channel is not an issue (Larinier 2000). The topography at the dam does not provide adequate distance for a low-gradient structure at this point because the immediate elevation gain would be too substantial. Therefore, alternative alignments were explored that used near-by tributaries to gain some elevation. Two potential alignments were considered based on a review of topographic maps, one on each side of the lake. On the north side of Lake Cachuma, the most likely course for such a canal would be for fish to use the natural channels from Santa Agueda Creek to the headwaters of Happy Canyon Creek and then enter an artificial canal to either Lake Cachuma, a tributary to Lake Cachuma (e.g. Cachuma Creek, as shown in Figure 10-1), or potentially continuing around the entire length of the Lake and into the mainstem above the Lake. The potential alignment presented in Figure 10-1 attempts to maintain an upstream gradient as long as possible and to follow the contour lines, to some degree, to maintain the low gradient necessary. A south-side alignment would most likely use Hilton Creek to gain some elevation and then continue around the south side of the lake ending in a tributary to the lake or continuing around to the mainstem Santa Ynez River.

The upstream end of the channel would need to be connected to the waterbody, either the mainstem Santa Ynez River, a tributary to Lake Cachuma, or Lake Cachuma itself, to allow upmigrating adults access to the upper watershed. If the channel is also to provide an outmigration pathway, the channel entrance would need to be designed to screen flow in the tributary or mainstem so that fish and a portion of the flow would enter the channel and the remainder of the flow would continue downstream into the lake.

Technical Feasibility

Although fish ladders have been constructed at dams higher than Bradbury, ladders at high dams have yet to successfully pass fish over more than 150 feet in elevation. The Pelton Fish Ladder in Madras, Oregon has a lift of 230-feet, and is 2.84-miles long, but ceased operation in 1968 as adult salmon and steelhead refused to enter the ladder (Ratliff *et al.* 1999). The reasons for such poor success passing adult fish over high dams has probably more to do with the behavior response or stamina of the fish once inside the fish ladder than it does with the design or construction of the structure (W. Trihey, Entrix pers comm.). If Hilton Creek were used to provide a portion of the passage route around Bradbury Dam the overall height of the fish ladder could be reduced from approximately 210 feet to about 70 feet if an existing migration barrier in the Hilton Creek was corrected or from approximately 210 feet to about 125 feet if it were not. A fish ladder, approximately 70 feet in height, could be constructed if the migration barrier in Hilton Creek has been corrected. If the migration barrier has not been corrected, then the fish ladder would be extended to be approximately 125 feet in height. In either event, upstream migration would be required to pass approximately 125 feet in elevation through high gradient flow.

Constructing a bio-engineered passage channel would also require surmounting the height of Bradbury Dam. But because the bio-engineered channel would look and perform more like a stream channel than a fish ladder it would require a lower average gradient and thus be considerably longer than a conventional ladder. This increased length would complicate the alignment and significantly increase the amount of land or land easements required for construction. Potential alignments from the headwaters of Happy Canyon Creek to Lake Cachuma are technically infeasible because the headwaters are over 90 feet above the elevation of Lake Cachuma (based on U.S. Geological Survey 7.5 minute topographic maps). Thus, there would be a high point in the canal where water would flow downstream towards Happy Canyon and downstream towards Lake Cachuma. This would require fish to swim “upstream” from Happy Canyon and then “downstream” into Lake Cachuma. Not only is this a substantial engineering challenge, but it is unlikely to successfully pass fish as they would become disoriented reducing the efficiency of the structure. This issue would be a problem for any alignment that used a natural stream channel to gain more elevation than the elevation of the outlet location (e.g. 750 feet above msl for an outlet into the lake or the mainstem above the lake).

Constructing an alignment that would result in continued upstream flow is also deemed infeasible. Two types of such alignments were described above: around the entire Lake or around a portion of the Lake, terminating in a tributary. If Hilton Creek were used to gain elevation while remaining on Reclamation property, the fish channel would begin at approximately 680 feet above msl. If the channel were to go around Lake Cachuma, it would be approximately seven miles in length and would need to maintain a slope of 0.2% to gain the 70 feet of elevation necessary to terminate at the mainstem immediately above Lake Cachuma. Such a slope would be difficult to maintain and would lead to siltation of the channel. Constructing canals along these alignments is infeasible because of the steep topography located adjacent to the lake, the inaccessibility to these areas for construction equipment, and the difficulty in engineering a continuous, low upstream slope over the distances needed.

A bio-engineered fish passage channel around Bradbury Dan also poses an additional challenge not associated with traditional ladders. Adult and juvenile fish response to a long and natural appearing channel is unknown. But it is likely that some adults will spawn in the passageway. This would in–part negate the purpose of the bio-engineered passage way (getting fish to the upper watershed) and cause the problem of maintaining acceptable flow and temperature conditions for rearing throughout the year.

The variation of Lake Cachuma's water surface elevation from year to year and from the beginning to the end of the adult steelhead migration period is as significant a technical challenge to successful ladder operation as is the height of Bradbury Dam. At full pool, the elevation of Cachuma Lake is 750 feet msl. During spill the lake elevation is somewhat higher. But much of the time Lake Cachuma is 30 to 50 feet below full pool elevation at the onset of steelhead migration. Sometimes the water surface elevation is 70 feet or more below full pool elevations. In order to provide acceptable exit conditions for fish at the upstream end of the ladder, multiple ladder exits at different elevations would be required. These ladder exits would be located along one shoreline with the higher elevation exits being furthest from the spillway. Each of the lower elevation exits would require a water control gate to close off inflow when the reservoir water surface rose above the hydraulic capacity of the fishway exit. With a 50-ft variation in reservoir elevation and a 10% fishway gradient, 500 feet of ladder would be required inside the reservoir.

Before fish can use a fish ladder or passageway they must find its downstream entrance. Experience demonstrates that locating the passage entrance near the migration barrier and providing a strong flow from it are key factors for attracting fish. At Bradbury Dam, placing a ladder entrance in or immediately downstream from the spillway plunge pool are good choices. In addition the 750-ft. elevation of Lake Cachuma at full pool provides nearly 200 ft. of hydraulic head for operating auxiliary underwater jets to attract fish to the ladder entrance or the mouth of Hilton Creek when spill is occurring. Constructing auxiliary jets for fish attraction would significantly increase the cost of the passage facility, but it would use water that otherwise would pass over the spillway and enable a fish ladder to be designed around relatively modest water requirements (probably 5 to 15 cfs). The use of auxiliary water to attract fish into a bio-engineered channel during periods of high streamflow in the Santa Ynez would be more difficult a transition to make between the slower moving water in the bypass channel and the need for attraction flows into the channel.

Installation of a bio-engineered fish channel is deemed infeasible due to a combination of factors including engineering and attraction challenges described above and because establishing a suitable upstream connection is deemed currently infeasible. The upstream connection would need to channel a portion of the tributary or mainstem flow along with steelhead into the fish bypass channel. Such a structure would essentially be a diversion dam across the channel equipped with fish screens. The geomorphic nature of the mainstem Santa Ynez River and associated tributaries in the watershed, the flashy nature of flow conditions, and the wide range of flows that can occur make engineering design technically challenging. Such structures, because of their complexity, are also very costly. The Robles Diversion Fish Passage Facilities, which are designed to screen up to 600 cfs of inflow in the nearby Ventura River will cost approximately $6 million to construct. A facility such as that proposed for Robles, however, would only screen a portion of the flow and therefore a substantial number of outmigrants would continue downstream into Lake Cachuma rather than entering the fish bypass channel.

Biological Concerns

In addition to the formidable design challenges regarding fish ladders or bypass channels at Bradbury Dam, several significant biological issues also exist. These unknowns and concerns include fish performance (bioenergetics) within a long fishway, the undesirably warm temperature of water available at some times for use in the fishway, genetic introgression, large populations of predator species within Lake Cachuma, and the lack of a well defined outmigration pathway from the upper basin. These biological concerns apply equally to all actions being considered for fish passage at Bradbury Dam.

Steelhead may encounter bioenergetic constraints as they use the fish ladder. Bell (1990) summarized key bioenergetic factors that should be taken into consideration when building a fish passage structure. Lactic acid build-up can be fatal as a result of unusual activity, which the long swim up the ladder might cause. The “avoidance reaction” must be prevented, which is the reluctance/refusal of fish to travel from one place/situation to another. Fish can sense changes in velocity, and may avoid moving from a lower to higher gradient. Therefore, it is necessary to provide smooth transitions and accelerations. Water quality in the ladder must be maintained, as fish avoid odors and high temperatures. Overcoming these bioenergetic constraints will be a challenge, as the gain in elevation and length of the fish ladder may deter steelhead from entering the ladder or successfully passing completely through it.

Providing water of suitable temperature into the fish ladder may be a technical challenge as the reservoir can begin to stratify, especially in years with lower runoff, as early as April (SYRTAC 1997). Adult steelhead generally prefer temperatures less than 20° C during the upstream migration period (Raleigh et al. 1984, Bjornn and Reiser 1991). Elevated temperatures may reduce swimming performance (Brett et al. 1958) and thus impair ability to pass migration obstacles, including a long ladder. Therefore, later in some migration seasons, higher temperature may result in unsuitable or less suitable water quality conditions for migrating fish. Because Lake Cachuma can stratify within the fish migration period, water running through the fish ladder would need to be provided from deeper within Lake Cachuma (a technical challenge) or the efficiency of the ladder to pass adults would decline under warmer water conditions. Further, should the water be drawn from deeper in the lake to address the temperature issue, there would then be difficulties associated with attracting outmigrants into the ladder from the lake.

If adults were able to successfully use a ladder to enter Lake Cachuma, the ladder would provide them access to spawning and rearing habitat located in the mainstem Santa Ynez River between Lake Cachuma and Gibraltar Dam, as well as tributaries to Lake Cachuma. This would include sizeable tributaries such as Cachuma and Santa Cruz creeks. However, a large portion of the upper watershed (i.e. above Gibraltar Dam) would remain inaccessible. The geographic area the fish ladder could potentially provide access to has been historically stocked with resident, non-native rainbow trout. It is currently unknown the degree to which the genetics of the resident trout populations in this area have been influenced by the hatchery stocking program. A fish ladder at Bradbury Dam would facilitate the mixing of Southern California steelhead (a federally endangered species) with these resident population of unknown genetic composition. Such mixing, if the local population has been substantially altered by the historical stocking, could adversely impact Southern California steelhead in the Santa Ynez River. Therefore, the genetic heritage of fish in this sub-basin of the Santa Ynez River watershed would need to be carefully assessed to determine if providing access for Southern California steelhead to this area would result in a benefit to the steelhead population.

In addition to bioenergetic constraints with fish ladders and potential genetic introgression concerns, a fish ladder alone would not allow steelhead to complete their life cycle. A ladder into the reservoir would likely be ineffective at providing downstream passage for outmigrating smolts and for any adults that may be returning to the ocean. Outmigrating smolts would have to navigate through Lake Cachuma (surface area of 3,000+ acres) in order to find the entrance to the fish ladder. The smolts would have to travel roughly 6 miles through Lake Cachuma to Bradbury Dam from the Santa Ynez River (based on topographic map review). Depending on storm events in the winter, all inflow may be stored, the reservoir may be spilling, or releases limited to those for the downstream fishery (target flow releases of up to 10 cfs or fish passage supplementation releases of up to 150 cfs). When the reservoir is not spilling, there is typically little current (other than wind-driven currents) in the reservoir. Further, as noted above, thermal stratification later in the spring when smolt are often moving can result in higher water temperatures and the associated increased stress levels. As a result of all these factors, it is unlikely that smolts would be able to negotiate their way through the reservoir to find the small outlet into the fish ladder. Downstream fish passage at Round Butte Dam was unsuccessful in the 1960s mainly because smolts could not locate the forebay collection facility due to the direction of surface currents (Korn *et al.* 1967 as cited in Ratliff *et al.* 1999). Without the ability for steelhead to complete their lifecycle, the fish ladder would not result in an increase in the steelhead population.

Additionally, the numerous warmwater predatory fishes in Lake Cachuma (ENTRIX 1995b) would prey on the smolts during their migration. In the John Day Reservoir, juvenile salmonids comprised a substantial percentage in the diet of channel catfish (Gray *et al*. 1984), a species which is found in Lake Cachuma along with other known predators of juvenile salmonids. If outmigrants are unable to locate the fishway entrance, the only other way for juvenile fish to migrate downstream would be to go over the face of the spillway in large storm events. However, spills statistically occur in approximately one out of every three years (SYRTAC 2000) therefore in many years no such passage would be provided. The years without a spill correspond with those, noted above, which would result in low attraction flows other than the periodic releases for fish passage supplementation. Finally, the trip down the spillway would likely result in injury and possibly mortality. Predation, lack of attraction flows to the fish ladder, and potential injury should fish go over the spillway combine to result in a small success rate for the exiting outmigration pathway.

In addition to the concerns above, the bio-engineered channel could potentially have avian predation issues depending on the success of engineering cover elements in the channel and associated riparian growth. Further, there would be take associated with operation of the fish screening facility that would be necessary at the upstream end of the channel to collect outmigrating fish. Further, due to technical issues noted above, under higher flow conditions a substantial portion of the flow would not be screened. Under these condition, many adults and smolts would continue downstream into Lake Cachuma rather than being able to bypass Bradbury Dam into downstream habitat where they could continue their outmigration.

Institutional Concerns

Allowing the federally listed steelhead to enter Lake Cachuma or tributaries upstream of the lake by any means would have serious regulatory consequences for the recreational fishery in the these areas. CDFG currently manages the lake as a fishery for bass, catfish, and stocked rainbow trout. Lake Cachuma is the largest lake in Santa Barbara County that is available to local fishermen (S. Radom, Commission, pers. comm.). Based on the closure of the fishery downstream of Bradbury Dam to protect listed steelhead, the presence of steelhead above Bradbury Dam would likely result in the prohibition of fishing in the lake and in the mainstem and tributaries between Bradbury and Gibraltar dams. This would significantly impact the opportunity for recreational fishing within the county. Therefore, allowing steelhead above the dam would raise institutional conflicts with the Commission and concerns with the public. Allowing federally listed steelhead above Lake Cachuma would also impact private landowners in this area.

In addition, subjecting the severely depleted Santa Ynez River steelhead population to the increased stress associated with the fish ladder or channel and migration through the lake, if technical and biological feasibility issues could be overcome, has not been supported by NMFS in the past, given the uncertainties for success and the endangered status for the steelhead in the lower Santa Ynez River (Hogarth, pers comm1997, 1998, and 1999). Finally, for the bio-engineered channel, in order to provide a water source for the canal, new water rights would need to be obtained for the water body where the channel would terminate. Additional land may also need to be acquired depending on the alignment selected. For all three alternatives, design, construction, and implementation costs (including land and water costs) would be substantial.

Trap-and-Truck Transport of Adult Steelhead

Description of the Action

This option would trap-and-truck upstream adult migrants in the lower basin and transport and release them at location(s) in the upper basin, most likely upstream of Gibraltar Dam. The upstream trap-and-truck operation could be linked with a downstream trap-and-truck operation designed to capture outmigrating adults and smolts and transport them into the lower basin so they could have access to the ocean, thus completing their lifecycle.

An advantage of a trap-and-truck operation over a fish ladder is that it has the potential to allow steelhead access to habitat throughout the upper basin, depending on the number and location of selected release sites. The ladder or fish channel would allow fish to pass over Bradbury Dam, but these fish would be blocked at Gibraltar Dam and thus would not have access to habitat available above this point. Steelhead would also be limited to habitat on the tributaries below any passage barriers.

Trapping of adult steelhead would be conducted using the same methods as the current SYRTAC studies of the lower basin. For several years, the SYRTAC has been conducting trapping operations in the lower Santa Ynez River and its tributaries as part of a migration monitoring program. The program has trapped both upstream and downstream migrating adults and juveniles. A fyke trap with a weir portion constructed after the Alaskan style A-frame weir would be placed across the stream to collect fish migrating upstream. Monitoring of traps and transport of steelhead would occur daily throughout the operation period. Trapping can be conducted only at flows up to approximately 75 cfs in the lower basin tributaries (S. Engblom, Cachuma Project Biologist, pers. comm.).

The current migrant trapping program is successful in capturing some adult upstream migrants even though the higher flows, when fish frequently migrate (Northwest Fisheries Science Center 2000), can not currently be trapped. However, for the upstream trap-and-truck effort to be successful, not every fish will need to be captured, as remaining fish can spawn in tributaries in the lower river and still provide benefit to the Southern California steelhead population. Possible trapping sites include Hilton Creek, which is on Reclamation property, or Salsipuedes Creek, which would require permission from the landowner. Both are current trapping sites for the Cachuma Project monitoring program (Reclamation 2000).

Captured adults would be transported in an aerated tanker truck to the upper basin. The fish would be released in Los Padres National Forest above Gibraltar Dam or Juncal Dam, and/or suitable tributary habitat above Gibraltar Dam. Once accessible areas have been identified, habitat data would need to be collected reviewed to determine the best areas to release adults. Such areas would contain both suitable spawning and summer rearing habitat. Potential release sites include Blue Canyon, Indian, Mono, Fox, and Alder creeks in the middle sub-basin, and Juncal Creek in the upper sub-basin.

The upstream trap-and-truck program would be accompanied by a downstream trap-and-truck program designed to trap outmigrating adults and smolts and transport them into the lower basin below Bradbury Dam. Trapping could occur using traps similar to those described above for the up-migrant program, although higher flows would not be trapped due to feasibility issues. Permanent trapping facilities could also be installed that would be designed to screen inflow and channel fish into a holding bay where they would be regularly transferred to a truck and transported to a release site downstream. Temporary trapping facilities would likely be installed at the lower end of tributaries where steelhead from the upstream trap-and-truck program were released. Because of the substantially higher cost of installing a permanent structure, if a permanent structure(s) was utilized they would be installed in fewer locations. Such structures would most likely be built across the mainstem Santa Ynez River upstream of the two upper basin reservoirs to capture outmigrating fish from each upper sub-basin.

Technical Feasibility

Trapping in the lower basin would be technically feasible based on the success of the existing program, although the number of fish captured would be limited by the inability to operate the traps during high-flow events. It is therefore assumed that trapping in upper basin tributaries would also be successful at lower flows. The current trapping program does not, however, successfully trap the mainstem Santa Ynez River and therefore trapping locations would be constrained to tributaries.

Use of a permanent trapping facility is not considered feasible in this watershed where there are flashy, debris-laden flows. As noted above in the discussion of the fish channel, it is technically infeasible to screen all the flow in rivers with geomorphology (high sediment load, shifting channel) and hydrology (large flow range, flashy nature) similar to the Santa Ynez River. Partial screening of such rivers is possible (e.g. Robles Fish Passage Facilities), however these facilities are costly to construct and maintain and require additional structures (e.g. fish ladder) so as to not establish a new barrier.

An additional technical issue in trap-and-truck operations is vehicular access in the upper basin to suitable release sites. Several of the roads that currently exist are not passable during the winter and spring months when transport would be necessary potentially limiting release locations.

Biological Concerns

Trap-and-truck operations involve a substantial amount of fish handling which can result in stress and in some cases mortality of individuals (Northwest Fisheries Science Center 2000). Specific points of stress include the transfer of fish from the trap to the truck, transport (truck ride) to the upper basin, and release into the upper tributaries. Measures will need to be incorporated in order to minimize the amount of handling and therefore stress of steelhead. Additionally, trap-and-truck operations might increase chances of steelhead contracting diseases leading to eventual mortality (Schreck 1984). Finally, additional stress and mortality may be experienced in the receiving stream due to low flows, poor habitat conditions, unsuitable temperatures, and/or competition with resident rainbow trout in the receiving stream.

Trap-and-truck programs could be implemented for just upstream migrants, just outmigrants, or both. Biologically, it may be desirable to move some adult steelhead into the upper basin, even without an associated outmigration program, to keep the anadromous life history strategy alive in this area of the Santa Ynez River. The current population has been landlocked for many generations; and fish exhibiting an anadromous tendency would tend to be selected against, as they may pass over the dams and be lost to the upstream population. By introducing adult steelhead into the upper basin and keeping the anadromous tendency alive in this area, a buffer may be provided that could be used as a source for anadromous southern steelhead genome, even if no assistance were provided to allow outmigrant juveniles to reach the sea. However, it would move the steelhead and the production of any steelhead transported from the lower basin to the upper basin. In addition, as steelhead can spawn more than once, adult steelhead moved over the dam would not be able to return to the ocean; and once moved above the dam, these fish would be forced to reside in one of the reservoirs or tributaries unless successfully recaptured and transported back downstream (see below). This would likely reduce their potential lifetime production. Given their relatively low numbers (< 100 fish, NMFS 2000), this would have a significant impact on the steelhead population. Fewer steelhead would remain downstream of Bradbury Dam to use existing habitat, and historic habitat made newly accessible through implementation of tributary enhancement projects, in the lower basin.

If the downstream trap-and-truck program were implemented, some of the juveniles translocated downstream of Bradbury Dam may remain resident within the system. These individuals may displace young steelhead already present. This could have a detrimental effect on these young steelhead. To reduce this possibility, downstream migrant traps would be placed so that they capture only fish that are actively moving downstream out of a tributary or in the mainstem above the reservoirs (*i.e.,* outmigrants), this being a sign of potential anadromy. To further reduce the risk of residualization, fish transported downstream would be placed near the upstream end of the lagoon so that they are less likely to enter a tributary stream where they might displace native fish.

If the downstream-migrant trap-and-truck operation were to be implemented without the corresponding upstream migrant transport program, the purpose would be to provide additional smolt outmigrants to the ocean to, ultimately, lead to increased adult steelhead returns to the Santa Ynez River. It is currently unknown how many juveniles might be actively migrating downstream in the upper basin, or how important these individuals are to the local populations (S. Engblom, Cachuma Project Biologist, pers. comm.). In addition, there has been substantial stocking of hatchery-origin rainbow trout in and above Bradbury Dam and therefore investigations about the genetic heritage of these fish would need to occur prior to transporting them into the lower basin's Southern California steelhead population. Until these questions are answered, impacts to the upper basin populations and likelihood of recruitment to the lower basin population, and thus potential biological benefit, are unknown. These factors should be investigated before downstream transport is implemented on its own.

If downstream trap-and-truck operations are implemented in conjunction with upstream transport of steelhead, the purpose would be to restore gene-flow between the upper and lower basin populations and to utilize the exiting, high quality habitat found in upper basin areas for rearing steelhead (i.e. increase steelhead production). There are several concerns with this type of program. First, as noted above, the genetic character of the populations upstream of Bradbury Dam are not well understood and concerns exist due to extensive historical stocking with hatchery rainbow trout. Analysis of upper basin genetic population distributions would need to occur prior to mixing listed Southern California steelhead with these upper basin fish. Second, there are substantial technical challenges with "fishing" higher flows which could result in the failure to trap a large percentage of the offspring of ESA-listed fish. Therefore, some amount of production of ESA-listed steelhead would be lost, if they were transported to the upper basin, due to the difficulties in trapping higher flows in the Santa Ynez system and mortalities of ESA-listed fish during both the upstream and downstream phases of the trap-and-truck effort. The combination of both up- and downstream migrant trap-and-truck programs would allow some portion of the transported steelhead to complete their lifecycle. However it is unlikely that this would, in the short-term, result in a greater biological benefit to the Southern California steelhead population than implementing the lower-basin enhancement measures without a trap-and-truck program. Once enhanced and newly accessible habitat in the lower basin has reached its capacity for steelhead, then the biological benefits of the trap-and-truck operations increase.

Institutional Concerns

Proposed trap-and-truck operations raise serious concerns for state and federal agencies. CDFG policies state, "trap-and-truck operations, because of their history of failure to fully mitigate for loss of habitat, will not be considered as mitigation for proposed water projects, except where already approved. For existing barriers that block access to historical spawning and rearing areas, trap-and-truck operations will only be considered if there are no other feasible alternatives." (Farley 1997). NMFS communicated that all of the trap-and-truck alternatives not be considered further (Hogarth 1997). In addition, they later recommended omission of various alternatives, including trap-and-truck, because they would require inordinate human intervention and technical complexity, and that human or mechanical error seemed inevitable (Hogarth 1997). In 1999, NMFS stated that "[I]ssues such as trapping and trucking of steelhead (*Oncorhynchus mykiss*) and a steelhead hatchery require careful long term development and assessment; and are not appropriate for consultation at this time" (Lecky 1999).

NMFS has recommended that other options be considered and implemented before trap-and-truck proposals are pursued, due to the lack of success achieved in other Western regions (Hogarth 1998). In their letter commenting on a draft of the Fish Management Plan, NMFS stated: "NMFS's experiences with trapping and trucking in other areas of the West have not met expectations...NMFS believes that trapping/trucking proposals are best integrated into Santa Ynez fish management after other options have been fully implemented and their success evaluated. Such proposals need to be carefully assessed for feasibility and long term benefits and costs" (Hogarth 1998). Thus, NMFS would prefer to see if conservation measures in the lower basin are successful at enhancing steelhead production before engaging in trap-and-truck measures. In addition, trap-and-truck operations would result in harm to trapped individual steelhead, which is considered a "take". Given the low numbers of steelhead in the Santa Ynez River, and the Southern California ESU in general, it appears unlikely that a permit would be issued by NMFS for implementation of the trap-and-truck program until after the lower basin conservation measures were fully implemented and the results monitored.

Finally, the trap-and-truck program could lead to similar conflicts with recreational uses of the upper basin (i.e. fishing) as described above and potential inter-species conflicts due to protection of other listed species in the upper basin. The USFS closes roads in the Los Padres National Forest to protect arroyo toad and California red-legged frogs under certain conditions and would thereby prevent use of those roads for the trap-and-truck program.

11.0 CUMULATIVE IMPACTS AND GROWTH INDUCING EFFECTS

11.1 CUMULATIVE IMPACTS

NEPA requires that an Environmental Impact Statement (EIS) address the direct, indirect, and cumulative impacts of a proposed action. "Cumulative impact" is defined under the NEPA regulations (Section 1508.7) as the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The federal Council of Environmental Quality (1997) has provided guidance on how to address cumulative impacts under NEPA. The approach involves the following steps; (1) identify the significant cumulative effects issues associated with the proposed action and define the assessment goals and establish the geographic scope for the analysis; (2) identify other actions affecting the environment; (3) characterize other impacts affecting these resources; and (4) determine the magnitude and significance of cumulative effects. This approach is used below to assess the potential cumulative impacts of the proposed project.

Under CEQA Guidelines Section 15130, an EIR must discuss cumulative impacts of a project when the project's incremental effect is “cumulatively considerable,” which means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Section 15065). Section 15355 of the CEQA Guidelines defines cumulative impacts as two or more individual effects, that when considered together, are either considerable or compound other environmental impacts. These cumulative impacts are changes in the environment that result from the incremental impact of the proposed project and other nearby related projects.

The key environmental resources and/or conditions that could be adversely affected by the proposed project include oak trees and recreational uses and facilities (due to surcharging), aquatic and riparian habitats (due to construction of various in-stream projects). These resources are located at Cachuma Lake and along the Santa Ynez River between Bradbury Dam and the ocean. Potential future projects or ongoing activities at Cachuma Lake and along the lower river that could affect the same resources or involve similar impacts are listed below:

State Water Board 94-5 Hearing

The State Water Board is convening the WR 94-5 hearing on the Cachuma Project in late 2003 to determine if there is a need to modify Reclamation’s water rights permits to divert, store, and use water from the Santa Ynez River to protect downstream water rights and public trust resources. The outcome of the hearing cannot be predicted. The State Water Board has the authority to modify the permits, including: (1) changes in the allowable storage; (2) changes in the amount and timing of downstream water rights releases; (3) changes in the method to measure and account for downstream releases; and (4) new downstream releases to address new public trust resource issues. There is no available information on what type of action, if any, the State Water Board may take in the WR 94-5 hearings. Any prediction would be purely speculative.

City of Solvang Water Master Plan

In May 2002, the City of Solvang prepared a draft Water System Master Plan Update (Plan). The Plan indicates that the City has a reliable supply of water from a variety of sources that will be adequate for the City's General Plan full build-out conditions. The Plan recommends that the City prioritize the development and use of its various water supply sources in the following order of decreasing preference: Santa Ynez River wells; State Water Project water; upland wells located in the City; and water purchased from the Santa Ynez River Water Conservation District, Improvement District No. 1.

In order to implement the above strategy, the City will install additional wells in the Santa Ynez River and increase pumping of the river underflow. Only two of the City's four wells in the Santa Ynez River are currently operating due to flood damage to two of the wells. The current pumping capacity from all four wells, when operative, is 1.78 cubic feet per second. The City's current permit to appropriate water from the Santa Ynez River provides for extractions of up to 5 cfs and up to 3,600 acre-feet per year. In order to achieve the permitted diversion amount of 5 cfs (to feet peak hour demand), the City will need to install three new wells. The City will also need to construct a new pressure treatment filtration plant to treat existing and future water developed from Santa Ynez River wells.

The City is currently preparing an EIR for the Plan. The EIR will be used to request a time extension from the State Water Resources Control Board to develop the river wells to their full permitted capacity of 5 cfs.

The proposed wells field is located at the Alisal Road Bridge. The proposed new wells in the river could affect the amount of surface water at and upstream of the bridge. Under the FMP/BO, long-term rearing target flows must be met at this bridge. Hence, there is a potential for the new pumping of underflow to affect Reclamation's ability to meet the target flows at Alisal Bridge.

Other Diversions along the Lower Santa Ynez River

Other appropriative diverters along the lower river include the City of Buellton and Santa Ynez River Water Conservation District, Improvement District No. 1 (SYRWCD ID#1). These agencies have water rights permits and/or licenses to divert underflow from the Santa Ynez River. To date, they have not diverted the maximum allowed under their permits. Diversions are accomplished by production wells in the river alluvium.

There does not appear to be a potential for a significant cumulative impact between any future diversions by Buellton and the proposed project because the City would be diverting underflow downstream of Alisal Road, and the proposed project does not include any releases below this point. However, there is a potential for a cumulative impact if SYRWCD ID#1 were to increase their pumping from the river, as explained above for the City of Solvang because SYRWCD ID#1's wells are upstream of Alisal Road.

Groundwater Pumping in the Lompoc Valley

The City of Lompoc, Vandenberg Village Community Services District, Mission Hills Community Services District, and private landowners pump from the Lompoc Basin, which includes the Lompoc Uplands and Lompoc Terrace (both hydrologically connected to the river) and the Lompoc Plain, which receives direct recharge from the river. At present time, pumping levels appear to be static; however, pumping may increase with the population. No cumulative impact is anticipated to occur with the proposed project, as the additional pumping would not affect the amount and timing of the releases for fish.

State Water Project

Beginning in 1997, SWP water has been delivered to Cachuma Lake, and to the Santa Ynez Valley to SYRWCD ID#1, City of Buellton, and City of Solvang. The importation of this higher quality water into the watershed is expected to reduce total dissolved solids in wastewater effluent discharged to the river and certain irrigation return flows. This could contribute to a long-term reduction in salinity levels in the surface water and Lompoc Plain groundwater basin that will also be affected by the use of SWP water in the water rights releases from the Cachuma Project. The continued importation of SWP water and an increase in the amount of imported water would not result in a cumulative impact with the proposed project because the amount of SWP water that can be mixed in downstream releases for fish will remain unchanged no matter how much SWP water is imported.

Regional Oak Tree Loss

In the past 5 to 8 years, there has been a substantial increase in the acreage of vineyards in Northern Santa Barbara County, particularly in the Los Alamos Valley. Much of the early vineyard development caused the removal of native oak trees. As a result, hundreds of native oak trees were legally removed as part of agricultural development. The County has initiated several efforts to control the loss of oak trees, and recently approved a voluntary permit program for oak tree removal on agricultural lands. The County recently adopted an oak tree protection program for agricultural and ranching operations that allow for removal of a certain number of oaks on private property without a permit or requirement for tree replacement. If this amount is exceeded, the landowner is required to acquire a permit and plant replacement oaks.

Reclamation is currently involved in a major oak tree restoration project at Cachuma Lake to compensate for the loss of 282 coast live oak trees associated with the Bradbury Dam Seismic

Modernization Project, completed in 1999. Reclamation has planted over 3,000 oak trees at four locations surrounding Cachuma Lake (see Figure 6-2). The program includes maintenance and watering until the oak trees are self-sufficient.

The loss of oak trees due to the proposed 3.0-foot surcharge would contribute to the past and ongoing impacts to oaks trees in the north county, and at Cachuma Lake. The proposed oak tree restoration program at the County Park would mitigate the loss of the trees due to the proposed project, and would provide a valuable benefit to the lake environment because of the lack of oak tree recruitment in the Park. However, the loss of large, mature oak trees would still represent a contribution to a regionally significant impact that has been occurring for decades.

Santa Ynez River Water Conservation District Project

In 1978, the Santa Ynez River Water Conservation District (SYRWCD) received Permit 17447 from the State Water Board to divert 100 cfs and up to 40,000 acre-feet per year from the Santa Ynez River for storage in the Lompoc Basin using diversion dikes and levees in the riverbed in the Lompoc forebay. Only 30 percent of the structures were constructed. They were destroyed in the high runoff in 1983 and have not been replaced. A petition was received by the State Water Board in 1989 to complete the construction and put the water to beneficial use. Another petition was filed in 2001 for a time extension.

No cumulative impact is anticipated to occur with the proposed project, as the proposed diversion would not affect the amount and timing of the releases for fish.

Cumulative Effects on Flooding Hazards

As described in Section 5.1.2.3, the current and proposed releases from Bradbury Dam to meet downstream rearing and passage flows under the FMP/BO could have a cumulative effect on riparian vegetation along the Santa Ynez River between the dam and Alisal Road. The combined effects of current operations and the proposed operations would cause more prolonged low flows downstream of Cachuma Lake and over a larger portion of the river than either operation alone. However, the cumulative effect of these changes in operations is still too small to cause a significant growth of riparian vegetation that could increase flooding hazards. The total amount of water discharged from the dam to the Santa Ynez River is essentially the same under recent historic operations, current operations, and proposed operations. In essence, the current and proposed operations are simply altering the timing and magnitude of downstream flows caused by releases and spills from the dam, not the total quantity of water. Any increase in flooding hazards due to vegetation growth is likely to be immeasurable and less than significant.

Cumulative Effects on Water Supply

As described in Section 5.2, the releases for long-term rearing flows under the proposed FMP/BO would not cause significant reductions in Cachuma Project deliveries to the Member Units because the 3.0-foot surcharge would offset the increment of water used for these releases. However, water supply from the Cachuma Project have been substantially affected by the current operations which involve releases for fish without any new surcharge to offset the loss of water that would otherwise be delivered to the Member Units. The combined effects of the current fish releases and the proposed fish releases (with a 3.0-foot surcharge) would cause a significant increase in shortages in deliveries to the Member Units in drought years. This impact is considered a significant, and unmitigable, as described in Section 5.2.2.4.

Relocation of Cachuma Lake Facilities due to Surcharging

As described in Section 6.6.2, the impacts of relocating the County Park facilities to avoid flooding by surcharging would be considered indirect and cumulative effects of the proposed project. Relocation of the recreational facilities would involve physical disturbances due to grading, demolition, filling, trenching, etc. These disturbances have the potential to affect biological resources. To determine the nature and magnitude of this impact, the areas of disturbance associated with removal of the facilities and the new locations were examined in the field. A summary of the environmental setting at the facility sites and relocation sites that would be disturbed is summarized in Table 11-1.

Facility relocation would primarily affect barren or developed areas or annual grassland (turf). However, 15 to 20 mature coast live oak trees would be removed. In addition, freshwater marsh habitat (about 0.1 acre) would be temporarily disturbed along the lake margin associated with relocation of the Teepee Island Bridge, work at Harvey's Cove picnic area, and work at the USCB Crew building and boat shop picnic area. No sensitive species would be affected by the relocations. Facilities can be sited to minimize impacts to wetlands and oak trees. **Impacts to wetlands and oak trees would be considered a significant, but mitigable impact (Class II).** This impact can be mitigated to less than significant levels by avoiding direct impacts during the facility siting process to the extent feasible, and by restoring wetland habitats disturbed and replacing oak trees removed.

TABLE 11-1
ENVIRONMENTAL IMPACTS OF FACILITY RELOCATION

	County's Proposed Improvements	Environmental Impacts
1. Water Intake and Water Treatment Plant	Demolish and remove all piping, buildings, equipment, appurtenances, and concrete pads associated with the water treatment plant. Backfill and compact any voids left, contour the grade and hydroseed with native seed mix. Abandon existing piping and cap the end. Backfill and compact the access hole, and hydroseed with native seed mix. Remove existing trees below 756 elevation. Replace oaks. Construct a CMU wall to 758 elevation. Adjust the intake structure to the new elevation. Raise the pump station and concrete pad to 758 elevation. Construct a driveway and parking area for the pump station. Construct a transmission line from the pump station to the new water treatment plant location (see #2).	The habitat surrounding the Water Intake facility is predominantly barren (cobbles and sand) with some annual grasses. The habitat surrounding the Water Treatment Plant is generally the same, with the exception of one large Coast Live Oak (approximately 10 DBH) in the center of the Plant facility that would likely be removed.

	County's Proposed Improvements	Environmental Impacts
2. Proposed Water Treatment Plant, New Location	Clear and grub the existing site (directly west of the Park entrance and north of Highway 154). Construct an elevated pad and grade and compact it. Construct the water treatment facility, piping and appurtenances including concrete improvements, catch basins, and storm drains. This will also include construction of a 3-foot wide concrete "V" ditch, a water line and valve box, and rip-rap at the storm drain outlet. Connect any new piping and drains to existing piping and drains. Construct a pavement driveway.	The proposed relocation site for the Water Treatment Plant is predominantly grassland habitat, with a few scattered Coast Live Oak trees around the perimeter of the site that would likely be avoided during construction.
3. Sewer Lift No. 2	Remove existing trees below 756 elevation and replace oaks. Abandon the existing pump station and cut and cap the existing gravity line from the existing sewer manhole. Remove the existing pump station to 5 feet below the grade and fill and hydroseed the area. Abandon the existing gravity sewer main and the force main in place. Cut the ends of the pipes and construct a concrete plug. Construct a new sewer manhole and gravity sewer main. The existing sewer shall remain active during the sewer manhole construction. Construct the new sewer pump station and valve vault (directly south of the existing site, approximately 50-75 feet). Connect it to the existing sewer force main. Relocate the existing picnic areas below 756 elevation. Construct emergency storage sewer manholes and the piping. Construct a standby generator and appurtenances on a concrete pad.	The existing site and proposed relocation for the Sewer Lift No. 2 facility are predominantly grassland habitat, with a few scattered Coast Live Oak trees scattered throughout the site that would likely be avoided during construction.
4. Sewer Lift No. 3	Relocate the foot trail east (across the road) of the existing station. Abandon the existing pump station in-place. Fill it with concrete. Construct a sewer manhole and gravity sewer pipe. Connect it to the proposed sewer manhole. Construct emergency storage sewer manholes and appurtenant piping. Construct the new sewer pump station No.3 and all appurtenances (southeast of the existing station, approximately 100 feet, on the opposite side of the road). Abandon the existing sewer force main and cap it with concrete. Construct a standby generator and appurtenances and connect it to the pump station. Construct a pavement structural section and a redwood header around the pump station and sewer manholes.	Both the existing site and the proposed relocation site are predominantly barren and grassland habitat, with the exception of one large Coast Live Oak in the center of the proposed relocation site. The oak tree will likely be lost during construction of the new Sewer Pump Station.
5. Marina	Remove existing trees below 756 elevation and replace oaks. Demolish and remove the existing improvements. Construct a concrete retaining wall (that extends from the north side of the marina entrance below the snack shop, to the northern end of the floating docks) with a drainage system and a top of wall elevation of 758.5. Construct a concrete abutment from the wall with stairs down to the floating docks. The top step shall be at 758 elevation, and the bottom step shall be at 755.5. Modify the existing floating dock to accept a maximum	The habitat along the existing access walkway above the docks and along the proposed retaining walls consists of coastal sage scrub, grassland, eroding slopes and small clumps of immature oaks. Two large oaks would likely be removed in order to widen the walkway.

	County's Proposed Improvements	Environmental Impacts
	elevation of 756. Construct new access ramps anchored to the concrete abutments that can adjust to lake level fluctuations. Widen the existing walkway above the floating docks to a 10-foot wide concrete access walkway. The minimum elevation shall be 758. Construct another concrete retaining wall (that extends from the south side of the marina entrance to the southern end of the launch ramp) with a drainage system and a top of wall elevation of 756. Construct rock rip-rap slope protection along the bank.	
6. Launch Ramp	Remove existing trees below 756 elevation and replace oaks. Adjust the existing floating dock south of the launch ramp to a minimum of 753 and relocate and adjust the access ramp to the existing building just south of that floating dock. Construct a concrete retaining wall (on the bank behind these structures) with a top of wall elevation of 754. Demolish and remove the existing concrete boat access ramp, and construct a panelized concrete boat access ramp. Demolish and remove the pavement and appurtenant improvements and construct a concrete staging area and ramp conforms. Construct a concrete stair extension with an expansion joint. The top step elevation shall be at 758.04. Construct a 5-foot wide concrete walkway to the existing restrooms. Relocate the existing bait and tackle shop to the proposed location (south, towards the marina entrance, approximately 200 feet). Provide electrical and water services. Demolish and remove the existing pavement, fencing and appurtenant improvements and construct contour grading and a pavement structural section. Construct a redwood header at the pavement edge. Adjust the existing floating dock located below the bait and tackle shop as necessary. Construct a rock rip-rap revetment and along the shore as necessary.	The only natural habitat occurs at the top, south end of the launch ramp, where there is coastal sage scrub and one large oak tree. The existing and proposed site for the bait and tack shop consists of two mature oaks and a large juniper bush. These will likely be removed for construction of the new shop.
7. Marina Overflow Parking	Remove existing trees below 756 elevation and replace oaks. Demolish and remove the existing parking lot and islands. Protect the existing dump station and reconstruct the parking lot with redwood headers and islands and adjust the existing manhole rims to finish grade. Contour grade westerly end of parking lot and re-landscape as required.	No natural habitat exists within the parking lot, with the exception of two large oak trees, one in the center and one at the west end.
8. Mohawk Road	Remove existing trees below 756 elevation and replace oaks. Construct a gabion rock wall (below the east side of the road across from the existing Sewer Lift Station No. 3) with a top of wall elevation of 758. Demolish and remove the existing road and use fill to construct a raised paved road. Remove the existing culvert and construct a new one. Modify the existing manhole and	The habitat along the proposed gabion rock wall is coyote brush scrub and rocky shore. Habitat adjacent to the road is generally barren.

	County's Proposed Improvements	Environmental Impacts
	adjust the rim of the manhole to the finish grade and provide a watertight seal.	
9. Harvey's Cove Picnic Area	Remove the existing culvert and construct a new culvert. Fill and contour grade to the existing debris basin. Contour grade, cut or fill as necessary. Construct a gabion rock wall along the south and west sides of the cove (approximately 500 feet long) with a top of wall elevation of 756. Construct a ramp landing and ramp attachment to adjust to fluctuating lake levels. Demolish and remove the existing concrete walkway and construct a 6-foot concrete walkway per plan. Modify the existing dock to accommodate a water surface elevation of 756.	Habitat along the proposed rock wall includes disturbed shoreline, scattered oak trees (Coast Live Oak and one Valley Oak), and mulefat bushes at the south end of the cove. Several oak trees and mulefat bushes would likely be removed for the construction of the rock wall and the culvert (approximately 2,500 square feet). The existing concrete walkway is within disturbed grassland habitat. Approximately 4,500 square feet of grassland is likely to be removed during the construction of the walkway.
10. Barona Shores Trail	Remove existing trees below 756 elevation and replace oaks. Construct an access trail, footbridge, and concrete abutments. Construct rock rip-rap slope protection around the abutments. Relocate the picnic areas.	The Barona Shores habitat includes oak woodland and chaparral. Several small oak trees and some chaparral (approximately 2,250 square feet) would likely be removed during construction of the trail and footbridge.
11. Tepee Island Access (Foot Bridge)	Remove existing trees below 756 elevation and replace oaks. The existing water line remains in its approximate location. Relocate the existing picnic tables below 756 elevation to a higher ground. Remove the existing footbridge. Demolish and remove the concrete abutments and fill and compact the voids. Hydroseed. Stabilize the existing soil and construct a concrete abutment and the new footbridge, approximately 100 feet north of the existing footbridge. Construct rock rip-rap for slope protection from the abutment to the shoreline. Remove any existing trees encroaching in the bridge and the abutment location and replace at a ratio of 10:1. Construct access to the existing parking area.	Habitat around the existing bridge is generally exotic weeds. There is one Valley Oak and a coyote bush directly to the southwest as well as several small mulefat bushes that may be impacted during demolition of the existing bridge. The habitat around the new bridge location is similar, with the addition of some wetland vegetation (cattails and curly dock) that would likely be removed.
12. Sweet Water Trail	Remove existing trees below 756 elevation and replace oaks. Construct a 500-foot long rock rip-rap revetment, along the south side of the cove, west of Harvey's Cove.	Habitat along the Sweetwater Trail consists of several small oaks and chaparral, most of which will likely be avoided.
13. Boat Works Shop and picnic area	Remove existing trees below 756 elevation and replace oaks. Relocate the existing picnic area location below 756 elevation (east of the workshop) to higher ground. Construct a 150-foot long gabion wall, north of the workshop on the shore, with a top wall elevation of 758.5. Construct an earthen access ramp in front of/in between the gabion wall. Regrade the parking areas and replace any removed.	The habitat surrounding the picnic area is disturbed grassland and oak woodland, neither of which would be impacted. The habitat around the boat works shop is mostly disturbed shoreline, and grassland with some scattered oak trees that would likely be avoided.
14. UCSB Crew and Overflow Area	Remove existing trees below 756 elevation and replace oaks. Relocate the existing picnic tables and BBQ pits east of the UCSB crew building, to higher ground (south). Regrade the area in front of the crew building to provide the UCSB crew access to the floating dock facilities. Modify the existing floating dock to float at a maximum elevation of 756 and provide for lake level fluctuation. Demolish and remove the existing access	The habitat surrounding the UCSB crew building is mostly bare dirt and some mulefat bushes that may be removed during the grading. The habitat surrounding the picnic area and access road is also mainly bare dirt with some scattered oak trees. Some oak trees may be removed during the construction of the new road.

	County's Proposed Improvements	Environmental Impacts
	road, regrade the area and hydroseed. Construct a new pavement road, shifted south approximately 100 feet to higher ground, and regrade as necessary. Hydroseed and replace any removed oaks.	

The facility relocation is the responsibility of the County, and as such, the mitigation to avoid a long-term significant recreation impact is under the authority of another public agency, not Reclamation or COMB. The disturbance of wetland habitats and oak trees associated with recreational facility relocation can be mitigated to a less than significant level by the following measure, which Reclamation and COMB suggest the County consider when developing plans and completing environmental review of future facility relocations:

R-1 Impacts to wetland habitats and oak trees shall be minimized to the extent feasible during the planning, siting, and construction of relocated recreational facilities. Wetland habitats and oak trees that would be disturbed due to facility relocation shall be replaced at the County Park. The exact acreage of wetland habitat and number of oak trees to be replaced is anticipated to be less than 0.1 acre and 20 trees, respectively. Oak tree replacement shall follow the approach described in the EIR/EIS for mitigating impacts for trees affected by surcharging.

11.2 GROWTH INDUCING EFFECTS

CEQA Guidelines Section 15126(g) requires a discussion of the ways in which a project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. The discussion should also include project characteristics which encourage and/or facilitate other activities that, individually or cumulatively, could have a significant environmental impact. CEQA emphasizes that growth in an area should not be considered beneficial, detrimental, or of little significance.

In general, a project may be considered growth inducing if it meets one or more of the following criteria: (1) removes an impediment to growth; (2) induces population growth; (3) induces economic expansion; (4) establishes a precedent setting actions; and (6) results in the development or encroachment in an isolated or adjacent area of open space. The proposed FMP/BO actions would not meet any of these criteria. Hence, the proposed project is not considered growth inducing.

12.0 FEDERAL LAWS, REGULATIONS AND POLICIES

12.1 RELATIONSHIP BETWEEN SHORT TERM USES OF RESOURCES AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The FMP/BO include various management actions and projects that, taken as a whole, will improve habitat conditions for the endangered southern steelhead, and increase the probability of recovery of the population along this river. The BO states:

"*…if carried forward for many years into the future, will provide the small Santa Ynez River steelhead population with improved critical habitat conditions in the form of increased migration opportunity and better access to spawning and rearing areas in the watershed below Bradbury Dam, allowing the population to increase in size. Therefore, the proposed project is likely to appreciably increase the likelihood of survival and recovery of the ESU by increasing its numbers and distribution*"(p. 63 of the BO).

The EIR/EIS describes various incidental environmental impacts of the FMP/BO management actions and projects. These impacts range from very short-term and localized construction related impacts for small instream habitat enhancements, to larger effects due to surcharging at Cachuma Lake that affect hundreds of oak trees and major recreational facilities. Reclamation believes that the overall habitat improvements along the Lower Santa Ynez River due to the FMP/BO will promote long-term productivity of the environment, and that the environmental benefits will greatly offset the incidental impacts of the FMP/BO.

12.2 IRRETRIEVABLE OR IRREVERSIBLE COMMITMENT OF RESOURCES

The FMP/BO will result in the following irretrievable and irreversible commitment of resources:

- Water from the Upper Santa Ynez River that is captured in Cachuma Lake and will be used exclusively for maintaining rearing and passage flows on the lower river

- Land, oak trees, and recreational facilities that would be affected by surcharging at Cachuma Lake

- Capital, labor, fuel, and construction materials required to construct passage impediment and habitat enhancement projects

- Capital, labor, fuel, and materials required to conduct long-term monitoring and public education programs

12.3 ENVIRONMENTAL JUSTICE

Environmental justice is defined by the Environmental Projection Agency (EPA) as "The fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Executive Order 12898, entitled "General Actions to Address Environmental Justice in Minority and Low-Income Populations" requires all federal agencies to determine if their operations and major federal actions affect minority and low-income populations in an adverse manner. A significant impact to environmental justice would if there was a significant adverse environmental impact on minority or low-income population or children that appreciably exceeded those on the general population.

The FMP/BO would result in the following direct adverse impacts to the general public - Potential disruption of recreational activities at Cachuma Lake due to surcharging and relocation of affected facilities. This impact would not directly or indirectly affect minority or low-income populations, nor would the impact be disproportionate to these sectors of society. As such, the FMP/BO would not cause environmental justice impacts.

The individual FMP/BO projects, such as the passage impediment projects, are located in remote areas with little human access because they are on private property or on public property with limited access. The FP/BO management actions and projects would not occur adjacent to minority or low-income populations.

14.3 FLOODPLAIN EXECUTIVE ORDER

Executive Order 11988 (Floodplain Management) states "*Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities... If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplains.*"

Most of the FMP/BO management actions on the lower Santa Ynez River and key tributaries would be compatible with floodplain management issues. For example, removal of passage impediments would increase flows and reduce floodplain obstructions. However, the increased releases from the dam for fish purposes could result in greater flood hazards over time, as described in Section 5.1.3. Although the FMP/BO would not involve any permanent alteration of the floodplain along the Santa Ynez River, it could alter flow patterns and water surface elevations in unimproved sections of the river due to increased channel vegetation over time. No feasible alternatives are available to avoid this conflict with the Floodplain Executive Order.

12.4 WETLAND EXECUTIVE ORDER

Executive Order 11990 (Protection of Wetlands) states that "*Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.*" Federal agencies are required to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative.

Many FMP/BO management actions and projects would involve temporary construction-related impacts to wetlands located in the channel bed of tributaries. For example, removal of passage barriers along Quiota Creek would cause temporary impacts to scattered patches of wetlands in the creek bed. These impacts would be temporary and reversible. The FMP/BO would not result in a decrease in wetlands. Instead, it is likely to increase the amount of wetlands along the Lower Santa Ynez River downstream of Bradbury Dam due to increased and more prolonged flows along the river.

12.5 ENDANGERED SPECIES ACT

Section 7 of the federal Endangered Species Act requires that federal agencies consult with the US Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS) when a federal agency determines that a proposed action may affect a species listed as threatened or endangered by the USFWS or NMFS, or its designated critical habitat. The BO represents the results of the consultation process with NMFS regarding the effects of ongoing operations of the Cachuma Project on the endangered southern steelhead.

Several of the FMP/BO projects may affect the threatened red-legged frog due to construction related impacts in creek channels. The impacts would be temporary and localized. Reclamation will consult with USFWS regarding any specific FMP/BO project would could affect this species, or any other federally listed species at or near the project site.

The endangered southwestern willow flycatcher, least Bell's vireo, and tidewater goby occurs along the river, but would not be directly or indirectly adversely affected by the project, as described in Section 5.8.2. Reclamation will seek concurrence of this "no adverse effect" determination with USFWS based on the documentation and analyses developed during the NEPA process for the FMP/BO.

12.6 CLEAN WATER ACT

The primary purpose of the Clean Water Act is to "maintain and restore the chemical, physical, and biological integrity of waters of the United States." Section 404 of the Clean Water Act regulates the discharge of fill or dredged material into "waters," including wetlands. A 404 permit from the Corps of Engineers is required for projects that result in a regulated discharge. Reclamation, Caltrans, Santa Barbara County, and/or COMB will require a Corps 404 permit (or its equivalent for Reclamation) for the following FMP/BO projects or management actions that affect jurisdictional "waters:"

- Passage impediment removal projects
- Tributary enhancement projects, such as bank stabilization

In order to acquire a 404 permit for the above activities, the project sponsor must demonstrate to the Corps that impacts to "waters" have been minimized to the extent feasible, residual impacts have been mitigated, and the least environmentally damaging alternatives to accomplish the above actions have been selected.

The primary responsibility for the protection of water quality in California resides with the State Water Resources Control Board and its nine Regional Water Quality Control Boards. The State Board sets statewide policy for the implementation of state and federal laws and regulations. The Regional Boards adopt and implement Water Quality Control Plans (Basin Plans).

The FMP/BO projects occur in jurisdiction of the California Regional Water Quality Control Board, Central Coast Region. The Basin Plan for the region sets forth water quality standards for surface and ground waters of the region, which include: (1) designated beneficial uses of water; and (2) narrative and quantitative water quality objectives. The Regional Board seeks to maintain the water quality objectives through its planning and permitting authorities to protect designated beneficial uses. The FMP/BO projects are not expected to degrade water quality, and in some cases, would improve water quality (i.e., sediment management projects on tributaries). Hence, the FMP/BO would be compatible with the Basin Plan, and in particular, beneficial uses related to coldwater fish, wildlife habitat, endangered species, and wetlands.

Section 401 of the Clean Water Act requires that the discharge of dredged or fill material into "waters" does not violate water quality standards. The Corps may not issue 404 permits (see above) unless the state has been notified, through the Regional Board, and a certification of compliance or wavier of state water quality standards have has been obtained. Implementation of many FMP/BO projects will require a 401 certification from the Regional Water Quality Control Board. The primary issue to be addressed under the 401 process is the magnitude and duration of water quality degradation during short-term in-stream construction work.

12.7 CLEAN AIR ACT

Under the Clean Air Act, states must prepare a State Implementation Plan (SIP) to ensure that areas within the state are in attainment with the National Ambient Air Quality Standards established by the US Environmental Protection Agency (EPA). Air quality standards have been set for the following pollutants: particulate matter less than 10 microns in diameter (PM10), carbon monoxide (CO), nitrogen oxides (NOx), sulfur dioxide, and lead. The Clean Air Act also requires that federal actions conform to the most recent federally approved SIP. Conformity consists of the following:

- A project must be consistent with the SIP's purpose of reducing the severity and frequently of air quality violations

- A project must not cause or contribute to new violations of the air quality standards, nor delay attainment of standards

EPA has established regulations that specify how federal agencies determine if their actions will conform with the SIP, promulgated in 40 CFR 51. Determining conformity requires two steps: an applicability analysis and a conformity determination. The applicability analysis is used to determine if the project will exceed *de minimus* emission thresholds based on the region's non-attainment status. Conformity determination is not required for projects where the annual and daily emissions caused by the federal action are less than the applicable threshold.

All FMP/BO projects would occur in the central section of the South Central Coast Air Basin (SCCAB). The SCCAB includes all of San Luis Obispo, Santa Barbara, and Ventura counties. The central section is under the jurisdiction of the Santa Barbara County Air Pollution Control District (APCD). The APCD establishes and enforces regulations for stationary sources in the Basin, and develops plans to accomplish attainment of the state and federal air quality standards. As required by both the California Clean Air Act of 1988 and the Federal Clean Air Act Amendments, the APCD has developed a Clean Air Plan (CAP) to address attainment of state and federal ozone standards.

Under federal and state standards, the County has designated by EPA as a "serious" non-attainment area for ozone. Santa Barbara County is also designated nonattainment for the state PM_{10} standard.

FMP/BO projects involving the use of construction equipment would result in short-term emissions of gaseous pollutants and fugitive dust due to construction activities The emissions from these activities of hydrocarbons, nitrogen oxides and particulate matter would be below the *de minimus* thresholds that require a Clean Air Act conformity analysis. As such, project related construction emissions are presumed to conform to the most recent federally approved SIP.

12.8 NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the National Historic Preservation Act (NHPA) requires that federal agencies take into account the effects of their actions on historic properties. Pursuant to these requirements, a cultural resource study of the potential effects of surcharging at Cachuma Lake was completed by West and Welch (2001) and Maki (2001). Reclamation has completed major elements of the Section 106 process by completing a Historic Properties Treatment Plan for archeological sites that would be affected by the proposed surcharging, and by executing a Memorandum of Agreement with the State Historic Preservation Officer and the Santa Ynez Band of Mission Indians.

13.0 AGENCIES CONTACTED

The following agencies were contacted for information during the preparation of the EIR/EIS:

Federal Agencies

National Marine Fisheries Service
US Fish and Wildlife Service
US Forest Service, Los Padres National Forest

State Agencies

Caltrans
California Department of Fish and Game

Other Agencies and Districts

Cachuma Operations and Maintenance Board
Cachuma Conservation Release Board
Carpinteria Valley Water District
Central Coast Water Authority
City of Santa Barbara
Goleta Water District
Montecito Water District
Santa Ynez River Water Conservation District, Improvement District No. 1
Santa Ynez River Water Conservation District

Local Government Agencies

County of Santa Barbara Parks Department
County of Santa Barbara Flood Control District

14.0 EIR/EIS PREPARERS

Cachuma Operation and Maintenance Board

Kate Rees – project manager

URS Corporation:

John Gray – project manager
Autumn Mckee – recreation, oak trees, general environmental analyses
Yvonne Marlin – riparian vegetation
Mary Maki (subcontractor) - archeology
Dave Compton (subcontractor) – riparian birds

Stetson Engineers:

Ali Shahroody – project manager
Curtis Lawler – hydrology and salinity modeling
Peter Pyle – groundwater modeling

Entrix:

Kindra Loomis – fisheries specialist
Jean Baldrige – fisheries specialist
Chip Blankenhorn - fisheries

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