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APPENDIX A.

NOTICE OF INTENT AND NOTICE OF PREPARATION

the 30-day public comment period. The final step involves, for the Federal EIS, preparing a Record of Decision (ROD) and, for the state EIR, certifying the EIR and adopting a Mitigation Monitoring and Reporting Plan. The ROD is a concise summary of the decisions made by the Corps from among the alternatives presented in the FEIS/EIR. The ROD can be published immediately after the FEIS public comment period ends. A certified EIR indicates that the environmental document adequately assesses the environmental impacts of the proposed project with respect to CEQA. A formal scoping meeting to solicit public comment and concerns on the proposed action and alternatives will be held on January 10, 2002 at 7 p.m., in the Multipurpose Room (1 & 2) in the San Clemente Senior Center, 242 Avenue Del Mar, San Clemente, California.

Luz D. Ortiz,

Army Federal Register Liaison Officer.

[FR Doc. 02–771 Filed 1–10–02; 8:45 am]

BILLING CODE 3710–KF–M

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement (DEIS) for the Matilija Dam Ecosystem Restoration Feasibility Study, Ventura County, CA

AGENCY: Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: The Los Angeles District of the U.S. Army Corps of Engineers will prepare a DEIS to support the Matilija Dam Ecosystem Restoration Feasibility Study, Ventura County, California. The study area is the Matilija Dam area and downstream to the Venture River Estuary. This study will investigate feasible alternatives to restore the Matilija Creek riverine ecosystem, primarily by removing Matilija Dam. Also, feasible alternatives for the removal of sediment behind the dam and the beneficial use of that sediment will be investigated.

The DEIS will analyze the potential impacts (beneficial and adverse) on the environment of a range of alternatives, including the proposed action and the no action alternative. The Los Angeles District and the Ventura County Flood Control District will cooperate in conducting this feasibility study.

ADDRESSES: District Engineer, U.S. Army Corps of Engineers, Los Angeles District, ATTN: CESPL–PD–RQ (R. Farve), P.O. Box 532711, Los Angeles, California 90053–2325.

FOR FURTHER INFORMATION CONTACT: Mr. Rey Farve, Environmental Coordinator, telephone (213) 452–3864, or Mr. Jonathan Vivanti, Study Manager, telephone (213) 452–3809.

SUPPLEMENTARY INFORMATION:

1. Authorization

This feasibility study was authorized by U.S. House of Representatives Committee Resolution on Transportation and Infrastructure (Docket 2593), dated April 15, 1999, which states, in part: ''that the Secretary of the Army is requested to review the report of the Chief of Engineers on the Ventura River, Ventura County, California, published as House Document 323, 77th Congress, 1st Session, and other pertinent reports, with a view to determining whether any modifications of the recommendations contained therein are advisable at this time, in the interest of environmental restoration and protection, and related purposes, with particular attention to restoring anadromous fish populations on Matilija Creek and returning natural sand replenishment to Ventura and other Southern California beaches.''

2. Background

Matilija Dam is located on Matilija Creek, a tributary of the Ventura River, approximately 16 miles upstream from the Pacific Ocean. The dam is located in Ventura County California, approximately 7 miles and 25 miles from the Cities of Ojai and Ventura, California, respectively. The feasibility study area currently includes the Matilija Dam and the area immediately upstream, and downstream of the dam to the Ventura River Estuary. The non-federal sponsor of the feasibility study is the Ventura County Flood Control District.

Matilija Dam was constructed in the late 1940's by Ventura County Flood Control to provide water storage for agricultural needs. Matilija Dam is a concrete arch structure 190 feet in height with an arc length of 620 feet at its crest. Sediment carried by Matilija Creek has deposited behind the dam and filled the reservoir, rendering the structure useless as a water storage facility. It is estimated that 6,000,000 cubic yards of sediment lies trapped behind the dam.

The dam no longer provides any flood control protection due to sedimentation behind the dam. There is some continued water supply use. The Casitas Municipal Water District currently operates the dam under a lease agreement from the County of Ventura, which expires in 2009. The operation is an integral part of the Robles/Casitas Reservoir water supply facilities and is estimated to currently contribute approximately 400 acre-feet of water per year. This water function, however, is projected to diminish rapidly as the reservoir continues to fill with sediments, and is expected to effectively cease by 2010 after the reservoir fills completely with sediment.

Presently, the dam is considered to be a major contributor to the declining numbers of steelhead trout in Matilija Creek. If no action is taken to secure passage for the steelhead trout to reach the upper watershed and its tributaries, the dam will continue to obstruct this endangered species, thereby limiting the amount of spawning and rearing habitat. In addition, the dam would continue to act as a barrier for wildlife movement for other terrestrial and aquatic species.

3. Alternatives

The feasibility study will focus on addressing the problems and needs caused by Matilija Dam with the primary objective of the feasibility study being to restore the Matilija Creek riverine ecosystem. Other objectives that are considered appropriate may involve possible beneficial use of the sediment behind the dam for beach nourishment or other environmental restoration.

In general, alternative plans will investigate reasonable alternatives to restore Matilija Creek, primarily by removing Matilija Dam. Feasible alternatives for the removal of sediment behind the dam and the beneficial use of that sediment will also be investigated. Significant beneficial impacts to the riverine ecosystem (especially to steelhead trout) are expected from restoration alternatives identified in the feasibility study.

4. Scoping Process

Participation of all interested Federal, State, and County agencies, groups with environmental interests, and any interested individuals are encouraged. Public involvement will be most beneficial and worthwhile in identifying the scope of pertinent, significant environmental issues to be addressed, identifying and eliminating from detailed study issues that are not significant, offering useful information such as published or unpublished data, providing direct personal experience or knowledge which informs decision making, and recommending suitable mitigation measures to offset potential impacts from the proposed action or alternatives.

A public scoping meeting is scheduled at the Ventura County Hall of Administration, County Board of Supervisors Meeting Room, 800 South Victoria Avenue, Ventura, CA 93009 at 7 pm on January 31, 2002. The purpose of the scoping meeting will be to gather information from the general public or interested organizations about issues and concerns that they would like to see addressed in the DEIS. Comments may be delivered in writing or verbally at the meeting or sent in writing to the Los Angeles District at the address given above. The scoping period will conclude March 12, 2002.

5. Availability of the DEIS

The DEIS is expected to be available to the public for review and comment beginning in the winter of 2004.

Luz D. Ortiz,

Army Federal Register Liaison Officer.

[FR Doc. 02–772 Filed 1–10–02; 8:45 am]

BILLING CODE 3710–KF–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent To Prepare a Joint Environmental Impact Statement/Environmental Impact Report for the Ventura Harbor Sand Bypass System and Regional Beneficial Reuse Feasibility Study, Ventura, CA

AGENCY: U.S. Army Corps of Engineers (Corps), DoD.

ACTION: Notice of intent.

SUMMARY: The Corps and the Ventura Port District propose to evaluate a sand bypassing system and other measures to improve maintenance of Federal harbors in the Ventura/Santa Barbara County area for more efficient operations and beneficial uses of the dredged material for storm damage protection and environmental restoration and enhancement.

FOR FURTHER INFORMATION CONTACT: Questions regarding the scoping process or preparation of the EIS/EIR may be directed to Mr. Paul Rose, Chief, Environmental Resources Branch, U.S. Army Corps of Engineers, P.O. Box 532711, Los Angeles, California, 90053–2325, (213) 452–3840.

SUPPLEMENTARY INFORMATION:

1. Proposed Action

For the Sand Bypassing component of the study, the purpose of the report shall focus on the alternatives for the sand bypassing system needed for accommodating the annual required dredge volume.

For the Regional Beneficial Use component, the purpose is to provide beneficial uses of the material for the Ventura County region for a proposed sand bypassing system at Ventura Harbor, California. The report shall be based on the Ventura Harbor Sand Bypass Regional Beneficial Uses Reconnaissance Report (Los Angeles District, 1997), to modify the existing federal navigation project for the purpose of providing regional uses of the dredged material for storm damage protection, environmental restoration and enhancement, and other beneficial uses.

Ventura Harbor is a small craft commercial and recreational harbor located approximately one hundred (100) kilometers northwest of the City of Los Angeles. The Los Angeles District currently maintains navigable channels by dredging an entrance channel and several sand traps outside of the harbor. The two (2) primary sand traps have a total capacity of approximately 640,000 m^3 and are located at the seaward end of the entrance channel and adjacent to the upcoast side of the North Jetty. Presently the Los Angeles District maintenance project is designed to dredge every two (2) years at an estimated dredge quantity of 615,000 m^3 per episode. Due to annual budgetary constraints, the Los Angeles District, in practice, maintains the entrance channel and sand traps on a yearly basis, removing on the average approximately 535,000 m^3 of sand per dredging episode. Fiscal year 2000 dredging resulted in the removal of approximately 140,000 m^3 from the navigation channel and channel trap, and approximately 320,000 m^3 from sand trap adjacent to the North Jetty. The dredged sands have historically been placed directly onto McGrath State Beach, in the nearshore environment adjacent to McGrath State Beach, directly onto South Beach, or, on a few occasions, onto the upcoast groin field cell.

2. Alternatives

Alternatives that may be considered include selection of various disposal sites as well as various sites and dredging methodologies for the dredging side of the bypass system, continued use of periodic dredging with beach/nearshore disposal, and no-project.

3. Scoping Process

The Corps and the Ventura Port District are preparing a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) to address potential impacts associated with the proposed project. The Corps is the Lead Federal Agency for compliance with NEPA for the project, and the Ventura Port District is the Lead State Agency for compliance with the CEQA for the non-Federal aspects of the project. The Draft EIS/EIR (DEIS/EIR) document will incorporate public concerns in the analysis of impacts associated with the Proposed Action and associated project alternatives. The DEIS/EIR will be sent out for a 45-day public review period, during which time both written and verbal comments will be solicited on the adequacy of the document. The Final EIS/EIR (FEIS/EIR) will address the comments received on the DEIS/EIR during public review, and will be furnished to all who commented on the DEIS/EIR, and is made available to anyone that requests a copy during the 30-day public comment period. The final step involves, for the federal EIS, preparing a Record of Decision (ROD) and, for the state EIR, certifying the EIR and adopting a Mitigation Monitoring and Reporting Plan. The ROD is a concise summary of the decisions made by the Corps from among the alternatives presented in the FEIS/EIR. The ROD can be published immediately after the FEIS public comment period ends. A certified EIR indicates that the environmental document adequately assesses the environmental impacts of the proposed project with respect to CEQA. A formal scoping meeting to solicit public comment and concerns on the proposed action and alternatives will be held on January 8, 2002, at 6:00 P.M., in the Channel Islands National Park Visitor Center, 1901 Spinnaker Drive, Ventura, California.

Luz D. Ortiz,

Army Federal Register Liaison Officer.

[FR Doc. 02–770 Filed 1–10–02; 8:45 am]

BILLING CODE 3710–KF–M

DEPARTMENT OF DEFENSE

Department of the Army

Armed Forces Epidemiological Board (AFEB); Open Meeting

AGENCY: Office of The Surgeon General, DoD.

ACTION: Notice of meeting.

SUMMARY: In accordance with section 10(a)(2) of Pub. L. 92–463, The Federal Advisory Committee Act, this announces the forthcoming AFEB meeting. This Board will meet from 0730–1630 on Tuesday, 19 February 2002, and 0730–1300 on Wednesday, 20 February 2002. The purpose of the

NOTICE OF PREPARATION

January 16, 2002

TO: Responsible Agencies:

SUBJECT: Notice of preparation of a Draft Environmental impact report for Matilija Dam Ecosystem Restoration Feasibility Study, Ventura County, CA

The Ventura County Flood Control District, acting as Lead Agency, has determined that the above referenced project may have a significant effect on the environment and that an environmental impact report (EIR) should be prepared. A brief project description and location map are attached.

The purpose of this notice is to call your attention to this project and to request that your organization assist us in identifying the scope and content of the environmental information that should be addressed in the EIR. Your agency/ organization has been identified as a:

- ☐ Responsible agency
- ☐ Trustee agency
- ☐ Affected agency
- ☐ Transportation planning agency or Public agency having authority over transportation facilities near the project
- ☐ Adjacent Local Government
- ☐ Interested party

Pursuant to State law, this information must be submitted to us by certified mail no later than 30 days after receipt of this letter.

If you have any questions or concerns, or would like to meet with County staff to discuss the contents of this notice, please contact Jorine Lawyer at (805) 477-7139 as soon as possible.

Sincerely,

Jeff Pratt

Jeff Pratt, P.E.
Deputy Director of Public Works
Flood Control Department

Attachments:
Project Description
Location Map

PROJECT DESCRIPTION

PROJECT TITLE: Matilija Dam Ecosystem Restoration Feasibility Study

PROJECT DESCRIPTION: The Los Angeles District of the U.S. Army Corps of Engineers and the Ventura County Flood Control District intend to prepare a joint Environmental Impact Statement and Environmental Impact Report (EIS/EIR) for the Matilija Dam Ecosystem Restoration Feasibility Study located in Ventura County, California. The Corps of Engineers is the federal Lead Agency for the project under the National Environmental Policy Act (NEPA) and the Ventura County Flood Control District is the Lead Agency under the California Environmental Quality Act (CEQA). The Draft EIS/EIR will analyze the potential impacts (beneficial and adverse) on the environment of a range of alternatives, including the proposed action and the no action alternative. The Corps of Engineers and the Ventura County Flood Control District will cooperate in conducting this feasibility study. This study will focus on addressing the problems and needs caused by Matilija Dam and will investigate the following objectives:

- Feasible alternatives for the restoration of the Matilija Creek riverine ecosystem (especially for steelhead trout), primarily by removing Matilija Dam,
- Feasible alternatives for the removal of sediment behind the dam, and
- Beneficial use of the removed sediment for beach nourishment or other environmental restoration purposes

PROJECT LOCATION AND BACKGROUND: Matilija Dam is located on Matilija Creek, a tributary of the Ventura River, approximately 16 miles upstream from the Pacific Ocean. The dam is located in Ventura County California, approximately 7 miles and 25 miles from the Cities of Ojai and Ventura, respectively. The study area currently includes the Matilija Dam and the areas immediately upstream and downstream of the dam to the Ventura River estuary.

Matilija Dam was constructed in the late 1940s by Ventura County Flood Control to provide water storage for agricultural needs. Matilija Dam is a concrete arch structure 190 feet in height with an arc length of 620 feet at its crest. Sediment carried by Matilija Creek has deposited behind the dam and filled the reservoir, rendering the structure useless as a water storage facility. It is estimated that 6,000,000 cubic yards of sediment lies trapped behind the dam.

The dam no longer provides any flood control protection due to sedimentation behind the dam. However, there is some continued water supply use. The Casitas Municipal Water District currently operates the dam under a lease agreement from the County of Ventura, which expires in 2009. Operation of the dam is an integral part of the Robles/Casitas Reservoir supply facilities as it currently contributes approximately 400 acre-feet of water per year. This water function, however, is projected to diminish rapidly as the reservoir continues to fill with sediments, and is expected to cease by 2010 after the reservoir fills completely with sediment.

Presently the dam is considered to be a major contributor to the declining numbers of steelhead trout in Matilija Creek. If no action is taken to secure passage for the steelhead trout to reach the upper watershed and its tributaries, the dam will continue to obstruct this endangered species, thereby limiting the amount of spawning and rearing habitat. In addition, the dam would continue to act as a barrier for wildlife movement for other terrestrial and aquatic species.

PUBLIC MEETING: The Ventura County Flood Control District has scheduled a public meeting regarding the proposed project. The meeting will be held on January 31, 2002, from 7:00 p.m. to 9:00 p.m. at the following location:

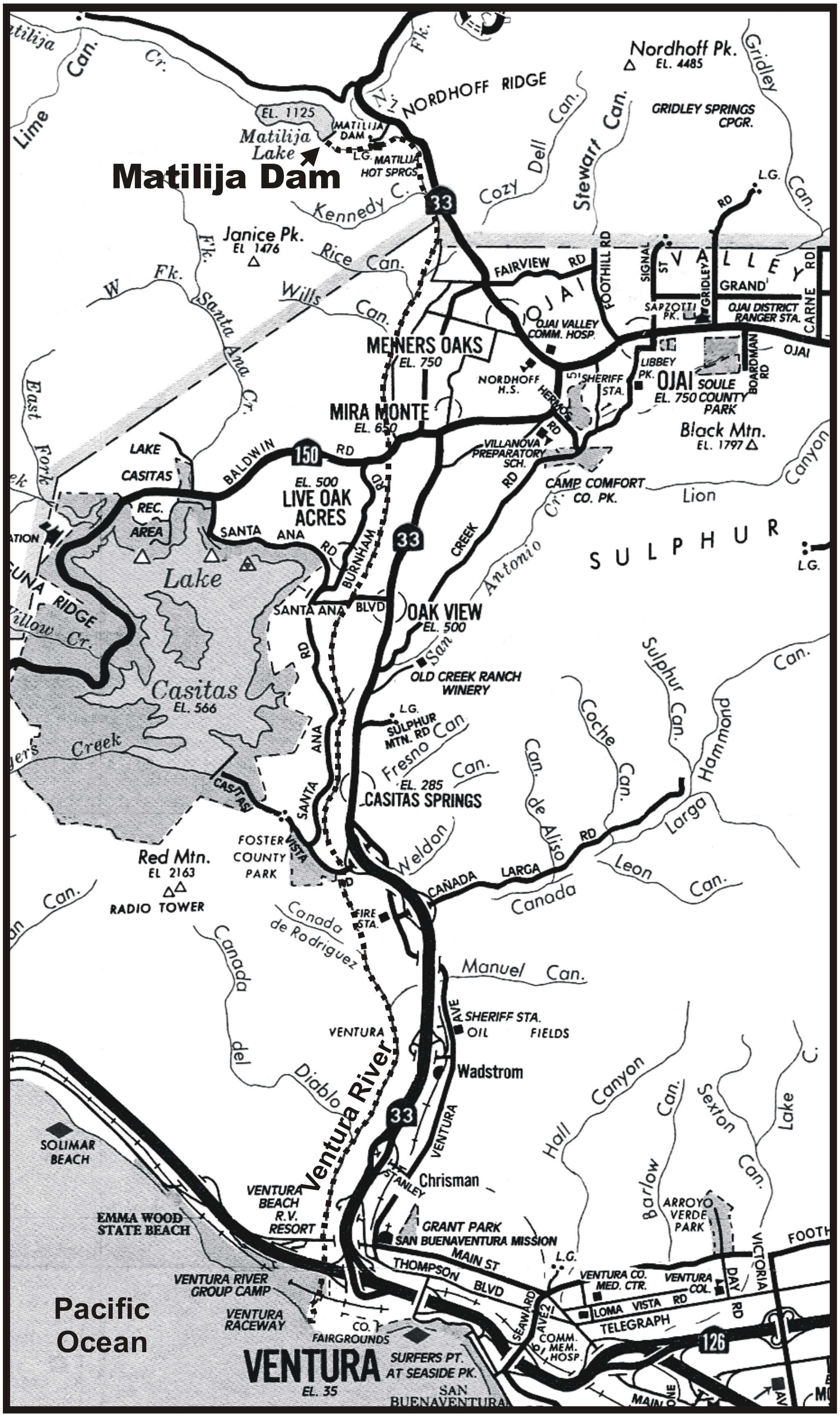
Ventura County Flood Control District
Hall of Administration Bldg., Supervisors' Chambers
800 S. Victoria Ave, Ventura, CA

For additional information please contact Darla Wise, Public Outreach for the Ventura County Flood Control District at 805-654-3942.

PROJECT WEBSITE: For further information and ongoing project updates, please visit the project website: http://www.matilijadam.org

COMMENTS ON THE SCOPE OF THE EIS/EIR: Comments on the scope of issues to be addressed in the EIS/EIR should be submitted in writing to:

Pamela Lindsey
Ventura County Public Works Agency
Flood Control Department
800 S. Victoria Avenue
Ventura, CA 93009-1600


Matilija Dam
Matilija Lake
EL. 1125
MATILIJA DAM
L.G.
MATILIJA HOT SPRGS
NORDHOFF RIDGE
Nordhoff Pk.
EL. 4485
GRIDLEY SPRINGS CPGR.
Lime Can.
Kennedy C.
Cozy Dell Can.
Stewart Can.
Gridley Can.
Janice Pk.
EL 1476
Rice Can.
Wills Can.
W. Fk.
Santa Ana Cr.
East Fork
FAIRVIEW RD
FOOTHILL RD
SIGNAL ST
GRIDLEY
VALLEY
GRAND
CARNE RD
OJAI
SAPZOTTI PK.
OJAI DISTRICT RANGER STA.
OJAI VALLEY COMM. HOSP.
MEINERS OAKS
EL. 750
NORDHOFF H.S.
SHERIFF STA.
LIBBEY PK.
OJAI
EL. 750
SOULE COUNTY PARK
BOARDMAN RD
HERMOSA RD
MIRA MONTE
EL. 650
VILLANOVA PREPARATORY SCH.
Black Mtn.
EL. 1797
BALDWIN RD
150
LAKE CASITAS REC. AREA
EL. 500
LIVE OAK ACRES
BURNHAM RD
CAMP COMFORT CO. PK.
Lion Canyon
SULPHUR
CREEK RD
San Antonio Cr.
33
SANTA ANA RD
Lake Casitas
EL. 566
RIDGE
Willow Cr.
Creek
SANTA ANA BLVD
OAK VIEW
EL. 500
OLD CREEK RANCH WINERY
L.G.
SULPHUR MTN. RD
Fresno Can.
Sulphur Can.
Coche Can.
Hammond Can.
CASITAS SPRINGS
EL. 285
Can. de Aliso
CASITAS
VISTA RD
FOSTER COUNTY PARK
Red Mtn.
EL 2163
RADIO TOWER
Weldon
CAÑADA LARGA RD
Larga
Leon Can.
Canada
Canada de Rodriguez
FIRE STA.
Manuel Can.
Canada del Diablo
VENTURA OIL FIELDS
SHERIFF STA.
AVE
Wadstrom
Ventura River
VENTURA
Hall Canyon
Barlow Can.
Sexton Can.
Lake C.
SOLIMAR BEACH
Chrisman
STANLEY
VENTURA BEACH R.V. RESORT
GRANT PARK
SAN BUENAVENTURA MISSION
ARROYO VERDE PARK
EMMA WOOD STATE BEACH
MAIN ST
THOMPSON BLVD
L.G.
VENTURA CO. MED. CTR.
VENTURA COL.
VICTORIA
FOOTH
DAY RD
LOMA VISTA RD
TELEGRAPH
VENTURA RIVER GROUP CAMP
VENTURA RACEWAY
SEAWARD
COMM. MEM. HOSP.
126
Pacific Ocean
CO. FAIRGROUNDS
VENTURA
EL. 35
SURFERS PT. AT SEASIDE PK.
SAN BUENAVENTURA
MAIN

APPENDIX B.

FISH AND WILDLIFE COORDINATION ACT COMPLIANCE

B.1 PLANNING AID REPORT

B.2 COORDINATION ACT REPORT

APPENDIX B.1

PLANNING AID REPORT

Planning Aid Report
for the Matilija Dam Removal Project
Ventura County, California

July 2003

Prepared For:

U.S. Army Corps of Engineers
Los Angeles District
Los Angeles, California

Prepared By:

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, California

Chris Dellith - Project Biologist

Diane K. Noda, Field Supervisor

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Introduction

This Planning Aid Report contains preliminary analysis by the U.S. Fish and Wildlife Service (Service) of the biological impacts of the Matilija Dam Removal Project, Ventura County, California. This report has been prepared in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C.661 *et Seq*.) and other authorities. The purpose of the FWCA is to provide for equal consideration of fish and wildlife conservation with other features of federally funded or permitted water resource development projects. Pursuant to the FWCA, the Service has coordinated with the National Oceanic and Atmospheric Administration (NOAA) and the California Department of Fish and Game (CDFG) before providing these comments. Our information is preliminary in nature and is provided as technical assistance to aid in your planning process. It describes: 1) the public fish and wildlife resources within the proposed project area and environs by providing a characterization, to date, of the existing biological environment within the proposed study area based on a literature review and fieldwork; 2) a listing of observed and possible listed, candidate, proposed, and sensitive flora and fauna within the proposed project area based on a literature review and fieldwork; 3) an analysis of the proposed alternatives and their possible effects on biological resources of the project area resulting from implementation of a U.S. Army Corps of Engineers (Corps) project alternative; and 4) our preliminary recommendations regarding the proposed alternatives.

The Corps directed the Service in the Fiscal Year 2002 Scope of Work to consider the study area to be the Matilija Reservoir and the area 2.5 miles upstream of the reservoir, and the Matilija Creek flood plain downstream to the Ventura Estuary. This area encompasses approximately 1,939.50 acres. The proposed project area is a subset of the study area and includes the Matilija Dam and Reservoir.

The Matilija Dam was constructed in the late 1940's by Ventura County Flood Control to provide water storage for agricultural needs. The dam is located on Matilija Creek, a tributary of the Ventura River, approximately 16 miles upstream from the Pacific Ocean. Silty material carried by Matilija Creek deposited behind the dam, filling the reservoir with sediment, rendering the structure relatively useless as a water storage facility. Furthermore, as a result of the sedimentation, the dam no longer provides flood control protection. However, some continued water supply use remains. The Casitas Municipal Water District currently operates the dam. The operation currently contributes approximately 400 acre-feet of water per year to the Robles/Casitas Reservoir water supply facilities. The ability of the operation to provide water is projected to diminish rapidly as the reservoir continues to fill with sediments, and is expected to cease by 2010 after the reservoir fills completely with sediment.

The Corps is in the process of conducting a feasibility study to investigate reasonable alternatives to restore Matilija Creek by removing Matilija Dam. To do so, the Corps convened some subgroups to work on different aspects of the dam removal and habitat restoration. These subgroups include: an Executive Committee, a Steering Committee, a Public Outreach Group, an Environmental Working Group, a Technical Studies Working Group, and a Plan Formulation Group. These groups are comprised of Federal, State, and local agencies, as well as non-governmental organizations. The two groups discussed in this report are the Environmental Working Group and Plan Formulation Group. The Plan Formulation Group works closely with all of the other feasibility study and Steering Committee groups to coordinate the formulation and evaluation of alternative plans. The Environmental Working Group works closely with the Public Outreach Group to collaborate and avoid duplication of efforts and coordinates all environmental fieldwork associated with the feasibility study and resource agency coordination.

Originally, eight alternatives were explored by the Corps for this project including a no-action plan. The Matilija Dam Ecosystem Restoration Feasibility Study is in the process of screening restoration alternatives that will be considered in the plan formulation process. Screening criteria included the preliminary identification of adverse impacts related to air quality, water quality, noise, habitat, and species concerns. The engineering feasibility of measures and costs, where available, were also considered. The screening process performed by the Plan Formulation Group was discussed at Environmental Working Group meetings throughout 2002 and into 2003. During these meetings, the Environmental Working Group analyzed the Plan Formulation Group's assessments on the proposed alternatives and agreed with the Plan Formulation Group to eliminate four of the alternatives that did not meet the goals and objectives identified by the Environmental Working Group. The four remaining alternatives are discussed in this planning aid report.

Description of Project Alternatives

Alternative 1. Under Alternative 1, the entire concrete dam structure above the original streambed would be removed by controlled blasting, in approximately 15-foot vertical increments. The concrete left in place below the streambed would be shaped to ensure fish passage and to simulate the natural pre-dam streambed configuration.

The concrete from the dam structure deconstruction would be used in one of two manners further described below. Metal debris would be hauled from the site and salvaged when possible. Non-salvageable items will be taken to the Toland Road landfill, 24 miles away, between Santa Paula and Fillmore.

A channel would be excavated along the southern side of the reservoir basin (*i.e.*, right side, looking downstream). The excavated materials would be placed upstream of the dam along the north (*i.e*., left side, looking downstream) side of the reservoir basin, adjacent to the channel. This is land owned by Ventura County. Sediment deposition areas would be stripped of all vegetation. The excavated channel would have a similar streambed elevation to the original pre-dam streambed, though it would be slightly straighter and have a slightly steeper gradient.

Slope protection (riprap stone), as described below, would be used in the design. The source for riprap would be on-site and from Schmidt Rock Quarry, approximately 5 miles from the dam.

Two options for stabilizing sediments are under consideration: permanent and temporary stabilization. For permanent stabilization, sediments would be re-graded within the original reservoir area. For temporary stabilization, re-graded sediments would be allowed to erode naturally downstream with significant flow events.

Permanent Stabilization

Under this sub-alternative, the excavated channel would have a base width of 60 feet. The channel would be designed to convey the 50-year recurrence level flood (18,800 ft^3/sec), which is the largest flood on record. Materials excavated from the channel would be used as fill along the north side of the channel and permanently stabilized with riprap. Side slopes in the middle to upper portions of the original reservoir area where sediments are coarser will be 4:1 (horizontal to vertical); side slopes in the lower portion of the reservoir area where sediments are finer would be a flatter 10:1. Slope protection (riprap) would be placed on the north side of the channel only and to a limited height. The revetment would extend 5 feet below the channel bottom to prevent undercutting of the slope. The south side of the channel would remain unlined to allow for natural erosion to the canyon sides. Concrete blocks, in acceptable sizes, from the deconstructed dam structure would be buried in the fill. Graded areas will be re-vegetated with locally native stock or sterile annual grasses to control erosion. All non-native Arundo (*Arundo donax*) (including roots) would be completely removed from the reservoir. Construction of this option estimated to require two years.

Temporary Stabilization

The channel would be designed to convey the 2-year recurrence level flood. The channel would be excavated with a base width of 60 feet and side slopes of 10:1 in the silt and clay areas for a distance of about 1600 feet upstream of the dam and 3:1 in the remainder of the reservoir. In areas where the channel is adjacent to the canyon slope, the right slope would be excavated to the approximate native contours, approximately 2:1. The lower portion of the channel would be lined with riprap stone, extending 5 feet below the channel bottom, to provide slope protection. The total volume of concrete blocks from the deconstructed dam, in appropriate sizes, would also be used as riprap material. A layer of sacrificial material would be placed and maintained over the riprap on the north side so it would erode during more frequent flood events. The temporarily stabilized fill would be monitored and maintained as necessary so that it would erode as designed; slopes would be evaluated to prevent catastrophic failures. All Arundo (including roots) would be completely removed from the reservoir.

All concrete used for riprap would be removed from the site upon completion of the project and hauled to a concrete recycling plant (Hanson Aggregates, Oxnard, 28 miles away). Construction of this option is estimated to require two years.

Alternative 2. The Natural Erosion Alternative is designed to allow removal of sediment using river hydraulic forces to move trapped sediment to locations more suitable for natural river functions. This alternative uses the erosive action of river flow to move and sort sediment particles thereby reducing cost and impacts associated with mechanical means of relocating sediment. The two major sub-alternatives described in the Natural Erosion approach are the one-notch and multi-notch sub-alternative.

One-notch sub-alternative

The one-notch sub-alternative involves removing the dam in one continuous process. Numerous methods could be used to remove the dam. Dam removal techniques will determine to some extent how the sediment is released from the reservoir. Water levels can be lowered prior to notching through a low level outlet or water levels can be set by the notch elevation. In either case, work is conducted continuously until the dam is removed. Downstream sediment concentrations are controlled only by river flow. The sediment erosion from the reservoir would occur over a period of many years or decades. The one-notch approach may have an additional advantage from reducing the time span over which sediment impacts occur causing lower impacts to species that rely on the river.

Multi-notch sub-alternative

The multi-notch sub-alternative is distinguished from the one-notch approach by the interruption of the dam demolition process at one or more stages of the demolition. Interruption of demolition allows eroded reservoir sediments to stabilize downstream of the dam and gives the river an opportunity to adjust to sediment inflows. In this approach, the dam would be removed in several stages and impacts from sediment downstream of the dam monitored. The advantage of the multi-notch scheme will be a greater measure of control over the rate of sediment release. The first notching can be such that a limited amount of sediment is released and the impacts are closely monitored downstream. The subsequent notches can be adjusted based on the first.

Alternative 3. This alternative is referred to as the Mechanical Transport of Fines and Sell Coarse alternative. This alternative would be used in conjunction with Alternative 2 one-notch scheme. Instead of using natural erosion to carry sediment downstream, the sediment would be transported using mechanical methods as described below.

Two 12-inch cutter head suction dredges working 24 hours a day, 7 days a week would be used to slurry the 2.1 million cubic yards of fine sediment in approximately 9 months. Fresh water from Lake Casitas would be used for the slurrying media. The slurry would then pass through a stationary screen to eliminate any coarse material and enter a thickener. The thickener would be used to increase the solids concentration of the slurry and recycle water for the dredging operation. A make-up water pump would be required to pump water back to the dredges. The slurry would then be transported by pipeline to a 94-acre disposal site located approximately 3 miles downstream. A single 400-horsepower pump would be required at the dam to maintain slurry velocity in the pipeline. An 8-mile-long fresh water pipeline and pumping system would be needed from Lake Casitas. The fresh water pipeline would be carbon steel and the slurry pipeline would be high density polyethylene. Additionally, a 90,000 gallon water storage tank would be placed at the left abutment to provide surge capacity. The thickener overflow can be fed directly into the storage tank if sufficient elevation difference between the thickener and storage tank is made available.

The upstream limit of the 94-acre disposal site is approximately 0.5 mile downstream of Robles Diversion Dam. The site is on the east side of the river at the base of the bluff adjacent to Rice Road. Using the identified disposal site, the thickness of the required berm would average approximately 15 feet. A modified horseshoe-shaped containment dike would be constructed along the north and western limits. The dike would be constructed of sands and gravels native to the disposal site and compacted. The average height is conservatively assumed to be 20 feet. Interior dikes would be constructed during slurry placement to enhance stability and separation of the fine sediments from the water. A drainage at the northern limit would be rerouted drainage off of Rice Road would be modified to route it around the area. Prior to placement the area would be cleared of vegetation to enhance percolation. The slurry would be discharged along the upstream end of the disposal area. If it is necessary to enhance collection of water and return it to Lake Casitas, additional engineered details (such as collection systems, settlement ponds, observation and pumping wells) would be provided for further analysis.

Approximately 3.8 million cubic yards of material from the delta and upstream channel areas of the Matilija Reservoir will be sold for use as aggregate and/or fill. Coarse material would be excavated and sold from the dam site without use of a temporary stockpile area. The Plan Formulation Group estimates that removal would take approximately four years; however, if demand for the material does not exist concurrent with dam deconstruction, the removal of coarse material may take longer.

The 94-acre disposal site would need to be procured. A right-of-way for the slurry pipeline of approximately 24 feet would be required. The fresh water pipeline from Lake Casitas to the disposal area would be placed along the existing maintenance road. Special considerations would be required at several crossings. Upstream of the disposal area, the fresh water pipe would use the same right of way as that required for the slurry pipe.

Following termination of all construction activities, all areas would be re-vegetated where possible. Some steeper side slopes may not be conducive to re-vegetation and may require some stabilization. Large rock found in the sediment would be left in the reservoir area to provide a more natural appearance. This alternative would require approximately 18 months to complete, although the dredging and dam deconstruction phases are assumed to be completed within 12 months of commencement of work activities.

Alternative 4. No Action: The Corps is considering the no action alternative as one of the project alternatives. No action assumes that no project would be implemented by the Federal government or by local interests to achieve the planning objectives. Under the no action alternative, the dam would remain in place. This alternative forms the basis from which all other alternative plans are measured.

Methods and Materials

This planning aid report was prepared by Chris Dellith, Project Biologist, under the supervision of Bridget Fahey, Santa Barbara/Ventura/Los Angeles Division Chief, U.S. Fish and Wildlife Service, Ventura, California. The Service's analysis of this project and recommendations are based on information provided in: 1) the supplemental scope of work for the Matilija Dam ecosystem restoration feasibility study (Corps 2003); 2) fieldwork done by representatives of the Service (Service 2000); 3) various scientific papers, technical reports, memoranda, and letters (see literature cited); 4) information contained in the Service's files and library; 5) interviews with other biological experts and project area landowners; and 6) the Service's best collective professional judgement.

Results

Environment Without the Project

General Description - The climate of coastal southern California is characterized by warm, dry summers and cool, relatively wet winters. Typical winter temperatures range from 40 to 60 degrees Fahrenheit, while 65 to 95 degrees Fahrenheit can be expected during the summer months. Precipitation consists almost entirely of winter rainfall, averaging about 15 inches per year in the area.

The study area is located on the Ventura River and Matilija Creek, near the town of Ojai, in Ventura County. Matilija Dam is located on Matilija Creek, which flows downstream of the dam for approximately 0.6 mile before it joins with the north fork of Matilija Creek and forms the mainstem Ventura River. The creek flows through a steep sided canyon with a narrow floodplain and riparian zone. The Ventura River flows through several constricting canyons interspersed with wider floodplain areas (although no wider than 0.5 mile). The canyon areas consist of chaparral vegetation communities on the lower slopes and Jeffrey pine on the mountain peaks. The creeks support riparian vegetation dominated by cottonwoods, willows, and other shrubby and herbaceous species. A few locations of native sycamore and alder riparian woodland within the riparian areas of the Ventura River. The Matilija Dam and Reservoir are surrounded by steep slopes with a chaparral plant community. The reservoir has between 20 to 35 acres of riparian habitat and up to 50 acres of open water habitat. The dam is an impediment to the natural flow of Matilija Creek.

The Robles Diversion is operated by the Casitas Municipal Water District (District) and is located approximately 2 miles downstream from the dam. Currently, Robles Diversion is a complete barrier to steelhead spawners attempting to reach headwater spawning grounds, including habitat within Matilija Creek above Matilija Dam and in the Lower North Fork Matilija Creek (NOAA 2003). The Robles Diversion diverts surface water from the Ventura River to Casitas Reservoir. District has been pursuing restoration of fish passage at the Robles Diversion through construction of a fish ladder.

An underground dam was constructed between the confluence of Coyote Creek and the Ventura River near Foster Park in 1908. This surface and subsurface facility is operated by Ventura County Flood Control. Below the Robles Diversion, the county, numerous other users, such as private landowners, who divert water from the Ventura River System.

The Ventura River Estuary extends about 0.6 mile inland from the Pacific Ocean. The estuary provides a diverse mix of habitats such as freshwater marsh, salt marsh, and riparian. At least 59 special-status species may occur in the types of habitat found in the project area near the dam and reservoir or in downstream areas and includes 14 listed species (federal or state) and 45 species of concern.

The approximate areas of various habitat types within the project area described below (Table 1).

Table 1. **Acreage and Percentages of Different Habitat Types Found in the Defined Study Area of the Matilija Dam Removal Project. Nomenclature from Cowardin et. al (1979) and Sawyer and Keeler-Wolf (1995).**

Habitat	Study Area (acres)	% of Total
Lacustrine System	27.8	1.43
Riverine System	276.0	14.23
Palustrine System	1,156.8	59.64
Estuarine System	14.9	0.77
Marine System	3.7	0.19
Grassland	128.5	6.63
Scrub	94.7	4.88
Chaparral	55.8	2.88
Woodland	133.3	6.87
Sand Dunes	7.9	0.41
Human-Influenced	40.1	2.07
Total	1,939.5	100

All of the numbers in the above table are rough estimates.

PLANTS

A total of 388 species of vascular plants from 82 families have been documented to date from the study area (David Magney Environmental Consulting 2002, CNDDB 2003). Most of the observed plants are common to the region and many in the study area are widely distributed. Listed, candidate, or otherwise sensitive species encountered during surveys or previously documented are described below. Potentially, some of the historically documented rare species in the Ventura River watershed could occur within the study area and are therefore included in the descriptions below. Nomenclature is from Hickman (1993).

The California Native Plant Society (CNPS) has developed an inventory of rare and endangered vascular plants of California that contains several lists that are described below: 1) List 1A: Plants presumed extinct in California; 2) List 1B: Plants rare, threatened, or endangered in California and elsewhere; 3) List 2: Plants rare, threatened, or endangered in California, but more common elsewhere; 40 List 3: Plants about which we need more information - a review list; and 5) List 4: Plants of limited distribution - a watch list (CNPS 2001).

Mile's milk-vetch (*Astragalus didymocarpus* var. *milesianus*) is a CNPS List 1B species. This plant is found in coastal scrub. It has been reported in locations from Ventura to San Luis Obispo Counties. In Ventura County, Mile's milk-vetch occurrence was documented in the CNDDB record for the Ojai area at an unknown date (CNDDB 2003). This species is threatened by development throughout its range. This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Davidson's saltscale (*Atriplex serenana* var. *davidsonii*) is a CNPS List 1B species. This plant is found in coastal bluff scrub and coastal scrub. The species is believed to be extirpated from Los Angeles County and is known from Baja California to Ventura County including Santa Catalina, Santa Cruz and Santa Rosa islands. This plant has also been reported in Riverside County. In Ventura County, it was documented in Ojai near the Ojai Valley Country Club in 1971 (CNDDB 2003) and at the Ventura River Delta in 2002 (Cher Batchelor, Botanist, pers. com. 2003). This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Late-flowered mariposa lily (*Calochortus weedii* var. *vestus*) is a CNPS List 1B species. This plant is found in chaparral, cismontane woodland, and riparian woodland from Ventura to Monterey Counties. In Ventura County, it was documented north of Ojai in Pratt Canyon on Forest Service Land in 1963 (CNDDB 2003). The species is threatened throughout its range by development and grazing. This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Ojai fritillary (*Fritillaria ojaiensis*) is a CNPS List 1B species. This plant is found in broad leaved upland forest, chaparral, and lower montane coniferous forest from Ventura, Santa Barbara, and possibly San Luis Obispo Counties. In Ventura County, it was documented in Wheeler Gorge along Highway 33 and the North Fork Matilija Creek in 1988 (CNDDB 2003). The species is presumed extant within the study area, but was not encountered during the latest field surveys.

Sanford's arrowhead (*Sagittaria sanfordii*) is a CNPS List 1B species. This plant is found in marshes and assorted shallow freshwater. The species is extirpated from southern California, and mostly extirpated from the central Valley. In Ventura County, it was last documented in 1983 at Mirror Lake just east of the Ventura River in the Ojai Valley (CNDDB 2003). This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Salt spring checkerbloom (*Sidalcea neomexicana*) is a CNPS List 2 species. This plant is found in chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub and playas. In Ventura County, it was documented in 1962 approximately 8 miles downstream of the project site between Santa Ana Boulevard and San Antonio Creek Bridge in Oak View (CNDDB 2003). This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

HABITAT TYPES WITHIN THE STUDY AREA

The habitat types described below are classified using Cowardin *et al.* (1979) for wetlands and Sawyer and Keeler-Wolf (1995) for uplands. Cowardin *et al.* (1979) recognizes five major wetland types (*i.e*., marine, estuarine, lacustrine, riverine, and palustrine) that differ with respect to hydrologic, geomorphologic, and chemical factors. Within each of these five major types, wetlands can be classified further according to hydrologic regime, substrate type, water chemistry, and vegetation. Habitat types present in the study area include all five of the major Cowardin *et al.* (1979) wetland systems, and four major upland vegetation types (grassland, scrub, chaparral, and woodland).

Wetlands Habitat Types- Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or land is covered by shallow water. Wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin *et al.* 1979).

Deepwater habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live, whether or not they are attached to the substrate. As in wetlands, the dominant plants are hydrophytes; however, the substrates are considered nonsoil because the water is too deep to support emergent vegetation. Deepwater habitats can be found within marine, estuarine, riverine, and lacustrine systems (Cowardin *et al.* 1979). Within the study area, deepwater habitats occurs in the lacustrine and marine systems.

1) Lacustrine habitat constitutes approximately 1.5 percent of the study area and occurs

immediately above and below the Matilija Dam at the Matilija Reservoir and the pool at the foot of the dam. This system includes wetlands and deepwater habitats with all of the following characteristics: 1) situated in a topographic depression or a dammed river channel; 2) lacking trees, shrubs, and emergents with greater than 30 percent areal coverage, and 3) total area exceeds 20 acres. Similar habitats of less than 20 acres are also included here if an active wave-formed, or bedrock shoreline feature makes up the boundary, or if the deepest water depth exceeds 6.6 feet at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5 parts per thousand (Cowardin *et al.* 1979). Lacustrine habitat type within the study area are classified into the following two subsystems: a) lacustrine limnetic unconsolidated bottom deepwater habitat; and b) lacustrine littoral emergent wetland. Matilija Reservoir and the pond below the dam are classified as lacustrine limnetic deepwater habitat. Lacustrine littoral emergent wetland was observed as a perimeter to Matilija Reservoir. The predominant plant species making up the lacustrine littoral emergent wetland habitat around the reservoir includes: *Scirpus*, *Polygonum*, *Cyperus*, and *Juncus* species.

2) Riverine habitat types constitute 14 percent of the study area and occur throughout the mainstem of the Ventura River and within Matilija Creek above the Matilija Reservoir. This system includes all wetlands and deepwater habitats contained within a channel (or a conduit periodically or continuously containing moving water, or forming a connecting link between two bodies of water), with two exceptions: 1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and 2) habitats with water containing ocean-derived salts in excess of 0.5 parts per thousand. The riverine system is bounded on the landward side by the channel bank, or by wetland dominated trees, shrubs, and persistent emergents. Water is usually, but not always, flowing in this system (Cowardin *et al.* 1979).

   The riverine system within the study area is divided into the three subsystems: a) riverine upper perennial habitat, which occurs predominantly in the upper reaches of the Ventura River; b) riverine lower perennial habitat, which occurs predominantly in the lower reaches of the surveyed portion of the Ventura River; and c) riverine intermittent wetland habitat, which includes areas of the Ventura River where water was not present during the time of the survey and where the substrate was not dominated by vegetation.

3) The palustrine system was developed to group the vegetated wetlands traditionally called such names as marshes, swamps, bogs, fens, prairies, and ponds. Palustrine habitat types constitute 60 percent of the study area and occur along the banks of the mainstem Ventura River and above the Matilija Reservoir. These systems include all nontidal wetlands dominated by trees, shrubs, persistent emergent plants, emergent mosses or lichens, and all such wetlands that occur in tidal areas, where salinity due to ocean-derived salts is below 0.5 parts per thousand. These systems are bounded by upland habitats or by any other system. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. The erosive forces of wind and water are of minor importance

except during severe floods (Cowardin *et al*. 1979).

Palustrine habitat types within the study area are divided into three classes: a) palustrine emergent wetlands, which were observed primarily as bars and banks adjacent to unconsolidated bottom and streambed wetlands with at least a 30 percent cover by herbaceous vegetation; b) palustrine scrub/shrub wetlands that includes areas throughout the study area which are seasonally flooded and are dominated predominately by shrubs located on bars and banks of the river channel; and c) palustrine forested wetlands found throughout the Ventura River.

4) Estuarine habitat type constitutes less than 1 percent of the study area, occurring at the mouth of the Ventura River in the estuary. This system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from land. The estuarine system includes both estuaries and lagoons and is more strongly influenced by its association with the land than is the marine system. Estuarine water regimes and water chemistry are affected by several environmental forces (tides, precipitation, freshwater runoff, evaporation, and wind), and salinities range from hyperhaline to oligohaline (Cowardin *et al*. 1979). Estuarine habitat within the study area can be divided into estuarine subtidal aquatic bed wetlands and estuarine intertidal wetlands.

5) Marine habitat constitutes less than 1 percent of the study area and occurs at the mouth of the Ventura River in the Pacific Ocean. This system consists of the open ocean overlaying the continental shelf. Water regimes are determined primarily by oceanic tides, and salinity of the water exceeds 30 parts per thousand. The study area includes marine intertidal beach and bar wetland with substrate that is exposed and flooded by tides. This area includes the associated splash zone.

Uplands Habitat Types. Uplands are defined as terrain not affected by the water table or surface water or else affected only for short periods so that hydrophilic vegetation or aquatic processes do not persist. Upland plant communities are found where soil moisture conditions are average to dry and where soils are not periodically flooded or saturated. Upland habitats cover about 24 percent of the survey area and several plant communities occupy the upland areas as well, including upland islands occurring as elevated terraces within the river floodplain, or immediately adjacent to the river's edge. Upland habitat types within the survey area are described using Sawyer and Keeler-Wolf (1995).

1) Grassland habitat types constitute approximately 7 percent of the study area and predominantly occur in the mainstem of the Ventura River near Meiners Oaks and Oak View. Grasslands consist of low-growing herbaceous and graminiod vegetation that forms a continuous ground layer covering open hillsides, or understory patches below emergent shrubs, shrublands, and woodlands. Many native flowering annual herb and perennial bulb species (wildflowers), as

well as naturalized annual forbs and invasive exotics, are important contributors to grassland. The two mapped grassland plant communities within the study area include California annual grassland series and ruderal grassland series.

2) Scrub habitat constitutes approximately 5 percent of the study area and is predominantly coastal sage scrub, which is a type of shrubland that is dominated by drought-deciduous, low-growing shrubs and subshrubs. Coastal sage scrub forms various stands dominated by several different soft-leaved and grayish-green shrub species, and forms stands with specific characteristics and site requirements; therefore, coastal sage scrub is often considered as a collection of species-specific plant series. The five major scrub series within the study area include black sage, California sagebrush-black sage, mixed sage, California buckwheat, and coyote brush.

3) Chaparral constitutes approximately 3 percent of the study area and is dominated by evergreen shrubs with small, thick, leathery, dark green, sclerophyllous leaves. The shrubs of chaparral are relatively tall and dense, and are adapted to periodic wildfires by stump sprouting or by germination from a dormant seed bank. These evergreen shrubs are also adapted to drought by deep extensive root systems, while their small thick leaf structure prevents permanent damage from moisture loss (Zedler *et al.* 1997). Many typical coastal sage scrub species also grow intermixed as associates with chaparral species. Chaparral typically occurs on moderate to steep south-facing slopes with dry, rocky, shallow soils, becoming more abundant with higher elevations where temperatures are lower and moisture supplies are more ample. The two major chaparral series within the study area include chamise, and sumac. Other co-dominant sumac series observed and mapped within the Ventura River survey area include sumac-black sages, sumac-white sage, sumac-California sagebrush, and sumac-ceanothus.

4) Woodland habitats comprise roughly 7 percent of the study area. These habitats are characterized by woody trees and tall tree-like shrubs, forming an open to closed canopy, and grow over a scattered variety of low-growing shrubs and a graminoid ground layer. The two mapped woodland plant communities include California walnut series and coast live oak series. Southern California black walnut was observed throughout the Ventura River area as a scattered tree in the palustrine forested wetland and was observed as forming a woodland on several raised terraces, canyon slopes, and banks of the river corridor. Coast live oak was observed scattered along the palustrine forested wetland and as an emergent tree in coastal sage scrub and chaparral plant communities. Coast live oak series is primarily mapped as occurring on raised terraces between channels and is influenced significantly by California annual grassland series, creating scattered oak savannahs throughout the river.

5) Sand dune habitats, which comprise less than 1 percent of the study area, consist of sparse to dense vegetation growing in aeolian sand deposits primarily along the coast. The Sand Dune habitats mapped at the Ventura River mouth include beach sand and sand-verbena–beach

bursage series. Beach sand habitat is subject to wave action or deposition/removal of sand and gravel. Beach sand consists primarily of sand substrate, and is inhabited by little to no vegetation. Sand-verbena-beach bursage series is a beach habitat co-dominated by different species of sand-verbena (*Abronia* spp.) and beach bursage (*Ambrosia chamissonis*).

6) Human-influenced habitats comprises roughly 2 percent of the study area and occur throughout the study area. These habitats include roads, trails, citrus orchards, riprap levees, nonnative woodlands, and various concrete structures.

INVERTEBRATES

A total of 79 families representing 23 orders of invertebrates were observed or captured during surveys of aquatic invertebrates within the study area (EDAW 1978). No listed, candidate, or sensitive forms are known to occur in the study area. Some of the orders of insects recorded during surveys include various damselflies and dragon flies (Odonta), mayflies (Ephemeroptera), water striders (Hemiptera), beetles (Coleoptera), syrphid flies (Diptera), stoneflies (Pleocoptera), and caddis flies (Trichoptera). Although data was not recorded for butterflies and moths (Lepidoptera), representatives of this order expected to occur within the study area include the following families: skippers (Hesperiidae), swallowtails (Papilionidae), cabbage butterflies (Pieridae), Gossermer-winged butterflies (Lycaenidae), and brush-footed butterflies (Nymphalidae).

Other representatives of at least the following insect orders could also be reasonably expected to occur: Orthoptera (grasshoppers and allies), Dermaptera (earwigs), and Neuroptera (dobsonflies, lacewings, and allies). Insects are a part of the diverse riparian food web, as prey, predators, pollinators, water purifiers, grazers, soil reducers, and mosquito-control agents. The introduced red swamp crayfish (*Procambarus clarki*), and signal crayfish (*Pacifastacus leniusculus*), which belong to the Order Decapoda, were also noted during surveys in the estuary and the mainstem of the Ventura River.

In the spring of 2001, the Ventura County Watershed Protection District (County), developed a biological and physical/habitat assessment program within the Ventura River watershed. On September 24 through 26, 2001, the County conducted the first year sampling event which included benthic macroinvertebrate surveys. The data from this sampling event plus data gathered by EDAW (1978) was used to describe invertebrates of the study area. These two reports included data only for benthic macroinvertebrates. Research on invertebrates other than benthic macroinvertebrates within the study area appears to be lacking and is therefore not addressed in this report.

FISHES

A total of 19 fish species consisting of native and non-native faunal components have been documented in previous surveys within the study area (Service 2000). Native freshwater species occurring in the study area include: Southern steelhead (*Oncorhynchus mykiss*), arroyo chub (*Gila orcutti*), Pacific lamprey (*Lampetra tridentata*), prickly sculpin (*Cottus asper*), California killifish (*Fundulus* *parvipinnis*), and partially-armored threespine stickleback (*Gasterosteus aculeatus microcephalus*). Non-native freshwater species occurring in the study area include: green sunfish (*Lepomis cyanellus*), redear sunfish (*Lepomis microlophus*), mosquitofish (*Gambusia affinis*), largemouth bass (*Micropterus salmoides*), common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), yellow bullhead catfish (*Ictalurus natalis*), and bluegill (*Lepomis macrochirus*). The Ventura Estuary serves as an important primary and nursery habitat for several fish species. Native estuarine species include: tidewater goby (*Eucyclogobius newberryi*), topsmelt (*Atherinops affinis*), staghorn sculpin (*Leptocottus armatus*), and striped mullet (*Mugil cephalus*).

Southern steelhead (*Oncorhynchus mykiss*)
The Southern California ecological significant unit (ESU) of steelhead was listed by the NOAA Fisheries as endangered on August 18, 1997, for naturally spawned populations of steelhead and their progeny residing below long-term impassible barriers. Steelhead, an ocean-going form of rainbow trout, are native to Pacific Coast streams from Alaska south to northwestern Mexico. Wild steelhead populations in California have decreased significantly from their historic levels. Extensive habitat loss due to water development, land use practices, and urbanization are largely responsible for the current population status.

Prior to the completion of Matilija Dam in 1947, CDFG personnel estimated that a minimum of 4,000 to 5,000 steelhead spawned in the Ventura River system in normal water years (NOAA 2003). Observations of small numbers of adult steelhead in the Ventura River have continued through the present, including documented steelhead sightings in 1974, 1975, 1978, 1979, 1991, 1993, and 2001. Recent surveys have documented steelhead rearing habitat, as well as use of this habitat by juvenile fish, throughout the stretch of river between the Robles Diversion and the Ventura River estuary. A population of less than 200 adults is the most recent estimate of the Ventura River steelhead population (Busby *et al*. 1996). However, in light of the continued pressures exerted upon the population and the paucity of recent sightings in the drainage, NOAA Fisheries estimates the Ventura River steelhead population is likely less than 100 adult individuals at the current time (NOAA 2003).

Tidewater goby (*Eucyclogobius newberryi*)
The tidewater goby was listed by the Service as endangered on March 7, 1994. The tidewater goby, a member of the Gobiidae family, is the only species in the genus *Eucyclogobius*. It is a small fish, rarely exceeding 2 inches standard length, and is characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins. The tidewater goby is known to occur in the Ventura Estuary, but have not been well studied (Service 1997)

The tidewater goby historically occurred in at least 109 California coastal lagoons. This species is currently known to occur in 84 locations. Its decline can be attributed to upstream water diversions, pollution, siltation, and urban development on surrounding lands. These threats continue to affect the remaining populations of tidewater gobies. In addition, given the lack of a marine life history stage and the high level of fragmentation between existing populations, the probability for exchange between the populations and natural colonization of suitable habitat is low.

Arroyo chub (*Gila orcutti*)
The arroyo chub is a California species of special concern. This species was native to the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita Rivers and Malibu and San Juan Creeks. It has been successfully introduced far outside its native range, often with trout plants, into the Santa Clara, Ventura, Santa Ynez, Santa Maria, Cuyama and Mojave River drainages and Malibu, Arroyo Grande and Chorro Creeks. The species is now absent from much of their native range and are abundant only in the west fork of the San Gabriel River. The arroyo chub appears to prefer low gradient streams, concentrating in pools and backwaters. Populations have been observed within one mile upstream of the Main Street bridge (Hunt and Lehman 1992).

AMPHIBIANS AND REPTILES
Amphibians and reptiles were inventoried by intensively searching appropriate microhabitats throughout the study area during surveys conducted by the Service from November 26, 1999, through September 12, 2000. The surveys attempted to identify the value of habitats within the study area as well as the distribution of suitable microhabitats within them. Literature sources, museum records, and consultation with local experts were also used to compile an inventory and discuss potential and historic species occurrences.

Eleven species of amphibians and 25 species of reptiles are known or reasonably expected to occur in the study area based on a literature and comparisons of known range, distribution, and apparently suitable habitat (Table 2). Because of the secretive nature and nocturnal and fossorial habits of many species, many forms can go undetected during survey work. A total of five amphibian species were detected by the Service during surveys in 2000 (Table 2). Pacific chorus frog (*Pseudacris regilla*) and bullfrog (*Rana catesbeiana*) were the most abundant. California treefrog (*Pseudacris cadaverina*), California toad (*Bufo boreas halophilus*), and the federally threatened California red-legged frog (*Rana aurora draytonii*) were also present (Service 2000). All of these species except for the bullfrog are native.

Bullfrog (*Rana catesbiana*)
Bullfrogs are common in the creek and reservoir. Typically, observers walking during the evening hours would record 40 bullfrogs in a 2-mile stretch of river. Most bullfrogs were observed in or along the deeper pools. One June 15, 2000, a nighttime boat survey of the reservoir perimeter yielded a count of 144 bullfrogs, and a second nighttime boat survey of the reservoir on August 2 yielded a count of 89 bullfrogs. On September 12, 2000, approximately 200 recently metamorphed bullfrogs were observed in an algae-covered pool (approximately 144 square yards in area) in the delta area of Matilija Creek. Dozens of bullfrog tadpoles were also commonly observed during surveys of creek areas (Service 2000).

California red-legged frog (*Rana aurora dryatonii*)

On May 23, 1996, the Service published a final rule to list the California red-legged frog as threatened (61 *Federal Register* (FR) 25813). The California red-legged frog is one of two subspecies of the red-legged frog (*Rana aurora*) found on the Pacific coast. The historical range of the California red-legged frog extended from the vicinity of Point Reyes National Seashore, Marin County, California, coastally and from the vicinity of Redding, Shasta County, California, inland southward to northwestern Baja California, Mexico.

The Service conducted six protocol surveys for the California red-legged frog between April 28, 2000, and July 22, 2000. One California red-legged frog was observed on April 30 in Matilija Creek about 0.75 mile upstream of the dam. The observed individual was in a well-vegetated, 3.5 foot deep pool on the edge of a willow riparian scrub community. Although many habitats appeared suitable for presence of the California red-legged frog, we only detected one individual. This scarcity of red-legged frogs may be attributable to the high densities of bullfrogs, red swamp crayfish, and/or largemouth bass in the study area. However, surveys by other researchers have found more California red-legged frogs in the vicinity of the study area. On September 30, 1999, students from the University of California at Santa Barbara found a recently metamorphed California red-legged frog along the banks of Matilija Creek approximately 1.5 miles above Matilija Dam. On July 7, 2000, consultants monitoring a road repair site found a California red-legged frog along the banks of Matilija Creek approximately 3 miles above Matilija Dam (Service 2000).

Arroyo toad (*Bufo californicus*)

The southwestern arroyo toad (arroyo toad) was listed by the Service as endangered on December 16, 1994 (59 FR 241). The arroyo toad is a small, dark-spotted toad of the family Bufonidae. This species is known from 22 river basins in the coastal and desert areas of 9 counties along the central and southern coast of California. Their range extends into northwestern Baja California, Mexico (Service 1999). Arroyo toads breed in stream channels and use stream terraces and surrounding uplands for foraging and wintering. Direct habitat loss due to urbanization, agriculture, and dam construction is the main cause for the decline of arroyo toads (Service 1999). Suitable habitat exists above the Matilija Dam and some marginal habitat exists in the vicinity of Foster Park. No records of arroyo toads exist from the Ventura River or Matilija Creek. In addition, habitat below the dam is sediment starved, rendering the habitat unsuitable to the arroyo toad.

Western spadefoot toad (*Spea hammondii*)

Suitable habitat for the western spadefoot toad, a California species of special concern, occurs along the Ventura River in the Oak View area (Wehtje 2000). This species is endemic to California ranges from the vicinity of Redding, Shasta County, southward into northwestern Baja California, Mexico. The spadefoot toad's known elevational range extends from near sea level to 4,471 feet above sea level. The known range of this species is entirely west of the Sierran-desert range axis (Jennings and Hayes 1994). Spadefoots breed in pools that form after heavy rains or in slow streams, springs, reservoirs, or irrigation ditches. Spadefoots spend dry periods in self-made burrows or those of gophers, squirrels, or kangaroo rats. An estimated 80 percent of spadefoot habitat has been lost from the Santa Clara River valley, Los Angeles County, Ventura County, and southward because of land development (Stebbins 2003). The habitat within the study area is unoccupied. There are no known records of spadefoot toads existing in the Ventura River or Matilija Creek. Spadefoot toads may have been extirpated from the study area because of the presence of exotic predators.

REPTILES

Reptiles were surveyed primarily by observers walking transects in wetland, riparian, and upland areas during approximately 15 field days. Reptiles were also actively sought during snorkel surveys on July 28, 2000. A total of seven reptile species were detected (Table 2). Western fence lizards (*Sceloporus occidentalis*), side-blotched lizards (*Uta stansburiana*), and coastal whiptails (*Cnemidophorus tigris stejnegeri*) were the most common. The southern alligator lizard (*Elgaria multicarinata*), southwestern pond turtle (*Clemmys marmorata pallida*), two-striped garter snake (*Thamnophis hammondii*), and southern Pacific rattlesnake (*Crotalus viridis helleri*) were also detected. All of these reptiles are native species (Service 2000).

Southwestern pond turtle (*Clemmys marmorata pallida*)

The southwestern pond turtle is considered as a California species of special concern and protected species by CDFG, and as sensitive by the USFS and the Bureau of Land Management (BLM). The southwestern pond turtle is distributed from sea level to approximately 6,562 feet, with the majority of populations below 4,265 feet in both permanent and intermittent aquatic habitats. Its range is fragmented to varying degrees by human activities, such as habitat alteration, abusive grazing practices, recreational fishing, and introduction of exotic predators and competitors (Jennings and Hayes 1994). The species is thought to be in a general state of decline in an estimated 75 to 80 percent of its range. Southwestern pond turtles formerly occurred along all major river systems within their present range. They are restricted to areas near the banks or quiet backwaters where the current is relatively slow and basking sites and refugia areas are available. However, they appear to be uncommon in heavily shaded areas, being concentrated where openings in the streamside canopy allow sufficient sunlight to facilitate basking. They have also been noted in small ponds and seasonally use vernal pools in California. Southwestern pond turtles may move distances up to several hundred yards from drying pools to adjacent creeks (Service 1993).

Approximately 20 southwestern pond turtles were observed directly and tracks of another 20 or more individuals were observed during surveys. Sweet (2000) rated many of the habitats in the study area as excellent for this species. Temple (2000) reported that sightings of pond turtles per site visit in the study area dramatically dropped after the El Nino storms of 1997-1998.

California horned lizard (*Phrynosoma coronatum frontale*)

The California horned lizard is a California species of special concern. This native coastal subspecies is found in a variety of arid and mesic habitats such as coastal sand dunes, open scrub, and riparian habitats with friable soils (Hunt and Lehman 1992). This species ranges from Shasta County southward along the edges of the Sacramento Valley into much of the South Coast Ranges, San Joaquin Valley, and Sierra Nevada foothills to northern Los Angeles, Santa Barbara and Ventura Counties (Jennings and Hayes 1994). Populations of California horned lizard are becoming increasingly fragmented by development within its range (Jennings and Hayes 1994).

The California horned lizard has been collected in arid upland habitats around Ojai (Los Angeles County Museum (LACM) number 101483) and west of Lake Casitas (University California Santa Barbara Vertebrate Museum (UCSB)). No other records of this species are known from the study area. We consider this species to be rare in the study area.

Coastal whiptail (*Cnemidophorus tigris stejnegeri*)

This species is a USFS species of special emphasis. This species is an active lizard of deserts and semiarid habitats, usually where plants are sparse and open areas for running are present. Whiptails range from deserts to warmer, drier areas within montane pine forests. They are also found in woodland and streamside growth, and avoid dense grassland and thick growth of shrubs. Whiptails are usually found where the ground has firm soil, and is rocky. The whiptail's diet consists of insects (including insect larvae, termites, grasshoppers, beetles), spiders, scorpions, and lizards (Stebbins 2003). The coastal whiptail is uncommon over much of its range in California, but it is abundant in the desert regions where suitable habitat is available (Zeiner *et al.* 1988). Several dozen coastal whiptails were observed in upland areas in the northern portion of the study area (Service 2000).

Silvery legless lizard (*Anniella pulchra pulchra*)

The silvery legless lizard is a California species of special concern. This highly specialized fossorial lizard occurs in a variety of habitats but is quite specific in its microhabitat requirements. It burrows beneath the leaf litter of shrubs or trees in loose, sandy soils and is generally absent from soils possessing a significant clay or silt component or that contain any degree of saturation, overlay a high water table or are subject to frequent disturbance (such as flooding).

The only soil type capable of supporting legless lizards within the study area is the remnant coastal sand dune area west of the Ventura River. Four individuals of this species were collected 820 feet west of the mouth of the Ventura River in 1979 (UCSB Nos. 8446-8449). Formerly more continuous, legless lizard habitat is now highly fragmented between Pitas Point, the Ventura Estuary, and the Oxnard Dunes. Beach erosion west of the Ventura River, recreation, and commercial and residential development of the beaches and dunes has eliminated this species from this area. The remaining dune habitat onsite at the river mouth represents the best chance for survival of this species in the immediate vicinity (Hunt and Lehman 1992).

Two-striped garter snake (*Thamnophis hammondii*)

The two-striped garter snake is considered by the CDFG as protected and a California species of special concern, USFS and BLM as sensitive (Table 2). This aquatic snake occurs in semi-permanent and permanent freshwater streams and ponds with bordering riparian woodland in central and southern California. It also frequents stock ponds and other human-made water sources. It can range well into xeric habitats such as chaparral adjacent to watercourse. Habitat alteration, flood control activities and the prolonged drought of 1986-1991 have reduced populations throughout its range. Additionally, the introduction of non-native predators such as the largemouth bass and the bullfrog, may have reduced or eliminated populations from many areas.

Despite the presence of excellent habitat for the two-striped garter snake, only three individuals of this species have been recorded within the study area. An 8-inch individual was observed in a small pool located approximately 328 feet downstream of the dam (Service 2000). Another individual was collected along the west bank of the Ventura River opposite Casitas Springs (UCSB 15708). The third individual was observed in marsh habitat in the active channel of the Ventura River approximately 1.5 miles upstream from the Main street Bridge in June 1992. Suitable habitat for this species occurs along the Ventura River and adjacent riparian corridor in the study area (Hunt and Lehman 1992).

Table 2. Known and Potentially Occurring Amphibians and Reptiles Within the Study Area

Species		Special Status	Known or Potential Occurrence in the Study Area
Common Name	**Scientific Name**		
AMPHIBIANS			
Arboreal salamander	*Aneides lugubris*	None	Expected in study area
Black-bellied slender salamander	*Batrachoseps nigriventris*	None	Observed in tributaries to Ventura River
Ensatina	*Ensatina eschscholtzi*	None	Expected in study area
California newt	*Taricha torosa torosa*	CSC	Expected in study area
Bullfrog	*Rana catesbeiana*	Non-native	Observed in the study area
California red-legged frog	*Rana aurora draytonii*	FT, CSC, CP	Observed in the study area
California treefrog	*Pseudacris cadaverina*	None	Observed in the study area
Pacific chorus frog	*Pseudacris regilla*	None	Observed in the study area
Arroyo toad	*Bufo californicus*	FE, CSC, CP	Probably extirpated
Western toad	*Bufo boreas halophilus*	None	Observed in the study area
Western spadefoot	*Spea hammondii*	CSC, CP, BLMS	Expected in study area
REPTILES			
Southwestern pond turtle	*Clemmys marmorata pallida*	CSC, CP, FSS, BLMS	Observed in the study area

California horned-lizard	*Phrynosoma coronatum frontale*	CSC, CP	Observed in the study area
Coastal western whiptail	*Cnemidophorus tigris stejnegeri*	CSC	Observed in the study area
Side-blotched lizard	*Uta stansburiana*	None	Observed in the study area
Silvery legless lizard	*Anniell pulchra pulchra*	CSC, FSS	Observed in the study area
Southern alligator lizard	*Elgaria multicarinata*	None	Observed in the study area
Western fence lizard	*Sceloporus occidentalis*	None	Observed in the study area
Western skink	*Eumeces skiltonianus*	None	Observed in the study area
California black-headed snake	*Tantilla planiceps*	None	Expected in the study area

Table 2. Known and Potentially Occurring Amphibians and Reptiles Within the Study Area (Continued)

Species		Special Status	Known or Potential Occurrence in the Study Area
Common Name	Scientific Name		
California kingsnake	*Lampropelltis getulus californiae*	None	Observed in the study area
California lyre snake	*Trimorphodon biscutatus vandenburghi*	None	Expected in the study area
Coast mountain kingsnake	*Lampropeltis zonata multifasciata*	None	Observed in the study area
Coast patchnose snake	*Salvadora hexalepsis virgultea*	CSC	Expected in the study area
Coastal rosy boa	*Lichanura trivirgata roseofusca*	None	Expected in the study area
Gopher snake	*Pituophis melanoleucus*	None	Observed in the study area
San Bernardino ringneck snake	*Diadophis punctatus modestus*	None	Observed in the study area
Southern Pacific rattlesnake	*Crotalus viridis helleri*	None	Observed in the study area
Southwestern blind snake	*Leptotyphlops humilis humilis*	None	Expected in the study area
Coachwhip	*Masticophis flagellum piceus*	None	Expected in the study area
Striped-racer	*Masticophis lateralis lateralis*	None	Observed in the study area
California red-sided garter snake	*Thamnophis sirtalis infernalis*	None	Expected in the study area

Two-striped garter snake	*Thamnophis hammondii*	CSC, CP, FSS	Observed in the study area
Western yellow-bellied racer	*Coluber constrictor mormon*	None	Expected in the study area
Western long-nosed snake	*Rhinocheilus lecontei lecontei*	None	Expected in the study area
San Diego night snake	*Hypsiglena torquata klauberi*	None	Observed in the study area

Special Status Codes
FE = Federally Endangered Species
FT = Federally Threatened Species
FSS = U.S. Forest Service Sensitive Species
BLMS = Bureau of Land Management Sensitive Species
CSC = California Species of Special Concern
CP = California Protected

BIRDS

Avian wildlife are abundant and diverse in the study area. Previous reports (Hunt and Lehman 1992; Service 2000; Aspen 2002; and URS 2000) have identified 245 species to date. Among the birds known to occur within the study area, 9 are listed as endangered or threatened on Federal and/or State lists (Table 3). In addition, 25 species known to occur are considered "sensitive" as they are listed on one or more of the following watchlists: State Species of Special Concern, and State Fully Protected Species (CDFG 1998). Literature and museum records and consultation with local experts were also used to compile an inventory and discuss potential and historic species occurrences.

A directed search for birds was conducted on 10 different survey dates (Service 2000). Eight of these surveys coincided with the protocol surveys for southwestern willow flycatcher and/or least Bell's vireo. Incidental bird observations were recorded during surveys for other species. We detected a total of 93 bird species (Table 3). Two of these species, the European starling (*Sturnus vulgaris*) and rock dove (*Columba livia*), are exotics; the remainder are native. The most common bird species included cliff swallow *(Petrochelidon pyrrhonota),* northern rough-winged swallow (*Stelgidopteryx serripennis*), song sparrow *(Melospiza melodia*), common yellowthroat (*Geothlypis trichas*), bushtit *(Psaltriparus minimus),* wrentit (*Chamaea fasciata*), western scrub jay *(Aphelocoma californica*), black phoebe (*Sayornis nigricans*), mallard (*Anas platyrhyncos*), bufflehead (*Bucephala albeola*), American coot (*Fulica americana),* and ruddy duck (*Oxyura jamaicensis*). Bird surveys were performed during a limited time period; many other species would likely be present if additional surveys were conducted at other times of the year.

Hunt and Lehman (1992) observed a total of 233 avian species in the lower Ventura River and Ventura Estuary during the breeding, winter and migratory seasons between June 1991 and July 1992 as well as several preceding years. Two important habitat types for birds in the study area are estuarine and palustrine systems.

The estuarine system is used by large number of waterbirds, whose densities vary seasonally and daily with fluctuating water levels. The largest numbers of birds are typically found when water levels in the estuary are relatively low, exposing mudflats and adjacent aquatic habitats. Moderate numbers of waterfowl are found within the study area from mid-fall through early spring. Gulls, brown pelicans (*Pelecanus occidentalis*), and terns use the area year-round for resting and bathing. Large numbers of shorebirds were also present to feed on the exposed mudflats when water levels were low. Regionally declining or listed species that frequent the estuary include the osprey (*Pandion haliaetus*), western snowy plover (*Charadrius alexandrinus nivosus*), and the California least tern (*Sterna antillarum brownii*). Small numbers (20 to 30 individuals) of black brant (*Branta bernicla nigricans*) seasonally visit the Ventura River estuary and cobble intertidal areas on their northward migration. The black brant feed on the abundant algae which colonizes the cobble substrate characteristic of portions of the estuary and intertidal area (Hunt and Lehman 1992).

The palustrine systems upstream of the Ventura River estuary provide important forage and cover for landbirds during all seasons. Dense willow and other riparian woodlands, especially adjoining water, are frequented by many migrant species in spring and fall, somewhat smaller numbers of wintering passerines, and several regionally rare and declining breeders in spring and summer. Regionally declining species of concern include yellow warbler (*Dendroica petechia*) and yellow-breasted chat (*Icteria virens*) (CDFG and Point Reyes Bird Observatory (PRBO) 2001).

Least Bell's vireo (*Vireo belli pusillus*)
The least Bell's vireo is state and federally listed as endangered. The least Bell's vireo was federally listed as endangered on May 2, 1986 (51 FR 16474). The least Bell's vireo is a small, olive-grey migratory songbird that nests and forages primarily in riparian woodland habitats. Typical nesting habitat consists of an understory of dense subshrub or shrub thickets dominated by sandbar willow (*Salix hindsiana*), mule fat, and saplings of other willow species. Historically, least Bell's vireos wintered in Mexico and ranged as far north as Tehama County, California. The current breeding distribution for the least Bell's vireo is restricted to southern California and northwestern Baja California. Widespread habitat loss has fragmented most remaining populations of least Bell's vireos into small, disjunct, widely dispersed subpopulations, which are concentrated in San Diego, Santa Barbara, and Riverside Counties. The decline in the numbers of the least Bell's vireo that led to its listing have been attributed, in part, to the combined, perhaps synergistic effects of the widespread loss of riparian habitats and brood-parasitism by the brown-headed cowbird (*Molothrus ater*).

Approximately 60 acres of suitable habitat for the least Bell's vireo exists within the study area from the Ventura River estuary to Foster Park. Greaves (2003) reported 1 pair of least Bell's vireo nesting in the vicinity of the Main Street Bridge and Ventura River in 2001, 2002, and 2003. The attempt during the 2003 season to nest in the Main Street vicinity failed possibly because of the large population of homeless people inhabiting the palustrine habitat. A second pair of least Bell's vireo was reported nesting approximately 0.75 mile downstream of Shell Road in June of 2003. Finally, a pair of least

Bell's vireo was reported in the Ventura River near Stanley Road in June of 2003. The status of these two pairs is unknown at this time (Greaves 2003).

Southwestern willow flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher was federally listed as endangered on February 27, 1995 (60 FR 10694). The breeding range of the southwestern willow flycatcher includes Arizona, New Mexico, the southern portions of California, Nevada, and Utah, western Texas, southwestern Colorado, and extreme northwestern Mexico. Loss and modification of riparian habitats and brood parasitism by brown-headed cowbirds were the primary reasons for listing the southwestern willow flycatcher. This species occurs in riparian habitats along rivers, streams, or other wetlands where dense growths of willows, coyote brush, arrowweed (*Pluchea* sp.), buttonbush (*Cephalanthus* sp.), tamarisk (*Tamarix* sp.), Russian olive (*Eleagnus* sp.) or other plants are present, often with a scattered overstory of cottonwoods. In the coastal portions of its range, southwestern willow flycatchers use willow-dominated riparian areas intermixed with cottonwoods, coyote brush and mule fat.

Five surveys were conducted according to Service protocol for the southwestern willow flycatcher from April 28, 2000, through July 22, 2000. Although approximately 14 acres of marginal habitat exists in locations between the estuary and Foster Park for this species, southwestern willow flycatchers were not detected. No historic records for nesting southwestern willow flycatchers in the Ventura River or Matilija Creek exist. Lack of suitable habitat and the presence of brown-headed cowbirds may preclude any occurrences of this species within the study area.

Western snowy plover (*Charadrius alexandrinus nivosus*)

The Pacific coast population of the western snowy plover was federally listed as threatened on March 5, 1993 (58 FR 12864). On March 2, 1995, the Service proposed designation of critical habitat for the western snowy plover (60 FR 11768). The western snowy plover is a small shorebird that forages on invertebrates in areas such as intertidal zones, the wrack line, dry sandy areas above the high tide line, salt pans, and the edges of salt marshes. The Pacific coast population nests near tidal waters along the mainland coast and on offshore islands from southern Washington to southern Baja California, Mexico. Most nesting occurs on unvegetated, or moderately vegetated, dune backed beaches and sand spits. During the non-breeding season western snowy plovers may remain at breeding sites or may migrate to other locations. The Pacific coast population of the western snowy plover has experienced widespread loss of nesting habitat and reduced reproductive success at many nesting locations. Factors resulting in loss of nesting habitat include urban development and the encroachment of European beachgrass (*Ammophila arenaria*). Reduced reproductive success is frequently tied to disturbance from human activities and to predation. Activities such as walking, jogging, running pets, horseback riding, and off-road vehicle use frequently crush and destroy the western snowy plover's cryptic nests and chicks. These activities also flush adults off nests and away from chicks, and thus interfere with essential incubation and chick rearing behaviors.

The western snowy plover is known to use the dune areas around the estuary and neighboring San

Buenaventura State Beach for wintering. Despite the presence of suitable breeding habitat, western snowy plovers have not been recorded breeding at the Ventura River estuary. The lack of breeding records at this site for this species maybe because of extensive beach use dating back into the 1930's (Wetlands Research Associates, Inc. 1992). The closest known breeding area for the western snowy plover occurs south of the study area at McGrath State Beach (Smith 2003). Western snowy plovers that have been observed in the sandy areas near the estuary mouth and on the drier mudflats in the estuary itself, are assumed to be post-breeding birds from McGrath State Beach (Hunt and Lehman 1992).

California least tern (*Sterna antillarum browni*)

In 1970, the first Federal list of endangered species was drawn up following passage of the Endangered Species Conservation Act of 1969. The California least tern *(Sterna antillarum browni)* was included on the list. The State of California passed its own Endangered Species Act in 1970 and subsequently published a list in May of 1971 that included the tern. The breeding range of this subspecies is described as extending along the Pacific Coast from San Francisco Bay, California, to Bahia de San Quintin, Baja California, Mexico. The California least tern is a migratory species that arrives in California by late April to breed and begins to depart to unknown southerly locations by August. It nests on coastal, sandy, open areas, usually around bays, estuaries, and creek and river mouths. California least terns were once common along the central and southern California coast. The precipitous decline of the California least tern is attributed to prolonged and widespread destruction and degradation of nesting and foraging habitats, and increasing human disturbance to breeding colonies. Conflicting uses of southern and central California beaches during the California least tern nesting season have led to isolated colony sites that are extremely vulnerable to predation from native, feral and exotic species, overwash by high tides, and vandalism and harassment by beach users.

In Ventura County, California least terns nest at Point Mugu, Ormond Beach, and just north of the mouth of the Santa Clara River. In 2002, approximately 260 pairs of California least terns nested at Ormond Beach, making this the largest colony in Ventura County. Young California least terns often use the estuary at the Ventura River for foraging and loafing before beginning their journey south (Hunt and Lehman 1992). As described above for the western snowy plover suitable breeding habitat for the California least tern occurs at the Ventura River estuary, but California least terns have not been known to breed there. The lack of breeding records at this site for this species maybe because of the extensive beach use dating from the 1930's (Wetlands Research Associates, Inc. 1992).

California brown pelican (*Pelecanus occidentalis californicus*)

The California brown pelican was federally listed as endangered in 1970. The California brown pelican is a large bird recognized by the long, pouched bill that is used to catch surface schooling fishes. California brown pelicans nest in colonies on small coastal islands that are free of mammalian predators and human disturbance, and are associated with an adequate and consistent food supply. Nesting colonies of the California brown pelican range from the Channel Islands in the Southern California Bight to the islands off Nayarit, Mexico. Prior to 1959, intermittent nesting was observed as far north as

Point Lobos in Monterey County, California. Dispersal between breeding seasons ranges from British Columbia, Canada, to southern Mexico and possibly to Central America. During the non-breeding season brown pelicans roost communally, generally in areas that are near adequate food supplies, have some type of physical barrier to predation and disturbance, and that provide some protection from environmental stresses such as wind and high surf. Breakwaters and jetties are often used for roosting. California brown pelicans experienced widespread reproductive failures in the 1960s and early 1970s. Much of the failure was attributed to eggshell thinning caused by high concentrations of DDE, a metabolite of DDT. Other factors implicated in the decline of this species include human disturbance at nesting colonies, and food shortages (Service 1997).

The California brown pelican occasionally roosts at the estuary mouth, primarily during the summer. No regular surveys have been conducted at the Ventura River mouth, so information on the status of the California brown pelican at this site is anecdotal. Additionally, their numbers may vary greatly with the season (Service 1997).

California condor (*Gymnogyps californianus*)
This species was federally listed as endangered on March 11, 1967 (32 FR 4001). The California condor is also a California endangered and fully protected species. Critical habitat was designated on September 24, 1976 (41 FR 187). The California condor is a member of the Cathartidae family or new world vultures. With a wing span of nearly 9.5 feet and weighing approximately 22 pounds, it is one of the largest flying birds in the world. California condors are opportunistic scavengers, feeding exclusively on the carcasses of dead animals. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Seasonal foraging behavior shifts may be the result of climatic cycles or changes in food availability. California condors maintain wide-ranging foraging patterns throughout the year, an important adaptation for a species that may be subjected to unpredictable food supplies. Most foraging occurs in open terrain of foothills, grasslands, potreros within chaparral areas, or oak savannah habitats. Historically, foraging also occurred on beaches and large rivers along the Pacific coast. Threats to the California condor include lead poisoning due to ingestion of fragments of bullets and shot found in hunter killed animals, collision with overhead transmission lines, ingesting toxins such as ethylene glycol (a commonly-used ingredient of antifreeze), being shot, predation by coyotes (*Canis latrans*) and golden eagles (*Aquila chrysaetos*), and unknown causes.

California condors have been reintroduced to the mountains in the Los Padres National Forest. Individuals occasionally fly over the Ojai Valley. No known activity sites for the California condor exist within the study area (Bruce Palmer, Service, pers. comm., 2003).

White-tailed kite (*Elanus caeruleus*)
The white-tailed kite is California fully protected species. The white-tailed kite is a common to uncommon year long resident in coastal and valley lowlands. This species inhabits herbaceous and open stages of most habitats in cismontane California. The white-tailed kite preys mostly on voles and

other small, diurnal mammals, occasionally on birds, insects, reptiles, and amphibians. It forages in undisturbed, open grasslands, meadows, farmlands and palustrine systems.

This regionally declining species is much rarer now than it was during its peak population years in the mid-1970's. Through the early 1980's, it was seen regularly on or adjoining the study area, particularly in upland areas. The loss of open space in the project area has resulted in the decline of this species (Hunt and Lehman 1992). Although this species is presumed extant in the study area, actual numbers of individuals are unknown.

American Peregrine falcon (*Falco peregrinus anatum*)
The American Peregrine falcon is state endangered and California fully protected species. In 1970, the Service listed the peregrine falcon as endangered under the Endangered Species Conservation Act of 1969. Subsequently, with protection under the Endangered Species Act and the banning of DDT, the peregrine falcon made a sufficient recovery. The Service removed the peregrine falcon from the list of endangered and threatened species in 1999 (64 FR 46542). The American peregrine falcon is the subspecies of peregrine falcon that historically nested from the North American boreal forest south into Mexico. The peregrine falcon is a crow-sized raptor that feeds mostly on birds and typically attacks its prey in the air. In a natural setting, American peregrine falcons nest almost exclusively on cliff ledges that are associated with suitable foraging areas. They have also been observed nesting on human-made structures in heavily urbanized areas. Prior to World War II, an expanding human population contributed to a gradual decline of this subspecies within the United States. Following World War II, the widespread use of chlorinated hydrocarbon-based pesticides, such as DDT, accelerated the American peregrine falcon's decline. Restrictions on the use of DDT and intensive intervention to augment natural reproduction have restored the American peregrine falcon in many parts of its historical range, including some areas of California.

A pair of peregrine falcons have been documented within the Ventura Estuary foraging on waterfowl and shorebirds. Peregrine falcons observed at the estuary are believed to be commuting from Anacapa Island (Hunt and Lehman 1992). To date, no additional observations have been recorded and we considered this species to be rare in the study area.

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
The western yellow-billed cuckoo is considered an endangered species by the state of California and a federal candidate species. This species is an uncommon to rare summer resident of valley foothill and desert habitats in scattered locations in California. The western yellow-billed cuckoo was formerly much more common and widespread throughout lowland California, but numbers drastically reduced by habitat loss. This species has not been observed or documented within the study area despite suitable nesting and foraging habitat within the study area. Habitat within the study area includes palustrine forested areas.

Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)

The Belding's savannah sparrow is considered an endangered species by the state of California. This subspecies is a resident of southern California coastal salt marshes from Goleta Slough in Santa Barbara County south to northwestern Baja California Norte, Mexico. Populations throughout the range appeared to be stable or increasing according to a census conducted in the late 1980's and approximately 2,275 pairs were located range-wide in 1986. The more common inland migratory race frequents coastal habitats between late spring and late fall. Individuals of this race were seen within the study area during surveys in 1991. In July 1992, a small flock consisting of three pairs of adults and a few juveniles were observed approximately 0.8 mile west of the Ventura Estuary. These individuals were found in dense vegetation consisting of *Salicornia*, *Distichlis*, and *Atriplex* species. The areal extent of this habitat around bordering areas of the Ventura Estuary is rather small. Consequently, Belding's savannah sparrow populations found there would be expected to be small and unstable. Individuals or pair of birds may occasionally establish a territory in these areas (Hunt and Lehman 1992).

Table 3. **Observed and Documented Birds Within the Study Area**

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Gaviidae (Loons)			
Red-throated loon	*Gavia stellata*	None	4, 5
Pacific loon	*Gavia pacifica*	None	4, 5
Common loon	*Gavia immer*	CSC	4, 5
Podicipedidae (Grebes)			
Pied-billed grebe	*Podilymbus podiceps*	None	1, 2, 3, 4
Horned grebe	*Podiceps auritus*	None	4, 5
Red-necked grebe	*Podiceps grisegena*	None	1, 4, 5
Eared grebe	*Podiceps nigricollis*	None	1, 2, 3, 4, 5
Western grebe	*Aechmophorus occidentalis*	None	1, 4, 5
Clark's grebe	*Aechmophorus clarkii*	None	1, 4, 5
Pelecanidae (Pelicans)			
Brown pelican	*Pelecanus occidentalis*	FE, SE, SFP	4, 5
Phalacrocoracidae (Cormorants)			
Double-crested cormorant	*Phalacrocorax auritus*	CSC	1, 2, 4, 5
Pelagic cormorant	*Phalacrocorax pelagicus*	None	4, 5
Ardeidae (Herons)			
American bittern	*Botaurus lentiginosus*	None	2, 3
Great blue heron	*Ardea herodias*	None	2, 3, 4, 5, 6
Great egret	*Casmerodius albus*	None	2, 3, 4, 5, 6
Snowy egret	*Egretta thula*	None	2, 3, 4, 5, 6
Little blue heron	*Egretta caerulea*	None	2, 3, 4, 5, 6
Tricolored heron	*Egretta tricolor*	None	2, 3, 4, 5, 6
Cattle egret	*Bubulcus ibis*	None	2, 6
Green-backed heron	*Butorides virescens*	None	2, 3, 4
Black-crowned night heron	*Nycticorax nycticorax*	None	2, 3, 4, 5

Table 3. **Observed and Documented Birds Within the Study Area (Continued)**

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Treskiornithidae (Ibises and Spoonbills)			
White-faced Ibis	*Plegadis chihi*	CSC	2, 3, 4
Anatidae (Swans, Geese and Ducks)			
Snow Goose	*Chen caerulescens*	None	1, 3, 4, 6
Ross' Goose	*Chen rossii*	None	1, 3, 6
Brant	*Branta bernicla*	None	4
Canada Goose	*Branta canadensis*	None	1, 2, 3, 4, 6
Wood Duck	*Aix sponsa*	None	1, 2, 3
Green-winged Teal	*Anas crecca*	None	1, 2, 3, 4, 6
Mallard	*Anas platyrhynchos*	None	1, 2, 3, 4
Northern Pintail	*Anas acuta*	None	1, 3, 4, 6
Cinnamon Teal	*Anas cyanoptera*	None	1, 2, 3, 4, 6
Blue-winged teal	*Anas discors*	None	1, 3, 4, 6
Northern Shoveler	*Anas clypeata*	None	1, 3, 4
Gadwall	*Anas strepera*	None	1, 2, 3, 4
American Wigeon	*Anas penelope*	None	1, 3, 4
Canvasback	*Aythya valisineria*	None	1, 3, 4
Redhead	*Aythya americana*	None	1, 3, 4
Ring-necked Duck	*Aythya collaris*	None	1
Greater Scaup	*Aythya marila*	None	1, 3, 4
Lesser Scaup	*Aythya affinis*	None	1, 3, 4
Oldsquaw	*Clangula hyemalis*	None	4, 5
Surf Scoter	*Melanitta perspicillata*	None	4, 5
White-winged Scoter	*Melanitta fusca*	None	1, 4, 5
Common Goldeneye	*Bucephala clangula*	None	1, 4
Bufflehead	*Bucephala albeola*	None	1, 4

Hooded Merganser	*Lophodytes cucullatus*	None	1, 2, 3, 4
Common Merganser	*Mergus merganser*	None	1, 2, 3

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Red-breasted Merganser	*Mergus serrator*	None	4, 5
Ruddy Duck	*Oxyura jamaicensis*	None	1, 3, 4, 5
Cathartidae (American Vultures)			
Turkey Vulture	*Cathartes aura*	None	6, 7, 8, 9
California Condor	*Gymnogyps californianus*	FE, SE, SFP	6, 7, 8, 9
Accipitridae (Kites, Hawks and Eagles)			
Osprey	*Pandion haliaetus*	CSC	1, 2, 4, 9
White-tailed kite	*Elanus caeruleus*	DFGFP	3, 6, 7
Northern harrier	*Circus cyaneus*	CSC	3, 6, 7
Sharp-shinned hawk	*Accipiter striatus*	CSC	3, 9
Cooper's hawk	*Accipiter cooperii*	CSC	9
Red-shouldered hawk	*Buteo lineatus*	None	3, 9
Red-tailed hawk	*Buteo jamaicensis*	None	3, 6, 7, 8, 9
Rough-legged hawk	*Buteo lagopus*	None	3, 9
Falconidae (Caracaras, Falcons)			
Merlin	*Falco columbarius*	CSC	3, 6, 7, 8, 9
American kestrel	*Falco sparverius*	None	3, 6, 7, 8, 9
Peregrine falcon	*Falco peregrinus*	SE, SFP	3, 4, 6, 7
Prairie falcon	*Falco mexicanus*	CSC	6
Phasianidae (Grouse, Quail and Ptarmigan)			
California quail	*Callipepla californica*	None	6, 7, 8, 9
Rallidae (Rail, Gallinules and Coots)			
Virginia rail	*Rallus limicola*	None	3
Sora	*Porzana carolina*	None	3

Common moorhen	*Gallinula chloropus*	None	2, 3
American coot	*Fulica americana*	None	1, 2, 3, 4

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Charadriidae (Plovers)			
Black-bellied plover	*Pluvialis squatarola*	None	2, 3, 4, 5, 6
Western snowy plover	*Charadrius alexandrinus nivosus*	FE, CSC	4, 5, 10
Semipalmated plover	*Charadrius semipalmatus*	None	2, 4, 5, 10
Killdeer	*Charadrius vociferus*	None	2, 3, 4, 10
Pacific golden-plover	*Pluvialis fulva*	None	4, 5, 10
Haematopodidae (Oystercatchers)			
American black oystercatcher	*Haematopus bachmani*	None	5
Recurvirostridae (Avocets and Stilts)			
Black-necked stilt	*Himantopus mexicanus*	None	1, 3, 4
American avocet	*Recurvirostra americana*	None	3, 4
Scolopacidae (Sandpipers and relatives)			
Greater yellowlegs	*Tringa melanoleuca*	None	1, 3, 4
Lesser yellowlegs	*Tringa flavipes*	None	1, 3, 4
Solitary sandpiper	*Tringa solitaria*	None	4
Willet	*Catoptrophorus semipalmatus*	None	3, 4, 5, 10
Wandering tattler	*Heteroscelus incanus*	None	4, 5, 10
Spotted sandpiper	*Actitis macularia*	None	1, 2, 4, 5, 10
Whimbrel	*Numenius phaeopus*	None	1, 2, 4, 5, 10
Long-billed curlew	*Numenius americanus*	CSC	3, 4
Marbled godwit	*Limosa fedoa*	None	3, 4, 10

Ruddy turnstone	*Arenaria interpres*	None	3, 4, 5, 10
Black turnstone	*Arenaria melanocephala*	None	3, 4, 5, 10
Surfbird	*Aphriza virgata*	None	4, 5, 10
Red knot	*Calidris canutus*	None	4, 10
Sanderling	*Calidris alba*	None	1, 2, 4, 5
Semipalmated sandpiper	*Calidris pusilla*	None	3, 4, 10

Table 3. **Observed and Documented Birds Within the Study Area (Continued)**

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Western Sandpiper	*Calidris mauri*	None	2, 3, 4, 5, 10
Least Sandpiper	*Calidris minutilla*	None	2, 3, 4, 5, 10
Baird's Sandpiper	*Calidris bairdii*	None	3, 4, 5, 10
Pectoral Sandpiper	*Calidris melanotos*	None	3
Dunlin	*Calidris alpina*	None	1, 3, 4, 5, 10
Short-billed Dowitcher	*Limnodromus griseus*	None	3, 4, 5
Long-billed Dowitcher	*Limnodromus scolopaceus*	None	1, 3
Common Snipe	*Gallinago gallinago*	None	3, 4
Wilson's Phalarope	*Phalaropus tricolor*	None	1, 3
Red-necked Phalarope	*Phalaropus lobatus*	None	3, 5
Red Phalarope	*Phalaropus fulicaria*	None	3, 5
Laridae (Gulls and Terns)			
Bonaparte's Gull	*Larus philadelphia*	None	1, 4, 5
Heermann's Gull	*Larus heermanni*	None	4, 5
Mew Gull	*Larus canus*	None	2, 5
Ring-billed Gull	*Larus delawarensis*	None	1, 2, 3, 4, 5
California Gull	*Larus californicus*	CSC	1, 2, 3, 4, 5, 10
Herring Gull	*Larus argentatus*	None	1, 2, 3, 4, 5, 10
Thayer's Gull	*Larus thayeri*	None	1, 4, 5

Western Gull	*Larus occidentalis*	None	2, 4, 5, 10
Glaucous-winged Gull	*Larus glaucescens*	None	2, 4, 5, 10
Glaucous Gull	*Larus hyperboreus*	None	5, 10
Black-legged kittiwake	*Rissa tridactyla*	None	5, 10
Caspian Tern	*Sterna caspia*	None	1, 4, 5, 10
Royal Tern	*Sterna maxima*	None	4, 5, 10
Elegant Tern	*Sterna elegans*	CSC	4, 5, 10
Common tern	*Sterna hirundo*	None	4, 5, 10
Forster's Tern	*Sterna forsteri*	None	3, 4, 5, 10

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	**Scientific Name**		
California Least Tern	*Sterna antillarum browni*	FE, SE, SFP	4, 5, 10
Black tern	*Chlidonias niger*	CSC	1, 3, 4, 5
Columbidae (Pigeons and Doves)			
Rock dove	*Columba livia*	Non-native	6, 7, 8, 9, 10
Band-tailed pigeon	*Columba fasciata*	None	8, 9
Mourning dove	*Zenaida macroura*	None	3, 6, 7, 8, 9
Spotted dove	*Streptopelia chinensis*	Non-native	3, 6, 7, 9
Tytonidae (Barn Owls)			
Barn owl	*Tyto alba*	None	3, 6, 7, 8, 9
Strigidae (Owls)			
Great horned owl	*Bubo virginianus*	None	3, 8, 9
Burrowing owl	*Athene cunicularia*	CSC	6, 7, 8, 9
Short-eared owl	*Asio flammeus*	CSC	3, 6
Caprimulgidae (Nightjars)			
Lesser nighthawk	*Chordeiles acutipennis*	None	7
Apodidae (Swifts)			

Black swift	*Cypseloides niger*	CSC	2, 3
Vaux's swift	*Chaetura vauxi*	CSC	9
White-throated swift	*Aeronautes saxatalis*	None	2, 3, 6, 7, 8, 9
Trochilidae (Hummingbirds)			
Black-chinned hummingbird	*Archilochus alexandri*	None	3, 9
Anna's hummingbird	*Calypte anna*	None	3, 7, 8, 9
Costa's hummingbird	*Calypte costae*	None	3, 7, 8
Rufous hummingbird	*Selasphorus rufus*	None	3, 7, 8
Allen's hummingbird	*Selasphorus sasin*	None	3, 7, 9
Alcedinidae (Kingfishers)			
Belted kingfisher	*Ceryle alcyon*	None	1, 2, 3, 4

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	Scientific Name		
Picidae (Woodpeckers)			
Red-breasted sapsucker	*Sphyrapicus ruber*	None	9
Nuttall's woodpecker	*Picoides nuttallii*	None	9
Downy woodpecker	*Picoides pubescens*	None	9
Northern flicker	*Colaptes auratus*	None	9
Tyrannidae (Tyrant Flycatchers)			
Olive-sided flycatcher	*Contopus borealis*	None	
Western wood-pewee	*Contopus sordidulus*	None	9
Willow flycatcher	*Empidonax traillii*	SE, FSS	3
Hammond's flycatcher	*Empidonax hammondii*	None	9
Pacific-slope flycatcher	*Empidonax difficilis*	None	3, 9
Black phoebe	*Sayornis nigricans*	None	3
Say's phoebe	*Sayornis saya*	None	6, 7
Ash-throated flycatcher	*Myiarchus cinerascens*	None	7, 8, 9

Tropical kingbird	*Tyrannus melancholicus*	None	3, 9
Cassin's kingbird	*Tyrannus vociferans*	None	9
Western kingbird	*Tyrannus verticalis*	None	6, 7
Alaudidae (Larks)			
Horned lark	*Eremophila alpestris*	None	6, 7, 8, 9
Hirundinidae (Swallows)			
Tree swallow	*Tachycineta bicolor*	None	1, 2, 3, 4, 9
Violet-green swallow	*Tachycineta thalassina*	None	7, 9
Northern rough-winged swallow	*Stelgidopteryx serripennis*	None	2, 6, 9
Bank swallow	*Riparia riparia*	ST	1, 2, 3
Cliff swallow	*Hirundo pyrrhonota*	None	1, 2, 3, 4, 6, 7, 9
Barn swallow	*Hirundo rustica*	None	1, 2, 3, 4, 6, 7, 9
Purple martin	*Progne subis*	CSC	3, 6, 9

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Corvidae (Jays, Magpies, and Crows)			
Scrub jay	*Aphelocoma coerulescens*	None	3, 6, 7, 8, 9
American crow	*Corvus brachyrhynchos*	None	3, 6, 7, 8, 9
Common raven	*Corvus corax*	None	3, 6, 7, 8, 9
Paridae (Titmice)			
Plain titmouse	*Parus inornatus*	None	3, 9
Aegithalidae (Bushtit)			
Bushtit	*Psaltriparus minimus*	None	9
Sittidae (Nuthatches)			
Red-breasted nuthatch	*Sitta canadensis*	None	9
Certhiidae (Creepers)			
Brown creeper	*Certhia americana*	None	9

Troglodytidae (Wrens)			
Rock wren	*Salpinctes obsoletus*	None	6, 7, 8
Bewick's wren	*Thryomanes bewickii*	None	3, 8
House wren	*Troglodytes aedon*	None	3, 8, 9
Marsh wren	*Cistothorus palustris*	None	3
Winter wren	*Troglodytes troglodytes*	None	3, 9
Muscicapidae (Trushes)			
Golden-crowned kinglet	*Regulas satrapa*	None	3, 9
Ruby-crowned kinglet	*Regulus calendula*	None	9
Blue-gray gnatcatcher	*Polioptila caerulea*	None	7, 8, 9
Swainson's thrush	*Catharus ustulatus*	None	3
Hermit thrush	*Catharus guttatus*	None	9
American robin	*Turdus migratorius*	None	9
Varied thrush	*Ixoreus naevius*	None	8, 9
Western bluebird	*Sialia mexicana*	None	3, 9
Wrentit	*Chamaea fasciata*	None	7, 8, 9

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	Scientific Name		
Mimidae (Mockingbirds and Thrashers)			
Northern mockingbird	*Mimus polyglottos*	None	7, 8, 9
California thrasher	*Toxostoma redivivum*	None	3, 8
Motacillidae (Wagtails and Pipits)			
American pipit	*Anthus rubescens*	None	3, 6, 10
Bombycillidae (Waxwings			
Cedar waxwing	*Bombycilla cedrorum*	None	3, 9
Laniidae (Shrikes)			
Loggerhead shrike	*Lanius ludovicianus*	CSC	3, 6, 7, 8, 9
Sturnidae (Starlings)			

European starling	*Sturnus vulgaris*	Non-native	3, 6, 9
Vireonidae (Typical Vireos)			
Least Bell's vireo	*Vireo bellii pusillus*	FE, SE	3
Solitary vireo	*Vireo solitarius*	None	3, 9
Hutton's vireo	*Vireo huttoni*	None	3, 8, 9
Warbling vireo	*Vireo gilvus*	None	3, 9
Emberizidae (Warblers, Sparrows, Blackbirds, and Orioles)			
Orange-crowned warbler	*Vermivora celata*	None	3, 7, 8, 9
Nashville warbler	*Vermivora ruficapilla*	None	8, 9
Yellow warbler	*Dendroica petechia*	CSC	3, 8, 9
Yellow-rumped warbler	*Dendroica coronata*	None	6, 7, 8, 9
Black-throated gray warbler	*Dendroica nigrescens*	None	9
Townsend's warbler	*Dendroica townsendi*	None	9
Hermit warbler	*Dendroica occidentalis*	None	9
Blackpoll warbler	*Dendroica striata*	None	3, 9
Bay-breasted warbler	*Dendroica castanea*	None	3, 9
Black-and-white warbler	*Mniotilta varia*	None	3, 9
American redstart	*Setophaga ruticilla*	None	3, 9

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	Scientific Name		
Northern waterthrush	*Seirus noveboracensis*	None	3
MacGillivray’s warbler	*Opornis tolmiei*	None	3, 9
Common yellowthroat	*Geothlypis trichas*	None	3, 6
Wilson's warbler	*Wilsonia pusilla*	None	3, 7, 8, 9
Yellow-breasted chat	*Icteria virens*	CSC	3
Summer tanager	*Piranga rubra*	CSC	3, 9
Western tanager	*Piranga ludoviciana*	None	9
Black-headed grosbeak	*Pheucticus melanocephalus*	None	3, 9

Lazuli bunting	*Passerina amoena*	None	3, 8, 9
Rufous-sided towhee	*Pipilo erythrophthalmus*	None	7, 8, 9
California towhee	*Pipilo crissalis*	None	6, 7, 8, 9
Chipping sparrow	*Spizella passerina*	None	7, 9
Lark sparrow	*Chondestes grammacus*	None	6, 7, 8, 9
Savannah sparrow	*Passerculus sandwichensis*	None	3
Belding' savannah sparrow	*P. s. beldingi*	SE	3
Rufous -crowned sparrow	*Aimophila ruficeps canescens*	CSC	7, 8
Fox sparrow	*Passerella iliaca*	None	3, 8, 9
Song sparrow	*Melospiza melodia*	None	3
Lincoln's sparrow	*Melospiza lincolnii*	None	3, 6
Swamp sparrow	*Melospiza georgiana*	None	3
White-throated sparrow	*Zonotrichia albicollis*	None	3, 7, 9
Golden-crowned sparrow	*Zonotrichia atricapilla*	None	3, 7, 9
White-crowned sparrow	*Zonotrichia leucophrys*	None	3, 6, 7, 8, 9
Dark-eyed junco	*Junco hyemalis*	None	9
Bobolink	*Dolichonyx oryzivorus*	None	3, 6
Red-winged blackbird	*Agelaius phoeniceus*	None	3, 6
Tricolored blackbird	*Agelaius tricolor*	CSC	3, 6
Western meadowlark	*Sturnella neglecta*	None	6

Table 3. Observed and Documented Birds Within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	None	3
Brewer's blackbird	*Euphagus cyanocephalus*	None	6, 7, 9
Brown-headed cowbird	*Molothrus ater*	None	3, 4, 6, 7, 8, 9
Hooded oriole	*Icterus cucullatus*	None	6, 7, 8, 9
Northern oriole	*Icterus galbula*	None	3, 9

Fringillidae (Finches)			
Purple finch	*Carpodacus purpureus*	None	6, 8, 9
House finch	*Carpodacus mexicanus*	None	3, 6, 9
Lesser goldfinch	*Carduelis psaltria*	None	3, 6
American goldfinch	*Carduelis lawrencei*	None	3, 9
Passeridae (Old World Sparrows)			
House sparrow	*Passer domesticus*	Non-native	3, 6, 7, 8, 9

Special Status Codes

FE = Federally Endangered Species
FT = Federally Threatened Species
FSS = U.S. Forest Service Sensitive Species
SE = State Endangered Species
CSC = California Species of Special Concern
SFP = California State Fully Protected Species

Habitat Codes

1 = Lacustrine
2 = Riverine
3 = Palustrine
4 = Estuarine
5 = Marine
6 = Grassland
7 = Scrub
8 = Chaparral
9 = Woodland
10 = Sand Dunes

MAMMALS

Forty species of mammals were recorded in the study area during field surveys and in museum records (Service 2000, Hunt and Lehman 1992). Twelve of these are rodents. Based on geographic range and appropriate habitat, an additional eight species could be present in the study area but have not been documented. No endangered or threatened mammal species were encountered or known to occur within the study area. However, the following California species of special concern have been documented within the study area: Yuma myotis (*Myotis yumansis*), pallid bat (*Antrozous pallidus*), and western mastiff bat (*Eumops perotis californicus*). The ring-tail cat (*Bassariscus astutus*), a California state fully protected species, has also been documented within the study area (Service 2000). Locally occurring bats are aerial insectivores that feed over or close to streams and lakes. Roosting areas for these species include rock crevices in bluffs, trees, bridges, and other human-made structures, such as those that exist within the study area. Hunt and Lehman (1992) discovered a large bat roost used by several species beneath the Main Street Bridge. This roost is the largest known to date on the coastal slope of Santa Barbara and Ventura Counties, although the regional distribution of bats in this area is poorly known. Most of the collection records for bats in the vicinity of the Ventura River are dated from between 1905 and 1950 (Hunt and Lehman 1992). The scarcity of more recent records may be due to a lack of recent field work coupled with regional declines in many bat populations.

Six species of mammals that occur within the study area are listed in the California hunting regulations, with seasons and bag limits set by the State Fish and Game Commission. Black bear (*Euarctos americanus*) and mule deer (*Odocoileus hemionus*) are regulated animals; Audubon's cottontail (*Sylvilagus audubonii*) is a resident small game animal; the gray fox (*Urocyon cinereoargenteus*) and raccoon (*Procyon lotor*) are furbearing mammals; and the bobcat (*Lynx rufus*) is a regulated nongame animal.

Southern California saltmarsh shrew (*Sorex ornatus salicornicus*)
The southern California saltmarsh shrew is California species of special concern. This species ranges from Ventura County to Orange County. Nothing is known about the status of the southern California saltmarsh shrew. Habitat destruction is the primary cause for this native shrew's decline. This species has not been documented within the study area; however, it probably occurs in estuarine and palustrine habitats adjacent to the Ventura River mouth within the study area.

Western mastiff bat (*Eumops perotis californicus*)
The western mastiff bat is a California species of special concern. This large bat is an uncommon inhabitant of scrub and open woodlands from San Francisco Bay south through Baja California and mainland Mexico. Incidental information suggests that this species has undergone significant declines in recent years (Williams 1986). Reasons for their decline are only conjecture. Extensive loss of habitat because of urbanization of coastal basins, marsh drainage, and cultivation of major foraging areas are likely factors in the decline. Widespread use of insecticides may have also reduced insect abundance and also poisoned some bats (Williams 1986).

Old collection records include the Ventura River near Weldon Canyon (LACM Number 30253). Old museum records are not indicative of their continued presence in this area because of regional declines. Western mastiff bats prefer roosting habitat that includes caves and large clefts in vertical rock walls; however, they may also use structures (such as the Main Street Bridge) on a short-term basis if the crevices are large enough (Hunt and Lehman 1992).

Townsend's big-eared bat (*Plecotus townsendii*)
The Townsend's big-eared bat is a California species of special concern. This bat is found in scrub and woodland habitats throughout the Pacific States, but details of its distribution are not well known. Once considered common, the Townsend's big-eared bat is now considered uncommon in California (Zeiner *et al.* 1990). Habitat for these bats must include appropriate roosting, maternity, and hibernacula sites free from disturbance by humans. A single visit by humans can cause the bats to abandon a roost (Williams 1986).

A colony of Townsend's big-eared bat exceeding 100 individuals occurs along Santa Cruz Island (Hunt and Lehman 1992). This species probably forages over the study area, but no roosting habitat is available on-site (barns or other buildings). No Townsend's big-eared bats have been recorded within the study area.

Ringtail (*Bassariscus astutus*)
The ringtail is a California state fully protected species. This secretive, nocturnal species in the procyonid family typically inhabits woodland and adjacent scrub habitats on rocky slopes near a permanent water source. Locally, individuals are found throughout the Santa Ynez and San Rafael Mountains. Its habitat requirements are den sites among boulders or in hollow trees and sufficient food in the form of rodents and other small animals. Urbanization, loss and degradation of riparian communities have depleted and extirpated some populations of ringtail (Williams 1986).

The ringtail has been collected within the study area at Matilija (Museum of Vertebrate Zoology (MVZ) number 3957-58) and Highway 33 at mile marker 32.5 (Santa Barbara Natural History Museum (SBNHM) number 2255).

American badger (*Taxidea taxus*)
The American badger is California species of special concern. This large, carnivorous mustelid is widely distributed throughout California in arid grasslands and scrub habitats containing friable soils and relatively open, uncultivated ground where it preys primarily on rodents. Most populations in southern California lowlands have extirpated through direct killing and urban and agricultural expansion.

American badger burrows were observed in the Ventura River floodplain approximately 2 miles upstream from the Main Street Bridge (Hunt and Lehman 1992). Additionally, two American badgers were collected in 1985 at the Casitas Municipal Water District plant at Oak View (SBNHM numbers 2286-2287).

Table 4. **Known and Potentially occurring Mammals within the Study Area**

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Soridae (shrews and moles)			
Broad-footed mole	*Scapanus latimanus*	None	3, 4, 6, 7, 8, 9
So. CA. Saltmarsh shrew*	*Sorex ornatus salicornicus*	CSC	3, 4
Desert shrew*	*Notiosorex crawfordi*	None	7
Vespertilionidae (mouse-eared bats)			
Pallid bat	*Antrozous pallidus*	CSC	3, 4, 6, 8, 9
Big brown bat	*Eptesicus fuscus*	None	3, 4, 6, 8, 9
Yuma myotis	*Myotis yumanensis*	CSC	3, 4, 6, 8, 9
Fringed myotis*	*Myotis thysanodes*	None	3, 4, 6, 8, 9
California myotis	*Myotis californicus*	None	7, 8, 9
Silver-haired bat*	*Lasionycteris noctivagans*	None	2, 3, 9
Western pipistrelle*	*Pipistrellus hesperus*	None	2, 3, 6, 7, 9
Hoary bat	*Lasiurus cinereus*	None	3, 4, 6, 8, 9
Red bat*	*Lasiurus borealis*	None	3, 4, 6, 8, 9
Townsend's big-eared bat*	*Plecotus townsendii*	CSC	7, 8, 9
Long-eared myotis	*Myotis evotis*	None	3, 4, 6, 8, 9
Molossidae (free-tailed bats)			
Mexican freetail bat*	*Tadarida brasiliensis*	None	3, 4, 6, 8, 9
Western mastiff bat	*Eumops perotis californicus*	CSC	3, 4, 6, 8, 9
Leporidae (rabbits)			
Brush rabbit	*Sylvilagus bachmani*	None	7, 8
Audubon cottontail*	*Sylvilagus audubonii*	None	7, 8
Sciuridae (squirrels and relatives)			
Merriam's chipmunk	*Tamias merriami*	None	7, 8, 9
California ground squirrel	*Spermophilus beecheyi*	None	3, 6, 7, 8, 9

Western gray squirrel	*Sciurus griseus*	None	9
Fox squirrel	*Sciurus niger*	Non-native	9

Table 4. Known and Potentially occurring Mammals within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Geomyidae (gophers)			
Botta's pocket gopher	*Tamias merriami*	None	3, 6, 7, 8, 9
Heteromyidae (kangaroo rats)			
Pacific kangaroo rat	*Dipodomys agilis*	None	6, 7, 10
Cricetidae (mice, woodrats, and voles)			
Western harvest mouse	*Reithrodontomys megalotis*	None	6, 7
California mouse	*Peromyscus californicus*	None	3, 4, 7, 8, 9
Deer mouse	*Peromyscus maniculatus*	None	3, 9, 10
Dusky-footed woodrat	*Neotoma fuscipes*	None	8
Brush mouse	*Peromyscus boylii*	None	3, 7, 8, 9
California vole	*Microtus californicus*	None	3, 4, 6
Muskrat	*Ondatra zibethicus*	Non-native	1, 2, 3
Muirdae (rats)			
Black rat	*Rattus rattus*	Non-native	4
House mouse	*Mus musculus*	Non-native	3, 4, 10
Canidae (foxes and coyotes)			
Coyote	*Canis latrans*	None	3, 4, 6, 7, 8, 9, 10
Gray fox	*Urocyon cinereogenteus*	None	3, 4, 6, 7, 8, 9, 10
Red fox	*Vulpes vulpes*	Non-native	3, 4, 6, 7, 8, 9, 10
Domestic dog	*Canis familiaris*	Non-native	3, 4, 6, 7, 8, 9, 10
Ursidae (bears)			
Black bear	*Ursus americanus*	None	3, 6, 7, 8, 9

Procyonidae (raccoon and ringtail)			
Ringtail	*Bassariscus astutus*	SFP	7, 8, 9
Raccoon	*Procyon lotor*	None	3, 4, 6, 7, 8, 9
Mustelidae (weasels and relatives)			
Long-tailed weasel*	*Mustela frenata*	None	6, 7
American badger	*Taxidea taxus*	CSC	6, 7

Table 4. Known and Potentially occurring Mammals within the Study Area (Continued)

Species		Special Status	Habitat
Common Name	**Scientific Name**		
Western spotted skunk	*Spilogale gracilis*	None	7, 8, 9
Striped skunk	*Mephitis mephitis*	None	3, 4, 6, 7, 8, 9
Felidae (cats)			
Mountain lion	*Felis concolor*	None	3, 6, 7, 8, 9
Bobcat	*Felis rufous*	None	3, 6, 7, 8, 9
Domestic cat	*Felis catus*	Non-native	3, 4, 6, 7, 8, 9
Cervidae (elk and deer)			
Mule deer	*Odocoileus hemionus*	None	3, 6, 7, 8, 9

*Denotes Potentially occurring Species

Special Status Codes

CSC = California Species of Special Concern
SFP = California State Fully Protected Species

Habitat Codes

1 = Lacustrine
2 = Riverine
3 = Palustrine
4 = Estuarine
5 = Marine
6 = Grassland
7 = Scrub
8 = Chaparral
9 = Woodland
10 = Sand Dunes

Analysis

The study area consists of a diverse mixture of habitats, as previously described. In particular, the willow-cottonwood riparian, riverine, estuarine, and oak woodland habitats have high value to a variety of resident and migratory wildlife. Some of these species are endangered, threatened, or otherwise sensitive and could be affected by the implementation of proposed alternative.

Alternatives 1, 2, and 3 would likely result in both short- and long-term effects within the study area. Examples of short-term direct impacts to wildlife are mortality, displacement, and disturbance during project implementation. Although these effects are likely to occur under Alternatives 1 through 3, the scope of these effects are difficult to quantify. Additional indirect short-term effects to terrestrial and aquatic habitats include temporary degradation with large quantities of sediment, litter, vehicular pollutants, dust, and noise. Long-term direct impacts would vary by alternative implementation. Regardless of which alternative is implemented, there will be adverse effects to wildlife, such as disease, injury, abandonment, and mortality.

Alternative 1. Under Alternative 1, we expect negative impacts to the area within the reservoir and surrounding wetlands as well as upstream riparian areas. Beneficial effects of this alternative are discussed on page 45.

We anticipate the following short-term effects:

- Mortality and injury from being crushed by earth moving equipment, demolition debris, and worker foot traffic.

- Work activities, including noise and vibration, may harass wildlife by causing individuals to leave the work area. This disturbance may increase the potential for predation and desiccation for aquatic species.

- Aquatic species may be entrained by pump intakes, if such devices are used to dry out work areas.

- Some potential also exists for disturbance of habitat to cause the spread or establishment of non-native invasive species, such as giant reed (*Arundo donax*) or salt cedar (*Tamarix* spp.).

- Native aquatic species may sustain harassment and mortality from predators. If water that is impounded during or after work activities creates favorable habitat for non-native predators, such as bullfrogs, crayfish, and centrarchid fishes, native aquatic species may suffer abnormally high rates of predation. Additionally, any time frogs or fish are concentrated in a small area at unusually high densities, native predators such as herons, egrets, opossums, and raccoons may feed on them opportunistically.

- Trash left during or after project activities could attract predators to work sites, which could, in turn, harass or prey on aquatic species. For example, raccoons are attracted to trash and also prey opportunistically on frogs or fish.

- Accidental spills of hazardous materials or careless fueling or oiling of vehicles or equipment could degrade water quality or upland habitat to a degree where the wildlife is adversely affected or killed.

- Work in live streams or in floodplains could cause unusually high levels of siltation downstream. This siltation could smother eggs and larvae of aquatic species and alter the quality of the habitat to the extent that use by individuals of the species is precluded.

- The potential exists for uninformed workers to intentionally or unintentionally harass, injure, harm, or kill wildlife.

Long-term effects include a reduction in the diversity of organisms that prefer the lacustrine habitat of the reservoir as a result of direct habitat loss. The stabilization of sediments above the dam will cover species of cattails and sedge that will be eventually replaced by riparian or upland vegetation. California red-legged frogs are known to occur in the riverine and palustrine habitat within the influence of the Matilija Reservoir that will be used for sediment stabilization. Also, duck populations that rely on cattail and sedge habitat will be negatively impacted from the loss of habitat. On the other hand, the implementation Alternative 1 may reduce the short-term increase in downstream turbidity and water quality problems. Stabilizing fine silt and sand sediments above the dam will not allow this sediment to become re-suspended into free-flowing river.

Alternative 2. Short-term effects under this alternative would be the same as those described above in Alternative 1. Long-term effects of Alternative 2 would vary depending on the size of storm events that would carry the sediments downstream. Under this alternative, the pulse of sediment released from behind the dam would be transported downstream, resulting in scouring of riverine, and palustrine habitats.

The influx of sediments into stream flow could damage spawning grounds for southern steelhead, and negatively impact water, habitat, and food quality. The sediment pulse may partially or completely fill channels, resulting in temporary or permanent changes to the channel course. Sudden changes in channel course and fluctuations in river bed elevation often leave behind terrace deposits that may persist long enough for vegetation colonization (Shafroth *et al.* 2002). In addition to creating new alluvial surfaces, sediment deposition downstream of the removed dam could bury existing vegetation. For the Alternative 2 one-notch option, re-suspended sediment from the dam removal process will have a temporary effect on the river. Following dam removal and depending on the time of removal and amount of rainfall, sediments should be flushed out of the river channels and natural sediment transport conditions will resume. Fine sediment concentrations would be low during periods of low flow and high during flood flows that erode channels in the reservoir area. Within 2 to 5 years, concentrations should return to natural levels. We predict with the multi-notch scheme a re-occurrence of negative impacts, only at a smaller scale, each time a notch is removed from the dam. In addition, short-term effects described above would re-occur each time a notch is removed. The advantage of the single-notch scheme will be speed of removal and overall cost. Potentially, the dam could be deconstructed in a single season.

Alternative 3. This alternative involves the use of mechanical transport to remove sediment stored behind the dam. This alternative would be used in conjunction with Alternative 2, one-notch scheme. The removal of sediment by mechanical means would eliminate downstream habitat degradation and water quality issues.

Short-term effects would be the same as those described in Alternative 1. Additional short-term concerns with this approach would be the routing of slurry lines through sensitive habitats such as riverine and palustrine. Constructing a system of slurry lines downstream of the dam would call for the use of heavy equipment and increased human traffic through sensitive resource areas in the Ventura River. The use of trucks would increase noise and air pollution in the project area. The use of mechanical equipment runs the risk of toxic chemical releases into the habitats through accidental spill. Noise from the slurry line itself could possibly disturb wildlife depending on the selected route for the slurry line. This alternative requires a high demand for natural water to keep the slurry operational. Imported water could introduce additional exotic species from local water sources (*i.e.*, Lake Casitas). Spillage from slurry lines into sensitive habitats could adversely affect vegetation by erosion or contamination of sediment laden slurry. Impacts to native vegetation could be minimized by revegetating impacted areas once the slurry lines are removed.

Beneficial Effects of Alternatives 1-3

Overall long-term benefits of removing the Matilija Dam include re-opening approximately 16 miles of prime steelhead spawning habitat not now available. The accessibility of this additional habitat would result in a net gain of spawning habitat even with a temporary loss or degradation of spawning habitat in the lower river. Eventually, a natural free-flowing river would result in normal sediment deposition downstream that could lead to better habitat for sensitive species such as the southwestern willow flycatcher, least Bell's vireo, western snowy plover, and even the arroyo toad. The Service believes that the proposed Matilija Dam removal project presents an important opportunity to restore listed species in the Ventura River watershed, and thereby contribute to the recovery of these listed species.

Furthermore, case studies of dam removals reveal marked changes in community structure in formerly impounded river reaches (Dolphin 2003). Typically, this involves the reduction of species adapted to still-water conditions such as carp, pollution-tolerant macroinvertebrates and some aquatic plants (Kanehl *et al.*, 1997). It is generally assumed that waterfowl and raptors also will become less common, although one case study (Edwards Dam Removal) found that bald eagle abundance in the formerly impounded reach actually increased (American Rivers 2003). Offsetting these losses, fish and wildlife diversity in formerly impounded reaches has been shown to dramatically increase, and this increase has come about because of recolonization by species that prefer clean, flowing water (Kanehl *et al.*, 1997). This probably results from changes in the nature of instream habitat such as increases in rocky substrates, fish cover, and the formation of pools and riffles.

Alternative 4. Under this alternative, the no project alternative, the opportunity for southern steelhead to use habitats above the dam would continue to be prohibited. The dam would continue to disrupt river connectivity and block passage both-up and downstream for migrating fish and other wildlife. In addition, leaving the dam in place would continue to limit the amount of sediments deposited downstream, creating an adverse effect on downstream aquatic species and their habitats. Because the dam forces sediments to settle to the bottom of the reservoir, the waters that eventually pass over the dam are sediment starved. Downstream of the dam, the sediment starved Ventura River regains sediment lost behind the dam by eroding deeper into the river channel and away at stream banks. Consequently, the river channel has become coarse, encouraging stream bank erosion and the disappearance of important riffles for southern steelhead spawning. Additionally, by 2010, lacustrine habitats would fill with sediment eliminating habitat for the California red-legged frog that occur within the study area. Finally, because rivers transport much of the sediments that create coastal habitats, impounding the
Ventura River and its sediment will continue to exacerbate the loss of shoreline habitats in Ventura County that depends on continued sediment transport.

Discussions and Conclusions

The study area and its restoration are complex, and any effort to rehabilitate the Ventura River system needs to be based on a sound understanding of the ecological benefits and drawbacks of the dam removal alternatives. The Matilija Dam disrupts the natural river course and flow, redirects river channels, transforms the floodplain and disrupts river continuity. Dam removal can enable the return of native species by restoring riverine and palustrine habitats on which native species depend. Dam removal should displace warm-water non-native species such as bass and carp that prefer a lake-like environment, while promoting the recovery of fish populations that prefer colder-water rivers, such as southern steelhead.

Sediment transport in a river is vital to riparian and riverine habitats and species. Most free-flowing rivers are characterized by wide fluctuations in flow, which affect sediment transport and creates unique and diverse habitats for species. Large flows should serve to erode small, nutrient rich sediments from a river and its shoreline, depositing this material downstream and in the Ventura River Estuary. These same flows should transport and redistribute larger sediments and boulders, creating new and more diverse habitats for feeding, spawning, and breeding of aquatic and riparian species.

Most of the impact of dam removal under alternatives 1 through 3 will occur at the dam itself and within a few miles downstream of the dam. Degree of impact and type of impact will depend on which alternative is implemented. Although most of the impacts will occur in these areas, the entire study area will be affected. Areas of special concern include those areas where listed species occur such the least Bell's vireo, southern steelhead, tidewater goby, California least tern, western snowy plover, and California red-legged frog.

Aquatic species are more vulnerable than terrestrial species to the impacts from each of the alternatives, as most of the short-term and long-term effects are to the aquatic habitat. For aquatic species such as southern steelhead, tidewater goby, and California red-legged frog, the permanent stabilization under Alternative 1, would have a minimal effect on aquatic species. Under this alternative, water quality degradation would be minimized as would adverse effects to aquatic species. However, the location designated for sediment stabilization is occupied by the California red-legged frog. By consulting with the Service and implementing a relocation plan, adverse effects to the California red-legged frog can be minimized. Certain terrestrial species, such as least Bell's vireo, California least tern, and the western snowy plover, will remain un-affected by this alternative.
Alternative 2 one-notch scenario could have a devastating short-term effect to aquatic and terrestrial species depending on the size and duration of a storm event. A large storm event could wipe out all downstream habitat with the sediment stored behind the dam. Smaller storm events would have the same effect only at a smaller scale. The long-term effect could be beneficial to aquatic species and terrestrial species alike by allowing rehabilitation process to begin sooner. In addition, sediment starved habitat and beaches will be re-nourished providing better habitat for species that inhabit those areas.

Alternative 3 would also minimize effects to aquatic species by reducing the amount of sedimentation in aquatic habitats. The biggest drawback with this alternative would be spillage of slurry into aquatic habitats. California red-legged frog habitat above the dam would be permanently disturbed as a result of dam removal and reducing the streambed gradient. As with the permanent stabilization option under Alternative 1, water quality degradation would be minimized as would adverse effects to aquatic species. Terrestrial species under this alternative could be adversely affected by the direct placement of slurry lines into sensitive habitat. Slurry from this alternative could used to replenish coastal beaches.

Alternative 1 temporary stabilization, alternative 2 one - and multi - notch, and alternative 3 would all eventually restore the natural river processes and replenish sediment starved areas to historical conditions. With each of these alternatives, consideration should be given to reintroducing California red-legged frogs and introducing arroyo toads in suitable habitat.

The planning effort for this project is considerably advanced and is not yet complete. Additional analysis on project alternatives and mitigation measures needs to be completed before a final evaluation of the project can be made. The Service believes that the analysis conducted thus far indicates that the various effects to wildlife that have been identified to date can be effectively addressed and that the net long-term benefits to wildlife in the Ventura River will be substantial.

Because federally listed species will be affected by any of the proposed alternatives, the Corps should consult with the Service pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.)*. Informal consultation or conferences may be conducted to exchange information and to resolve conflicts with respect to listed species prior to a written request for formal Section 7 consultation. A federal agency is required to confer with the Service on any action that is likely to jeopardize the continued existence of any species proposed for federal listing. Conferences are intended to identify and resolve potential conflicts between an action and a listed species at an early point in the planning process.

Recommendations

In the event that the Matilija Dam Removal Project proceeds, we propose the following recommendations that may benefit fish and wildlife resources:

- Continued surveys for least Bell's vireo and southwestern willow flycatcher should be conducted in the present study area.
- To avoid impacts to nesting birds, a monitoring program for such activity should be developed in the project area, particularly in the vicinity of reservoir.
- Surveys for bats should be conducted in the vicinity of the dam.
- An Arundo eradication project should be initiated prior to initiation of a dam removal alternative. Tamarisk and other non-native invasive plants encountered should also be removed. Measures to prevent the spread or introduction of these species, such as avoiding areas with established native vegetation, restoring disturbed areas with native species, and post-project monitoring and control of exotic species should be developed.
- An intensive eradication program for bullfrogs, crayfish, and green sunfish should be completed prior to initiation of a dam removal project both within the reservoir and downstream of the dam. Eradicating these species from the reservoir prior to dam removal will prevent any downstream relocation. Downstream eradication of non-native species may result in lower mortality to native species.
- A relocation plan for the California red-legged frog, southwestern pond turtle, coastal whiptail, two-striped garter snake, and other special status species should be developed and initiated prior to initiation of a dam removal project. Other native species should also be considered for possible relocation out of the project area.
- Revegetation and stream restoration programs should be developed prior to the start of any

dam removal activities. A native plant nursery should be developed at or near the project site to provide a source of plants and trees for revegetation. Cultivation of locally native tree species should be initiated as soon as possible to help incorporate multiple age class forests in the revegetation plan.

- A wildlife care facility should be contracted to treat sick, injured, or orphaned animals found in the study area.

- A reintroduction program for arroyo toad and California red-legged frog into the study area should be evaluated.

- There should be no net loss of in-kind natural habitat.

- Mortality and injury to species within the project site could be reduced by minimizing and clearly demarcating the boundaries of the project areas and equipment access routes and locating staging areas outside of sensitive areas.

- Avoiding work activities during the breeding season would reduce adverse impacts to sensitive species.

- Improper handling, containment, or transport of individual species should be reduced or prevented by use of qualified biologists.

- The creation of nuisance ponds in the project area that may render native species vulnerable to predatory species should be avoided.

- Project workers should be informed of the importance of keeping the project site free of trash to avoid attracting predators to the project site which could harass or prey on aquatic species.

- Project workers should be informed of the importance of preventing hazardous materials from entering the environment. Locating staging and fueling areas a minimum of 65 feet from riparian areas or other water bodies, and by having an effective spill response plan in place could reduce harmful effects and mortality to wildlife.

- Best management practices should be implemented and the area to be disturbed should be reduced to the minimum necessary to assist in reducing the amount of sediment that is washed downstream as a result of project activities.

- Project workers should be informed of the presence of species and the measures that are being implemented to protect them during project activities.

In the event that the project proceeds forward with an alternative that releases sediments downstream of the dam, the following additional recommendation is also offered:

- Monitoring of benthic invertebrates, amphibians, reptiles, fishes, birds, vegetation, and wetlands should be considered downstream of the dam in Matilija Creek, Ventura River, and Ventura River Estuary.

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APPENDIX B.2

COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2943 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
PAS 698.746.1655

June 2, 2004

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

Subject: Draft Coordination Act Report, Matilija Dam Removal Project, Ventura County, California

Dear Ms. Villalobos:

Enclosed is the draft Coordination Act Report by the U.S. Fish and Wildlife Service for the Matilija Dam Removal Project. This work product is provided under Military Interdepartmental Purchase Request (MIPR) number W81EYN12572757 and the Scope of Work dated September 2001.

If you have any questions, please call Chris Dellith of my staff at (805) 644-1766.

Sincerely,

Carl T. Benz
Assistant Field Supervisor
South Coast/Deserts

Enclosure

cc: Mark Capelli, National Oceanic Atmospheric Administration Fisheries
Martin Potter, California Department of Fish and Game
Maurice Cardenas, California Department of Fish and Game
Pam Lindsey, Ventura Watershed Protection District
Rey Farve, U.S. Army Corps of Engineers
Stan Glowacki, National Oceanic Atmospheric Administration Fisheries

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

Matilija Dam Ecosystem Restoration Feasibility Study
Ventura County, California

Prepared for the

U.S. Army Corps of Engineers
Los Angeles District

by the

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, California

Diane Noda, Field Supervisor
Rick Farris, Division Chief, Santa Barbara/Ventura/Los Angeles
Chris Dellith, Author and Project Biologist

June 2004

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INTRODUCTION

This document constitutes the Fish and Wildlife Coordination Act Report (Report) in fulfillment of the scope of work number W81EYN12572757 dated February 6, 2003, between the U.S. Fish and Wildlife Service (Service) and the U.S. Army Corps of Engineers (Corps) regarding the ecosystem restoration feasibility study of the Matilija Dam in Ventura County. This report has been prepared in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C.661 *et seq.*) and other authorities. The purpose of the FWCA is to provide for equal consideration of fish and wildlife conservation with other features of federally funded or permitted water resource development projects. Pursuant to the FWCA, the Service has coordinated with the National Oceanic and Atmospheric Administration (NOAA) and the California Department of Fish and Game (CDFG) before providing these comments. The Corps directed the Service in the Fiscal Year 2003 Scope of Work to consider the study area to be the Matilija Reservoir and the area 2.5 miles upstream of the reservoir, and the Matilija Creek and Ventura River flood plain downstream to the Ventura Estuary. This area encompasses approximately 1,940 acres. The proposed project area is a subset of the study area and includes the Matilija Dam and Reservoir.

Our analysis of this project and the recommendations provided herein are based on information provided in: 1) the supplemental scope of work for the Matilija Dam ecosystem restoration feasibility study (Corps 2003); 2) fieldwork done by representatives of the Service (Service 2000); 3) various scientific papers, technical reports, memoranda, and letters (see literature cited); 4) information contained in the Service's files and library; 5) interviews with other biological experts and study area landowners; and 6) the Service's best collective professional judgment.

This report provides: 1) a description of the public fish and wildlife resources within the proposed project area and environs by providing a characterization, to date, of the existing biological environment within the proposed study area; 2) a listing of observed and possible listed, candidate, proposed, and sensitive flora and fauna within the proposed project area; 3) an analysis of the Full Dam Removal/Temporary Stabilization Alternative 4b and its effects on biological resources of the project area; and 4) our recommendations regarding Alternative 4b.

The Matilija Dam was constructed in the late 1940's by the Ventura County Flood Control District to provide water storage for agricultural needs. The dam is located on Matilija Creek, a tributary of the Ventura River, approximately 16 miles upstream from the Pacific Ocean. Silty material carried by Matilija Creek has been deposited behind the dam, filling the reservoir with sediment, along with notching of the dam, and rendering the structure relatively useless as a water storage facility. Furthermore, as a result of the sedimentation, the dam no longer provides attenuation of even moderate flood flows. However, some continued water supply use remains. The Casitas Municipal Water District currently operates the dam. The operation contributes approximately 400 acre-feet of water per year to the Robles/Casitas Reservoir water supply facilities.

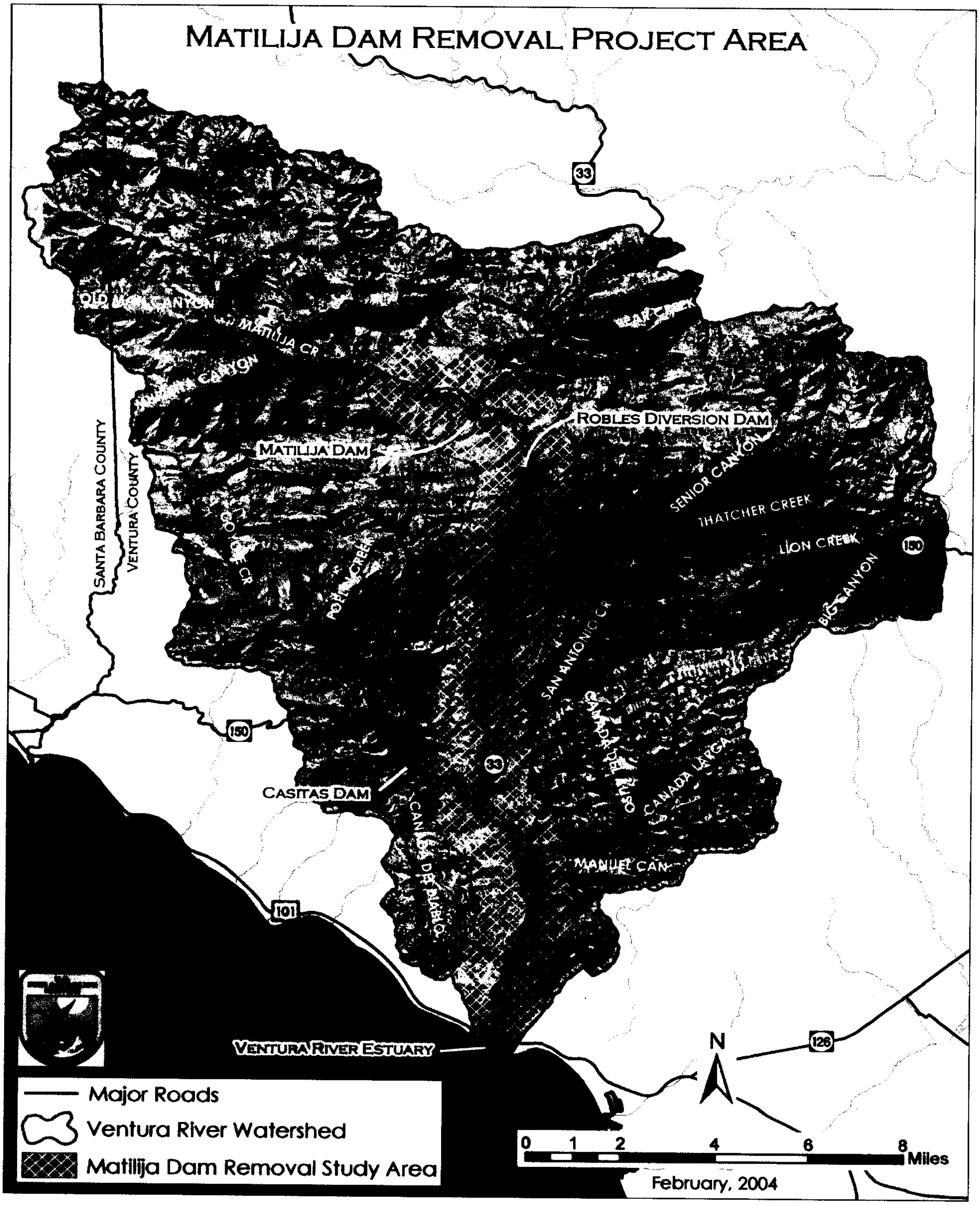

Figure 1. Matilija Dam Removal Project Area

The ability of the operation to provide water is projected to diminish rapidly as the reservoir continues to fill with sediments, and is expected to cease by 2010 after the reservoir fills completely with sediment. The Corps conducted a feasibility study to investigate reasonable alternatives to restore Matilija Creek and the Ventura River by removing Matilija Dam. To do so, the Corps convened a variety of subgroups to work on different aspects of the dam removal and habitat restoration. These subgroups include: an Executive Committee, a Steering Committee, a Public Outreach Group, an Environmental Working Group, a Technical Studies Working Group, Lobbying and Legislative Group, Public Access and Recreation Group, and a Plan Formulation Group. These groups are comprised of Federal, State, and local agencies, as well as non-governmental organizations. The two groups discussed in this report are the Environmental Working Group and Plan Formulation Group. The Plan Formulation Group works closely with all of the other feasibility study and Steering Committee groups to coordinate the formulation and evaluation of alternative plans. The Environmental Working Group works closely with the Public Outreach Group to collaborate and avoid duplication of efforts and coordinates all environmental fieldwork associated with the feasibility study and resource agency coordination.

DESCRIPTION OF THE PROJECT AREA

The climate of coastal southern California is characterized by warm, dry summers and cool, relatively wet winters. Typical winter temperatures range from 40 to 60 degrees Fahrenheit, while 65 to 95 degrees Fahrenheit can be expected during the summer months. Precipitation consists almost entirely of winter rainfall, averaging about 15 inches per year in the area.

The study area is located on the Ventura River and Matilija Creek, near the town of Ojai, in Ventura County. Matilija Dam is located on Matilija Creek, which flows downstream of the dam for approximately 0.6 mile before it joins with the north fork of Matilija Creek and forms the main stem Ventura River. Creek flows through a steep sided canyon with a narrow floodplain and riparian zone. The Ventura River flows through several constricting areas interspersed with wider floodplain areas (although never wider than 0.5 mile). The canyon areas consist of chaparral vegetation communities on the lower slopes and Jeffrey pine on the mountain peaks. The creeks support riparian vegetation dominated by cottonwoods, willows, and other shrubby and herbaceous species. A few areas of native sycamore and alder riparian woodland are present within the riparian areas of the Ventura River and Matilija Creek. The Matilija Dam and Reservoir are surrounded by steep slopes with a chaparral plant community. The reservoir supports between 20 to 35 acres of riparian habitat and up to 50 acres of open water habitat. The dam is an impediment to the natural flow of Matilija Creek.

The Robles Diversion is operated by the Casitas Municipal Water District (District) and is located approximately 2 miles downstream from the dam. Currently, Robles Diversion is a complete barrier to Southern steelhead (*Oncorhynchus mykiss*) attempting to reach headwater spawning grounds, including habitat within Matilija Creek above Matilija Dam and in the Lower North Fork Matilija Creek (NOAA 2003). The Robles Diversion diverts surface water from the Ventura River to Casitas Reservoir. The District has been pursuing restoration of fish passage at the Robles Diversion through construction of fish passage facilities, including a fish screen, ladder, and monitoring station.

An underground dam was constructed between the confluence of Coyote Creek and the Ventura River approximately 7 miles upstream from the Ventura River estuary near Foster Park in 1908. This surface and subsurface facility is operated by the City of Ventura. Below the Robles Diversion, the county, and numerous other users, such as private landowners, divert water from the Ventura River System.

The Ventura River Estuary extends about 0.6 mile inland from the Pacific Ocean. The estuary provides a diverse mix of habitats such as freshwater marsh, salt marsh, and willow-scrub riparian. At least 59 special-status species may occur in the types of habitat found in the study area near the dam and reservoir or in downstream areas. This includes 14 listed species (federal or state) and 45 species of concern.

The habitat types described below are classified using Cowardin *et al.* (1979) for wetlands and broad physiognomic units for uplands. Cowardin *et al.* (1979) recognizes five major wetland types (*i.e.*, marine, estuarine, lacustrine, riverine, and palustrine) that differ with respect to hydrology, geomorphology, and chemical factors. Within each of these five major types, wetlands can be classified further according to hydrologic regime, substrate type, water chemistry, and vegetation. Habitat types present in the study area include all five of the major Cowardin *et al.* (1979) wetland systems, and four major upland vegetation types (grassland, scrub, chaparral, and woodland). The approximate aerial extent of the various habitat types within the project area are shown on Table 1.

Table 1. Acreages and Percentage of Total Area of Different Habitat Types Found in the Defined Study Area of the Matilija Dam Removal Project (Corps and Ventura County Flood Control District, 2002).

Habitat	**Study Area (acres)**	**% of Total**
Lacustrine System	27.8	1.43
Riverine System	276.0	14.23
Palustrine System	1,156.8	59.64
Estuarine System	14.9	0.77
Marine System	3.7	0.19
Grassland	128.5	6.63
Scrub	94.7	4.88
Chaparral	55.8	2.88
Woodland	133.3	6.87
Sand Dunes	7.9	0.41
Human-Influenced	40.1	2.07
Total	1,939.5	100

DESCRIPTION OF PREFERRED ALTERNATIVE

Originally, eight alternatives were explored by the Corps for this project, including a no-action plan (Service 2003). The Matilija Dam Ecosystem Restoration Feasibility Study screened restoration alternatives that were considered in the plan formulation process. Screening criteria included the preliminary identification of adverse impacts related to air quality, water quality, noise, habitat, and biological resources. The engineering feasibility of measures and costs, where available, were also considered. The screening process performed by the Plan Formulation Group was discussed at Environmental Working Group meetings throughout 2002, 2003, and into 2004. During these meetings, the Environmental Working Group analyzed the Plan Formulation Group's assessments on the proposed alternatives and agreed with the Plan Formulation Group to eliminate alternatives that did not meet the goals and objectives identified by the Environmental Working Group. The preferred alternative is described as follows:

Alternative 4b - Full Dam Removal/Temporary Sediment Stabilization on Site

The dam demolition process for Alternative 4b would be conducted in one phase. Alternative 4b (preferred alternative) would slurry the 'Reservoir Area' sediment (2.1 million cubic yards) to a designated downstream disposal site or to a number of sites and allow for removal of the dam. The remaining trapped sediment would be temporarily stabilized within the upstream channel and original reservoir basin limits.

For the removal of fine sediment by slurry operation, this alternative assumes for cost estimating purposes that the source of water would be Lake Casitas, utilizing a specially constructed 8-mile long pipeline. Slurried materials may be deposited at a 94-acre disposal site located approximately 0.5 miles downstream of Robles Diversion Dam on a floodplain terrace of the Ventura River. The site is on the east side of the river at the base of the bluff adjacent to Rice Road. A dike, with an average height of 20 feet, would be constructed to contain the slurried material. The 94-acre site has not been endorsed by the Plan Formulation Committee; however, it has been included in the Matilija Dam Feasibility Study Ecosystem Restoration, Alternatives Analysis Report F4 Milestone (2004) as an alternative, but not as the preferred alternative. The aspect of this project component remains unresolved at this time, it is expected that the disposal site for the slurried fines will be broken into a number of sites, rather than one large site.

The excavated channel through the reservoir site will be 100 feet in width to allow for a smaller meandering channel to naturally develop in the channel bottom between storm events. The channel 3:1 side slopes (horizontal to vertical) will be lined with soil cement up to 7 feet above the channel invert and 5 feet below to prevent undercutting of the structure. The soil cement revetment was designed to reduce erosion of the trapped sediments for the more frequent storm events (less than 10 years), thereby mitigating for potential increased downstream turbidity impacts that could affect Robles water diversion operations. In addition to reducing impacts on the Robles Diversion, the temporary stabilization of sediments in the reservoir site is intended to reduce impacts to other infra-structure such as bridges, levees, as well as overwhelming aquatic and riparian habitats with sediment deposition. Storm events greater than 12,500 cubic feet per second would erode the remainder of the trapped sediments over time, including the estimated 770,000 cubic yards of fines that are intermixed with larger grain-sized material. Material behind the revetment will periodically need to be graded to avoid undermining of the revetment and improve erosion potential. All soil cement revetment would be removed from the site following sufficient evacuation of stored sediment from within the original reservoir limits.

Locations for the sediment storage sites were selected to align the channel in a similar way to the 1947 pre-dam conditions, to minimize impacts to more sensitive habitat areas, and to ensure the natural aesthetics of the area were not adversely affected by the temporary stockpile of sediments. The design slopes for the storage sites are 4:1. No revegetation plans of the storage sites or channel are included in the preferred plan. It is assumed that the area will naturally revegetate after several years.

As part of the restoration effort, giant reed (*Arundo donax*) would be removed from the limits of the original reservoir basin prior to any earthmoving or dam deconstruction activity. Giant reed will also be removed from the channel of lower Matilija Creek and the Ventura River as part of the Matilija ecosystem restoration project. Areas where giant reed is removed would be treated with herbicide.

Following controlled blasting of the dam, the concrete rubble would be processed as required for transportation to a commercial concrete recycling plant, assumed to be Hanson Aggregates (approximately 28 miles from Matilija Dam). Metal debris would be hauled from the site and salvaged. Non-salvageable items would be hauled to the Toland landfill, 41 miles away, between Santa Paula and Fillmore.

Downstream flood control protection would include purchase of the Matilija Hot Springs facility, purchase and removal of structures and the bridge at Camino Cielo, and raising of the Santa Ana bridge, construction of new or raising existing levees and floodwalls at Meiners Oaks (up to 17 feet maximum above the river bank), Live Oaks and Casitas Springs (up to 13 feet maximum above the river bank) and Cañada Larga (up to 15 feet maximum above the river bank). The levee and floodwall at Meiners Oaks and extensions of the existing Live Oaks features would be new features.

Modifications for sedimentation impacts at Robles Diversion Dam would include the installation of a high flow sediment bypass (radial gates) structure to allow for evacuation of increased sediment loads at the facility sediment basin resulting from removal of Matilija Dam. In addition, NOAA Fisheries has indicates that this facility should be designed to allow the upstream passage of adult steelhead to widen the migratory window provided by the Robles Diversion Fish Passage Facilities. Modifications to the existing timber overflow weir structure at the facility would also be needed. Modifications at the City of Ventura water supply facilities at Foster Park to handle increased turbidity from suspended fines (silts and clays) would include the placement of two groundwater supply wells.

The Corps estimates that this alternative will require approximately 36 months to complete the slurrying operation of the project area sediment, removal of the dam, excavation of the channel, and construction of the soil cement revetment. While removal of the remaining trapped sediment will be variable and dependent upon the hydrology, it is assumed that within 20 years of initial earthmoving and deconstruction activities, the re-vegetation phase will be completed.

DESCRIPTION OF BIOLOGICAL RESOURCES IN THE PROJECT AREA

Plants

A total of 388 species of vascular plants from 82 families have been documented to date from the study area (David Magney Environmental Consulting 2002, CNDDB 2003, Ferren *et al.* 1990, Mertes *et al.* 1995). Most of the observed plants are common to the region and many in the study area are widely distributed. Listed, candidate, or otherwise sensitive plant species encountered during surveys or previously documented are described below. Potentially, some of the historically documented rare species in the Ventura River watershed could occur within the study area and are therefore included in the descriptions below. Taxonomy nomenclature is from Hickman (1993).

The California Native Plant Society (CNPS) has developed an inventory of rare and endangered vascular plants of California that contains several lists that are described below: 1) List 1A: Plants presumed extinct in California; 2) List 1B: Plants rare, threatened, or endangered in California and elsewhere; 3) List 2: Plants rare, threatened, or endangered in California, but more common elsewhere; 40 List 3: Plants about which we need more information - a review list; and 5) List 4: Plants of limited distribution - a watch list (CNPS 2001).

Mile's milk-vetch (*Astragalus didymocarpus* var. *milesianus*) is a CNPS List 1B species. This plant is found in coastal scrub. It has been reported in locations from Ventura to San Luis Obispo Counties. In Ventura County, a Mile's milk-vetch occurrence was documented in the CNDDB record for the Ojai area on an unknown date (CNDDB 2003). This species is threatened by development throughout its range. This plant is presumed extant within the study area by the CNDDB, but was not encountered during the latest field surveys.

Davidson's saltscale (*Atriplex serenana* var. *davidsonii*) is a CNPS List 1B species. This plant is found in coastal bluff scrub and coastal scrub habitats. The species is known from Baja California to Ventura County, including Santa Catalina, Santa Cruz and Santa Rosa islands and is believed to be extirpated from Los Angeles County. This plant has also been reported in Riverside County. In Ventura County, it was documented in Ojai near the Ojai Valley Country Club in 1971 (CNDDB 2003) and at the Ventura River Delta in 2002 (Cher Batchelor, Botanist, pers. com. 2003). This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Late-flowered mariposa lily (*Calochortus weedii* var. *vestus*) is a CNPS List 1B species. This plant is found in chaparral, cismontane woodland, and riparian woodland from Ventura to Monterey Counties. In Ventura County, it was documented north of Ojai in Pratt Canyon on Forest Service (USFS) Land in 1963 (CNDDB 2003). The species is threatened throughout its range by development and grazing. This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Ojai fritillary (*Fritillaria ojaiensis*) is a CNPS List 1B species. This plant is found in broad-leaved upland forest, chaparral, and lower montane coniferous forest from Ventura, Santa Barbara, and possibly San Luis Obispo Counties. In Ventura County, it was documented in Wheeler Gorge along Highway 33 and the North Fork Matilija Creek in 1988 (CNDDB 2003). The species is presumed extant within the study area, but was not encountered during the latest field surveys.

Sanford's arrowhead (*Sagittaria sanfordii*) is a CNPS List 1B species. This plant is found in marshes and assorted shallow freshwater. The species is extirpated from southern California, and mostly extirpated from the central Valley. In Ventura County, it was last documented in 1983 at Mirror Lake just east of the Ventura River in the Ojai Valley (CNDDB 2003). This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Salt spring checkerbloom (*Sidalcea neomexicana*) is a CNPS List 2 species. This plant is found in chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub and playas. In Ventura County, it was documented in 1962 approximately 8 miles downstream of the project site between Santa Ana Boulevard and San Antonio Creek Bridge in Oak View (CNDDB 2003). This plant is presumed extant within the study area, but was not encountered during the latest field surveys.

Invertebrates

A total of 79 families representing 23 orders of invertebrates were observed or captured during surveys of aquatic invertebrates within the study area (EDAW 1978). No listed, candidate, or sensitive forms are known to occur in the study area. Some of the orders of insects recorded during surveys include various damselflies and dragon flies (Odonta), mayflies (Ephemeroptera), water striders (Hemiptera), beetles (Coleoptera), syrphid flies (Diptera), stoneflies (Pleocoptera), and caddis flies (Trichoptera). Although data was not recorded for butterflies and moths (Lepidoptera), representatives of this order expected to occur within the study area include the following families: skippers (Hesperiidae), swallowtails (Papilionidae), cabbage butterflies (Pieridae), gossamer-winged butterflies (Lycaenidae), and brush-footed butterflies (Nymphalidae).

Other representatives of at least the following insect orders could also be reasonably expected to occur: Orthoptera (grasshoppers and allies), Dermaptera (earwigs), and Neuroptera (dobsonflies, lacewings, and allies). Insects are a part of the diverse riparian food web, as prey, predators, pollinators, water purifiers, grazers, soil reducers, and mosquito-control agents. The introduced red swamp crayfish (*Procambarus clarki*), and signal crayfish (*Pacifastacus leniusculus*) were also noted during surveys in the estuary and the main stem of the Ventura River.

In the spring of 2001, the Ventura County Watershed Protection District (County), developed a biological and physical/habitat assessment program within the Ventura River watershed. On September 24 through 26, 2001, the County conducted the first year sampling event which included benthic macroinvertebrate surveys. The data from this sampling event plus data gathered by EDAW (1978) was used to describe invertebrates of the study area. These two reports included data only for benthic macroinvertebrates. Research on invertebrates other than benthic macroinvertebrates within the study area is lacking and therefore not addressed in this report.

Fish

Nineteen fish species, both native and non-native, have been documented in previous surveys within the study area (Service 2000). Native freshwater species occurring in the study area include: southern steelhead, arroyo chub (*Gila orcutti*), Pacific lamprey (*Lampetra tridentata*), prickly sculpin (*Cottus asper*), California killifish (*Fundulus parvipinnis*), and partially-armored threespine stickleback (*Gasterosteus aculeatus microcephalus*). Non-native freshwater species occurring in the study area include: green sunfish (*Lepomis cyanellus*), redear sunfish (*Lepomis microlophus*), bluegill (*Lepomis macrochirus*), mosquitofish (*Gambusia affinis*), largemouth bass (*Micropterus salmoides*), common carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), and yellow bullhead catfish (*Ictalurus natalis*). The Ventura Estuary serves as an important primary and nursery habitat for several fish species. Native estuarine species include: tidewater goby (*Eucyclogobius newberryi*), topsmelt (*Atherinops affinis*), staghorn sculpin (*Leptocottus armatus*), and striped mullet (*Mugil cephalus*).

Southern steelhead (*Oncorhynchus mykiss*)
The Southern California ecologically significant unit (ESU) of steelhead was listed by the NOAA Fisheries as endangered on August 18, 1997, for naturally spawned populations of steelhead and their progeny residing below long-term impassible barriers. Steelhead, an ocean-going form of rainbow trout, is native to Pacific Coast streams from Alaska south to northwestern Mexico. Wild steelhead populations in California have decreased significantly from their historical levels. Extensive habitat loss due to water development, land use practices, and urbanization are largely responsible for the current population status.

Prior to the completion of Matilija Dam in 1947, CDFG personnel estimated that a minimum of 4,000 to 5,000 steelhead spawned in the Ventura River system in normal water years (NOAA 2003). Observations of small numbers of adult steelhead in the

Ventura River have continued to the present, including documented steelhead sightings in 1974, 1975, 1978, 1979, 1991, 1993, and 2001. Recent surveys have documented steelhead rearing habitat, as well as use of this habitat by juvenile fish, throughout the stretch of river between the Robles Diversion and the Ventura River estuary. A population of less than 200 adults is the most recent estimate of the Ventura River steelhead population (Busby *et al.* 1996). However, in light of the continued pressures exerted upon the population and the paucity of recent sightings in the drainage, NOAA Fisheries estimates the Ventura River steelhead population is likely less than 100 adult individuals at the current time (NOAA 2003).

Tidewater goby (*Eucyclogobius newberryi*)

The tidewater goby was listed by the Service as endangered on March 7, 1994. The tidewater goby, a member of the Gobiidae family, is the only species in the genus *Eucyclogobius*. It is a small fish, rarely exceeding 2 inches standard length, and is characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins. The tidewater goby is known to occur in the Ventura Estuary, but this population has not been studied well (Service 1997, Capelli 1997).

The tidewater goby historically occurred in at least 123 California coastal lagoons. This species is currently known to occur in 95 locations. Its decline can be attributed to upstream water diversions, pollution, siltation, and urban development on surrounding lands. These threats continue to affect the remaining populations of tidewater gobies. In addition, given the lack of a marine life history stage and the high level of fragmentation between existing populations, the probability for exchange between the populations and natural colonization of suitable habitat is low.

Arroyo chub (*Gila orcutti*)

The arroyo chub is a California species of special concern. This species was native to the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita Rivers and Malibu and San Juan Creeks. It has been successfully introduced far outside its native range, often with trout plants, into the Santa Clara, Ventura, Santa Ynez, Santa Maria, Cuyama and Mojave River drainages and Malibu, Arroyo Grande and Chorro Creeks. Introduced populations of this species are abundant in the above noted rivers. The species is now absent from much of its native range and is abundant only in the west fork of the San Gabriel River. The arroyo chub appears to prefer low gradient streams, concentrating in pools and backwaters. Populations have been observed within one mile upstream of the Main Street Bridge (Hunt and Lehman 1992).

Amphibians and Reptiles

Amphibians and reptiles were inventoried by intensively searching appropriate microhabitats throughout the study area during surveys conducted by the Service from November 26, 1999, through September 12, 2000. The surveys attempted to identify the value of habitats within the study area as well as the distribution of suitable microhabitats within them. Literature sources, museum records, and consultation with local experts were also used to compile an inventory and discuss potential and historical species occurrences.

Eleven species of amphibian and 24 species of reptile are known or reasonably expected to occur in the study area based on a literature and comparisons of known range, distribution, and apparently suitable habitat (Table 2). Because of the secretive nature and nocturnal and fossorial habits of many species, some species can go undetected during survey work. A total of five amphibian species were detected by the Service during surveys in 2000 (Table 2). Pacific chorus frog (*Pseudacris cadaverina*) and bullfrog (*Rana catesbeiana*) were the most abundant. California treefrog (*Pseudacris regilla*), California toad (*Bufo boreas halophilus*), and the federally threatened California red-legged frog (*Rana aurora draytonii*) were also present (Service 2000). All of these species except the bullfrog are native.

Bullfrog (*Rana catesbiana*)

Bullfrogs are common in the Ventura River, Matilija creek and reservoir. Typically, observers walking during the evening hours would record 40 bullfrogs in a 2-mile stretch of river. Most bullfrogs were observed in or along the deeper pools. One June 15, 2000, a nighttime boat survey of the Matilija Reservoir perimeter yielded a count of 144 bullfrogs, and a second nighttime boat survey of the reservoir on August 2, 2000, yielded a count of 89 bullfrogs. On September 12, 2000, approximately 200 recently metamorphed bullfrogs were observed in an algae-covered pool (approximately 144 square yards in area) in the delta area of Matilija Creek. Dozens of bullfrog tadpoles were also commonly observed during surveys of the Matilija creek areas (Service 2000).

California red-legged frog (*Rana aurora draytonii*)

On May 23, 1996, the Service published a final rule to list the California red-legged frog as threatened (61 *Federal Register* (FR) 25813). The California red-legged frog is one of two subspecies of the red-legged frog (*Rana aurora*) found on the Pacific coast. The historical range of the California red-legged frog extended from the vicinity of Point Reyes National Seashore, Marin County, California, coastally and from the vicinity of Redding, Shasta County, California, inland southward to northwestern Baja California, Mexico.

The Service conducted six protocol surveys in the project area for the California red-legged frog between April 28, 2000, and July 22, 2000. One California red-legged frog was observed on April 30 in Matilija Creek about 0.75 mile upstream of the dam. The observed individual was in a well-vegetated, 3.5 foot deep pool on the edge of a willow riparian scrub community. Although many habitats appeared suitable for presence of the California red-legged frog, we only detected one individual. This scarcity of California red-legged frogs may be attributable to the high densities of bullfrogs, red swamp crayfish, and/or largemouth bass in the study area. However, surveys by other researchers have found more California red-legged frogs in the vicinity of the study area. On September 30, 1999, students from the University of California at Santa Barbara found a recently metamorphed California red-legged frog along the banks of Matilija

Creek approximately 1.5 miles above Matilija Dam. On July 7, 2000, consultants monitoring a road repair site found a California red-legged frog along the banks of Matilija Creek approximately 3 miles above Matilija Dam (Service 2000).

Arroyo toad (*Bufo californicus*)
The southwestern arroyo toad (arroyo toad) was listed by the Service as endangered on December 16, 1994 (59 FR 241). The arroyo toad is small with dark spots and a pale patch between its eyes. This species is known from 22 river basins in the coastal and desert areas of 9 counties along the central and southern coast of California. Its range extends into northwestern Baja California, Mexico (Service 1999). Arroyo toads breed in stream channels and use stream terraces and surrounding uplands for foraging and wintering. Direct habitat loss due to urbanization, agriculture, and dam construction is the main cause for the decline of arroyo toads (Service 1999). Suitable habitat exists above the Matilija Dam and some marginal habitat exists in the vicinity of Foster Park. No records of arroyo toads exist from the Ventura River or Matilija Creek. In addition, habitat below the dam is sediment-starved, which prevents terraces from forming and renders the habitat unsuitable for the arroyo toad.

Western spadefoot toad (*Spea hammondii*)
Suitable habitat for the western spadefoot toad, a California species of special concern, occurs along the Ventura River in the Oak View area (Wehtje 2000). This species is endemic to California ranges from the vicinity of Redding, Shasta County, southward into northwestern Baja California, Mexico. The spadefoot toad occurs at elevations from near sea level to 4,471 feet above sea level. The known range of this species is entirely west of the Sierran-desert range axis (Myers 1944). Spadefoot toads breed in pools that form after heavy rains or in slow streams, springs, reservoirs, or irrigation ditches. Spadefoot toads spend dry periods in self-made burrows or those of gophers, squirrels, or kangaroo rats. An estimated 80 percent of spadefoot toad habitat has been lost from the Santa Clara River valley, Los Angeles County, Ventura County, and southward because of land development (Stebbins 2003). There are no known records of spadefoot toads existing in the Ventura River or Matilija Creek. Spadefoot toads may have been extirpated from the study area because of the presence of exotic predators (*e.g.*, bullfrog).

Reptiles surveys consisted of observers walking transects in wetland, riparian, and upland areas over approximately 15 field days. Southwestern pond turtles (*Clemmys marmorata pallida*), were also actively sought during snorkel surveys on July 28, 2000. A total of seven reptile species were detected (Table 2). Western fence lizards (*Sceloporus occidentalis*), side-blotched lizards (*Uta stansburiana*), and coastal whiptails (*Aspidoscelis tigris stejnegeri*) were the most common. The southern alligator lizard (*Elgaria multicarinata*), southwestern pond turtle, two-striped garter snake (*Thamnophis hammondii*), and southern Pacific rattlesnake (*Crotalus viridis helleri*) were also detected. All of these reptiles are native species (Service 2000).

Southwestern pond turtle (*Clemmys marmorata pallida*)
The southwestern pond turtle is considered a California species of special concern and protected species by CDFG, and is described as sensitive by the USFS and the Bureau of

Land Management (BLM). The southwestern pond turtle is found from sea level to approximately 6,600 feet, with the majority of populations below 4,300 feet in both permanent and intermittent aquatic habitats. Its distribution is fragmented by human activities, such as habitat alteration, grazing practices, recreational fishing, and introduction of exotic predators and competitors (Jennings and Hayes 1994). The species is thought to be in a general state of decline in an estimated 75 to 80 percent of its range. Southwestern pond turtles formerly occurred along all major river systems within their present range. They are usually found near the banks or quiet backwaters of streams where the current is relatively slow and basking sites and refugia are available. However, they appear to be uncommon in heavily shaded areas, being concentrated where openings in the streamside canopy allow sufficient sunlight to facilitate basking. They have also been noted in small ponds and vernal pools in California. Southwestern pond turtles may move distances up to several hundred yards from drying pools to adjacent creeks (Service 1993).

Approximately 20 southwestern pond turtles were observed in the study area, and tracks of another 20 or more individuals were observed during surveys. Sweet (2000) rated many of the habitats in the study area as excellent for this species. Temple (2000) reported that the number of pond turtles observed during each site visit in the study area dropped dramatically after the El Nino storms of 1997-1998.

California horned lizard (*Phrynosoma coronatum frontale*)
The California horned lizard is a California species of special concern. This native coastal subspecies is found in a variety of arid and mesic habitats such as coastal sand dunes, open scrub, and riparian habitats with friable soils (Hunt and Lehman 1992). The species ranges from Shasta County southward along the edges of the Sacramento Valley into much of the South Coast Ranges, San Joaquin Valley, and Sierra Nevada foothills to northern Los Angeles, Santa Barbara and Ventura Counties (Jennings and Hayes 1994). The specialized diet and habitat requirements, site fidelity, and cryptic defense behavior make this species highly vulnerable. Commercial collecting, and habitat loss due to agriculture and urbanization are the main reasons cited for the decline of this taxa. Most surviving populations inhabit upland sites with limited optimal habitat. Many of these sites are on marginally suitable Forest Service land (Jennings and Hayes, 1994). However, the most insidious threat to California horned lizard is the continued elimination of its food base by exotic ants. Argentine ants (*Iridomyrmex humulis*) colonize around disturbed soils associated with building foundations, roads and landfills, and expand into adjacent areas, eliminating native ant colonies (Ward, 1987). Under these conditions California horned lizard populations have become increasingly fragmented, and have undergone the added stress of a number of other factors, including fire, grazing, off-road vehicles, domestic cats, and development (Jennings and Hayes, 1994). This taxon is unable to survive habitats altered by development, agriculture, off-road vehicle use, or flood control structures (Goldberg, 1983).

The California horned lizard has been collected in arid upland habitats around Ojai (Los Angeles County Museum (LACM) number 101483) and west of Lake Casitas (University

California Santa Barbara Vertebrate Museum (UCSB)). No other records of this species are known from the study area. We consider this species to be rare in the study area.

Coastal whiptail (*Cnemidophorus tigris stejnegeri*)
This species is a USFS species of special emphasis. This species is an active lizard of deserts and semiarid habitats, usually where plants are sparse. It prefers open areas where it can run to escape predators. Whiptails range from deserts to warmer, drier areas within montane pine forests. They are also found in woodland and streamside growth, and avoid dense grassland and thick growth of shrubs. Whiptails are usually found where the ground has firm soil and is rocky. The whiptail's diet consists of invertebrates including insect larvae, termites, grasshoppers, beetles, spiders, and scorpions, as well as other lizards (Stebbins 2003). The coastal whiptail is uncommon over much of its range in California, but it is abundant in the desert regions where suitable habitat is available (Zeiner *et al.* 1988). Several dozen coastal whiptails were observed in upland areas in the northern portion of the study area (Service 2000).

Silvery legless lizard (*Anniella pulchra pulchra*)
The silvery legless lizard is a California species of special concern. This highly specialized fossorial lizard occurs in a variety of habitats but is quite specific in its microhabitat requirements. It burrows beneath the leaf litter of shrubs or trees in loose, sandy soils and is generally absent from soils possessing a significant clay or silt component or that contain any degree of saturation, overlay a high water table or are subject to frequent disturbance (such as flooding).

The only soil type capable of supporting legless lizards within the study area is the remnant coastal sand dune area west of the Ventura River. Four individuals of this species were collected 820 feet west of the mouth of the Ventura River in 1979 (UCSB numbers 8446-8449). Formerly contiguous legless lizard habitat is now highly fragmented between Pitas Point, the Ventura Estuary, and the Oxnard Dunes. Beach erosion west of the Ventura River, recreation, and commercial and residential development of the beaches and dunes has eliminated this species from this area. The remaining dune habitat onsite at the river mouth represents the best chance for survival of this species in the immediate vicinity (Hunt and Lehman 1992).

Two-striped garter snake (*Thamnophis hammondii*)
The two-striped garter snake is a California species of special concern. It is considered by the USFS and BLM to be sensitive (Table 2). This aquatic snake occurs in semi-permanent and permanent freshwater streams and ponds with bordering riparian woodland in central and southern California. It also frequents stock ponds and other human-made water sources. It can range well into xeric habitats such as chaparral adjacent to a watercourse. Habitat alteration, flood control activities and the prolonged drought of 1986-1991 have reduced populations throughout its range. Additionally, the introduction of non-native predators such as the largemouth bass and the bullfrog, may have reduced or eliminated populations from many areas.

Despite the presence of excellent habitat for the two-striped garter snake, only three individuals of this species have been recorded within the study area. An 8-inch individual was observed in a small pool located approximately 328 feet downstream of the dam (Service 2000). Another individual was collected along the west bank of the Ventura River opposite Casitas Springs (UCSB 15708). The third individual was observed in marsh habitat in the active channel of the Ventura River approximately 1.5 miles upstream from the Main Street Bridge in June 1992. Suitable habitat for this species occurs along the Ventura River and adjacent riparian corridor in the study area (Hunt and Lehman 1992).

Table 2. Known and Potentially Occurring Amphibians and Reptiles within the Study Area.

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
AMPIHBIANS			
Arboreal salamander	*Aneides lugubris*		
Black-bellied slender salamander	*Batrachoseps nigriventris*		
Ensatina	*Ensatina eschscholtzi*		
California newt	*Taricha torosa torosa*		CSC
Bullfrog	*Rana catesbeiana*		
California red-legged frog	*Rana aurora draytonii*	FT	CSC
California treefrog	*Pseudacris regilla*		
Pacific chorus frog	*Pseudacris cadaverina*		
Western toad	*Bufo boreas halophilus*		
Western spadefoot	*Spea hammondii*		CSC
REPTILES			
Southwestern pond turtle	*Clemmys marmorata pallida*		CSC
California horned-lizard	*Phrynosoma coronatum frontale*		CSC
Coastal western whiptail	*Cnemidophorus tigris stejnegeri*		CSC
Side-blotched lizard	*Uta stansburiana*		
Silvery legless lizard	*Anniella pulchra pulchra*		CSC
Southern alligator lizard	*Elgaria multicarinata*		
Western fence lizard	*Sceloporus occidentalis*		
Western skink	*Eumeces skiltonianus*		
California black-headed snake	*Tantilla planiceps*		
California kingsnake	*Lampropelltis getulus californiae*		
California lyre snake	*Trimorphodon biscutatus vandenburghi*		
Coast mountain kingsnake	*Lampropeltis zonata multifasciata*		
Coast patchnose snake	*Salvadora hexalepsis virgultea*		CSC
Gopher snake	*Pituophis melanoleucus*		
San Bernardino ringneck snake	*Diadophis punctatus modestus*		
Southern Pacific rattlesnake	*Crotalus viridis helleri*		
Southwestern blind snake	*Leptotyphlops humilis humilis*		
Coachwhip	*Masticophis flagellum piceus*		
Striped-racer	*Masticophis lateralis lateralis*		

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
California red-sided garter snake	*Thamnophis sirtalis infernalis*		
Two-striped garter snake	*Thamnophis hammondii*		CSC
Western yellow-bellied racer	*Coluber constrictor mormon*		
Western long-nosed snake	*Rhinocheilus lecontei lecontei*		
San Diego night snake	*Hypsiglena torquata klauberi*		

Special Status Codes

FT = Federally Threatened Species
CSC = California Species of Special Concern

Birds

Birds are abundant and diverse in the study area. Previous reports (Hunt and Lehman 1992; Service 2000; Aspen 2002; and URS 2000) have identified 245 species to date. Among the birds known to occur within the study area, 9 are listed as endangered or threatened on Federal and/or State lists (Table 3). In addition, 25 species known to occur are considered "sensitive" as they are listed on one or both of the following watchlists: California Species of Special Concern and State Fully Protected Species (CDFG 1998). We also reviewed literature and museum records and consulted with local experts to compile an inventory and discuss potential and historical species occurrences.

Biologists conducted surveys for birds on 10 different dates (Service 2000). Eight of these surveys coincided with the protocol surveys for southwestern willow flycatcher and/or least Bell's vireo. Incidental bird observations were recorded during surveys for sensitive species. We detected a total of 93 bird species (Table 3). Two of these species, the European starling (*Sturnus vulgaris*) and rock dove (*Columba livia*), are non-native; the rest are native. The most common bird species included cliff swallow *(Petrochelidon pyrrhonota),* northern rough-winged swallow (*Stelgidopteryx serripennis*), song sparrow *(Melospiza melodia*), common yellowthroat (*Geothlypis trichas*), bushtit *(Psaltriparus minimus)*, wrentit (*Chamaea fasciata*), western scrub-jay *(Aphelocoma californica*), black phoebe (*Sayornis nigricans*), mallard (*Anas platyrhyncos*), bufflehead (*Bucephala albeola*), American coot *(Fulica americana)*, and ruddy duck (*Oxyura jamaicensis*).

Because bird surveys were performed during a limited time period; many other species would likely be detected if additional surveys were conducted at other times of the year. Hunt and Lehman (1992) observed a total of 233 avian species in the lower Ventura River and Ventura Estuary during the breeding, winter and migratory seasons between June 1991 and July 1992 as well as several preceding years. Two important habitat types for birds in the study area are estuarine and palustrine systems. The estuarine system is used by large numbers of waterbirds whose densities vary seasonally and daily with fluctuating water levels. The largest numbers of birds are typically found when water levels in the estuary are relatively low, exposing mudflats and adjacent aquatic habitats where food items become available. Moderate numbers of waterfowl are found within the study area from mid-fall through early spring. Gulls, brown pelicans (*Pelecanus occidentalis*), and terns use the area year-round for resting and bathing. Regionally declining or listed species that frequent the estuary include the osprey (*Pandion haliaetus*), western snowy plover (*Charadrius alexandrinus nivosus*), and the California least tern (*Sterna antillarum brownii*). Small numbers (20 to 30 individuals) of black brant (*Branta bernicla nigricans*) seasonally visit the Ventura River estuary and cobble intertidal areas on their northward and southward migration. The black brant feed on the abundant algae which colonizes the cobble substrate characteristic of portions of the estuary and intertidal area (Hunt and Lehman 1992).

The palustrine systems upstream from the Ventura River estuary to the dam provide important forage and cover for landbirds during all seasons. Dense willow and other riparian woodlands, especially adjoining water, are frequented by many migrant species in spring and fall, and somewhat smaller numbers of wintering passerines. Several regionally rare and declining birds nest in the study area in spring and summer, including regionally declining species of concern such as yellow warbler (*Dendroica petechia*) and yellow-breasted chat (*Icteria virens*) (CDFG and Point Reyes Bird Observatory (PRBO) 2001).

Least Bell's vireo (*Vireo belli pusillus*)
The least Bell's vireo is state and federally listed as endangered. It was federally listed as endangered on May 2, 1986 (51 FR 16474). The least Bell's vireo is a small, olive-grey migratory songbird that nests and forages primarily in riparian woodland habitats. Typical nesting habitat consists of an understory of dense subshrub or shrub thickets dominated by sandbar willow (*Salix hindsiana*), mule fat, and saplings of other willow species. Historically, least Bell's vireos wintered in Mexico and ranged as far north as Tehama County, California. The current breeding distribution for the least Bell's vireo is restricted to southern California and northwestern Baja California. Widespread habitat loss has isolated most remaining populations of least Bell's vireos into small, widely dispersed subpopulations, which are concentrated in San Diego, Santa Barbara, and Riverside Counties. The decline in the numbers of the least Bell's vireo that led to its listing have been attributed, in part, to the combined, perhaps synergistic effects of the widespread loss of riparian habitats and brood-parasitism by the brown-headed cowbird (*Molothrus ater*).

Approximately 60 acres of suitable habitat for the least Bell's vireo exists within the study area from the Ventura River estuary to Foster Park. Greaves (2003) reported 1 pair of least Bell's vireo nesting in the vicinity of the Main Street Bridge and Ventura River in 2001, 2002, and 2003. The attempt during the 2003 season to nest in the Main Street vicinity failed possibly because of the large population of homeless people inhabiting the area. A second pair of least Bell's vireos was reported nesting approximately 0.75 mile downstream of Shell Road in June of 2003. Finally, a pair of least Bell's vireos was reported in the Ventura River near Stanley Road in June of 2003. The status of these two pairs is unknown at this time (Greaves 2003). Lack of suitable habitat and the presence of brown-headed cowbirds may preclude additional occurrences of this species within the study area.

Southwestern willow flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher was federally listed as endangered on February 27, 1995 (60 FR 10694). The breeding range of the southwestern willow flycatcher includes Arizona, New Mexico, the southern portions of California, Nevada, and Utah, western Texas, southwestern Colorado, and extreme northwestern Mexico. Loss and modification of riparian habitats and brood parasitism by brown-headed cowbirds were the primary reasons for the species' decline that led to its listing. The southwestern willow flycatcher occurs in riparian habitats along rivers, streams, or other wetlands where dense growths of willows, coyote brush, arrowweed (*Pluchea* sp.), buttonbush (*Cephalanthus* sp.), tamarisk (*Tamarix* sp.), Russian olive (*Eleagnus* sp.) or other plants are present, often with a scattered overstory of cottonwoods. In the coastal portions of its range, southwestern willow flycatchers use willow-dominated riparian areas intermixed with cottonwoods, coyote brush and mule fat.

Five surveys were conducted according to Service protocol for the southwestern willow flycatcher from April 28, 2000, through July 22, 2000. Although approximately 14 acres of marginal habitat exists in locations between the estuary and Foster Park for this species, southwestern willow flycatchers were not detected. No historic records for nesting southwestern willow flycatchers in the Ventura River or Matilija Creek exist. Lack of suitable habitat and the presence of brown-headed cowbirds may preclude any occurrences of this species within the study area.

Western snowy plover (*Charadrius alexandrinus nivosus*)

The Pacific coast population of the western snowy plover was federally listed as threatened on March 5, 1993 (58 FR 12864). On December 9, 1999, the Service designated critical habitat for the western snowy plover (64 FR 68508). The western snowy plover is a small shorebird that forages on invertebrates in areas such as intertidal zones, the wrack line, dry sandy areas above the high tide line, salt pannes, and the edges of salt marshes. The Pacific coast population nests near tidal waters along the mainland coast and on offshore islands from southern Washington to southern Baja California, Mexico. Most nesting occurs on unvegetated, or moderately vegetated, dune backed beaches and sand spits. During the non-breeding season western snowy plovers may remain at breeding sites or migrate to other locations. The Pacific coast population of the western snowy plover has experienced widespread loss of nesting habitat and reduced reproductive success at many nesting locations. Factors resulting in loss of nesting habitat include urban development and the encroachment of European beachgrass (*Ammophila arenaria*). Reduced reproductive success is frequently tied to disturbance from human activities and to predation. Activities such as walking, jogging, running pets, horseback riding, and off-road vehicle use frequently crush and destroy the western snowy plover's cryptic nests and chicks. These activities also flush adults off nests leaving chicks and eggs vulnerable to predation and weather.

The western snowy plover is known to use the dune areas around the Ventura River estuary and neighboring San Buenaventura State Beach for wintering. Despite the presence of suitable breeding habitat, western snowy plovers have not been recorded breeding at the Ventura River estuary. The lack of breeding records at this site for this species maybe because of extensive beach use dating back into the 1930's (Wetlands Research Associates, Inc. 1992). The closest known breeding area for the western snowy plover occurs south of the study area at McGrath State Beach (Smith 2003). Western snowy plovers that have been observed in the sandy areas near the estuary mouth and on the drier mudflats in the estuary itself, are assumed to be post-breeding birds from McGrath State Beach (Hunt and Lehman 1992).

California least tern (*Sterna antillarum browni*)
In 1970, the first Federal list of endangered species was drawn up following passage of the Endangered Species Conservation Act of 1969. The California least tern *(Sterna antillarum browni)* was included on the list. The State of California passed its own Endangered Species Act in 1970 and subsequently published a list in May of 1971 that included the tern. The breeding range of this subspecies extends along the Pacific Coast from San Francisco Bay, California, to Bahia de San Quintin, Baja California, Mexico. The California least tern is a migratory species that arrives in California by late April to breed and begins to depart to unknown southerly locations by August. It nests on sandy, open areas, usually around bays, estuaries, and creek and river mouths. California least terns were once common along the central and southern California coast. The precipitous decline of the California least tern is attributed to prolonged and widespread destruction and degradation of nesting and foraging habitats, and increasing human disturbance to breeding colonies. Conflicting uses of southern and central California beaches during the California least tern nesting season have isolated colony sites that are extremely vulnerable to predation from native predators, feral pets and non-native predators, overwash by high tides, and vandalism and harassment by beach users.

In Ventura County, California least terns nest at Point Mugu, Ormond Beach, and just north of the mouth of the Santa Clara River. In 2002, approximately 260 pairs of California least terns nested at Ormond Beach, making this the largest colony in Ventura County. Young California least terns often use the estuary at the Ventura River for foraging and loafing before beginning their journey south (Hunt and Lehman 1992). As described above for the western snowy plover, suitable breeding habitat for the California least tern occurs at the Ventura River estuary, but California least terns have not been known to breed there. The lack of breeding records at this site for this species maybe because of the extensive beach use dating from the 1930's (Wetlands Research Associates, Inc. 1992).

California brown pelican (*Pelecanus occidentalis californicus*)
The California brown pelican was federally listed as endangered in 1970. It is a large bird recognized by the long, pouched bill that is used to catch surface schooling fishes. California brown pelicans nest in colonies on small coastal islands that are free of mammalian predators and human disturbance, and are associated with an adequate and consistent food supply. Nesting colonies of the California brown pelican range from the

Channel Islands in the Southern California Bight to the islands off Nayarit, Mexico. Prior to 1959, intermittent nesting was observed as far north as Point Lobos in Monterey County, California. Dispersal between breeding seasons ranges from British Columbia, Canada, to southern Mexico and possibly to Central America. During the non-breeding season brown pelicans roost communally, generally in areas that are near adequate food supplies, have some type of physical barrier to predation and disturbance, and that provide some protection from environmental stresses such as wind and high surf. Breakwaters and jetties are often used for roosting. California brown pelicans experienced widespread reproductive failures in the 1960s and early 1970s. Much of the failure was attributed to eggshell thinning caused by high concentrations of DDE, a metabolite of DDT. Other factors implicated in the decline of this species include human disturbance at nesting colonies, and food shortages (Service 1997).

The California brown pelican occasionally roosts at the Ventura River estuary mouth, primarily during the summer. No regular surveys have been conducted at the Ventura River mouth, so information on the status of the California brown pelican at this site is anecdotal. Additionally, their numbers may vary greatly with the season (Service 1997).

California condor (*Gymnogyps californianus*)
This species was federally listed as endangered on March 11, 1967 (32 FR 4001). The California condor is also a California endangered and fully protected species. Critical habitat was designated on September 24, 1976 (41 FR 187). The California condor is a member of the Cathartidae family or new world vultures. With a wing span of nearly 9.5 feet and weighing approximately 22 pounds, it is one of the largest flying birds in the world. California condors are opportunistic scavengers, feeding exclusively on the carcasses of dead animals. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Seasonal foraging behavior shifts may be the result of climatic cycles or changes in food availability. California condors maintain wide-ranging foraging patterns throughout the year, an important adaptation for a species that may be subjected to unpredictable food supplies. Most foraging occurs in open terrain of foothills, grasslands, potreros within chaparral areas, or oak savannah habitats. Historically, foraging also occurred on beaches and large rivers along the Pacific coast. Threats to the California condor include lead poisoning due to ingestion of fragments of bullets and shot found in hunter killed animals, collision with overhead transmission lines, ingesting toxins such as ethylene glycol (a commonly-used ingredient of antifreeze), being shot, and predation by coyotes (*Canis latrans*) and golden eagles (*Aquila chrysaetos*).

California condors have been reintroduced to the mountains in the Los Padres National Forest. Individuals occasionally fly over the Ojai Valley. No known activity sites for the California condor exist within the study area (Bruce Palmer, Service, pers. comm., 2003).

White-tailed kite (*Elanus caeruleus*)
The white-tailed kite is California fully protected species. The white-tailed kite is a common to uncommon year long resident in coastal and valley lowlands. This species

inhabits herbaceous and open stages of most habitats in cismontane California. The white-tailed kite preys mostly on voles and other small, diurnal mammals, occasionally on birds, insects, reptiles, and amphibians. It forages in undisturbed, open grasslands, meadows, farmlands and palustrine systems.

This regionally declining species is much rarer now than it was during its peak population years in the mid-1970's. Through the early 1980's, the white-tailed kite was seen regularly on or adjoining the study area, particularly in upland areas. The loss of open space in the project area has resulted in the decline of this species (Hunt and Lehman 1992). Although this species is presumed extant in the study area, actual numbers of individuals are unknown.

American peregrine falcon (*Falco peregrinus anatum*)
The American peregrine falcon is state endangered and California fully protected species. In 1970, the Service listed the peregrine falcon as endangered under the Endangered Species Conservation Act of 1969. Subsequently, with protection under the Endangered Species Act and the banning of DDT, the peregrine falcon made a sufficient recovery to be removed from the list of endangered and threatened species in 1999 (64 FR 46542).

The American peregrine falcon is the subspecies of peregrine falcon that historically nested from the North American boreal forest south into Mexico. The peregrine falcon is a crow-sized raptor that feeds mostly on birds and typically attacks its prey in the air. In a natural setting, peregrine falcons nest almost exclusively on cliff ledges that are associated with suitable foraging areas. They have also been observed nesting on human-made structures in heavily urbanized areas. Prior to World War II, an expanding human population and habitat loss contributed to a gradual decline of this subspecies within the United States. Following World War II, the widespread use of chlorinated hydrocarbon-based pesticides, such as DDT, accelerated the American peregrine falcon's decline. Restrictions on the use of DDT and intensive intervention to augment natural reproduction have restored the American peregrine falcon to many parts of its historical range, including some areas of California.

A pair of peregrine falcons has been documented within the Ventura Estuary foraging on waterfowl and shorebirds. Peregrine falcons observed at the estuary are believed to be commuting from Anacapa Island (Hunt and Lehman 1992). To date, no additional observations have been recorded and we consider this species to be rare in the study area.

Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
The western yellow-billed cuckoo is listed as an endangered species by the state of California and is a candidate for federal listing. This species is an uncommon to rare summer resident of riparian habitats of valley foothill and desert areas in scattered locations in California. The western yellow-billed cuckoo was formerly much more common and widespread throughout lowland California, but its numbers have been drastically reduced by habitat loss. This species has not been observed or documented within the study area, despite the presence of suitable nesting and foraging habitat. Habitat within the study area includes palustrine forested areas.

Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)
The Belding's savannah sparrow is listed as an endangered species by the state of California. This subspecies is a resident of southern California coastal salt marshes from Goleta Slough in Santa Barbara County south to northwestern Baja California Norte, Mexico. Populations throughout the range appeared to be stable or increasing according to a census conducted in the late 1980's and 2,275 pairs were located range-wide in 1986.

In July 1992, a small flock Belding's savannah sparrows consisting of three pairs of adults and a few juveniles were observed approximately 0.8 mile west of the Ventura River estuary. These individuals were found in dense vegetation consisting of pickleweed, saltgrass, and saltbush species. The areal extent of this habitat around bordering areas of the Ventura River estuary is rather small. Consequently, Belding's savannah sparrow populations found there would be expected to be small and unstable. Individuals or pairs of birds may occasionally establish a territory in these areas (Hunt and Lehman 1992).

Table 3. Birds Expected and Observed within the Study Area

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Gaviidae (Loons)			
Red-throated loon	*Gavia stellata*		
Pacific loon	*Gavia pacifica*		
Pacific loon	*Gavia immer*		CSC
Podicipedidae (Grebes)			
Pied-billed grebe	*Podilymbus podiceps*		
Horned grebe	*Podiceps auritus*		
Red-necked grebe	*Podiceps grisegena*		
Eared grebe	*Podiceps nigricollis*		
Western grebe	*Aechmophorus occidentalis*		
Clark's grebe	*Aechmophorus clarkii*		
Pelecanidae (Pelicans)			
Brown pelican	*Pelecanus occidentalis*	FE	SE
Phalacrocoracidae (Cormorants)			
Double-crested cormorant	*Phalacrocorax auritus*		CSC
Pelagic cormorant	*Phalacrocorax pelagicus*		
Ardeidae (Herons)			
American bittern	*Botaurus lentiginosus*		
Great blue heron	*Ardea herodias*		
Great egret	*Casmerodius albus*		
Snowy egret	*Egretta thula*		
Little blue heron	*Egretta caerulea*		
Tricolored heron	*Egretta tricolor*		
Cattle egret	*Bubulcus ibis*		
Green-backed heron	*Butorides virescens*		

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Black-crowned night heron	*Nycticorax nycticorax*		
Treskiornithidae (Ibises and Spoonbills)			
White-faced Ibis	*Plegadis chihi*		CSC
Anatidae (Swans, Geese and Ducks)			
Snow goose	*Chen caerulescens*		
Ross' goose	*Chen rossii*		
Brant	*Branta bernicla*		
Canada goose	*Branta canadensis*		
Wood duck	*Aix sponsa*		
Green-winged teal	*Anas crecca*		
Mallard	*Anas platyrhynchos*		
Northern pintail	*Anas acuta*		
Cinnamon teal	*Anas cyanoptera*		
Blue-winged teal	*Anas discors*		
Northern shoveler	*Anas clypeata*		
Gadwall	*Anas strepera*		
American wigeon	*Anas penelope*		
Canvasback	*Aythya valisineria*		
Redhead	*Aythya americana*		
Ring-necked duck	*Aythya collaris*		
Greater scaup	*Aythya marila*		
Lesser scaup	*Aythya affinis*		
Oldsquaw	*Clangula hyemalis*		
Surf scoter	*Melanitta perspicillata*		
White-winged scoter	*Melanitta fusca*		
Common goldeneye	*Bucephala clangula*		
Bufflehead	*Bucephala albeola*		
Common merganser	*Mergus merganser*		
Hooded merganser	*Lophodytes cucullatus*		
Red-breasted merganser	*Mergus serrator*		
Ruddy duck	*Oxyura jamaicensis*		
Cathartidae (American Vultures)			
Turkey vulture	*Cathartes aura*		
California condor	*Gymnogyps californianus*	FE	SE, SFP
Accipitridae (Kites, Hawks and Eagles)			
Osprey	*Pandion haliaetus*		CSC
White-tailed kite	*Elanus caeruleus*		SFP
Northern harrier	*Circus cyaneus*		CSC
Sharp-shinned hawk	*Accipiter striatus*		CSC
Cooper's hawk	*Accipiter cooperii*		CSC
Red-shouldered hawk	*Buteo lineatus*		
Red-tailed hawk	*Buteo jamaicensis*		
Rough-legged hawk	*Buteo lagopus*		
Falconidae (Caracaras, Falcons)			
Merlin	*Falco columbarius*		CSC
American kestrel	*Falco sparverius*		

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Peregrine falcon	*Falco peregrinus*		SE, SFP
Prairie falcon	*Falco mexicanus*		CSC
Phasianidae (Grouse, Quail and Ptarmigan)			
California quail	*Callipepla californica*		
Rallidae (Rail, Gallinules and Coots)			
Virginia rail	*Rallus limicola*		
Sora	*Porzana carolina*		
Common moorhen	*Gallinula chloropus*		
American coot	*Fulica americana*		
Charadriidae (Plovers)			
Black-bellied plover	*Pluvialis squatarola*		
Western snowy plover	*Charadrius alexandrinus nivosus*	FE	CSC
Semipalmated plover	*Charadrius semipalmatus*		
Killdeer	*Charadrius vociferus*		
Pacific golden-plover	*Pluvialis fulva*		
Haematopodidae (Oystercatchers)			
American black oystercatcher	*Haematopus bachmani*		
Recurvirostridae (Avocets and Stilts)			
Black-necked stilt	*Himantopus mexicanus*		
American avocet	*Recurvirostra americana*		
Scolopacidae (Sandpipers and relatives)			
Greater yellowlegs	*Tringa melanoleuca*		
Lesser yellowlegs	*Tringa flavipes*		
Solitary sandpiper	*Tringa solitaria*		
Willet	*Catoptrophorus semipalmatus*		
Wandering tattler	*Heteroscelus incanus*		
Spotted sandpiper	*Actitis macularia*		
Whimbrel	*Numenius phaeopus*		
Long-billed curlew	*Numenius americanus*		CSC
Marbled godwit	*Limosa fedoa*		
Ruddy turnstone	*Arenaria interpres*		
Black turnstone	*Arenaria melanocephala*		
Surfbird	*Aphriza virgata*		
Red knot	*Calidris canutus*		
Sanderling	*Calidris alba*		
Semipalmated sandpiper	*Calidris pusilla*		
Western sandpiper	*Calidris mauri*		
Least sandpiper	*Calidris minutilla*		
Baird's sandpiper	*Calidris bairdii*		
Pectoral sandpiper	*Calidris melanotos*		
Dunlin	*Calidris alpina*		
Short-billed dowitcher	*Limnodromus griseus*		
Long-billed dowitcher	*Limnodromus scolopaceus*		
Common snipe	*Gallinago gallinago*		
Wilson's phalarope	*Phalaropus tricolor*		
Red-necked phalarope	*Phalaropus lobatus*		

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Red phalarope	*Phalaropus fulicaria*		
Laridae (Gulls and Terns)			
Bonaparte's gull	*Larus philadelphia*		
Heermann's gull	*Larus heermanni*		
Mew gull	*Larus canus*		
Ring-billed gull	*Larus delawarensis*		
California gull	*Larus californicus*		
Herring gull	*Larus argentatus*		
Thayer's gull	*Larus thayeri*		
Western gull	*Larus occidentalis*		
Glaucous-winged gull	*Larus glaucescens*		
Glaucous gull	*Larus hyperboreus*		
Black-legged kittiwake	*Rissa tridactyla*		
Caspian tern	*Sterna caspia*		
Royal tern	*Sterna maxima*		
Elegant tern	*Sterna elegans*		
Common tern	*Sterna hirundo*		
Forster's tern	*Sterna forsteri*		
California least tern	*Sterna antillarum browni*	FE	SE, SFP
Black tern	*Chlidonias niger*		
Columbidae (Pigeons and Doves)			
Rock dove	*Columba livia**		
Band-tailed pigeon	*Columba fasciata*		
Mourning dove	*Zenaida macroura*		
Spotted dove	*Streptopelia chinensis**		
Tytonidae (Barn Owls)			
Barn owl	*Tyto alba*		
Strigidae (Owls)			
Great horned owl	*Bubo virginianus*		
Burrowing owl	*Athene cunicularia*		CSC
Short-eared owl	*Asio flammeus*		CSC
Caprimulgidae (Nightjars)			
Lesser nighthawk	*Chordeiles acutipennis*		
Apodidae (Swifts)			
Black swift	*Cypseloides niger*		CSC
Vaux's swift	*Chaetura vauxi*		CSC
White-throated swift	*Aeronautes saxatalis*		
Trochilidae (Hummingbirds)			
Black-chinned hummingbird	*Archilochus alexandri*		
Anna's hummingbird	*Calypte anna*		
Costa's hummingbird	*Calypte costae*		
Rufous hummingbird	*Selasphorus rufus*		
Allen's hummingbird	*Selasphorus sasin*		
Alcedinidae (Kingfishers)			
Belted kingfisher	*Ceryle alcyon*		
Picidae (Woodpeckers)			

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Red-breasted sapsucker	*Sphyrapicus ruber*		
Nuttall's woodpecker	*Picoides nuttallii*		
Downy woodpecker	*Picoides pubescens*		
Northern flicker	*Colaptes auratus*		
Tyrannidae (Tyrant Flycatchers)			
Olive-sided flycatcher	*Contopus borealis*		
Western wood-pewee	*Contopus sordidulus*		
Willow flycatcher	*Empidonax traillii*		SE
Hammond's flycatcher	*Empidonax hammondii*		
Pacific-slope flycatcher	*Empidonax difficilis*		
Black phoebe	*Sayornis nigricans*		
Say's phoebe	*Sayornis saya*		
Ash-throated flycatcher	*Myiarchus cinerascens*		
Tropical kingbird	*Tyrannus melancholicus*		
Cassin's kingbird	*Tyrannus vociferans*		
Western kingbird	*Tyrannus verticalis*		
Alaudidae (Larks)			
Horned lark	*Eremophila alpestris*		
Hirundinidae (Swallows)			
Tree swallow	*Tachycineta bicolor*		
Violet-green swallow	*Tachycineta thalassina*		
Northern rough-winged swallow	*Stelgidopteryx serripennis*		
Bank swallow	*Riparia riparia*		ST
Cliff swallow	*Hirundo pyrrhonota*		
Barn swallow	*Hirundo rustica*		
Purple martin	*Progne subis*		CSC
Corvidae (Jays, Magpies, and Crows)			
Western scrub-jay	*Aphelocoma californica*		
American crow	*Corvus brachyrhynchos*		
Common raven	*Corvus corax*		
Paridae (Titmice)			
Oak titmouse	*Baeolophus inornatus*		
Aegithalidae (Bushtit)			
Bushtit	*Psaltriparus minimus*		
Sittidae (Nuthatches)			
Red-breasted nuthatch	*Sitta canadensis*		
Certhiidae (Creepers)			
Brown creeper	*Certhia americana*		
Troglodytidae (Wrens)			
Rock wren	*Salpinctes obsoletus*		
Bewick's wren	*Thryomanes bewickii*		
House wren	*Troglodytes aedon*		
Marsh wren	*Cistothorus palustris*		
Winter wren	*Troglodytes troglodytes*		
Muscicapidae (Thrushes)			
Golden-crowned kinglet	*Regulus satrapa*		

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Ruby-crowned kinglet	*Regulus calendula*		
Blue-gray gnatcatcher	*Polioptila caerulea*		
Swainson's thrush	*Catharus ustulatus*		
Hermit thrush	*Catharus guttatus*		
American robin	*Turdus migratorius*		
Varied thrush	*Ixoreus naevius*		
Western bluebird	*Sialia mexicana*		
Wrentit	*Chamaea fasciata*		
Mimidae (Mockingbirds and Thrashers)			
Northern mockingbird	*Mimus polyglottos*		
California thrasher	*Toxostoma redivivum*		
Motacillidae (Wagtails and Pipits)			
American pipit	*Anthus rubescens*		
Bombycillidae (Waxwings)			
Cedar waxwing	*Bombycilla cedrorum*		
Laniidae (Shrikes)			
Loggerhead shrike	*Lanius ludovicianus*		CSC
Sturnidae (Starlings)			
European starling	*Sturnus vulgaris**		
Vireonidae (Typical Vireos)			
Least Bell's vireo	*Vireo bellii pusillus*	FE	SE
Solitary vireo	*Vireo solitarius*		
Hutton's vireo	*Vireo huttoni*		
Warbling vireo	*Vireo gilvus*		
Emberizidae (Warblers, Sparrows, Blackbirds, and Orioles)			
Orange-crowned warbler	*Vermivora celata*		
Nashville warbler	*Vermivora ruficapilla*		
Yellow warbler	*Dendroica petechia*		CSC
Yellow-rumped warbler	*Dendroica coronata*		
Black-throated gray warbler	*Dendroica nigrescens*		
Townsend's warbler	*Dendroica townsendi*		
Hermit warbler	*Dendroica occidentalis*		
Blackpoll warbler	*Dendroica striata*		
Bay-breasted warbler	*Dendroica castanea*		
Black-and-white warbler	*Mniotilta varia*		
American redstart	*Setophaga ruticilla*		
Northern waterthrush	*Seirus noveboracensis*		
MacGillivray's warbler	*Oporornis tolmiei*		
Common yellowthroat	*Geothlypis trichas*		
Wilson's warbler	*Wilsonia pusilla*		
Yellow-breasted chat	*Icteria virens*		CSC
Summer tanager	*Piranga rubra*		CSC
Western tanager	*Piranga ludoviciana*		
Black-headed grosbeak	*Pheucticus melanocephalus*		
Lazuli bunting	*Passerina amoena*		
Rufous-sided towhee	*Pipilo erythrophthalmus*		

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
California towhee	*Pipilo crissalis*		
Chipping sparrow	*Spizella passerina*		
Lark sparrow	*Chondestes grammacus*		
Savannah sparrow	*Passerculus sandwichensis*		
Belding' savannah sparrow	*Passerculus sandwichensis beldingi*		SE
Rufous-crowned sparrow	*Aimophila ruficeps canescens*		CSC
Fox sparrow	*Passerella iliaca*		
Song sparrow	*Melospiza melodia*		
Lincoln's sparrow	*Melospiza lincolnii*		
Swamp sparrow	*Melospiza georgiana*		
White-throated sparrow	*Zonotrichia albicollis*		
Golden-crowned sparrow	*Zonotrichia atricapilla*		
White-crowned sparrow	*Zonotrichia leucophrys*		
Dark-eyed junco	*Junco hyemalis*		
Bobolink	*Dolichonyx oryzivorus*		
Red-winged blackbird	*Agelaius phoeniceus*		
Tricolored blackbird	*Agelaius tricolor*		CSC
Western meadowlark	*Sturnella neglecta*		
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*		
Brewer's blackbird	*Euphagus cyanocephalus*		
Brown-headed cowbird	*Molothrus ater*		
Hooded oriole	*Icterus cucullatus*		
Bullock's oriole	*Icterus bullockii*		
Fringillidae (Finches)			
Purple finch	*Carpodacus purpureus*		
House finch	*Carpodacus mexicanus*		
Lesser goldfinch	*Carduelis psaltria*		
American goldfinch	*Carduelis lawrencei*		
Passeridae (Old World Sparrows)			
House sparrow	*Passer domesticus**		

Special Status Codes

FE = Federally Endangered Species
FT = Federally Threatened Species
SE = State Endangered Species
CSC = California Species of Special Concern
SFP = California State Fully Protected Species
* = non-native species

Mammals

Forty species of mammals were recorded in the study area during field surveys and documented in museum records (Service 2000, Hunt and Lehman 1992). Twelve of these mammals are rodents. Based on geographic range and appropriate habitat, an additional eight species could be present in the study area but have not been documented.

No endangered or threatened mammal species were encountered or are known to occur within the study area; however, the following California species of special concern have been documented within the study area: Yuma myotis (*Myotis yumansis*), pallid bat (*Antrozous pallidus*), and western mastiff bat (*Eumops perotis californicus*). The ringtail cat (*Bassariscus astutus*), a California fully protected species, has also been documented within the study area (Service 2000).

The locally occurring bats are aerial insectivores that feed over or close to streams and lakes. Roosting areas for these species include crevices in bluffs, rocks, trees, bridges, and other human-made structures, such as those that exist within the study area. Hunt and Lehman (1992) discovered a large bat roost used by several species beneath the Main Street Bridge. This roost is the largest known to date on the coastal slope of Santa Barbara and Ventura Counties, although the regional distribution of bats in this area is poorly known. Most of the collection records for bats in the vicinity of the Ventura River date from between 1905 and 1950 (Hunt and Lehman 1992). The scarcity of more recent records may be due to a lack of recent field work coupled with regional declines in bat populations.

Six species of mammals that occur within the study area are listed in the California hunting regulations, with seasons and bag limits set by the State Fish and Game Commission. Black bear (*Euarctos americanus*) and mule deer (*Odocoileus hemionus*) are regulated animals; Audubon's cottontail (*Sylvilagus audubonii*) is a resident small game animal; the gray fox (*Urocyon cinereoargenteus*) and raccoon (*Procyon lotor*) are furbearing mammals; and the bobcat (*Lynx rufus*) is a regulated nongame animal.

Southern California saltmarsh shrew (*Sorex ornatus salicornicus*)
The southern California saltmarsh shrew is California species of special concern. This species ranges from Ventura County to Orange County. Nothing is known about the status of the southern California saltmarsh shrew. Habitat destruction is the primary cause for this native shrew's decline. This species has not been documented within the study area; however, it may occur in estuarine and palustrine habitats adjacent to the Ventura River mouth within the study area.

Western mastiff bat (*Eumops perotis californicus*)
The western mastiff bat is a California species of special concern. This large bat is an uncommon inhabitant of scrub and open woodlands from San Francisco Bay south through Baja California and mainland Mexico. Incidental information suggests that this species has undergone significant declines in recent years (Williams 1986). Reasons for the species decline are only conjecture. Extensive loss of habitat because of urbanization of coastal basins, marsh drainage, and cultivation of major foraging areas are likely factors. Widespread use of insecticides may have also reduced insect abundance and also poisoned some bats (Williams 1986).

Specimen collection records for the western mastiff bat include the Ventura River near Weldon Canyon (LACM Number 30253). Old museum records are not indicative of the species' continued presence in this area because of regional declines. Western mastiff bats prefer roosting habitat that includes caves and large clefts in vertical rock walls; however, they may also use structures (such as the Main Street Bridge) on a short-term basis if the crevices are large enough (Hunt and Lehman 1992).

Townsend's big-eared bat (*Plecotus townsendii*)
The Townsend's big-eared bat is a California species of special concern. This bat is found in scrub and woodland habitats throughout the Pacific states, but details of its distribution are not well known. Once considered common, the Townsend's big-eared bat is now considered uncommon in California (Zeiner *et al.* 1990). Habitat for these bats must include appropriate roosting, maternity, and hibernacula sites free from disturbance by humans. A single visit by humans can cause the bats to abandon a roost (Williams 1986).

A colony of Townsend's big-eared bat exceeding 100 individuals occurs on Santa Cruz Island (Hunt and Lehman 1992). This species probably forages over the study area, but no roosting habitat is available on-site. No Townsend's big-eared bats have been recorded within the study area.

Ringtail (*Bassariscus astutus*)
The ringtail is a California fully protected species. This secretive, nocturnal species in the raccoon family typically inhabits woodland and adjacent scrub habitats on rocky slopes near a permanent water source. Locally, individuals are found throughout the Santa Ynez and San Rafael Mountains. Its habitat requirements are den sites among boulders or in hollow trees and sufficient food in the form of rodents and other small animals. Urbanization, loss and degradation of riparian communities have depleted and extirpated some populations of ringtail (Williams 1986).

The ringtail has been collected within the study area at Matilija (Museum of Vertebrate Zoology (MVZ) number 3957-58) and Highway 33 at mile marker 32.5 (Santa Barbara Natural History Museum (SBNHM) number 2255).

American badger (*Taxidea taxus*)
The American badger is California species of special concern. This large, carnivorous animal is widely distributed throughout California in arid grasslands and scrub habitats containing friable soils and relatively open, uncultivated ground where it preys primarily on rodents. Most populations in southern California lowlands have been extirpated by direct killing and urban and agricultural expansion.

American badger burrows were observed in the Ventura River floodplain approximately 2 miles upstream from the Main Street Bridge (Hunt and Lehman 1992). Additionally, two American badgers were collected in 1985 at the Casitas Municipal Water District plant at Oak View (SBNHM numbers 2286-2287).

Table 4. Mammals Known and Potentially Occurring within the Study Area

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Soridae (shrews and moles)			
Broad-footed mole	*Scapanus latimanus*		
So. Ca. Saltmarsh shrew*	*Sorex ornatus salicornicus*		CSC
Desert shrew*	*Notiosorex crawfordi*		
Vespertilionidae (mouse-eared bats)			
Pallid bat	*Antrozous pallidus*		CSC
Big brown bat	*Eptesicus fuscus*		
Yuma myotis	*Myotis yumanensis*		CSC
Fringed myotis*	*Myotis thysanodes*		
California myotis	*Myotis californicus*		
Silver-haired bat*	*Lasionycteris noctivagans*		
Western pipistrelle*	*Pipistrellus hesperus*		
Hoary bat	*Lasiurus cinereus*		
Red bat*	*Lasiurus borealis*		
Townsend's big-eared bat*	*Plecotus townsendii*		CSC
Long-eared myotis	*Myotis evotis*		
Molossidae (free-tailed bats)			
Mexican freetail bat*	*Tadarida brasiliensis*		
Western mastiff bat	*Eumops perotis californicus*		CSC
Leporidae (rabbits)			
Brush rabbit	*Sylvilagus bachmani*		
Audubon cottontail*	*Sylvilagus audubonii*		
Sciuridae (squirrels and relatives)			
Merriam's chipmunk	*Tamias merriami*		
California ground squirrel	*Spermophilus beecheyi*		
Western gray squirrel	*Sciurus griseus*		
Fox squirrel	*Sciurus niger***		
Geomyidae (gophers)			
Botta's pocket gopher	*Thomomys bottae*		
Heteromyidae (kangaroo rats)			
Pacific kangaroo rat	*Dipodomys agilis*		
Cricetidae (mice, woodrats, and voles)			
Western harvest mouse	*Reithrodontomys megalotis*		
California mouse	*Peromyscus californicus*		
Deer mouse	*Peromyscus maniculatus*		
Dusky-footed woodrat	*Neotoma fuscipes*		
Brush mouse	*Peromyscus boylii*		
California vole	*Microtus californicus*		
Muskrat	*Ondatra zibethicus*		
Muirdae (rats)			
Black rat	*Rattus rattus***		
House mouse	*Mus musculu**s*		
Canidae (foxes and coyotes)			

COMMON NAME	SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS
Coyote	*Canis latrans*		
Gray fox	*Urocyon cinereogenteus*		
Red fox	*Vulpes vulpes***		
Domestic dog	*Canis familiaris***		
Ursidae (bears)			
Black bear	*Ursus americanus*		
Procyonidae (raccoon and ringtail)			
Ringtail	*Bassariscus astutus*		SFP
Raccoon	*Procyon lotor*		
Mustelidae (weasels and relatives)			
Mustelidae (weasels and relatives)	*Mustela frenata*		
American badger	*Taxidea taxus*		CSC
Western spotted skunk	*Spilogale gracilis*		
Striped skunk	*Mephitis mephitis*		
Felidae (cats)			
Mountain lion	*Felis concolor*		
Bobcat	*Felis rufous*		
Domestic cat	*Felis catus***		
Cervidae (elk and deer)			
Mule deer	*Odocoileus hemionus*		

*Denotes potentially occurring Species
**Denotes non-native species

Special Status Codes

CSC = California Species of Special Concern
SFP = California State Fully Protected Species

IMPACTS OF THE PREFERRED ALTERNATIVE ON BIOLOGICAL RESOURCES

The study area and its restoration are complex, and any effort to rehabilitate the Ventura River system needs to be based on a sound understanding of the ecological benefits and drawbacks of the dam removal alternatives. The Matilija Dam disrupts the natural river course and flow, redirects river channels, transforms the floodplain and disrupts river continuity. In addition to interrupting the natural flow of water, the Matilija Dam also limits the natural recolonization of riparian plant species downstream of the dam by inhibiting the dispersal of plant propagules such as seeds, stolens, and roots buried in sediments trapped behind the dam. Dam removal can enable the return of native species by restoring riverine and palustrine habitats on which native species depend. Dam removal should displace warm-water non-native species such as bass and carp that prefer a lake-like environment, while promoting the recovery of fish populations that prefer colder-water rivers, such as southern steelhead.

Sediment transport in a river is vital to riparian and riverine habitats and species. Most free-flowing rivers are characterized by wide fluctuations in flow, which affect sediment transport and create unique and diverse habitats for species. Large flows should serve to erode small, nutrient rich sediments from a river and its shoreline, depositing this material downstream and in the Ventura River Estuary. These same flows should transport and redistribute larger sediments and boulders, creating new and more diverse habitats for feeding, spawning, and breeding of aquatic and riparian species.

The preferred alternative would likely result in both short- and long-term effects within the study area. Examples of short-term direct impacts to wildlife are mortality, displacement, and disturbance during project implementation. Although these effects are likely to occur under the preferred alternative, the scope of these effects is difficult to quantify. Indirect short-term effects to terrestrial and aquatic habitats include temporary degradation with large quantities of sediment, litter, vehicular pollutants, dust, and noise. Under the preferred alternative, we expect negative impacts to the area within the reservoir and surrounding wetlands as well as upstream riparian areas.

Most of the impact of dam removal under the preferred alternative will occur at the dam itself and within a few miles downstream of the dam. Although most of the impacts will occur in these areas, the entire study area will be affected. Areas of special concern include those where listed species occur such the least Bell's vireo, southern steelhead, tidewater goby, California least tern, western snowy plover, and California red-legged frog.

We anticipate the following short-term effects:

- Mortality and injury of wildlife from during earth-moving, demolition, vehicular access, and worker foot traffic.

- Displacement and/or disruption of breeding and feeding behavior of terrestrial species resulting from removal of habitats during project construction. This effect applies primarily to those aspects of the project which include habitat modifications, such as on-site sediment deposition, new and existing levee construction and expansion.

- Work activities, including noise and vibration, may harass wildlife, causing individual animals to leave the work area and displace them from nesting, foraging, and roosting areas. This disturbance may increase the potential for predation and desiccation for aquatic species.

- Aquatic species may be entrained by pump intakes, if such devices are used to dry out work areas.

- Some potential exists for disturbance of habitat to cause the spread or establishment of non-native invasive species, such as giant reed or salt cedar

(*Tamarix* spp.). Improper disposal of giant reed after removal could also result in additional spreading of this exotic invasive species.

- Native aquatic species may be harassed and suffer mortality from predation. If water that is impounded during or after work activities creates favorable habitat for non-native predators, such as bullfrogs, crayfish, and centrarchid fishes, native aquatic species may suffer abnormally high rates of predation. Additionally, any time frogs or fish are concentrated in a small area at unusually high densities, native predators such as herons, egrets, opossums, and raccoons may feed on them opportunistically.

- Trash left during or after project activities could attract predators to work sites, which could, in turn, harass or prey on sensitive species. For example, raccoons are attracted to trash and also prey opportunistically on frogs or fish or bird eggs.

- Accidental spills of hazardous materials or careless fueling or oiling of vehicles or equipment could degrade water quality or upland habitat to a degree where the wildlife is adversely affected or killed.

- Work in live streams or in floodplains could cause unusually high levels of siltation downstream. This siltation could smother eggs and larvae of aquatic species and alter the quality of the habitat to the extent that use by individuals of many species is temporarily precluded.

- The potential exists for uninformed workers to intentionally or unintentionally harass, injure, harm, or kill wildlife.

We anticipate the following long-term effects:

- Long-term effects include a reduction in the diversity of organisms that prefer the lacustrine habitat of the reservoir as a result of direct habitat loss. The temporary stabilization of sediments above the dam will cover species of cattails and sedge that will be eventually replaced by riparian or upland vegetation. California red-legged frogs are known to occur in the riverine and palustrine habitat within the influence of the Matilija Reservoir that will be used for sediment stabilization. Also, duck populations that rely on cattail and sedge habitat will be negatively impacted from the loss of habitat. However, the lacustrine habitat associated with Matilija Reservoir is quickly converting to palustrian forested wetland habitat as a result of siltation, and is projected to be completely converted within a decade. On the other hand, the implementation of the preferred alternative may reduce the short-term increase in downstream turbidity and water quality problems. Temporary stabilization of fine silt and sand sediments above the dam will not allow this sediment to become re-suspended into free-flowing river.

- Displacement and/or disruption of breeding and feeding behavior of terrestrial species resulting from removal of habitats as a result of project construction. This effect applies primarily to those aspects of the project which include habitat modifications, such as on-site sediment deposition, new and existing levee construction and expansion.

The City of Ventura (City) proposes to modify the existing water diversion and treatment facilities on the Ventura River near Foster Park. The City's proposal describes the following components: construction of a series of new wells and pipelines; several rehabilitated wells; a subsurface collector associated with the subsurface dam; and potential abandonment of unspecified structures in the active Ventura River channel. To date, no analysis has been provided to support impacts on percolation rates into the shallow groundwater basin as a result of the Matilija ecosystem restoration project. The proposed slurring of fine materials under the Alternative 4b, is intended to substantially reduce the transport of fine sediments, and thus obviate impacts to downstream well fields. The potential impacts of the City's proposed project in the Foster Park area may have long-term adverse affects on the aquatic and riparian habitat in this reach of the Ventura River. Water supply operations at the City's Foster Park facilities can adversely affect aquatic habitats in a number of ways. Specific adverse impacts of the water/diversion operations include, but are not necessarily limited to, the following:

1) Disturbing instream habitat through the periodic construction of a pilot channel or berm to direct flows into existing surface diversion;

2) Impeding the upstream or downstream movement of fish and other aquatic species, either by dewatering the channel below the surface diversion, or creating a physical impediment to fish passage as a result of the construction of a diversion berm;

3) Entraining fish (particularly juvenile fish) into the existing surface diversion, or impinging them against the diversion screen, when the fish screen is not properly installed or maintained;

4) Lowering the surface water level in the river channel, and some cases de-watering portions of the channel, below the surface diversion;

5) Lowering the surface water level in the river channel, and in some cases completely de-watering the channel, or isolating pools upstream of the surface diversion as a result of the lowering of groundwater levels in the shallow aquifer.

DISCUSSION AND CONCLUSION

Overall long-term benefits of removing the Matilija Dam include re-opening approximately 16 miles of prime steelhead spawning habitat not now available. The accessibility of this additional habitat would result in a net gain of spawning habitat even with a temporary loss or degradation of spawning habitat in the lower river.

We believe the project's purpose is broader than fish passage and should be considered ecosystem restoration. Although fish passage is the driving element, dam removal will also provide an important benefit by restoring the fluvial processes upstream and downstream of the project area. The downstream channel will benefit from the increased transport of sand and gravel and the habitat condition should greatly improve overtime. An increase in the sediment supply will help restore the estuary and increase intertidal habitat available for tidewater gobies and southern steelhead. Eventually, a natural free-flowing river would result in normal sediment deposition downstream that could lead to better habitat for sensitive species such as the southwestern willow flycatcher, least Bell's vireo, western snowy plover, and even the arroyo toad.

The area upstream of Matilija dam is now suitable for arroyo toads, but primarily on the private inholdings from about a mile upstream of the dam to the junction of the upper north fork of Matilija Creek (Sweet 2004). Sediment stabilization and soil cement channel lining this area will temporarily eliminate the existing suitable habitat for arroyo toads. Prospects for arroyo toad introduction into the Ventura River will be better with the dam removal. The Ventura River downstream of the dam is currently unsuitable for arroyo toads owing to sediment starvation, but with the restoration of sediment input from the dam removal, the habitat should improve markedly. Whether the current amounts of human incursion into the floodplain would permit arroyo toads to exist in the Ventura River is unknown; however, we expect that the river channel will be less incised after the dam removal and floods will take out anything now on the low terraces. Currently, the Ventura River has flood prone watershed morphology, with essentially palmate headwaters on south-facing slopes that can receive extraordinary amounts of rain (i.e., the 1969 flood events). If all the tributaries recruit at once, then a severe flood model applies the Ventura River. The Matilija Dam no longer stops floods, but the sediment it releases once the dam is removed will fill existing channels and lead to greater lateral spread of floodwaters than currently exists.

Case studies of dam removals reveal marked changes in community structure in formerly impounded river reaches (Dolphin 2003). Typically, this involves the reduction of species adapted to still-water conditions such as carp, pollution-tolerant macroinvertebrates and some aquatic plants (Kanehl *et al.*, 1997). It is generally assumed that waterfowl and raptors also will become less common, although one case study (Edwards Dam Removal) found that bald eagle abundance in the formerly impounded reach actually increased (American Rivers 2003). Offsetting these losses, fish and wildlife diversity in formerly impounded reaches has been shown to dramatically increase, and this increase has come about because of recolonization by species that prefer clean, flowing water (Kanehl *et al.*, 1997). This probably results from changes in the nature of instream habitat such as restoration of a natural flow regime and increases in rocky substrates, fish cover, and the formation of pools and riffles.

RECOMMENDATIONS

In the event that the Matilija Dam Removal Project proceeds, we recommend the following actions that may benefit plant, fish and wildlife resources:

- Continued surveys for least Bell's vireo and southwestern willow flycatcher should be conducted in the present study area for the duration of the project.

- A monitoring program for assessing nesting bird activity should be developed for the project, particularly in the vicinity of reservoir.

- Surveys for bats should be conducted in the vicinity of the dam or any where project activities could affect them.

- A giant reed eradication project should be initiated prior to initiation of a dam removal alternative. Tamarisk and other non-native invasive plants encountered should also be removed. Measures to prevent the spread or introduction of these species, such as avoiding areas with established native vegetation, restoring disturbed areas with native species, and post-project monitoring and control of exotic species, should be developed.

- An intensive eradication program for non-native species (e.g. bullfrogs, bass, carp, *etc.*) should be completed prior to initiation of a dam removal project both within the reservoir and downstream of the dam. Eradicating these species from the reservoir prior to dam removal will prevent any downstream relocation. Downstream eradication of non-native species may result in lower mortality to native species.

- A relocation plan for the California red-legged frog, southwestern pond turtle, coastal whiptail, two-striped garter snake, and other special status species should be developed and initiated prior to initiation of a dam removal project. Other native species should also be considered for possible relocation out of the project area.

- Revegetation and stream restoration programs should be developed prior to the start of any dam removal activities. A native plant nursery should be developed at or near the project site to provide a source of plants and trees for revegetation. Cultivation of locally native tree species should be initiated as soon as possible to help incorporate multiple age class plants in the revegetation plan.

- The sediment in the reservoir is sorted with fine material near the surface and closer to the reservoir and the coarser material near the bottom and further upstream. This sorting should be considered when constructing the new stream bed. The finer material should be placed on the bottom of the fill with the coarser material used as the streambed. The channel's gravel bed should be deep enough to provide suitable spawning material 2 feet below the expected channel bottom.

- A wildlife care facility should be contracted to treat sick, injured, or orphaned animals found in the study area.

- A reintroduction program for arroyo toad and California red-legged frog into the study area should be evaluated.

- Mortality and injury to species within the project site could be reduced by minimizing and clearly demarcating the boundaries of the project areas and equipment access routes and locating staging areas outside of sensitive areas.

- Avoiding work activities during the breeding season would reduce adverse impacts to sensitive species.

- Improper handling, containment, or transport of individual species should be reduced or prevented by use of qualified biologists.

- The creation of nuisance ponds in the project area that may render native species vulnerable to predatory species should be avoided.

- Best management practices should be implemented and the area to be disturbed should be kept to the minimum necessary to reduce the amount of sediment that is washed downstream as a result of project activities.

- All roads constructed for the project should be decommissioned except those needed for future project maintenance.

- Project workers should be informed through a worker education program of the presence of species and the measures that are being implemented to protect them during project activities. The program should describe: the importance of keeping the project site free of trash to avoid attracting predators to the project site, which could harass or prey on aquatic species; on-site signage, printed material with sensitive species information; and worker orientations. Project workers should also be informed of the importance of preventing hazardous materials from entering the environment. Locating staging and fueling areas a minimum of 65 feet from riparian areas or other water bodies, and by having an effective spill response plan in place could reduce harmful effects and mortality to wildlife.

- Regular monitoring of benthic invertebrates, amphibians, reptiles, fishes, birds, vegetation, and wetlands should be considered downstream of the dam in Matilija Creek, Ventura River, and Ventura River estuary. Monitoring may be limited to specific sensitive species for each major habitat type. Monitoring duration should be based on the project duration, habitat types, and species.

- Because federally listed species may be affected by any of the proposed alternatives, the Corps should consult with the Service pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.).* Informal consultation or conferences may be conducted to exchange information and to resolve conflicts with respect to listed species prior to a written request for formal Section 7 consultation.

CONCLUSION

We believe that the proposed Matilija Dam removal project presents an important opportunity to restore listed species in the Ventura River watershed, and thereby contribute to the recovery of listed species. This project is on a watershed scale and will restore basic physical processes responsible for creating and sustaining habitats and ecosystem functions that support listed species. The project will also benefit current weak stocks of southern steelhead, which spawn in the Ventura River system. We offer our support for the project and believe the Corps should aggressively move forward with the preferred alternative.

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APPENDIX C.

BIOLOGICAL ASSESSMENT AND SECTION 7 CONSULTATION

APPENDIX C1.   BIOLOGICAL ASSESSMENT of species under the jurisdiction of the National Marine Fisheries Service (NMFS)

I.   INTRODUCTION

This Biological Assessment is prepared to comply with the regulations on interagency cooperation regarding compliance with the Endangered Species Act (50 CFR 402). These regulations require that a Biological Assessment be prepared to assess the potential impacts of federal projects which are "major construction activities" on listed or proposed threatened and endangered species (50 CFR 402.12). This analysis is intended to satisfy the Corps requirements to prepare a Biological Assessment (as per 50 CFR 402.12) for the Matilija Dam Ecosystem Feasibility Study. (Note that this Biological Assessment relies heavily on the information provided in the Draft Environmental Impact Statement/Report [DEIS/R] for the Matilija Dam Ecosystem Feasibility Study so as not to duplicate previously provided information.)

This Biological Assessment evaluates the effects of the recommended alternative for the proposed Matilija Dam Ecosystem Restoration Feasibility Study on the endangered west coast steelhead (*Oncorhynchus mykiss*).   This species is the only threatened or endangered species identified in a species list letter dated 8 April 2004 (provided at the end of this Biological Assessment) as under the jurisdiction of the National Marine Fisheries Service (NMFS). (Also see section III.A.)

II.   STUDY AREA AND DESCRIPTION OF PROPOSED ACTION

A.   STUDY AREA AND STUDY OBJECTIVES

This Biological Assessment relies heavily on the information provided in the Main Report and the Draft Environmental Impact Statement/Report [DEIS/R] for the Matilija Dam Ecosystem Feasibility Study. The information in this section is a brief summary of a more detailed description of the proposed restoration alternative that appears in the Main Report.

The study area is located in Ventura County, California approximately 70 miles northwest of Los Angeles, and encompasses the area around Matilija Dam and Reservoir and downstream of the dam along Matilija Creek and the Ventura River to the Pacific Ocean (see Figure 2 of the Main Report).

The purpose of this feasibility study is to evaluate opportunities for reestablishing natural ecosystem functions and riverine processes that have been degraded as a result of the construction of Matilija Dam. This study evaluates the effect of Matilija Dam on the ecosystem and the natural dynamic riverine, estuarine and coastal processes, and formulates restoration features designed to improve the potential for long-term survival of native aquatic, wetland and terrestrial complexes as self-regulating, functioning systems.

Specifically this study focuses on identification of the Federal interest in (1) ecosystem restoration for terrestrial and aquatic habitat to benefit native fish and wildlife (including the federally listed endangered southern steelhead trout) to the Ventura River and Matilija Creek in the vicinity of Matilija Dam; and (2) improvements to the natural hydrologic and sediment transport regime to support Ventura River's coastal beach sand replenishment.

The proposed project is also described in detail in the DEIS/R (see Section 2 of the DEIS/R)

B. PROPOSED RESTORATION ALTERNATIVE

Several alternatives were considered in the feasibility study, and the alternative analysis process is documented in section 3 of the DEIS/EIR (and section 3 of the Main Report). See section 3 of the DEIS/EIR for descriptions of all alternatives (including the No Action alternative) and alternatives that were eliminated from further study. The following is a brief description of the recommended restoration alternative. A more detailed description appears in the Main Report and DEIS/EIR.

1. Proposed Alternative Project Features.

The recommended restoration alternative includes the features summarized below. (For a more detailed description of these features [including proposed locations and diagrams] see Figures 3-1a, 3-1b, and 3-2 of the DEIS.)

The recommended restoration alternative is identified as: Full Dam Removal/Sediment Stabilization on-Site: Short-Term Stabilization. This alternative involves the following features: 1) complete removal of Matilija Dam, 2) slurrying 2.1 million cubic yards of fine grained (mostly silt) sediment from the current "reservoir area" to a downstream disposal site, 3) stabilizing the remainder of the trapped sediment stored behind the dam but allowing upstream (coarse grained) stored sediment in the upper channel area to be transported downstream by storms that exceed the 2-5 year storm event (i.e., flows exceeding 3000 – 7500 cfs), and allowing delta area (medium-grained sediment with fines) stored sediment in the mid-basin area to be transported downstream by storms that exceed the 10 year storm event (i.e., flows exceeding 12,500 cfs), 4) downstream (of the Dam) improvements (new levees/floodwalls, expansion of existing levees, bridge removal and bridge extension) in specific areas to mitigate impacts that result from sediment-induced flooding, 5) sediment bypass structure at the Robles Diversion Dam, and 6) includes removal of about 250 acres of *Arundo donax* (Hereafter, refered to as Arundo or Giant Cane) from the study area.

(Note: the area behind Matilija Dam [i.e., the area that makes up the historic extent of the Matilija Reservoir] is discussed in the Main Report and this BA as 3 zones: "Reservoir Area", the "Delta Area", and the "Upstream Channel Area". These areas are described and depicted in the Main Report in Section 2, (Fig. 2-17).

It is estimated that the recommended restoration alternative will require approximately 36 months to complete the slurrying operation of the ‘Reservoir Area’ sediment, removal of the dam, excavation of the channel, and stabilizing sediment stored on-site. While removal of the remaining trapped sediment will be variable and dependent upon the hydrology, it is assumed that within 20 years of initial earthmoving and deconstruction activities, the natural re-vegetation of the area behind the dam will be completed. Arundo removal downstream of the dam will occur within a five year period of the onset of construction activities.

Various components of the Recommended Restoration Alternative are as follows:

(a) Removal of Reservoir Area Sediments

The ‘Reservoir Area’ sediment, approximately 2.1 million cubic yards of mostly silt, underlying the existing lake behind Matilija Dam will be slurried to a designated downstream disposal site, allowing for removal of the dam.

Two 12-inch cutter head suction dredges working 24 hours a day, 7 days a week will be utilized to slurry the 2.1 million cubic yards of fine sediment in approximately 9 months. Fresh water from Lake Casitas (4,500 acre-feet) would be used for the slurry media. The slurry would then be transported by pipeline to disposal areas located downstream

The upstream limit of the disposal site is approximately 0.5 miles downstream of Robles Diversion Dam. (See Fig. 3-1a of DEIS). (Note that two possible sites are identified in the Main Report for the slurry disposal site: a 118-acre site and a 94-acre site. Detailed discussions of the two optional sites are provided in section 3 of the Main Report.)

(b) Temporary Stabilization of Remaining Sediments

While the slurry operation is taking place, a channel will be excavated in the ‘Delta’ and ‘Upstream Channel’ areas in the Basin of Matilija Dam with an alignment similar to the pre-dam channel. The 1.3 million cubic yards of sediment excavated to construct the channel will be temporarily placed in three storage sites, with an alternate fourth site identified at this time in case it is determined that it is needed. The storage sites are designed to erode and transport sediments downstream during flood events greater than the 2-5 year storm event (i.e., flows exceeding 3000 – 7500 cfs) for upstream storage sites, which has largely coarse-grained sediment, and the 10-year storm event (i.e., flows exceeding 12,500 cfs) for mid-basin storage sites, which will have mostly mid-grained sediment. (See Fig. 3-2 of DEIS/EIR).

During the slurry operation, the perimeter of the current Reservoir Area, the Delta Area, and Upstream Channel Area sites will be stripped of most of the existing vegetation, particularly the large stands of Arundo. Other native vegetation that is intertwined with Arundo will also be removed. One stand of oak trees in the Upstream Channel area, but has not been subject to significant amounts of sediment deposition, and , therefore, will be protected in place. A more detailed Arundo removal plan in the Matilija Dam area and in River Reaches downstream is discussed below and in the DEIS (section 3.6).

The excavated channel will be 100 feet in width to allow for a smaller meandering channel to naturally develop in the channel bottom between storm events. The channel 3H:1V sideslopes will be lined with soil cement up to 7 feet above the channel invert and 5 feet below to prevent undercutting of the structure. The soil cement revetment was included in the design to reduce erosion of the trapped sediments for the more frequent events (less than 10 years). Storm events greater than 12,500 cfs (i.e., of 10-year recurrence) would erode the remainder of the trapped sediments over time, including the estimated 770,000 cubic yards of fines that are intermixed with the larger grain-sized material.

Locations for the sediment storage sites align the channel in a similar way to pre-dam conditions. No re-vegetation plans of the storage sites or channel are included in the Recommend Plan. It is assumed that the area will naturally re-vegetate after several years.

Material behind the revetment will periodically need to be graded to avoid undermining of the revetment and improve erosion potential. All soil cement revetment would be removed from the site following sufficient evacuation of stored sediment from within the original reservoir limits.

(c) Dam Demolition

The dam demolition process will be conducted in one phase, initiated during slurry operations. Following dredging of the Reservoir area, the remainder of the structure above the original streambed (approximate elevation 975 feet) will be removed. This will be done by controlled blasting, in approximately 15-foot vertical increments. Concrete rubble (77,000 cubic yards, assuming a bulking factor of 1.5) will be processed after blasting as required for transportation to a commercial concrete recycling plant.

(d) Downstream Flood Control Protection Improvements

Current hydraulic modeling performed for the feasibility study indicates significant deposition will occur in the channel between the dam (RM 16.5) through the reach occupied by Robles Diversion Dam (at RM 14.15), downstream to San Antonio Creek (RM 13), and further downstream to Casitas Springs (RM 6) during the 50-year project life or during a single, large flood event. (See below for a discussion of the hydraulic modeling performed for the feasibility study.) Preliminary studies were conducted to determine the magnitude of the impact of downstream sedimentation within the 100-year floodplain from the expected change in water surface elevation predicted by the hydraulic model.

As previously stated, new levees/floodwalls, expansion of existing levees, bridge removal and bridge extension are proposed in certain River Reach locations to mitigate these expected impacts. The location and description of the flood control improvements are described in detail in Section 4 of the Main Report and Section 3 of the DEIS/EIR; these improvements are considered part of the recommended restoration alternative.

(e) Sediment By-pass

A sediment bypass would limit the amount of deposition (typically coarser sediment) in the existing sediment basin at the Robles diversion facility by allowing increased sediment loads associated with removal of Matilija Dam to be flushed downstream of the facility. Therefore, a sediment bypass structure at the Robles Diversion structure is included in the recommended restoration alternative primarily to reduce the amount of coarse sediment deposition that occurs at the Robles Diversion sediment basin. The high flow sediment bypass would be located to the east of the sediment basin overflow weir at the Robles diversion facility. Environmental benefits to the riparian ecosystem are also expected, as the sediment by-pass is expected to allow this sediment fraction to remain in the river channel during high flows and allow for a more natural sediment transport processes to occur through that river reach and not become trapped within the sediment basin.

The bypass would be a radial gate structure (140-ft wide) with four gates, and have a capacity of 10,000 ft^3/sec. The advantage of a radial gate system is that it allows water levels to be maintained constant in the forebay for diversion operations while also allowing flushing of sediment at the gates from the lowermost portion of the water column profile (i.e., bed load) where coarse sediment loads are the highest. The current sluice gate structure (three radial gates) to the west of the overflow weir would remain in place and would continue to operate as needed. It has a capacity of approximately 7,000 ft^3/sec. (As such - the bypass combined with three existing radial gates, allow for passage of sediments and flows up to 17,000 cfs.)

Initial modeling shows that a sediment bypass structure placed at the sediment basin would limit the amount of deposition at Robles to approximately existing level conditions. This bypass feature would significantly reduce any potential impacts related to water diversions at the Robles facility. Also, the bypass structure is conservatively estimated to not affect turbidity levels at the Robles facility and to Lake Casitas, since fine sediment remain unaltered by the proposed bypass structure.

A new concrete overflow weir will replace the existing timber crib weir structure to insure the adjacent sediment bypass structure is not undermined during very large flow events. Although the existing overflow weir structure is designed to withstand a 100 –year event storm, a loss of the structure would undermine the stability of the high flow sediment bypass. A new concrete overflow weir would need to be constructed allowing it to be tied into the concrete foundation of the sediment bypass structure.

Selective operations of the bypass gates in conjunction with the existing sluice gates could allow the diversion at Robles to remain in operation in larger flood events than previously possible. The conceptual plan is shown in Figure 4-4 of the Main Report.

Initial coordination with the NMFS is ongoing relative to the design of the bypass. The goal is to design and operate the bypass structure such that, in addition to reducing the amount of sediment retained within the Robles Basin, it also increases opportunities of steelhead to pass through the area. Currently, it is estimated that the Robles fishway allows for 18 fish passage days through Robles structure with > 50 cfs (a total of 44 natural passage days pre-Robles have been assumed in the Biological Opinion for the fishway (cf. Rogers 2003 and NMFS 2003, and HEP Appendix, section 3.B(2)(a)). Attempts will be made to design the bypass structure so that it results in an increase in the number of “passage days” that are available to steelhead through the area.

(f) Desilting Basin

A desilting basin is included as a local “betterment” for the Recommended restoration alternative. (In an instance where the local sponsor may want features that are larger than the Federally supported plan; the incremental increase in the federal plan is termed a “betterment” and is entirely a non-Federal responsibility.) The desiltation basin is considered a betterment with respect to improving diversion operations at Robles diversion as compared to the baseline conditions. The desilting basin, an off-line structure to the Robles-Casitas canal, functions by allowing diverted flows from the Ventura River to settle out fine sediment (silts, clays) prior to conveyance of the flows via the canal to Lake Casitas. Canal waters would be diverted through the desilting basin, reducing the velocity of the flows and allowing the fines to settle in the basin.

The size of the basin is based on the required storage capacity to settle fine sediment for a 1991 storm event. Hydraulic model simulations estimated that the storage capacity would need to be 61 acre-feet to settle about 46 acre-feet of fine sediments, providing extra volume to limit the maximum velocity of the diverted flows. (The capacity was determined by using the fine sediment load of 46 ac-ft, resulting from a 3 to 4-yr recurrence 1991 storm event; total fine sediment loads attributed to trapped sediment at Matilija Dam remaining after slurrying of ‘Reservoir Area’ sediment is 200 ac-ft).

The proposed basin would require excavation and levee construction to contain the diverted flows. Fine sediment would be settled out by the addition of a flocculating polymer. The resulting sludge would require periodic removal and disposal to a nearby storage site. To prevent infiltration losses, a geofabric liner would be installed. The intake structure to the canal will require modification. Three proposed locations of the desiltation basin are identified near the Robles-Casitas canal (Figure 3-1a of the DEIS/EIR). Conceptual plans for the desiltation basin are shown in Figure 4-5 of the Main Report.

(g) **Arundo removal**.

As previously mentioned, the invasive exotic plant, Giant Cane (*Arundo donax*), will be removed from the area behind the dam as a result of dam deconstruction and sediment stabilization on-site. In addition, Arundo is proposed to be removed from several downstream River reaches to improve the quality of habitat within the riparian corridor of downstream of the dam.

Eradication efforts would, in general, start from the uppermost Reaches in the study area and work downstream. (The reverse direction would be counterproductive since potential propagules transported fluvially from upstream areas would likely infest eradicated areas downstream. Prior to commencement of dam deconstruction and earthmoving activities, efforts to eradicate Giant Cane in Reaches 9, 8 and 7 will be completed.)

Giant Cane eradication would be accomplished by mechanical and manual removal of the biomass (chip and haul), followed by herbicide spraying of the ground area. Periodic follow-up treatment would be required for a period of at least 5 years. (For more details of the Arundo removal strategy, see Habitat Valuation Appendix [Appendix E, sub-Appendix 4]).

h) Recreation Plan and Components

The conceptual recreation plan will be located within the project site area using established construction and maintenance facility and access requirements, staging areas and disposal sites. The alignments for slurry pipelines and freshwater lines as well as any haul roads and other access routes will consider future recreation potential. Recreation facilities will also be considered outside the immediate project area that would connect to and enhance other regional recreation resources. The plan would include a network of trails and interpretive areas and would greatly enhance the value of the project in terms of education and recreation. Based on preliminary site analysis, two trails, one of which would utilize an existing access road, and three interpretive areas are proposed for the project site (see Figure 4-7 in Main Report).

Trails: Within the area immediately around and upstream from the dam site, the addition of a pair of trails could provide a linkage from Highway 33 to the Matilija Wilderness Area while also providing a 3-mile trail loop for shorter walks and access to the project area.

A multi-use trail could be developed from the existing unimproved access road that parallels the eastern edge of Matilija Lake. This road currently connects from Highway 33 to the public road that leads up Matilija Canyon. A parallel trail could be cut down slope from the multi-use trail. This trail would facilitate better access to the project site while providing opportunities for low-impact wildlife observation near the riparian areas of the creek.

Interpretive Areas: Based on existing facilities and landscape features, three interpretive areas are proposed for the project area. Specific facilities at these areas could include comfort stations, shelters, picnic areas, drinking fountains and faucets, interpretive signs and markers, and similar features consistent with Corps of Engineers guidance.

Interpretive Area A: The greatest opportunity for interpretation, as well as ancillary facilities such a restrooms and water, exists at the dam site itself (Interpretive Area A). At a minimum, this 9-acre area could function as a gateway and staging area to the project area as well as Matilija Canyon as a whole. This site could include an informational kiosk and interpretive materials or potentially a small interpretive center that could serve as a facility for project construction activities and coordination. This location is also strategic for the local community in that it would alleviate the adverse effects of recreational staging in the residential area further up Matilija Canyon.

Interpretive Area B: This site would be located at Hanging Rock, an historically- significant geologic landmark that has been buried due to sedimentation associated with operation of the dam. The Hanging Rock is a landmark that has been the subject of many historic postcards and images of Matilija Creek to the point of being an icon of the area. Should the opportunity arise as a result of the project to restore this landscape feature, the Hanging Rock would be a likely location where users would stop along the trail. As such, this would be a strategic location to provide interpretive amenities and/ or a rest area. The historic significance of this site as natural landscape feature would provide numerous interpretive opportunities.

Interpretive Area C: This area would be located at the northern end of the immediate project area where the proposed multi-use and hiking trails converge. This is a key location in terms of the broader trail system in that users would have the opportunity at this location to continue up Matilija Canyon or to return to the staging area via the trail loop. This site could be designed to encourage casual trail users to return via the loop trail in order to minimize impacts to residences further up the canyon. Serious consideration should also be given to routing an extension of this trail so as to avoid having to use the road as a trail connection. An alternative route would be safer for both trail users and motor vehicle drivers while providing a more wilderness/rural experience for the trail user and minimizing potential conflicts between recreation and canyon residents.

(i) Hydraulic Models Used in assessing Impacts for the Matilija Feasibility Study

To assess and forecast sedimentation and turbidity impacts to aquatic resources within the feasibility study area, hydraulic models were utilized. Detailed discussions of models are provided in the Hydrology, Hydraulics, and Sedimentation Studies of Alternatives (Appendix D of the Main Report, hereafter called the H&H Report).

Sedimentation forecast. The behavior of the River in response to sediment loading was modeled using GSTARS-1D (Generalized Sediment Transport model for Alluvial River Systems – 1 Dimension). Storms that occurred in 1991-2001, repeated 5 times, were used as input to develop a 50-year hydrograph to model and predict long-term downstream sedimentation under without and with project conditions (i.e., for restoration alternatives). The hydrologic simulation does not include any events larger than the 20-year event. [5% exceedence]). (Also see H&H Report, Sections 8.1 and 9.1.)

Turbidity forecast. The GSTARS-1D model was also used to predict the concentrations of fine sediment (silts and clays) expected from various discharges. Sediment concentrations were used as a measure of stream turbidity.

A wet hydrograph and a dry hydrograph were used to predict turbidity levels and durations. The wet hydrograph, which included the 1991 storm (a 3-4 year storm of 3000 cfs) and the 1998 flood (a 15-year storm of 12.5K & 15.2K cfs), was used to assess potential impacts and simulate conditions under a likely wet period following dam removal. The dry hydrograph (i.e., 6 dry years from 1954 – 1960 with discharges ranging between 0 and 5500 cfs) was used to forecast turbidity under drought condition (see H&H Report, sections 8.1 and 9.2).

Water surface elevations. Floodplain analysis for baseline (without-project) conditions was performed using the HEC-RAS hydraulic model. Overflows were mapped for the 2, 5, 10, 50, 100, and 500-year recurrence intervals. GSTARS-1D (following confirmatory validation by HEC-RAS) was used to predict with-project conditions floodplain impacts for similar recurrence intervals used for baseline conditions.

Detailed descriptions of the models and how they were used in the feasibility study are provided in the H&H Report (Appendix D of the Main Report).

2. Initial Construction Activities.

Constructions activities associated with dam removal (i.e., deconstruction of the dam, removal of sediment from behind the dam, and stabilizing sediment on site) are expected to occur over approximately 36 months. Some aspect of construction is expected to occur year round; construction activities in or around water or active channels would occur in the usually dry period of April-December. It is estimated that Arundo removal will occur with 5 years.

Activities associated with the dredging of 2.1 million cubic yards of sediment sequestered behind the dam, stabilizing 1.3 million cubic yards of sediment in the reservoir area, and deconstructing the dam are described in section II.B.2, above. Equipment expected to be used includes: front end loaders, dump trucks, scrapers, dozers, graders, backhoe, water trucks, and rollers. A detailed list of equipment that may be used and a possible schedule of when activities are performed are provided in the Air Quality Appendix (Appendix G, Tables 6.1-1, 6.1-2, and 6.1-5) of the DEIS/EIR. (Also see the M-CACES [MicroComputer-Aided Cost Estimating] Appendix of the Main Report).

3. Future Operation, Maintenance, Repair, Rehabilitation, And Replacement (OMRRR).

In compliance with authorizing legislation and cost-sharing requirements, the non-Federal sponsor will assume responsibility of Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRRR) of this project after initial construction is completed by the Corps. An Operation and Maintenance Manual will be developed as part of turning over the project to the local sponsor. The manual will describe the specific requirements expected for properly operating and maintaining project features to assure they will continue to function. The OMRRR requirements for the project features are described in general below.

(a) Ecosystem Restoration Features

In general, there will be little operation, maintenance repair, rehabilitation or replacement requirements necessary for those features of the project associated with ecosystem restoration after construction and adaptive management is completed, and after sediment behind the soil cement is depleted, the soil cement will be removed and the residual area of the reservoir will be revegetated, if necessary. It is expected that all sediments associated with the dam will be depleted after a ten-year period and the hydrologic and sediment transport relationships will be restored to pre-dam conditions.

(b) Mitigation for Induced Flooding

The OMRRR requirements for the induced flooding mitigation features will require maintenance of the levees and floodwalls. This includes periodic inspections, especially after flood events of the constructed features, and appropriate repair of any damages that could impact its function.

(c) Mitigation for Water Supply Impacts

Some sediment OMRRR may be required at Robles Dam, although maintenance should be relatively minimal with the construction of the sediment bypass.

(d) OMRR at Robles Dam associated with Matilija Dam deconstruction

Portions of the operations at the Robles Diversion Facility that could potentially be impacted by the expected increased sedimentation resulting from deconstruction of Matilija Dam include: potential impacts of suspended material entering the Robles-Casitas Canal, potential sediment deposition into the Robles sediment basin, and possible deposition at the fish screen and fishway (see H&H Report, section 9.3 and 10.3). The removal of the additional (above No Action) sediment at the facility will be conducted within the existing environmental constraints that sediment is removed from Robles facility as per existing (No Actions) operations and maintenance.

To address the potential impacts from suspended sediment entering the Robles-Casitas Canal, the Locally preferred Plan incorporates a Desiltation Basin. As discussed in Section II.B.1, the desilting basin, an off-line structure to the Robles-Casitas canal, would function by allowing diverted flows from the Ventura River to settle out fine sediment (silts, clays) prior to conveyance of the flows via the canal to Lake Casitas. Fine sediment would be settled out by the addition of a flocculating polymer. The desilting basin will be cleaned out after every storm that causes and accumulated depth of more than 1 foot, or prior to the onset of the rainy season in October. Sediment from the desilting basin will be transferred to an adjacent permanent storage site.

The sediment bypass is expected to limit the amount of deposition in the sediment basin. Deposition at Robles with the proposed sediment by-pass in place is expected to have less deposition than currently experienced at Robles. (Model simulations that assume that the bypass structure is open throughout the entire simulated storm predict that sediment deposition in the basin is than the No Action alternative. See section 10.3 and Figure 10.4 of the H&H Report)

At the fish screen and within the fishway, it is anticipated that the additional deposition will be mostly sandy sediment. For the preferred restoration alternative, preliminary estimates of two to three feet of deposition, or about 400 cubic yards, may occur upstream of the fish screen once or twice a year. Some deposition would occur in the fishway. Under baseline conditions, the fishway has been designed to require only low maintenance and to typically function for the entire diversion season before requiring routine maintenance. It is predicted that the deconstruction of Matilija Dam will result in deposition of 400 cubic yards of material at the fish screen that will need to be removed once or twice a year.

(e) **Recreation Plan**

Maintenance requirements needed for the Recreation Plan include items to assure continued functioning of the features and public safety. This will include assuring trails are kept clean of debris, emptying trash barrels, repairing or replacing picnic facilities, comfort stations, etc.

III. THREATENED AND ENDANGERED SPECIES IN THE PROJECT AREA

The only species under jurisdiction of the National Marine Fisheries Service that potentially occurs within the Study Area is the west coast steelhead (*Oncorhynchus mykiss*).

A. Status of Southern California Steelhead.

In response to a petition to list west coast steelhead (*Oncorhynchus mykiss*) populations under the ESA, the NMFS conducted a status review of this species (Busby et al. 1996). In this status review, 15 distinct populations or Evolutionarily Significant Units (ESUs) of steelhead in Washington, Oregon, Idaho, and California were assessed of their risk of extinction. In California 5 ESUs were identified; only the Southern California ESU was designated as endangered. The Southern California ESU consists of all steelhead and their progeny that occur in coastal river basins from the Santa Maria River (inclusive) to the U.S. – Mexico Border (62 FR 43937, August 18, 1997; 67 FR 21586, May 1, 2002).

Extensive habitat loss due to water development, land use practices, and urbanization are largely responsible for the current endangered population status. In addition, hatchery practices and rainbow trout planting may have led to genetic introgression.

B. Life History and Habitat Requirements

The following discussion on “Life History and Habitat Requirements” (this sections) and the following discussion on “Status of Steelhead and Steelhead Habitat in Matilija Dam Feasibility Study Area” (Section C) is taken largely (and in many instances verbatim) from NMFS (2003:28-36) (unless otherwise noted) and is incorporated by reference per 40 CFR 1502.21.

The major life history stages of steelhead, relative to this discussion, involve freshwater rearing and emigration of juveniles to the ocean, upstream migration of adults, spawning, and incubation of embryos (Moyle 2002; Busby et al. 1996). Steelhead rear in freshwater for one to three years before migrating to the ocean, usually in the spring, where they may remain for up to four years. Steelhead grow and reach maturity at age two to four while in the ocean. Adults immigrate to natal streams for spawning during October through March, but some adults do not enter coastal streams until spring. Adults may migrate several miles, hundreds of miles in some watersheds, to reach their spawning grounds. Adult immigration appears to be associated with winter/spring storm events, with upstream migration triggered by changing flow conditions.

Although spawning may occur from December to June, the specific timing of spawning may vary among and between years, as well as streams, within a region. Migration and life history patterns of Southern California steelhead depend more strongly on rainfall and stream flow than is the case for steelhead populations farther north. Recent observations on the Santa Clara River suggest that spawning peaks in February and March, and smolt outmigration can continue into mid-June if sufficient flow persists. Steelhead do not necessarily die after spawning and may return to the ocean, sometimes repeating their spawning migration one or more years. Female steelhead dig a nest (redd) in the gravely stream substrate and then deposit their eggs. After fertilization by the male, the female covers the nest with a layer of gravel; the embryos incubate within the gravel pocket. Hatching time varies from about three weeks to two months depending on water temperature. The young fish emerge from the nest about two to six weeks after hatching.

Low stream flow, high water temperature, physical barriers, low dissolved oxygen, and high turbidity can delay or halt upstream migration of adults and timing of spawning, and downstream migration of juveniles and subsequent entry into estuary, lagoon, or ocean. Suitable water depth and velocity, and substrate composition are the primary requirements for spawning, but water temperature and turbidity are also important. Dissolved oxygen concentration, pH, and water temperature are factors affecting survival of incubating embryos. Fine sediment, sand and smaller particles, can fill interstitial spaces between substrate particles, thereby reducing water-flow through and dissolved oxygen levels within a nest. Juvenile steelhead require living space (different combinations of water depth and velocity), shelter from predators and harsh environmental conditions, food resources, and suitable water quality and quantity, for development and survival.

Young-of-the-year and yearling steelhead generally use riffles and runs during much of a given year where these habitats exist. However, young-of-the-year and older juveniles may seek cover and cool water in pools during the summer, particularly as discharge and, therefore, space declines in summer and fall.

C. Status of Steelhead and Steelhead Habitat in Matilija Dam Feasibility Study Area.

Steelhead populations in the Ventura River system have not been well studied (Chubb 1997). Prior to the completion of Matilija Dam in 1947, CDFG personnel estimated that a minimum of 4,000 to 5,000 steelhead spawned in the Ventura River system in normal water years (Clanton and Jarvis 1946; Clanton and White 1946). Observations of small numbers of adult steelhead in the Ventura River have continued through the present, including documented steelhead sightings in 1974, 1975, 1978, 1979, 1991, 1993, and 2001. NMFS estimated run size of less than 200 adults (Busby et al. 1996) is the most recent estimate of the Ventura River steelhead population. However, in light of the continued pressures exerted upon the population and the paucity of recent sightings in the drainage, NMFS believes that the Ventura River steelhead population is likely less than 100 adult individuals at the current time.

The amount of habitat available to steelhead likely has a direct affect on population size, since loss of access to habitat resulting from dams and other upstream barriers is a primary cause of the
steelhead's precipitous decline in southern California (Busby et al. 1996). During times of sufficient rainfall, steelhead historically had access to approximately 50 miles of spawning and rearing habitat within the main stem Ventura River (16 miles), Matilija Creek (12 miles), Coyote/Santa Ana Creek (14 miles), and San Antonio Creek (8 miles) (from various sources cited in NMFS 2003).

Prior to completion of Matilija, Robles and Casitas Dams, the prime steelhead spawning and rearing habitat was located within the upper Coyote Creek and Matilija Creek watersheds. Until the Robles Diversion Fish Passage Facility project is completed, steelhead are limited to the fourteen miles of main stem river below Robles Diversion, three miles of lower Coyote Creek below Casitas Dam, and eight miles of San Antonio Creek. The 25 miles of habitat currently available to steelhead represents less than half of the historic total, and ranges from poor (lower Coyote Creek) to marginal (mainstem Ventura River and San Antonio Creek) quality for spawning and rearing activities. (Note that the Robles Diversion fishway is estimated to open access to about 4.5 miles of steelhead habitat above the diversion dam into Matilija Creek below Matilija Dam and up the North Fork of Matilija Creek.) But while much of the prime spawning and rearing habitat historically occurred in the currently inaccessible upper reaches of Matilija and Coyote Creek, steelhead within the Ventura system have adapted to the current river condition by utilizing available mainstem habitat when the preferred headwater habitat was made inaccessible by insufficient migration flows or anthropogenic barriers (i.e., Matilija Dam and Casitas Dam).

1. Mainstem Ventura River

The 16-mile reach of the Ventura River from the confluence of Matilija Creek and NF Matilija Creek downstream to the Ventura River estuary is affected by numerous anthropogenic disturbances and modifications. Historical operation of the Robles Diversion, located approximately 14 miles upstream of the Ventura River mouth, has profoundly impacted steelhead migration, spawning and rearing throughout the lower Ventura River. In general, flows up to 20 cfs are released downstream during diversion operations. Historic operation of the Robles Diversion greatly diminished most natural migratory opportunities within the lower river. The Robles Diversion fishway passage structure (currently under construction) will open upstream migrational opportunities to steelhead into Matilija Creek above the Robles Diversion structure into Matilija Dam and up the (Lower) North Fork of Matilija Creek, a total of about 4.5 miles of habitat. Additionally, minimum downstream flow releases from the Diversion structure are prescribed in the Biological Opinion to facilitate upstream migration through the lower Ventura River system. (NMFS 2003).

Pumping of subsurface alluvial groundwater occurs at several points close to or within the active channel along much of the 11 miles directly below the Robles diversion structure. The City of Ventura operates a well field and surface water diversion in the Foster Park area, which between 1980 and 1990 extracted an annual average of approximately 6,800 AF of surface flow and groundwater. Several smaller water districts and individual water extractors drew an average of approximately 3,200 AF per year out of the alluvial aquifer between Foster Park and the Robles Diversion during the same time period. When factoring all water extractions and diversions occurring within the upper Ventura River basin (including Casitas), approximately 18,000 AF of water is withdrawn annually. The substantial amount of water diverted from the Ventura River during winter and spring storm events had the effect of substantially abbreviating the duration and magnitude of river flow necessary for successful steelhead migration. Furthermore, extracting water from the alluvial aquifer underlying the Ventura River can dramatically diminish available surface flow and in turn negatively affect instream habitat characteristics.

Aquatic habitat in the lower Ventura River is especially vulnerable to subsurface water extraction during the summer/fall period, when natural surface flow is already at seasonally low levels and rearing fish and aquatic organisms are confined into the Casitas Springs/Foster Park reach where perennial flows historically existed in most years.

2. Matilija Creek below Matilija Dam

The reach of Matilija Creek between the Matilija/NF Matilija confluence upstream to Matilija Dam is represented by a deeply incised, moderate gradient stream reach relatively unaffected by human development except for the small frontage road that follows a majority of its length. This stream reach is, however, adversely affected to a high degree by the long standing Matilija Dam, which has greatly altered historic flow patterns and sediment transport processes within Matilija Creek since its completion in 1948. Alteration of the natural fluvial processes present below the dam (i.e., sediment transport and recruitment, natural storm flow patterns, etc.) has starved the stream reach of suitable spawning substrate and interrupted fish migratory patterns. Yet, the reach currently contains ample rearing habitat for juvenile fish, and small pockets of potential spawning habitat exist

3. North Fork Matilija Creek

Bordering Highway 33 for much of its entire length, North Fork Matilija Creek flows into the

Ventura River 16 miles upstream of the Ventura River estuary. Due to the steep gradient and corresponding pool/riffle habitat that dominates the watershed, large areas of quality spawning and rearing habitat were historically available to steelhead. Since the watershed is relatively unaffected by human development, much of this quality habitat still remains in sections of the main creek as well as some of the larger tributaries of the system such as Bear Creek and Cannon Creek. Upstream fish migration is currently blocked by a degraded "Arizona" (low flow) stream crossing within the Wheeler Gorge Campground located approximately 4 miles upstream of the North Fork Matilija/Matilija confluence. Only habitat downstream of the campground is considered available to steelhead at the current time (upon completion of the Robles fishway structure). However, the U.S. Forest Service is supposedly considering options for removing the barrier.

4. Upper Matilija Watershed.

Several miles of very high quality steelhead habitat exist above Matilija Dam (Chub 1997; Capelli 1999). Recent surveys performed for this Feasibility Study assessed habitat quality and identified impassable barriers to upstream migration above Matilija Dam (TRP 2003). It was estimated that, above Matilija Dam, Matilija Creek, Upper North Fork of Matilija Creek, Murietta Creek, and Old Man Creek provides about 17 miles of good to high quality spawning and rearing habitat. These areas are identified as Reaches 7, 8 and 9 in Figure 1-2 of the DEIS/EIR.

Chubb (1997) and TRP (2003) both provide information on possible upstream barriers to migration. In general, during normal years of normal or high flow there are several miles of steelhead habitat available past Matilija Dam. (In the Habitat Evaluation Analysis for this Feasibility Study (see Appendix E of the DEIS/EIR), it is assumed that there are about 17 miles of stream habitat available to migrating steelhead behind Matilija Dam based on information provided in TRP (2003:19): 8.2 miles in Matilija Creek, 4.9 miles in the Upper North Fork of Matilija Creek, 2.3 miles in Old Man Creek, and 1.9 miles in Murietta Creek.)

Chubb (1997), TRP (2003), and TRP (2004) also provide information on the quality of upper watershed habitat. As expected, not all upper Matilija watershed streams are of equal quality. TRP (2003:21) compared their habitat quality assessment with information previously provided by Chubb (1997) and reported on the few differences in characterization of habitat quality of these upper watershed Creeks. TRP (2004) reports the results of determining the habitat quality above and below Matilija Dam using a modification of an existing HEP rainbow trout model (Raleigh et al 1984). In general, all agree that a significant amount of high quality steelhead spawning and rearing habitat are inaccessible to steelhead as a result of the impassible barrier created by Matilija Dam.

IV. IMPACTS OF THE PROPOSED RESTORATION ALTERNATIVE ON STEELHEAD TROUT

The single most significant impact (beneficial and adverse) to aquatic resources in the study area from the proposed restoration alternative will result from dam-trapped sediment being released into the aquatic ecosystem. The following is a general summary of beneficial and adverse impacts sediment is expected to have on the aquatic ecosystem below Matilija Dam. The following discussion is based largely on: Bash et al. (2001), Bednarek (2001), Graf (2002), Gregory et al. 2002, Kondolf (1997), Newcombe and MacDonald (1991), Shafroth et al. (2002), Wood and Armitage (1997).

Specific impacts of the proposed restoration alternative to steelhead from initial construction and future Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRRR) activities are discussed in Sections IV.A and IV.B, below.

Adverse impacts of sedimentation. Dam removal will result in the transport of previously trapped sediment downstream. Both fine-grained and coarse sediment will be transported downstream during rainfall events as a result of the removal of Matilija Dam. Suspended sediment (the fine-grained silts and clays transported in the water column) degrades water quality by increasing turbidity. Suspended sediment adversely affects aquatic resources by clogging gills and reducing visibility. Bed load sediment transport (i.e., sediment traveling along the channel bed) usually involves coarser material. Bed load sediment can also clog gills, smother spawning gravels, fill pool habitat, and cause abrasions on aquatic organisms. The extent of adverse impacts to the aquatic ecosystem depends largely on the magnitude, frequency, and duration of suspended and bed load sediment transport.

Although elevated sediment levels can have adverse impacts on aquatic resources, these effects are often short-term. Since aquatic resources evolved under these natural disturbances, it is not surprising that they have been documented to recover rapidly. Lucas (1985, as cited in Bednarek 2001) reported that fish began to reappear into the North and South Fork of Toutle River only 3 months after the eruption of Mt. St. Helens released 3 billion cubic yards of sediment into the watershed. NMFS (2001) cite the complete recovery of Tularcitos Creek in 4 years following an event of heavy sediment discharge. The release of approximately 9,150 cubic yards of sediment from Halligan Reservoir (from the North Fork Poudre River of north-central Colorado) resulted in extensive adverse impacts to benthic invertebrates, trout habitat, and fish kill downstream (Wohl and Cenderelli 2000; CDPHE 2002). Near pre-sediment release recovery of the aquatic ecosystem was reported within 3 years (CDPHE 2000:2). Spina and Tormey (2000) found no significant impacts to steelhead habitat in Malibu Creek following heavy sediment load transport. Kanehl et al. (1997:398) reported that natural channel recovery could lead to substantial gains in habitat quality following dam removal within a few years.

The range of recovery of aquatic ecosystems is generally reported as wide, but is usually consistent with natural variation in the sediment levels of the river (Bednarek 2001). Nevertheless, the rate of recovery in aquatic ecosystems after dam removals is difficult to predict due to the large number of controlling factors (Heinz Center 2002:147).

Beneficial impacts of sedimentation. Sediment movement in rivers is a natural occurrence of aquatic and riparian ecosystems. As such, these ecosystems have evolved to take advantage of the periodic, natural disturbances associated with sediment movement. Sediment movement in the aquatic/riparian ecosystem contributes to habitat complexity/diversity by redistributing spawning gravels, formation of riffles, channel widening, increase channel braiding, and contributing to channel movement. The diversity of habitats created by the mosaic of channel forms and sediment movement contributes to the biotic productivity of the riparian ecosystem.

Dam construction typically results in a "sediment shadow" downstream where sediment-starved flows (often referred to as "hungry waters") erode coarse sediment from the channel. This typically results in channel narrowing, bed erosion (channel incision), channel bed coarsening (channel armoring), and reduction in overbank flooding. These changes in the geomorphology of the stream (i.e., physical changes) results in corresponding biological changes (e.g., loss of stream gravels for steelhead spawning and riffle formation, reduced riparian zone due to channel narrowing). As stated above, aquatic/riparian habitat complexity and diversity that occurs with the natural movement of sediment downstream is usually lost below dams (Gregory et al. 2002; Kondolf 1997; Mount 1995:322; Pitlick and Steeter 1998; Pizzuto 2002).

A. INITIAL CONSTRUCTION

1. Direct deconstructions-related Impacts

Direct impacts to aquatic resources associated with deconstruction related activities are expected to be minimized by using Best Management Practices that are typically employed when using heavy equipment around waterways. A significant amount of construction will occur in and around the riverine environment as a result of removing Matilija Dam (e.g., constructing a 100-ft. wide channel through the reservoir sediments, stabilizing the excavated sediment in the reservoir area with 3-7 foot revetment, and the removal and extension of downstream bridges). As mentioned in section II.B.2, it is estimated that the recommend restoration alternative will require approximately 36 months to complete the slurrying operation of the 'Reservoir Area' sediment, removal of the dam, excavation of the channel, and stabilizing sediment stored on-site. While removal of the remaining trapped sediment will be variable and dependent upon the hydrology, it is assumed that within 20 years of initial earthmoving and deconstruction activities, the natural re-vegetation of the area behind the dam will be completed. Some aspect of construction is expected to occur year round; construction activities, however, in or around water or active channels would primarily occur in the usually dry period of April-December.

Standard Operating Procedures and Best Management Practices such as: diverting water around construction activities, installing culvert/rock-fill crossings, pre-cautions to minimize turbidity/siltation such as installing silt fencing and silt catchments basins may all be applied to minimize impacts to aquatic resources. (Appropriate commitments made by the Corps and Ventura County Watershed Protection District on other construction projects in Ventura County [see CDF&G 2003] per the State of California's Streambed Alteration Agreement [Section 1601] will likely be implemented for the 1601 Agreement for this study to minimize adverse impacts associated with construction activities on the aquatic environment.)

Arundo removal activities will also employ Best Management Practices and impacts associated with its removal are expected to have minimal adverse impacts on aquatic resources.

Mitigation Measures/Environmental Commitments that will be employed to minimize the adverse impacts of activities associated with deconstruction of the dam are identified in Section 8 of the DEIS/EIR. With adherence to the mitigation measures/environmental commitments, direct deconstruction-related impacts to steelhead are not likely to adversely affect steelhead.

2. Indirect deconstruction Impacts: sedimentation and turbidity

Deconstruction of Matilija Dam will result in increased sedimentation and turbidity downstream compared to without project conditions. General impacts of sedimentation and turbidity to aquatic resources were discussed at beginning of Section IV.

Under the proposed restoration alternative, erosion of 1.3 million cubic yards of sediment by natural fluvial processes would commence when flows overtop the height of the soil cement revetment placed to temporarily store sediments. Flows greater than 3000-7500 cfs (2-5 year storms) will erode the coarse-grained sediment stored in the upstream storage sites; flows greater than 12,000 cfs (10-year storms) would erode sediment in the other storage sites.

The soil cement revetment would be constructed utilizing aggregate available onsite. All soil cement revetment would be removed from the site following sufficient evacuation of trapped sediment from the reservoir basin. The removal would occur in stages, and will be dependent on criteria establishment in the Monitoring and Adaptive Management Plan (Appendix K), taking into account levels of sediment evacuation and effects downstream. Complete removal is expected to occur within 20 years. A state of equilibrium, whereby sediment entering the river and leaving the river to the ocean will be in balance, will occur about 20 years after removal of the dam (see H&H Report, section 9.6 and Table 9.15).

(a) Sedimentation Impacts.

As stated previously, hydraulic modeling was performed to assess the impact of sedimentation expected from the proposed restoration alternative and to predict where natural fluvial processes will deposit sediment removed from behind Matilija Dam downstream. The actual rate of removal of sediment sequestered behind Matilija Dam depends upon the magnitudes of storms; the following predictions used in this analysis are based on model simulations using the 1991-2001 hydrology, as discussed in section II.B.1(i).

Depths of Deposited Sediment. The following discussion relative to the sedimentation deposited in the study area is based largely on the H&H Report (section 9.1) and information provided in Exhibit G of the H&H Report (Model Results of all Simulations).

Sediment from behind the dam is expected to re-supply river reaches that were starved of sediment as a result of construction of the dam and change the overall without project trend from erosion to deposition. (The channel elevations have decreased by as much as 10 feet from River Mile 5 to River Mile 2). The increase in sediment is predicted to affect the upper river reaches (Reaches 6 and 5) more than the lower reaches. Below Reach 4 (below the Santa Ana Blvd. Bridge), deposition is expected to be minimal. (Also see H&H Report, section 9.1 and DEIS/EIR, Figure 5.2-1.)

(Note that aggradation in Reaches 3 and 1 is predicted with or without the restoration alternative by the hydraulic model. This is primarily the result of sedimentation from the San Antonio drainage, which is unrelated to the deconstruction of the Matilija Dam.)

The average depths of sedimentation 1, 3, 10 and 50 years after removal of the dam are presented in Table 9.8 of the H&H Appendix. The average sedimentation in Reach 6 and 5 (which are just below the Dam) is expected to be between 0.4-0.7 ft. in the first year, between 1 to 1.5 ft. the third year and 1-2.3 ft by the tenth year. Over the 50-year life of the project, the model predicts about 1 to 6 ft. of sediment accumulating in Reaches 5 and 6.

The change in the thalweg elevation at various time intervals for the proposed restoration alternative is presented in Fig.19.147 & Fig. 19.148 of the H&H Report (Exhibit G). Based on the 50-year simulation, the change in the thalweg elevation of the river is predicted to be less than 2 feet by the third year. By year 10, the change in elevation is expected to be between 2-4 feet in Reaches 3, 5 and 6 and remain less than 2 feet in the remainder of the study area.

By year 50, the change in elevations is expected to be more widespread throughout the study area as higher flow storms are expected to remove most of the sequestered sediment. A change in 4-6 feet of thalweg elevation is predicted in the depositional reaches (Reaches 3, 5 & 6). The changes in elevation are less than 4 feet for most of the rest of the study area.

Because significant deposition is expected in the area of the Robles Diversion facility, a sediment bypass is a component of the restoration alternative. This feature is expected to reduce sedimentation in the basin to near without project levels. As mentioned previously relative to future Operations and Maintenance (OMRRR) (section II.B.3, above), it is expected that the fish screen and fishway will need to be cleaned out once or twice a year to remove sediment that is the result of deconstructing Matilija Dam. With the restoration alternative, monitoring and adaptive measures would insure that the fish screen or fishway were unaffected by sediment accumulation resulting from the deconstructions of Matilija Dam.

In Reach 4 downstream to Reach 1, short-term and long-term deposition resulting from deconstruction of Matilija Dam is expected to be minor. The hydrological models predict no difference in the sedimentation rate with the restoration alternative when compared to future without project conditions (i.e., No Action alternative) (cf. Tables 9.2 and 9.8 of the H&H Appendix; also see Fig 5.2-1 of the DEIS/EIR). (Note that sediment deposition within the Ventura Estuary, River Reach 1, is not reliably predicted by the H&H model. See discussion in H&H Report, section 9.1, page 235.)

The sedimentation in the river is expected to occur largely within the first 10-20 years. The deposition is expected to be gradual and not expected to cause any blockages or barriers to fish passage or movement. As such, the depth of sediment and the change in thalweg elevations are not likely to adversely affect steelhead migrational opportunities.

Changes to River Channel Form. Deposition of sediment also is expected to change the channel plan form characteristics, channel geometry, and riverbed. The expected adverse or negligible effects to aquatic resources/steelhead are discussed below. The beneficial effects are discussed under the heading "Beneficial Impacts to Steelhead" (section IV.A.2(c)).

To predict and compare the effect of sedimentation on channel from and channel hydraulics, the hydraulic (HEC-RAS) model was used to forecast the channel width-to-depth ratios by River Reaches for with and without project conditions. (See H&H Report, section 9.7.1.) The channel width: depth ratio is a metric which examines the total width of water relative to the average depth of water for a given flow rate. Drastic changes in the width: depth ratio at various flows might suggest that the channel is not stable and that barriers to fish movement might result.

A River Reach-by River Reach discussion of the width: depth ratio analysis is presented in the H&H Report (section 9.7.1). As a brief summary, an area upstream of the Matilija Delta (River Reach 8) has a width: depth ratio of about 70 that remain constant for flow between 100-3,000 cfs. (High width: depth ratios [i.e. > 40] are normal for braided channels [Mount 1995:75]). Without the project, River Reaches that are incised and degraded have ratios that decrease under high flows (i.e., the channel width does not change as rapidly as the depth decreases); and the ratio increases at lower flows. With the restoration alternative, the River channel is predicted to begin exhibiting constant width: depth ratios in most River Reaches and reverse the trends that exist under the without project condition (especially for flows between 100-300 cfs). As such, no adverse effects (a possibly beneficial effects) to channel form are expected from the proposed restoration alternative.

(b) Turbidity Impacts.

As mentioned in section II.B(i), turbidity was assumed to be a function of fine sediment (silts and clays) concentrations as predicted by the hydraulic model. (Note that the relationship between turbidity and suspended sediment concentrations is not a perfect one (see Bash et al. 2001:3) but for this discussion they are used interchangeably.)

A wet cycle and dry cycle hydrograph was used in the hydraulic model to forecast expected impacts from turbidity. The wet hydrograph is expected to provide a reasonable basis for assessing impacts from a likely wet hydrologic cycle. The dry hydrograph is provided to forecast turbidity under drought conditions.

Under without Project conditions, the majority of fine sediment that enters Matilija Reservoir passes over the dam at the higher discharge. With Matilija Dam in place (No Action alternative) the hydraulic model predicts sediment concentrations peaks of over 10,000 mg/l during storms that quickly dropping to levels background levels of about 800-1000 mg/l afterwards. (See H&H Report, Technical Summary – Table 10, H&H Report, section 9.2, and Figs 19.6 & 19.42).

Removing Matilija Dam is expected to produce significant short-term increased concentrations in sediment (turbidity). Using a wet hydrograph (i.e., 3-5 year or 15-year storms), the hydraulic model predicts that turbidity could increase by 10 times that of background (pre-storm) levels. The high turbidity level is expected to return quickly to levels within natural variability (i.e., 2-4 times pre-storm conditions). After five years the model predicts turbidity levels to be near levels similar to No Action conditions (cf. Figures 19.6 and 19.42; and Figs.19.55 and 19.87 of the H&H Report).

Peak concentrations are predicted to be as high as 10,000 to 30,000 mg/l following wet hydrograph storms. Following storms, concentrations quickly drop to concentrations within the range of No Action (natural) levels (but above the lower No Action levels) for several months.

Model results using a dry cycle hydrograph have no increase in turbidity because the soil cement revetment retains the stored sediment for storms that do not exceed the 2-5 year recurrence interval.

Adverse impacts of high suspended sediment concentrations on aquatic resources were discussed in the beginning of Section IV. Suspended sediment concentrations of 3,000 ppm (i.e., 3,000 mg/l) were reported by Cardone and Kelly (1961) to physically injure steelhead. As previously mentioned, the release of approximately 9150 cubic yards of sediment (concentrations unknown) released from Halligan Reservoir (in north-central Colorado) resulted in an extensive fish kill downstream (Wohl and Cenderelli 2000; CDPHE 2002).

As mentioned above, even without removing the Dam, sediment concentration peaks of 10,000 mg/l are predicted. Under with project conditions, sediment concentrations would peak at similar levels, but would not return to background levels as quickly as under without Project conditions. Adverse impacts to aquatic resources should be expected from elevated concentrations levels. Burial, smothering of benthic invertebrates and fish kills immediately below the Dam may occur due to high, prolonged sediment concentrations.

As discussed in the beginning of section IV, recovery of aquatic ecosystems from excessive sedimentation is generally rapid (i.e., within a few years). The hydraulic model predicts that under with Project conditions, sediment concentrations should return to levels within the range of natural variability of without project conditions (i.e., 2 to 4 times above background levels) within days and to levels similar without project conditions in 2-3 years. As such, potential impacts to steelhead are predicted to be adverse and significant but of a short-term duration.

(Also note that the preferred restoration alternative includes slurrying 2.1 million cubic yards of fine sediment to a downstream disposal site specifically to reduce the adverse impacts that suspended sediment would have on the water quality and aquatic ecosystem downstream.)

(c) Beneficial impacts to steelhead

Beneficial effects of Sediment. The general beneficial effects of sedimentation on riparian ecosystems were briefly discussed in the beginning of section IV. Southern California channels, when not confined by bedrock canyons, typically exhibit braided channel patterns that contain active channels, inactive side channels, channel bars, and islands that provide a variety of aquatic and adjacent riparian habitats that support various biological resources. Sediment-laden discharges are the main contributor of formation of southern California's braided channels (Mount 1995:71-74).

Deconstructing Matilija Dam is expected to result in significant beneficial effects to the aquatic ecosystem downstream of the dam as the natural sedimentation processes that lead to channel complexity and habitat diversity (that would result in increased aquatic productivity) are restored. Sediment-starved River Reaches downstream of Matilija Dam are expected to experience significant aggradation as sediment is re-supplied. The proposed sediment by-pass at the Robles Diversion structure is expected to allow high-flows to naturally move sediment downstream and avoid entrapment in the Robles Basin. The channel in River Reaches 5 and 3 that have experienced downcutting (incision) for the past 30 years and are expected to aggrade significantly following deconstruction. (Reach 4 is considered relatively stable and significant aggradation is not expected.) (see H&H Report, section 9.1). It is expected that Reaches 5 and 3, especially, might experienced an improvement in the steelhead spawning habitat quality as more coarse gravel becomes available (see HEP Appendix, Appendix E of the DEIS/EIR).

The 100-ft. wide channel in the former Matilija Reservoir area (Reach 7) is expected to have hydraulic conditions favorable to steelhead upstream migration. The excavated channel will allow for a naturally meandering, low flow channel to develop. As such, once the dam is removed and the channel is excavated through the reservoir sediments, significant benefits to steelhead are expected as upstream migration to about 17 miles of high quality habitat upstream of Matilija Dam is restored.

Other beneficial effects of Dam deconstruction. Besides removing a significant migrational barrier to upstream fish migration, the aquatic ecosystem is expected to receive significant benefits from the eradication of exotic species (bullfrogs, largemouth bass, bluegill and Arundo) that thrive in Matilija Reservoir. (The beneficial impacts expected from eradication of the exotic Arundo are discussed in the next sub-section.)

Bullfrogs, largemouth bass and bluegill are common in the existing warm-water of Matilija Reservoir. These species are all voracious predators of native benthic invertebrates and fish. Removal of this warm-water environment is expected to have the beneficial effect of eradicating these non-native predators of Matilija Reservoir from the aquatic environment. Native fish are expected to benefit from the decreased predation and competition for food (benthic invertebrates).

As mentioned previously (in section II.B.1.(e)), the design of the sediment-bypass (which is proposed for the existing Robles Diversion structure) will be coordinated with the NMFS so that a design that possibly *increases* the number of passage days available for steelhead to migrate through the Robles facility is developed. Currently, the fishway allows for 18 fish passage days through Robles with > 50 cfs (compared to 44 that might be available under pre-Robles Dam conditions). As such, the sediment by-pass structure is not likely to adversely affect steelhead migration opportunities through that River Reach (i.e., only beneficial effects to steelhead are expected).

Arundo removal. The adverse effects of Arundo on the native riparian community of southern California are discussed in section 2.A of the HEP Appendix (Appendix E of the DEIS/EIR). The large stand of Arundo infesting the Matilija Reservoir is a significant supply source of infestation downstream. Removal of this large, expanding stand would greatly benefit the aquatic ecosystem downstream by removing a source for future infestations. The recommended restoration alternative also includes an aggressive plan to remove Arundo throughout the study area and replace it with native riparian vegetation.

The importance of native vegetation on the aquatic community is well documented (Knight and Bottorff 1984; Mahoney and Erman 1984; Faber et al. 1989; Davis et al. 1996). Native riparian vegetation is much better than non-native Arundo at streamside stabilization, streamside shade, preventing excessive sedimentation from channel terraces, and providing organic material in the form of leaf drop, bud scales, fruit/seeds into the aquatic system. Native vegetation also uses significantly less water than Arundo. Significant beneficial effects to aquatic resources are expected in improved water quality, water quantity, and providing a natural source of organic material to the aquatic environment.

B. FUTURE OPERATION, MAINTENANCE, REPAIR, REHABILITATION, AND REPLACEMENT (OMRR&R)

Future OMRR&R activities associated with restoration activities primarily relate to maintenance of the soil cement revetment that temporarily stabilizes stored sediment in the former reservoir area. Occasional repair/replacement is expected of the revetment during its 10-year life span. Best Management Practices that were employed during the initial construction of the revetment will be used during any repair/replacement activities. No adverse impacts to steelhead are expected from these activities.

OMRR&R activities at the Robles Diversion structure (sediment basin and Robles fishway) would consist primarily of the removal of the incremental increase of sediment (above the No Action alternative) expected from the deconstruction of Matilija Dam. The removal of the additional (above No Action) sediment at the facility will be conducted within the current environmental constraints that sediment is removed from Robles under without Project conditions. No adverse impacts to steelhead are expected from Matilija deconstruction-generated sediment removal at Robles.

Continued OMRR&R is expected to have the same beneficial impacts to steelhead and the aquatic environment as previously discussed for initial construction activities.

V. MONITORING AND ADAPTIVE MANAGEMENT

Monitoring and Adaptive Management measures are identified in Appendix K of the DEIS. They are designed to ensure that the restoration effort achieves the restoration goals. Extensive vegetation monitoring and fish and wildlife monitoring are proposed for the first 10 years with future wildlife monitoring every other year, throughout the life of the project. The fisheries monitoring will be the primary mechanism to determine if impacts from the restoration alternative are more adverse to aquatic resources than anticipated. The Monitoring and Adaptive Management Plan provides a means for the NMFS to be involved in data collection/analysis and in making adaptive management recommendations to ensure adverse impacts to steelhead are minimal.

VI. CONCLUSION

As stated in section II.A, the proposed restoration alternative would re-establish natural ecosystem functions and riverine processes that have been degraded as a result of the construction of Matilija Dam. The riparian ecosystem restoration will be achieved by deconstructing Matilija Dam, allowing dam-trapped sediment to gradually be removed by natural fluvial process, and removing the exotic Giant Cane from the riparian zone.

By implementation of Best Management Practices and Mitigation Measures identified in the DEIS/EIR, direct deconstruction related activities may affect but are not expected to adversely affect steelhead.

The indirect effects of sedimentation and turbidity that results from deconstruction of Matilija Dam also may affect steelhead. The gradual deposition of sediment downstream of Matilija Dam is not expected to adversely affect steelhead. Beneficial effects to steelhead and aquatic resources from restoring natural sedimentation processes to sediment-starved River Reaches are expected.

The increased turbidity (sediment concentrations) predicted to occur after significant storm events is expected to have significant, short-term adverse impacts to steelhead and aquatic resources. No long-term adverse effects are expected, as elevated concentrations are expected to return to levels within the natural variability of turbidity levels soon after storms. After temporally stored sediment is eroded from the former reservoir area, no potential will exist for increased downstream sediment concentrations.

Significant beneficial impacts to steelhead are expected from activities related to the proposed restoration alternative. A significant upstream migration barrier for steelhead will be removed and 17 miles of high quality habitat will become open to upstream migrants. Restored natural sedimentation is expected to contribute to the restoring the River’s ability to create diverse habitats downstream. The removal of exotic plants and vertebrates is expected to significantly benefit aquatic and riparian species in the study area.

VII. SUMMARY

The recommended plan has certain components that are expected to affect the endangered steelhead (i.e., may affect). In general, impacts are not likely to be adverse and significant beneficial effects are expected to steelhead. Direct construction-related impacts are not likely to adversely affect steelhead, as mitigation measures identified for the study are expected to lessen potential impacts. The indirect impact of sedimentation caused by dam removal is expected to be gradual and not adversely affect steelhead movements. The increased sediment concentration (turbidity) caused by eroding dam-sequestered sediment could be significant on steelhead and aquatic resources and likely to be adverse, but is expected to be short-term.

Removing the impassible migration barrier (Matilija Dam) that prevents steelhead's access to 17 miles of high quality habitat is expected to have significant long-term beneficial affects to steelhead. Restoring a more natural sediment regime to the aquatic/riparian ecosystem and removing exotic plants (especially Arundo) and vertebrates is also expected to yield significant beneficial impacts to steelhead and the aquatic ecosystem.

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APPENDIX C2. BIOLOGICAL ASSESSMENT of species under the jurisdiction of the US Fish & Wildlife Service (USFWS)

I. INTRODUCTION

This Biological Assessment is prepared to comply with the regulations on interagency cooperation regarding compliance with the Endangered Species Act (50 CFR 402). These regulations require that a Biological Assessment be prepared to assess the potential impacts of federal projects which are "major construction activities" on listed or proposed threatened and endangered species (50 CFR 402.12). This analysis is intended to satisfy the Corps requirements to prepare a Biological Assessment (as per 50 CFR 402.12) for the Matilija Dam Ecosystem Feasibility Study. (Note that this Biological Assessment relies heavily on the information provided in the Draft Environmental Impact Statement [DEIS] for the Matilija Dam Ecosystem Feasibility Study so as not to duplicate previously provided information [sections 4.3 and 5.3 of the DEIS/EIR]. Also since the proposed restoration alternative is the exact, same alternative presented in the Biological Assessment for the National Marine Fisheries Service [see Appendix C1], much of the project description is cited from that Appendix so as to not duplicate the description discussion)

This Biological Assessment evaluates the effects of the recommended alternative for the proposed Matilija Dam Ecosystem Restoration Feasibility Study on the following threatened or endangered species: Southwestern Willow Flycatcher (*Empidonax traillii extimus*), Least Bell's Vireo (*Vireo belli pusillus*), California Condor (*Gymnogyps californianus*), Western Snowy Plover (*Charadrius alexandrinus nivosus*), Brown Pelican (*Pelecanus occidentalis californicus*), California Least Tern *(Sterna antillarum browni)*, California Red-legged Frog (*Rana aurora dryatonii*), Arroyo Toad (*Bufo californicus*), Tidewater Goby (*Eucyclogobius newberryi*). Impacts to the candidate Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) are also considered in this assessment.

These species were identified in a species list letter from the USFWS dated 11 May 2004 (provided at the end of this Biological Assessment) and a Draft Fish & Wildlife Coordination Act Report (CAR) (dated June 2004, see Appendix B of the DEIS). (Also see section III.A.)

The species discussed in this Assessment are considered unique or sensitive by the Federal Government because of their declining populations. In the federal listing process, which is under the authority of the U.S. Fish & Wildlife Service (USFWS), species are classified as either Endangered, Threatened, Proposed (Threatened or Endangered), or Candidate Species.

Endangered Species are those in danger of becoming extinct throughout all or a significant portion of their range. **Threatened Species** are those likely to become endangered in the foreseeable future. These species have gone through the listing process and are considered "fully listed" or "listed species" and receive full protection under the Endangered Species Act (ESA) (16 U.S.C. 1531-1543). A federal action that "may effect" these species must undergo Section 7 (of the ESA) Consultation with the USFWS (16 U.S.C. Section 1536; 50 CFR 402).

Species can be proposed to be listed in the *Federal Register* as threatened or endangered under Section 4 of the ESA, in which case they are **Proposed Threatened** or **Proposed Endangered**. After the necessary review period, these are either "fully listed" (as Threatened or Endangered), delisted, or reclassified (50 CFR 424; Rolf 1989:37-47). If a federal action "may effect" a proposed species, the federal agencies must "confer" with the USFWS/NMFS (50 CFR 402.10).

Candidate Species are those species being considered by the USFWS/NMFS for listing as endangered or threatened species, but are not yet the subjects of a proposed rule for listing (50 CFR 424.02[b]). Therefore, Candidate Species have no legal protection under the ESA. (However, Candidate Species can be emergency listed if USFWS determines that the species' well-being is at risk.)

II. STUDY AREA AND DESCRIPTION OF PROPOSED ACTION

A. STUDY AREA AND STUDY OBJECTIVES

Same as presented in Appendix C1.

B. PROPOSED RESTORATION ALTERNATIVE

Several alternatives were considered in the feasibility study, and the alternative analysis process is documented in section 3 of the DEIS/EIR (and section 3 of the Main Report). See section 3 of the DEIS/EIR for descriptions of all alternatives (including the No Action alternative) and alternatives that were eliminated from further study.

A brief description of the restoration alternative is provided in Appendix C1, section B.1. A more detailed description of the recommended alternative appears in the Main Report and DEIS/EIR.

III. THREATENED AND ENDANGERED SPECIES IN THE STUDY AREA

As stated in section I, above – a species list provided by the USFWS and the Draft Coordination Act Report prepared by the USFWS for this project (USFWS 2004 - see Appendix XX of the DEIS) identified the threatened or endangered species known to occur, or have the potential to occur in the Matilija Dam Ecosystem Restoration Study Area.

This section gives a general description of the threatened or endangered species in or near the study area that may be affected by the proposed restoration alternative. Much of this discussion incorporates information provided by the USFWS (see USFWS 2000, 2003, and 2004) and Thelander (1994). Also, much information on the Threatened and Endangered species in the Feasibility Study Area is provided in the DEIS/EIR and will be cross-referenced as much as possible.

A. Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

This is one of 5 subspecies of willow flycatchers in North America. The southwestern willow flycatcher was federally listed as endangered on February 27, 1995 (60 FR 10694). This neotropical migrant passerine birds breeds in the southwestern United States and winters in Mexico, central America, and northern South America. The breeding range of the southwestern willow flycatcher includes Arizona, New Mexico, the southern portions of California, Nevada, and Utah, western Texas, southwestern Colorado, and extreme northwestern Mexico. Critical habitat in southern California for this species has been identified in the thickets of riparian trees and shrubs along the Santa Ana River (in Riverside County), and four rivers in San Diego Counties (Santa Margarita, San Luis Rey, San Dieguito, and San Diego Rivers) (62 FR 39129, July 22, 1997).

The habitat for this subspecies is dense riparian growth and thickets of trees and shrubs of rivers, streams and wetlands. Throughout its range, habitat for this species tends to be rare and widely separated by vast expanses of arid lands. Loss and modification of riparian habitats and brood parasitism by brown-headed cowbirds were the primary reasons for listing the southwestern willow flycatcher. In the coastal portions of its range, southwestern willow flycatchers use willow-dominated riparian areas intermixed with cottonwoods, coyote brush and mule fat.

Birds arrive on the breeding range in late April to May and nesting begins in late May to early June. Birds typically nest in willows, but other riparian trees are commonly used. Young birds fledge from late June to mid-August. The nesting season is usually considered over by September. As the name implies, this bird is an insectivore and feeds on flying insects.

Five surveys were conducted according to Service protocol for the southwestern willow flycatcher from April 28, 2000, through July 22, 2000. Although approximately 14 acres of marginal habitat exists in locations between the estuary and Foster Park for this species, southwestern willow flycatchers were not detected. No historic records for nesting southwestern willow flycatchers in the Ventura River or Matilija Creek exist. Lack of suitable habitat and brood-parasitism by the brown-headed cowbird (*Molothrus ater*) may preclude any occurrences of this species within the study area.

B. Least Bell’s Vireo (*Vireo belli pusillus*)

The least Bell’s vireo is a small, olive-grey migratory songbird that nests and forages primarily in riparian woodland habitats. Historically, least Bell’s vireos wintered in Mexico and ranged as far north as Tehama County, California. The current breeding distribution for the least Bell’s vireo is restricted to southern California and northwestern Baja California.

The least Bell’s vireo is state and federally listed as endangered; it was federally listed as endangered on May 2, 1986 (51 FR 16474). The decline in the numbers of the least Bell’s vireo that led to its listing have been attributed, in part, to the combined, perhaps synergistic effects of the widespread loss of riparian habitats and brood-parasitism by the brown-headed cowbird

(*Molothrus ater*).   Widespread habitat loss has fragmented most remaining populations Typical nesting habitat consists of an understory of dense subshrub or shrub thickets dominated by sandbar willow (*Salix hindsiana*), mule fat, and saplings of other willow species into small, disjunct, widely dispersed subpopulations, which are concentrated in San Diego, Santa Barbara, and Riverside Counties.

Approximately 60 acres of suitable habitat for the least Bell's vireo exists within the study area from the Ventura River estuary to Foster Park. Greaves (2003) reported 1 pair of least Bell's vireo nesting in the vicinity of the Main Street Bridge and Ventura River in 2001, 2002, and 2003. The attempt during the 2003 season to nest in the Main Street vicinity failed possibly because of the large population of homeless people inhabiting the palustrine habitat. A second pair of least Bell's vireo was reported nesting approximately 0.75 mile downstream of Shell Road in June of 2003. Finally, a pair of least Bell's vireo was reported in the Ventura River near Stanley Road in June of 2003. The status of these two pairs is unknown at this time (Greaves 2003).

C. California Condor (*Gymnogyps californianus*)

This species was federally listed as endangered on March 11, 1967 (32 FR 4001). The California condor is also a California endangered and fully protected species. Critical habitat was designated on September 24, 1976 (41 FR 187).

The California condor is a member of the Cathartidae family or new world vultures. With a wingspan of nearly 9.5 feet and weighing approximately 22 pounds, it is one of the largest flying birds in the world. California condors are opportunistic scavengers, feeding exclusively on the carcasses of dead animals. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Seasonal foraging behavior shifts may be the result of climatic cycles or changes in food availability. California condors maintain wide-ranging foraging patterns throughout the year, an important adaptation for a species that may be subjected to unpredictable food supplies. Most foraging occurs in open terrain of foothills, grasslands, chaparral areas, or oak savannah habitats.

Historically, foraging also occurred on beaches and large rivers along the Pacific coast. Threats to the California condor include lead poisoning due to ingestion of fragments of bullets and shot found in hunter killed animals, collision with overhead transmission lines, ingesting toxins such as ethylene glycol (a commonly-used ingredient of antifreeze), being shot, predation by coyotes and golden eagles, and unknown causes.

California condors have been reintroduced to the mountains in the Los Padres National Forest. Individuals occasionally fly over the Ojai Valley. No known activity sites for the California condor exist within the study area (Bruce Palmer, Service, pers. comm., 2003 as cited by USFWS 2003).

D. Western Snowy Plover (*Charadrius alexandrinus nivosus*)

The western snowy plover is a small shorebird that has twelve subspecies worldwide. The pacific coast population of the western snowy plover (which is listed as threatened) is defined as those individuals that nest adjacent to or near tidal waters, and includes all nesting colonies on the mainland coast, peninsulas, offshore islands, adjacent bays, and estuaries. (The pacific coast population is considered distinct from western snowy plovers that breed in the interior). This subspecies breeds primarily on the coastal beaches from southern Baja California to southern Washington. Sand spits, dune-backed beaches, unvegetated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal habitats. Snowy plovers occur year-round in coastal California. A population shift probably occurs where migrant, wintering birds augmenting or even replaces resident (breeding and non-breeding) birds in late August (Page et al, 1979).

The Pacific coast population of the western snowy plover was federally listed as threatened on March 5, 1993 (58 FR 12864). On March 2, 1995, the Service proposed designation of critical habitat for the western snowy plover (60 FR 11768).

Nest sites typically occur in flat, open area with sandy or saline substrates; vegetation and driftwood are usually present. Most nesting occurs on unvegetated, or moderately vegetated, dune backed beaches and sand spits. During the non-breeding season (September – March) western snowy plovers may remain at breeding sites or may migrate to other locations. The Pacific coast population of the western snowy plover has experienced widespread loss of nesting habitat and reduced reproductive success at many nesting locations. Factors resulting in loss of nesting habitat include urban development and the encroachment of European beachgrass (*Ammophila arenaria*). Reduced reproductive success is frequently tied to disturbance from human activities and to predation.

The western snowy plover is known to use the dune areas around the estuary and neighboring San Buenaventura State Beach for wintering. Despite the presence of suitable breeding habitat, western snowy plovers have not been recorded breeding at the Ventura River estuary. The lack of breeding records at this site for this species maybe because of extensive beach use dating back into the 1930's (Wetlands Research Associates, Inc. 1992). The closest known breeding area for the western snowy plover occurs south of the study area at McGrath State Beach (Smith 2003). Western snowy plovers that have been observed in the sandy areas near the estuary mouth and on the drier mudflats in the estuary itself, are assumed to be post-breeding birds from McGrath State Beach (Hunt and Lehman 1992).

E. Brown Pelican (*Pelecanus occidentalis californicus*)

The endangered California brown pelican is a frequent visitor of many coastal harbors and has been observed throughout the year, but is most conspicuous in the fall and winter following the breeding season on Anacapa and Santa Barbara Islands from January to March. Pelicans forage for surface fish, particularly anchovies, by plunge diving along the open coast, and well out to sea, and scavenge for fish remains around the commercial fishing boats and piers at harbors.

California brown pelicans experienced widespread reproductive failures in the 1960s and early 1970s. Much of the failure was attributed to eggshell thinning caused by high concentrations of DDE, a metabolite of DDT. The California brown pelican was listed as endangered <<in 19XX>

Other factors implicated in the decline of this species include human disturbance at nesting colonies, and food shortages.

Prior to 1959, intermittent nesting was observed as far north as Point Lobos in Monterey County, California. Dispersal between breeding seasons ranges from British Columbia, Canada, to southern Mexico and possibly to Central America. During the non-breeding season brown pelicans roost night-time communally, generally in areas that are near adequate food supplies, have some type of physical barrier to predation and disturbance, and that provide some protection from environmental stresses such as wind and high surf. Breakwaters and jetties are often used for roosting.

The California brown pelican occasionally roosts at the Ventura Estuary mouth, primarily during the summer. The Ventura River mouth is considered a diurnal roost site for brown pelicans by (Strong and Jaques 2003). This species is extremely tolerant of human activity at diurnal (day-time) roost and is often seen roosting and loafing on breakwaters, piers, buoys, harbors, and wharves throughout southern California (Jaques and Anderson 1987; Jaques et al. 1996). As many as 84 birds have been reported during their surveys.

F. California Least Tern *(Sterna antillarum browni)*

In 1970, the first Federal list of endangered species was drawn up following passage of the Endangered Species Conservation Act of 1969; the California least tern was included on that list. The State of California passed its own Endangered Species Act in 1970 and subsequently published a list in May of 1971 that included the tern.

California least terns winter in Mexico and central America and migrate to south and central California in mid-April to breed. During their stay in California, birds forage for fish in the nearshore coastal waters and embayments. Birds typically nest in small colonies; the nest usually occurs in the open expanse of lightly colored sand or dirt or dried mud next to lagoons or estuaries or on open sandy beaches. The nests generally consist of merely a small depression or scrape in the soil or sand and lined with pebbles or seashell fragments. Nesting usually concludes by mid-August, with post-breeding groups still present into mid-September (USFWS 1980).

California least terns were once common along the central and southern California coast. The precipitous decline of the California least tern is attributed to prolonged and widespread destruction and degradation of nesting and foraging habitats, and increasing human disturbance to breeding colonies. Conflicting uses of southern and central California beaches during the

California least tern nesting season have led to isolated colony sites that are extremely vulnerable to predation from native, feral and exotic species, overwash by high tides, and vandalism and harassment by beach users.

In Ventura County, California least terns nest at Point Mugu, Ormond Beach, and just north of the mouth of the Santa Clara River. In 2002, approximately 260 pairs of California least terns nested at Ormond Beach, making this the largest colony in Ventura County. Young California least terns often use the estuary at the Ventura River for foraging and loafing before beginning their journey south (Hunt and Lehman 1992). As described above for the western snowy plover suitable breeding habitat for the California least tern occurs at the Ventura River estuary, but California least terns have not been known to breed there. The lack of breeding records at this site for this species maybe because of the extensive beach use dating from the 1930's (Wetlands Research Associates, Inc. 1992).

G. Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

The western yellow-billed cuckoo is considered an endangered species by the state of California and a federal candidate species. This species is an uncommon to rare summer resident of valley foothill and desert habitats in scattered locations in California. The western yellow-billed cuckoo w as formerly much more common and widespread throughout lowland California, but numbers drastically reduced by habitat loss. This species has not been observed or documented within the study area despite suitable nesting and foraging habitat within the study area. Habitat within the study area includes palustrine forested areas.

H. California Red-legged Frog (*Rana aurora dryatonii*)

On May 23, 1996, the Service published a final rule to list the California red-legged frog as threatened (61 *Federal Register* (FR) 25813). The California red-legged frog is one of two subspecies of the red-legged frog (*Rana aurora*) found on the Pacific coast. The historical range of the California red legged frog extended from the vicinity of Point Reyes National Seashore, Marin County, California, coastally and from the vicinity of Redding, Shasta County, California, inland southward to northwestern Baja California, Mexico.

Adult frogs require dense shrubby or emergent vegetation closely associated with deep (>2 ft.) still or slow moving water. The largest densities are associated with deep-water pools with dense stands of overhanging willows and an intermingled fringe of cattails. Frogs breed from November to March.

Estivation habitat and the ability to reach this habitat are considered a critical factor for frog’s survival. All habitat within the range of the species is potential estivation habitat – including boulders, rocks, downed logs that provide moist conditions during the dry season within the riparian zone. Frogs have been found up to 100 feet from water in adjacent dense riparian vegetation.

The Service conducted six protocol surveys in the study area for the California red-legged frog between April 28, 2000, and July 22, 2000. One California red-legged frog was observed on April 30 in Matilija Creek about 0.75 miles upstream of the dam. The observed individual was in a well-vegetated, 3 to 5 foot deep pool on the edge of a willow riparian scrub community. Although many habitats appeared suitable for presence of the California red-legged frog, surveys only detected one individual. This scarcity of red-legged frogs may be attributable to the high densities of bullfrogs, red swamp crayfish, and/or largemouth bass in the study area.

Surveys by others have detected California red-legged frogs in the vicinity of the study area. On September 30, 1999, students from the University of California at Santa Barbara found a recently metamorphed California red-legged frog along the banks of Matilija Creek approximately 1.5 miles above Matilija Dam. On July 7, 2000, consultants monitoring a road repair site found a California red-legged frog along the banks of Matilija Creek approximately 3 miles above Matilija Dam.

I. Arroyo Toad (*Bufo californicus*)

The southwestern arroyo toad (arroyo toad) was listed by the Service as endangered on December 16, 1994 (59 FR 241). The arroyo toad is a small, dark-spotted toad of the family Bufonidae. This species is known from 22 river basins in the coastal and desert areas of 9 counties along the central and southern coast of California. Their range extends into northwestern Baja California, Mexico. Direct habitat loss due to urbanization, agriculture, and dam construction is the main cause for the decline of arroyo toads.

Arroyo toads breed from late March to mid-June in stream channels that have gravelly pools to sandy terraces. Toads use stream terraces and surrounding uplands for foraging and wintering. Arroyo toads require shallow, slow-moving streams and riparian habitats that are distributed naturally on a regular basis, primarily by flooding. Toads use the surrounding upland areas for foraging and wintering. Adults excavate shallow burrows for shelter during the day when surface is damp or during longer intervals in the dry season.

Suitable habitat exists above the Matilija Dam and some marginal habitat exists in the vicinity of Foster Park. No records of arroyo toads exist from the Ventura River or Matilija Creek. In addition, habitat below the dam is sediment starved, rendering the habitat unsuitable to the arroyo toad.

J. Tidewater Goby (*Eucyclogobius newberryi*)

The tidewater goby was listed by the Service as endangered on March 7, 1994. The tidewater goby, a member of the Gobiidae family, is the only species in the genus *Eucyclogobius*. It is a small fish, rarely exceeding 2 inches standard length, and is characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins.

The tidewater goby historically occurred in at least 109 California coastal lagoons. This species is currently known to occur in 84 locations. All life stages of tidewater gobies are found in the upper end of the coastal lagoons where salinities are typically less than 10 parts-per-thousand. The goby does not have a marine life history phase; this severely restricts this species from recolonizing other lagoons once it is extirpated.

Peak nesting activities occur in late April through early May, when male digs a vertical nesting burrow 4 to 8 inches deep in clean, coarse sand.

Its decline can be attributed to upstream water diversions, pollution, siltation, and urban development on surrounding lands. These threats continue to affect the remaining populations of tidewater gobies. In addition, given the lack of a marine life history stage and the high level of fragmentation between existing populations, the probability for exchange between populations and natural colonization of suitable habitat is low. The tidewater goby is known to occur in the Ventura Estuary, but have not been well studied (Capelli 1997).

IV. IMPACTS TO THREATENED AND ENDANGERED SPECIES

In this section, impacts will be discussed as they relate to riparian threatened and endangered species (i.e., southwestern willow flycatcher, least Bell's vireo, yellow-billed cuckoo, California red-legged frog, and arroyo toad) and coastal species (i.e., western snowy plover, brown pelican, California least tern, and tidewater goby). None of the activities associated with the proposed restoration alternative are considered to affect the California condor, as it is not known to occur in the study area.

A. INITIAL CONSTRUCTION

1. Direct deconstruction-related impacts.

(a) Riparian threatened or endangered species

Direct impacts to aquatic and riparian resources associated with deconstruction related activities are expected to be minimized by using Best Management Practices that are typically employed when using heavy equipment around waterways. A significant amount of construction will occur in and around the riverine environment as a result of removing Matilija Dam (e.g., constructing a 100-ft. wide channel through the reservoir sediments, stabilizing the excavated sediment in the reservoir area with 3-7 foot revetment, and the removal and extension of downstream bridges). The recommended restoration alternative also involves construction of a slurryline from Matilija Dam to a disposal area below Robles Dam and entails construction of a desiltation basin.

As mentioned in section II.B.2, it is estimated that the recommend restoration alternative will require approximately 36 months to complete the slurrying operation of the 'Reservoir Area' sediment, removal of the dam, excavation of the channel, and stabilizing sediment stored on-site.

While removal of the remaining trapped sediment will be variable and dependent upon the hydrology, it is assumed that within 20 years of initial earthmoving and deconstruction activities, the natural re-vegetation of the area behind the dam will be completed. Some aspects of construction are expected to occur year round; construction activities, however, in or around water or active channels would occur in the usually dry period of April-December.

Standard Operating Procedures and Best Management Practices, such as, diverting water around construction activities, installing culvert/rock-fill crossings, pre-cautions to minimize turbidity/siltation such as installing silt fencing and silt catchments basins, will be applied to minimize impacts to aquatic resources. (Appropriate commitments made by the Corps and Ventura County Watershed Protection District on other construction projects in Ventura County [see CDF&G 2003] per the State of California's Streambed Alteration Agreement [Section 1601] will likely be implemented for the 1601 Agreement for this study to minimize adverse impacts associated with construction activities on the aquatic environment.)

Arundo removal activities will also employ Best Management Practices and impacts associated with its removal are expected to have minimal adverse impacts on aquatic and riparian resources.

Mitigation Measures/Environmental Commitments that will be employed to minimize the adverse impacts of activities associated with deconstruction of the dam are identified in section 8 of the DEIS/EIR (Measures B-1 to B-16). With adherence to the mitigation measures/environmental commitments, direct deconstruction-related impacts are not likely to adversely affect riparian threatened or endangered species.

(b) Coastal threatened or endangered species

No construction activities will occur along the coastal portion of the study area. As such no coastal species will be affected by direct de-construction related activities.

2. Indirect deconstruction-related impacts.

The most significant indirect impacts from the deconstruction of Matilija Dam are associated with the increased sedimentation and turbidity downstream cause by the erosion of dam-trapped sediment. (General impacts of sedimentation and turbidity to aquatic resources were discussed in the beginning of Section IV of Appendix C1.)

Under the proposed restoration alternative, erosion of 1.3 million cubic yards of sediment by natural fluvial processes would commence when flows overtop the height of the soil cement revetment placed to temporarily store sediments. Flows greater than 3000-7500 cfs (2-5 year storms) will erode the coarse-grained sediment stored in the upstream storage sites; flows greater than 12,000 cfs (10-year storms) would erode the other storage sites.

(a) Sedimentation Impacts.

Riparian threatened or endangered species. Adverse impacts to the aquatic ecosystem from sedimentation are discussed in Section IV.A.2.(a) of Appendix C1. Riparian endangered species that depend on the aquatic ecosystem (i.e., amphibians) are expected to be affected as described in Appendix C1. Sediment deposition is expected to occur gradually over time and not cause barriers to animal movement, and, therefore, it is not expected to have no effect on endangered amphibians ability to migrate within the study area.

Impacts to the riparian zone are expected to be local and also to occur gradually over time. The very localized areas where over 3-feet of sediment would be deposited are shown in Figure 1 of the HEP Appendix (Appendix E of the DEIR/EIS). Recovery to the riparian zone from deposited sediment is expected to be rapid and complete within 10-20 years (see discussion in section 6 of the HEP Appendix).

Riparian birds (Southwest willow flycatcher, least bell's vireo, yellowed billed-cuckoo) may be affected by localized sediment deposition in the riparian zone, but adverse affects are not likely as sedimentation will be localized in only a small portion of the entire study area, and complete recovery of these localized areas of the riparian zone is expected in 10-20 years.

Coastal threatened or endangered species

Sedimentation in the Ventura Estuary is not reliably predicted by the H&H Model (see H&H Report, section 9.1, page 228), but is expected to be < 3 feet over the period-of-analysis. No adverse impacts to tidewater goby are expected from sediment associated with this restoration alternative. No effect to any other coastal endangered species is anticipated from sedimentation-related impacts.

(b) Turbidity Impacts.

Riparian threatened or endangered species. Turbidity impacts on the aquatic ecosystem are discussed in section IV.A.2(b) of Appendix C1. Endangered amphibians are expected to be affected as aquatic resources previously analyzed because a significant part of their life history is wholly aquatic.

Adverse impacts to aquatic life forms of the red-legged frog could occur at high turbidity (i.e., sediment concentration) levels. Since toads area a more terrestrial species, its aquatic life form occurs in slow moving water or pools in late March to mid-June. High turbidity levels would likely be associated with large rainfall events – when toads are not as dependent on the aquatic environment (as opposed to the dry, summer season).

The California red-legged frog, if present in the downstream portion of the study area, could potentially experience high turbidity levels. Turbidity impacts are expected to be short-term (i.e., return to levels within the range of natural variability of No Action conditions) within days and return to background levels in 2-3 years. As such, adverse impacts may be significant, but expected to be short term for aquatic life forms of endangered amphibians. (Also see discussion of turbidity impacts to aquatic resources in Appendix C1, section IV.2(b).)

No effects to endangered riparian birds are expected from high turbidity level in the stream.

Coastal threatened or endangered species A turbidity plume in the nearshore marine environment from deconstruction of Matilija Dam is expected to be no more extensive than currently occurring under without project conditions. <<cite coastal engineering appendix>> Turbidity plumes in offshore river mouths are a common occurrence during high flows associated with the winter rains. No effect to foraging coastal birds are anticipated from turbidity generated as a result of dam deconstruction.

Peak nesting activities for tidewater goby occurs in late April through early May, after the rainy season. Turbidity levels associated with dam-deconstruction activities are expected to be within the normal range of levels for the River. No effects to tidewater goby are anticipated.

(c) Beneficial Impacts

Beneficial effects associated with restoring a natural sediment regime in the riparian/aquatic ecosystem is discussed in section IV.A.2(c) of Appendix C1. Amphibians are especially expected to benefit from the complexity/diversity of habitats in the aquatic environment that results from restoring a more natural sediment regime. As mentioned in Appendix C1, sediment movement in streams is responsible for the diversity of habitats that occur in braided channels (e.g., channel bars, inactive channels, channel terraces, and channel islands). Amphibians use these diverse habitats at various times in their life cycle. As such, dam deconstruction is expected to create diverse aquatic habitat suitable for endangered amphibians.

Removal of the invasive, exotic Arundo from the study area is expected to have significant benefits to the riparian ecosystem, as discussed in Appendix C1 (see section IV.A.2(c)). Arundo is notorious for overtaking and displacing native riparian vegetation. If left unchecked, Arundo could displace the existing native riparian community and cause existing habitat for endangered riparian birds to become unsuitable. The benefits to endangered birds that depend on native riparian community from an aggressive Arundo removal program in the Ventura River watershed are expected to be substantial.

Even without the project, the open water behind Matilija Dam is eventually expected to be completely filled by 2038 (see HEP Appendix [Appendix E of the DEIS/EIR, section 4]). The bullfrogs, largemouth bass, and sunfish in the open water will eventually be eradicated as a result. The benefit to endangered amphibians from removal of Matilija dam is that that the open water that supports these exotic species is removed as soon as dam deconstruction begins.

B. FUTURE OPERATION AND MAINTENANCE

Future OMRR&R activities associated with restoration activities primarily relate to maintenance of the soil cement revetment that temporarily stabilizes stored sediment in the former reservoir area. Occasional repair/replacement is expected of the revetment during its 10-year life span.

Best Management Practices that were employed during the initial construction of the revetment will be used during any repair/replacement activities. No adverse impacts to threatened or endangered species are expected from these activities.

OMRR&R activities at the Robles Diversion structure (sediment basin and Robles fishway) would consist primarily of the removal of the incremental increase of sediment (above the No Action alternative) expected from the deconstruction of Matilija Dam. The removal of the additional (above No Action) sediment at the facility will be conducted within the current environmental constraints that sediment is removed from Robles under without Project conditions. No adverse impacts to threatened or endangered species are expected from Matilija deconstruction-generated sediment removal at Robles.

Continued OMRR&R is expected to have the same beneficial impacts to threatened and endangered species as previously discussed for initial construction activities.

V. **MONITORING**

Monitoring and Adaptive Management measures are identified in Appendix K (of the DEIS). They are designed to ensure that the restoration effort achieves the restoration goals. Extensive vegetation monitoring and wildlife monitoring are proposed for the first 5 years with future wildlife monitoring every other year, throughout the life of the project. The wildlife monitoring will be the primary mechanism to determine if endangered species do in fact inhabit the restored sites in the future. The Monitoring and Adaptive Management Plan provides a means for the USFWS to be involved in data collection/analysis and in making adaptive management recommendations.

VI. **CONCLUSION**

As stated in section II.A, the proposed restoration alternative would re-establish natural ecosystem functions and riverine processes that have been degraded as a result of the construction of Matilija Dam. The riparian ecosystem restoration will be achieved by deconstructing Matilija Dam, allowing dam-trapped sediment to gradually be removed by natural fluvial processes, and removing the exotic Arundo from the riparian zone.

By implementation of Best Management Practices and Mitigation Measures identified in the DEIS/EIR, direct deconstruction related activities may affect but are not expected to adversely affect riparian threatened or endangered species. No effects are expected to coastal threatened or endangered species from direct construction related activities.

The indirect effect of sedimentation and turbidity that results from deconstruction of Matilija Dam also may affect endangered amphibians. The gradual deposition of sediment downstream of Matilija Dam is not expected to adversely affect endangered amphibians. Beneficial effects to amphibians and aquatic resources from restoring natural sedimentation processes to sediment-starved River Reaches are expected. Adverse affects to riparian bird endangered species are not likely from sedimentation in the riparian zone as they are expected to be local and short-term.

The increased turbidity (sediment concentrations) predicted to occur after significant storm events is expected to have significant, short-term adverse impacts to endangered amphibians if present in the downstream portions of the study area. No long-term adverse effects are expected, as elevated concentrations are expected to return to levels within the natural variability of turbidity levels soon after storms and to background levels in 5 years. No effects to endangered riparian birds or coastal species from short-term elevated turbidity levels.

Significant beneficial impacts to threatened or endangered riparian birds and amphibians are expected from activities related to the proposed restoration alternative.   Restored natural sedimentation is expected to contribute to the restoring the River's ability to create diverse habitats downstream. The removal of exotic plants and vertebrates is expected to significantly benefit all aquatic and riparian species in the study area.

VII. **SUMMARY**

VIII. **REFERENCES**

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DEPARTMENT OF THE ARMY
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February 17, 2004

REPLY TO
ATTENTION OF

Office of the Chief
Environmental Resources Branch

Mr. Rodney McInnis
Acting Regional Administrator
National Marine Fisheries Service
Southwest Region
501 West Ocean Blvd., Suite 4200
Long Beach, California 90802-4213

Dear Mr. McInnis:

The U.S. Army Corps of Engineers (Corps) is preparing a Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Feasibility Study. Matilija Dam is located on Matilija Creek in Ventura County. We would like your office to provide us with a current species list of any endangered, threatened, or candidate species that may be in the proposed study area.

The Corps is conducting the feasibility study to investigate reasonable alternatives to restore Matilija Creek and the Ventura River primarily by removing Matilija Dam and removing Giant Reed (*Arundo donax*) from the riparian corridor. The study area includes the Matilija Dam and the area immediately upstream and downstream to the Ventura River estuary. The goal of this restoration effort will be to reestablish natural ecosystem functions and riverine processes.

You are probably well aware that we have been coordinating extensively with Mr. Mark Capelli and Mr. Stan Glowacki of you staff relative to this feasibility study. Both are very familiar with the planning efforts that has occurred to date for this study and the extend of the feasibility study area.

Please provide our office with a species list of all threatened, endangered, proposed, and candidate species that could occur in our Matilija Dam Ecosystem Restoration study area. If you have any further questions on this project, please call Mr. Rey Farve of my staff, at (213) 452-3864

Sincerely,

for Ruth Bajza Villalobos
Chief, Planning Division

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

n reply refer to:
APR 8 2004 51422SWR02PR8272:SC

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

Attr Rey Farve

Dear Ms. Villalobos

This letter responds to your February 17, 2004, written request for a list of threatened or endangered species under jurisdiction of the National Marine Fisheries Service (NOAA Fisheries) which are present within the Ventura River and Matilija Creek watersheds in Ventura County, California. Currently, Federally endangered southern California steelhead (*Oncorhynchus mykiss irideus*) are present in the Ventura River system, as this river is open to migration of ocean-going fish. Residualized rainbow trout (*Oncorhynchus mykiss irideus*) which are genetically capable of reverting to the anadromous form of the ocean-going steelhead are currently present in Matilija Creek. Currently there is no critical habitat designated for this species but it is currently under review, and it is possible that these watersheds will be designated as critical to the future survival and recovery of southern California steelhead.

NOAA Fisheries appreciates the opportunity to provide technical assistance for the U.S. Army Corps of Engineers on projects that may affect endangered steelhead. Please contact Stan Glowacki at (562) 980-4061 or Mark Capelli at (805) 963-6478 if you have any questions concerning this letter or if you require additional information.

Sincerely,

for Rodney R. McInnis
Acting Regional Administrator

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT CORPS OF ENGINEERS
P.O. BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325

REPLY TO
ATTENTION OF

February 17, 2004

Office of the Chief
Environmental Resources Branch

Ms. Diane Noda
U.S. Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, California 93003

Dear Ms. Noda:

The U.S. Army Corps of Engineers (Corps) is preparing a Draft Environmental Impact Statement/Environmental Impact Report for the Matilija Dam Ecosystem Restoration Feasibility Study. Matilija Dam is located on Matilija Creek in Ventura County. We would like your office to provide us with a current species list of any endangered, threatened, or candidate species that may be in the proposed study area.

The Corps is conducting the feasibility study to investigate reasonable alternatives to restore Matilija Creek and the Ventura River primarily by removing Matilija Dam and removing Giant Reed (*Arundo donax*) from the riparian corridor. The study area includes the Matilija Dam and the area immediately upstream and downstream to the Ventura River estuary. The goal of this restoration effort will be to reestablish natural ecosystem functions and riverine processes.

You are probably well aware that we have been coordinating extensively with Mr. Chris Dellith of you staff relative to Fish and Wildlife Coordination Act activities. We received the Planning Aid Report for this study in July 2003. We expect to receive a Draft Coordination Act Report from your office by about May 2004 for this feasibility study.

Please provide our office with a species list of all threatened, endangered, proposed, and candidate species that could occur in our Matilija Dam Ecosystem Restoration study area. If you have any further questions on this project, please call Mr. Rey Farve of my staff at, (213) 452-3864.

Sincerely,

for Ruth Bajza Villalobos
Chief, Planning Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2943 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
PAS 1190.1302.1754

May , 2004

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

Subject Matilija Dam Ecosystem Restoration Feasibility Study Species List, Ventura County, California

Dear Ms. Villalobos:

We are writing in response to your request, dated February 17, 2004, and received in our office on February 27, 2004, for information on endangered and threatened species that may occur at or near the proposed subject project site. The U.S. Army Corps of Engineers (Corps) is preparing draft environmental impact statement/environmental impact report for the Matilija Dam ecosystem restoration feasibility study. Matilija Dam is located on Matilija Creek in Ventura County.

The Corps is conducting the feasibility study to investigate alternatives to restore Matilija Creek and the Ventura River primarily by removing Matilija Dam and removing giant reed (*Arundo donax*) from the riparian corridor. The study includes the Matilija Dam, the area immediately upstream, and downstream to the Ventura river estuary. The goal of the restoration effort will be to reestablish natural ecosystem functions and riverine processes.

The enclosed list of species fulfills the requirements of the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act of 1973, as amended. The Corps, as the lead Federal agency for the project, has the responsibility to review its proposed activities and determine whether any listed species may be affected. If the project is a construction project that may require an environmental impact statement[1], the Corps has the responsibility to prepare a biological assessment to make a determination of the effects of the action on the listed species or critical habitat. If the Corps determines that a listed species or critical habitat is likely to be adversely affected, it should request, in writing through our office, formal consultation pursuant to section 7 of the Act. Informal consultation may be used to exchange information and resolve

[1] "Construction project" means any major Federal action which significantly affects the quality of the human environment designed primarily to result in the building of structures such as dams, buildings, roads, pipelines, and channels. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorizations or approval which may result in construction.

conflicts with respect to threatened or endangered species or their critical habitat prior to a written request for formal consultation. During this review process, the Corps may engage in planning efforts but may not make any irreversible commitment of resources. Such a commitment could constitute a violation of section 7(d) of the Act.

Only listed species receive protection under the Act. However, sensitive species should be considered in the planning process in the event they become listed or proposed for listing prior to project completion. We recommend that you review information in the California Department of Fish and Game's Natural Diversity Data Base. You can contact the California Department of Fish and Game at (916) 324-3812 for information on other sensitive species that may occur in this area.

If you have any questions regarding this matter, please contact Chris Dellith of my staff at (805) 644-1766.

Sincerely,

Rick Farris
Division Chief
Santa Barbara/Ventura/Los Angeles

Enclosure

LISTED AND CANDIDATE SPECIES
WHICH MAY OCCUR IN MATILIJA CREEK AND THE VENTURA RIVER,
VENTURA COUNTY, CALIFORNIA

<u>Birds</u>		
Southwestern willow flycatcher	*Empidonax traillii extimus*	E
Least Bell's vireo	*Vireo bellii pusillus*	E
California condor	*Gymnogyps californianus*	E
Western snowy plover	*Charadrius alexandrinus nivosus*	`, CH
Brown pelican	*Pelecanus occidentalis*	E
California least tern	*Sterna antillarum browni*	E
Yellow-billed cuckoo	*Coccyzus americanus*	C
<u>Amphibians</u>		
California red-legged frog	*Rana aurora draytonii*	T
Arroyo toad	*Bufo californicus*	E
<u>Fish</u>		
Tidewater goby	*Eucyclogobius newberryi*	E
Steelhead trout	*Oncorhynchus mykiss* *	

Key:
E - Endangered T Threatened, CH - Critical habitat

C - Candidate species for which the Fish and Wildlife Service has on file sufficient information on the biological vulnerability and threats to support proposals to list as endangered or threatened.

*Species for which the National Marine Fisheries Service has responsibility. For more information, call the Santa Rosa Field Office at 707-575-6050 or go to <u>http://swr.ucsd.edu/</u>

APPENDIX D.

CLEAN WATER ACT 404(B)(1) WATER QUALITY EVALUATION

APPENDIX D. 404(B)(1)
EVALUATION OF THE EFFECTS OF THE DISCHARGE OF DREDGED OR FILL MATERIALS INTO THE WATERS OF THE UNITED STATES

I. INTRODUCTION

The following is provided in accordance with Section 404(b)(1) of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500) as amended by the Clean Water Act of 1977 (CWA) (Public Law 95-217, 33 U.S.C. 1251 et seq.). Its intent is to succinctly state and evaluate information regarding the effects of discharge of dredged or fill material into the waters of the United States. As such, it is not meant to stand-alone and relies heavily upon information provided in the environmental document to which it is attached

Project Purpose. The basic project purpose is aquatic habitat restoration, which is a water-dependent activity. Because the activity is water-dependent, it is not necessary to rebut the presumption that practicable alternatives are available off-site that are less damaging. Rather the alternatives analysis can focus on the No Action alternative and a reasonable range of on-site alternatives. For this analysis, the overall project purpose is to restore the ecological system of Matilija Creek and Ventura River, with particular attention focused on restoring anadromous fish populations such as steelhead (*Oncorhynchus mykiss*) and returning natural sand replenishment to Ventura and other Southern California beaches (USACE, 2001). Matilija Dam currently obstructs the natural watershed system of the Ventura River, as approximately 80% of the steelhead's suitable spawning habitat occurs upstream of the dam, resulting in decline of the steelhead trout population and alteration of sediment transport and downstream coastline erosion. Dam and removal of accumulated sediments would restore the natural watershed system of the Ventura River.

Section 230.10(a) of 404(b)(1) guidelines states "an alternative is practicable if it is available and capable of being done after taking into consideration costs, existing technology, and logistics in light of overall project purposes."

Project Criteria. Pursuant to the Section 404(b)(1) Guidelines (40 CFR 230), the least environmentally damaging practicable alternative (LEDPA) must be practicable in terms of technology, cost, and logistics in light of the overall project purpose, and produce the least environmental damage. Per 33 CFR 320-330, the proposed action must also not be contrary to the public interest. The Proposed Action is the LEDPA, and it is not contrary to the public interest. Impacts to aquatic and terrestrial habitat will be avoided where possible, minimized where avoidance is not possible, and compensated for when they occur.

II. ALTERNATIVE ANALYSIS

There are five alternatives for the Matilija Dam Ecosystem Restoration Project, including the No Action Alternative and four main action alternatives. Of the four action alternatives, three have two sub-alternatives that have been considered for the EIS/EIR. These are as follows:

- No Action Alternative
- Alternative 1 – Full Dam Removal/Mechanical Sediment Transport: Dispose of Fines, Sell Aggregate
- Alternative 2 – Full Dam Removal/Natural Sediment Transport
    - Alternative 2a – Slurry "Reservoir Area" Fines Off Site
    - Alternative 2b – Natural Transport of "Reservoir Fines"

- Alternative 3 – Incremental Dam Removal/Natural Sediment Transport
    - Alternative 3a – Slurry “Reservoir Area” Fines Off Site
    - Alternative 3b – Natural Transport of “Reservoir Fines”
- Alternative 4 – Full Dam Removal/Long-Term Sediment Transport
    - Alternative 4a – Long-Term Transport Period
    - Alternative 4b – Short-Term Transport Period (Proposed Alternative)

Alternatives 1, 2a, 2b, 3a, 3b, 4a, and 4b have the same set of objectives, but meet project need sin different ways. Each of the action alternatives include the following project activities: removal of Matilija Dam; removal of material from behind the dam; implementation of downstream flood protection; removal of giant reed beginning in reaches 7, 8, and 9, (refer to Project Description) then continuing with eradication activities downstream; modification of downstream water supply facilities; and overall revegetation and restoration of habitat.

Removal of Matilija Dam
The removal of Matilija Dam is a central feature for all of the action alternatives. It is a complete barrier to steelhead migration to prime spawning habitat located upstream. For all of the alternatives, the dam would be removed with controlled blasting, which would allow for dam removal to be completed in a relatively short period of time. The dam would be removed in 15-foot increments by placing explosives at proper distances along horizontals plains of the dam face. This way, most of the dam would be removed in 11 of the 15-foot increments.

Removal of sediment behind Matilija Dam
There is currently about 6 million cubic yards of sediment located upstream of the dam. If this material is not removed all at once or gradually as the dam is lowered, it would wash downstream and cause several problems, such as habitat burial, elevated turbidity, and loss of flood capacity. Sediment would be removed from behind the dam by using cutter head suction dredges (in Alternative 1, 2a, 3a, 4a and 4b) or clamshell dredges (in Alternative 2b and 3b). Sediment would be excavated to construct a pilot channel, no greater than ten feet deep, to initially convey flow through the reservoir basin. The material for the pilot channel varies greatly from alternative to alternative, and will be discussed under each alternative description.

A slurry pipeline would be constructed (in Alternatives 1, 2a, 3a, 4a and 4b) to convey the material to a downstream disposal site. The slurry pipeline would run from the reservoir to one of three disposal sites. The three potential sites for slurry disposal are Rice Road, Highway 150 and North of Baldwin Road. **Rice Road** is approximately 2.5miles downstream of the Matilija Dam on the east side of the river downstream of Robles Diversion and is approximately 90 acres. **Highway 150** consists of four non-contiguous sites that would range from 3.6 to 6.3 miles downstream of Matilija Dam. One sub-site, measuring 50 acres, would be located immediately upstream of the Highway 150 bridge. The three remaining sub-sites would all be located downstream of the Highway 150 bridge. **North of Baldwin Road** is located 3.6 miles downstream of the Matilija Dam to the west of the Ventura River (north of Baldwin Road) and would use approximately 95 acres for slurry disposal. Of these three disposal site areas, only one area would be chosen for use as the disposal site. A decision has not yet been reached; therefore all three disposal areas are analyzed in the EIS/EIR.

Implementation of downstream flood protection
Flood protection measures have been developed for the proposed action, because removal of the dam would facilitate the movement of sediment downstream, which would increase the risk of flooding in

these areas. These measures include modifications (e.g., increasing the height) to all the existing levees, modification or replacements of bridges, and the acquisition of some properties.

Two different levels of improvements have been proposed due to the different risks involved in the release in sediments for all alternatives: high level and low level. Both the high and low levels of flood control protection would include the purchase and removal of the Matilija Hot Springs retreat facility, two houses at Camino Cielo, and nine cabins at Camino Cielo. The Camino Cielo Bridge would also need to be removed. Under both levels of flood control protection, the Santa Ana Road Bridge would need to be replaced with a higher structure to allow 100-year flood flows to pass underneath.

It is estimated that 200,000 cubic yards of material would be required to construct and modify the levees; this material would be excavated and brought from the reservoir area to the levee or levees construction site/s. Additional riprap stone protection would be placed on any new or modified levees.

Because of the sediment removal/stabilization methods proposed in Alternatives 1 and 4a, the low-level downstream flood protection would be required as a part of the project. Under these alternatives, new levees and floodwalls would be constructed at Meiners Oaks and the Robles Diversion as well as Camino Cielo, and the Live Oaks and Casitas levees would be raised and floodwalls would be added at these locations. Levees and floodwalls at these locations would be constructed to the following heights:

- SR 33 Camino Cielo Protection – Floodwall 0.1 to 6.6 feet
- Meiners Oaks, Robles Diversion – Levee 0.0 to 1.4 feet, Floodwall 1.4 to 12.0 feet, Levee 12.0 to 5.1 feet
- Live Oaks – Floodwall 0.0 to 6.8 feet
- Casitas Springs – Levee 6.7 to 5.5 feet, Floodwall 5.5 to 7.4 feet, Levee 7.4 to 1.2 feet
- Canada Larga – Levee to 3.0 feet.

High-level flood protection for Alternatives 2a, 2b, 3a, 3b, and 4b would require the construction of new levees and floodwalls at Meiners Oaks and the Robles Diversion, Camino Cielo, and Cañada Larga. Levees and floodwalls would be modified at Live Oaks and Casitas. Levees and floodwalls at these locations would be constructed to the following heights:

- SR 33 Camino Cielo Protection – Floodwall 4.1 to 10.6 feet
- Meiners Oaks, Robles Diversion – Levee 0.0 to 6.4 feet, Floodwall 6.4 to 17.0 feet, Levee 17.0 to 10.1 feet
- Live Oaks – Levee 5.2 to 4.3 feet, Floodwall 4.2 to 12.8 feet
- Casitas Springs – Levee 12.7 to 11.5 feet, Floodwall 11.5 to 13.4 feet, Levee 13.4 to 7.2 feet

Removal of Giant Reed
Giant reed eradication is another activity that would occur with the proposed project to restore Matilija Creek and the Ventura River. Removal of giant reed would extend upstream beyond the influence of the reservoir limits into Reaches 8 and 9 (please refer to Project Description), through the reservoir and dam area in Reach 7, then along the Ventura River from Reach 6 consecutively through the other reaches downstream through Reach 1. Eradication activities in Reaches 7, 8, and 9 would be completed prior to the commencement of dam removal and reservoir material excavation. Giant reed removal would be accomplished with the use of a flail mower. The biomass would be removed, chipped, and dried. An EPA-approved foliar herbicide with a high concentration of glyphosate or similar compound (i.e.; Rodeo™), would be sprayed over the cut areas. Periodic follow-up treatment would be required for at least five years, and additional monitoring and eradication efforts would be necessary throughout the life of the project to prevent re-establishment of this highly invasive weed. A watershed-wide giant reed management plan would need to be in place to control giant reed in areas adjacent to the 100-year

floodplain and along Ventura River tributaries not included in the study area, such as Coyote and San Antonio Creeks. There have been some efforts made to develop a watershed-wide eradication program.

Modification of downstream water supply facilities

Because all of the alternatives would increase sediment flow and movement downstream, Casitas Municipal Water District facilities at Robles Diversion and City of Ventura water supply facilities at Foster Park would require modifications to help control water quality impacts caused by the sediments. Modifications to Robles Diversion Dam would include an expansion of the sediment debris basin, installation of radial gate sediment bypass structures in the dam, and construction of a desilting basin.

Habitat Evaluation Procedure (HEP)

A modified Habitat Evaluations Procedure (HEP) was used to quantitatively assess the value of existing habitat and the potential value of restored habitats under various alternatives. A numerical rating or value between 0.0 and 1.0 (lowest to highest value) was determined to identify the quality of habitats (HV – Habitat Value). The HV was then multiplied by the area of the habitat to obtain the Habitat Units (HUs) for each of the components analyzed for the project: Steelhead Habitat, Riparian Habitat, and Natural Processes. The Habitat Units for each component were averaged over the 50-year lifespan of the project and added together to provide the total Average Annual Habitat Units (AAHUs) for each alternative. As it is described above, the higher the average annual habitat units, the greater the habitat and potential value of restoration. Table D-1 summarizes the different AAHUs for each different alternative.

Table D-1. Average Annual Habitat Units (AAHUs)

Alternative	Average Annual Habitat Units (AAHUs)
No Action	0
Alternative 1	609
Alternative 2a	678
Alternative 2b	678
Alternative 3a	678
Alternative 3b	678
Alternative 4a	554
Alternative 4b	731

No Action (Future Without-Project) Alternative. Under the No Action Alternative, neither the Corps nor the Ventura County Watershed Protection District (VCWPD) would initiate any action to restore the aquatic and terrestrial habitat along Matilija Creek and the Ventura River, including the removal of Matilija Dam. Matilija Reservoir is expected to completely fill with sediment by 2017, entirely eliminating its water storage capacity, which is less than 10% currently. It is estimated that an additional 6,000,000 cubic yards of sediment could continue to accumulate in the reaches behind Matilija Dam, which could lead to further alteration of upstream habitat and channel areas. Once the reservoir is filled in, sediment from the upper Matilija Creek watershed would pass over the dam and begin flowing downstream, which would then be deposited along the mainstem of the Ventura River. This sediment would eventually be carried by river flows to the coast.

Because Matilija Dam would stay in place, the dam would continue to block upstream passage for steelhead, blocking spawning access to areas in the upper Matilija Creek and its tributaries. Matilija Creek and its tributaries compromise up to 50 percent of the steelhead's prime spawning habitat in the Ventura River system. In addition, the dam would continue to act as a barrier for wildlife movement for other terrestrial and aquatic species.

No major change in groundwater and surface water supplies is expected. While the reservoir fills with sediment within the next 50 years, the turbidity of the water falling over the dam would increase slightly. This could decrease the water quality for water suppliers downstream.

Alternative 1 – Full Dam Removal/Mechanical Sediment Transport: Dispose of Fines, Sell Aggregate. This alternative is designed to fully remove the dam in one continuous process. Please refer to Section 3.3 of the EIS/EIR for a more detail description of the dam removal process. Roughly 2.1 million cubic yards of fine sediments would be removed mechanically and slurried to a disposal area off site and the remainder disposed of at the Toland Road Landfill. The slurry material would be disposed of at one of the three potential disposal sites described above and in Section 3.1 of the EIS/EIR.

Of the remaining 3.8 million cubic yards of sediment, 3.0 million cubic yards of sand and gravel would be stockpiled upstream of the reservoir area on the east side of the channel and sold from the site for use as aggregate. Residual fine sediment (770,000 cubic yards) would be trucked to the slurry disposal area. Concrete rubble from the dam would be crushed and sold as aggregate. Metal debris would be hauled from the site and salvaged and non-recyclable debris would be sent to the Toland Road Landfill. With this alternative, the dam could be deconstructed in a single season.

Alternative 1 includes features to minimize the effect of increased turbidity through the mechanical removal of all accumulated sediments. Because turbidity impacts are temporary, impacts to water quality standards are considered adverse but less than significant; therefore, no mitigation is required.

In addition, lateral erosion; streambed scour and long-term channel aggradation would have adverse impacts. The increase of sediment loads due to the re-supply of sediment would impact the diversion at Robles Diversion (refer to Section 5.2.4 for a more detail description of these impacts). However, with the implementation of the sediment bypass at this location, this alternative's impacts to surface water supplies at Robles Division would be less than significant.

Aggradation along Reaches 7, 6b, 5, 4, 3, 2 and 1 is expected to either have less-than significant adverse effects or have beneficial impacts. Along the upper reaches, aggradation would aid in returning the system to a more natural hydrologic conditions, having a beneficial impact. In Reach 3, 2, and 1, approximately one to more than three feet of sediment are expected as additional deposition. As erosion would continue, however, impacts would be considered adverse but less than significant.

During slurry operation, the reservoir basin would be stripped of all vegetation and giant reed. A 60-foot-wide channel would be excavated to convey flows through the reservoir basin. The alignment of the channel would be excavated along the southern side of the reservoir as adjacent as feasible to the canyon wall. The channel's streambed elevation would be similar to the pre-dam elevation, but would be straighter and slightly steeper. Aggregate would be stockpiled on the northern side of the reservoir basin for sale activities. A soil cement revetment, constructed utilizing on-site aggregate and extending 13 feet above the channel invert and 5 feet below, would be constructed to protect sand and gravel operation during 100-year storm events. This revetment would be a temporary structure, which would be removed and recycled following completion of the aggregate sale operation. After the removal of this structure, the channel alignment and configuration would be allowed to move freely within the reservoir basin.

As described above, Alternative 1 would require the low-level flood control measure and modification of downstream water supply facilities. Alternative 1 would result in a potential increase in flood hazards primarily through sediment deposition that would reduce channel and levee capacity, reduce bridge capacity, and raise flood water surface elevations. Aggradation would be greatest at the channel between the dam (RM 16.5) through the reach occupied by Robles Diversion Dam (at RM 14.15), downstream to San Antonio Creek (RM 13), and further downstream to Casitas Springs (RM 6) during the 50-year project life or during a single, large flood event. However, with the purchase of property located in proximity to the dam site and channel (Reach 6), the modification and/or construction of flood walls and structures along all other reaches, including the Camino Cielo bridge and the replacement of the Santa Ana Bridge, flood hazard impacts would be reduce to less-than-significant levels.

The groundwater and surface water impacts would be similar to those described for the No Action Alternative except they would occur when the project activities have been completed, approximately two years after completion of construction. Impacts to groundwater or surface water supplies would be adverse, but less than significant.

Graded areas, including the slurry disposal area, would be re-vegetated with locally native stock or sterile annual grasses to control erosion. Dam removal and slurry operations would require approximately two years to complete, but sale of the aggregate material is assumed to take approximately ten years.

Dam and sediment removal activities in addition to aggregate sales would disrupt wildlife movement in Matilija Canyon and along Matilija Creek for a period of up to ten years, approximately seven years longer than Alternative 4b (please refer to Alternative 4b below). Short-term effects of Alternative 1 would occur as a result of temporary and permanent removal of sensitive habitats including lacustrine, riverine, palustrine, and upland habitat types. Although lacustrine and palustrine habitats along Matilija Creek (at Lake Matilija) would be reduced, the reduction in these habitat types is not considered significant since they were created artificially and, although they currently provide habitat for a number of sensitive species, the habitat would eventually be lost without the implementation of an action alternative. These impacts would be considered adverse, but less than significant.

In addition, this alternative would reduce impacts on water quality and aquatic organisms due to reduced sediment aggradation downstream over the long-term. Therefore, short-term impacts to steelhead remain adverse and significant; however, long-term impacts are improved. Vegetation, including giant reed, would be removed during the early stages of the alternative, thereafter disrupting wildlife habitat and movement corridors for the duration of Alternative 4b aggregate sales. These impacts, particularly for the duration proposed would be considered significant impacts. A number of mitigation measures (B-1 through B-10) are described in Section 5.3.3 that, if implemented, would bring impacts to a less-than-significant level.

Short-term affects to water quality may occur during the removal of giant reed. The Proposed Action would include the use of mechanical and glyphosate-based herbicide for giant reed removal. Glyphosate could enter surface water through three routes: (1) direct application to aquatic vegetation; (2) binding to soil that washes off treated terrestrial sites; or, (3) through drift from treated areas near water. In addition, potential impacts to surface water could occur due to the accidental spill or leaking of herbicides. To minimize possible affects to surface and ground water the use of herbicides would take place over short periods of time, and would be applied either by or under the supervision of a licensed professional to ensure that specific safety measures are followed. In addition, glyphosate remains attached to soil and sediment particles after application, where it is degraded over time by microorganisms. Due to its quick adsorption by soil and the fast action of soil microorganisms, the potential for leaching into surface or groundwater is low and would be considered a less-than-significant impact.

Overall, Alternative 1 would have a considerable impact on acreage through the project area. As summarized in Table 5.3-1 of the EIS/EIR (Section 5.3), Alternative 1 would have temporary habitat impacts on 213.73 acres and would have permanent habitat impacts on 46.83 acres. In addition, the

Habitat Evaluation Procedure (HEP) completed for the EIS/EIR indicated that Alternative 1 would result in 609 average annual habitat units. As described above, the HEP measures impacts and benefits to steelhead and riparian habitat, as well as natural hydrologic and sedimentation processes.

All impacts to the waters of the U.S. and adjacent wetlands would be temporary. Short-term impacts would result from removal of the dam, construction of downstream improvements, and transport or disposal of sediment. Due to the short-term nature and limited intensity of the impacts, all impacts would be less than significant.

Alternative 2 – Full Dam Removal/ Natural Sediment Transport. Alternative 2 is designed to fully remove the dam in one continuous process and allow removal of sediment using river hydraulic forces to move trapped sediment to locations more suitable for natural river functions, thereby reducing cost and impacts associated with mechanical means of relocating sediment. Concrete rubble from the dam would be processed for transportation and transported to Hanson Aggregates. Non-recyclable debris would be sent to the Toland Road Landfill. Downstream sediment concentrations would be controlled only by river flow. The advantages of the removing the dam in one continuous process would be speed of removal and overall cost. Potentially, the dam could be deconstructed in a single season.

Within Alternative 2, there are two sub-alternatives: 2a and 2b. Both sub-alternatives would require the high level flood control protection as described above and in Section 3.1 of the EIS/EIR. Graded areas, including the slurry disposal area, would be re-vegetated with locally native stock or sterile annual grasses to control erosion.

Alternative 2a – Slurry "Reservoir Area" Fines Off Site. Under this alternative, the site behind the dam would be stripped of vegetation and giant reed as described above and in Section 3.1 of the EIS/EIR. In addition, 2.1 million cubic yards of fine sediment would be excavated from behind the dam and slurried to one of the three potential disposal sites downstream over the course of nine months. A small pilot channel, no greater than 10-feet deep, would be excavated to initially convey flows through the reservoir basin.

The remaining 3.8 million cubic yards of sediment trapped behind the dam would be allowed to erode within the original reservoir limits. Although the remaining sediment would be stockpiled in the excavated reservoir area of the dam, Alternative 2a does not include any additional landscaping, stabilization, or armoring for the stockpiled sediment. Leaving the stockpiles unarmored would allow the sediment to be carried downstream in storm events of any size and would not restrict this erosion to occur only during storm events greater than a certain intensity. It is expected that storm flows would eventually return the Matilija Canyon area to a more-natural condition resembling the pre-dam contours of the canyon. Although it is unknown how long it would take for this sediment to be moved downstream out of the canyon, it is anticipated that the majority of the sediment would be scoured from the canyon in a few two- to five-year storm events. The expected duration for dam removal and slurry activities under Alternative 2a is two years.

Because the dam is removed in a single phase in this alternative, all the sediment is immediately available for transport. An increase in turbidity may cause water quality problems in Lake Casitas and may increase water treatment costs. Based on the average detention time of water in the reservoir (approximately eight years) it is expected that most of the silt and sand-sized sediment would deposit near the outlet of Robles Canal into Casitas Reservoir and would not reach the intakes for the treatment plant. For Alternative 2a, the duration of excessive turbidity is expected to be a matter of days as soon as flow is returned to the reservoir area. Impacts to water quality standards or waste could be potentially significant but could be mitigated to a less-than-significant level with the addition of a de-silting basin (mitigation measure H-1, Section 5.2.5 of the EIS/EIR).

In addition, Alternative 2a would cause an initial oversupply of sediment that would quickly return the channel to pre-dam elevations. However, the channel may actually aggrade above pre-dam elevations at select locations if sediment is supplied to the river too quickly. The possibility of this excessive aggradation in some reaches would require that levees be constructed higher than the other alternatives. However, with the exception of induced flooding, sediment related impacts are generally beneficial for the reason that the river channel downstream of the dam would return to sediment equilibrium after approximately ten years. Deposition would occur, which should inhibit the channel erosion that has occurred over the years since the construction of the dam. As a result, sediment delivery to the ocean would be increased. Construction of a sediment bypass would prevent potentially adverse impacts at the Robles Diversion and Robles Canal. Therefore, impacts would be adverse, but less than significant.

Flood hazard impacts would be the same as described for Alternative 1. In addition, groundwater and surface water supplies could potentially be affected with the removal of Matilija Dam as it could deplete groundwater or surface water supplies or interfere with groundwater flow or recharge due to increases in turbidity and sedimentation. It is estimated that project-related turbidity increases would cause surface diversions from existing facilities at Foster Park to be reduced by approximately 470 acre feet the first year after construction of the dam, diminishing to no reduction in diversions after six years. Total reduction in diversions over the six-year period is estimated at 1,600 acre-feet, which represents approximately four percent of the six-year diversion total. The alternative includes the construction of two groundwater wells at Foster Park to offset the possible reduction. With the inclusion of these wells, impacts to City of Ventura water supply facilities are considered adverse, but less than significant at Foster Park and Lake Casitas. Affects on ground or surface water from giant reed removal would be similar to Alternative 1.

Under Alternative 2a, the removal of the dam and construction and maintenance of downstream levees would limit the time wildlife movement in Matilija Canyon and along Matilija Creek is disrupted and provide for a beneficial impact to the area. Similar to Alternative 1, all vegetation would be removed during the early stages of the alternative, thereafter disrupting wildlife habitat and movement corridors only during dam removal and vegetation clearing. These impacts, although temporary would still be considered significant. Following dam removal and restoration activities, the canyon and creek in the vicinity of the Matilija Dam and reservoir would eventually be restored to a natural condition and wildlife movement through the area would resume. Wildlife movement through the canyon would ultimately be enhanced and would provide a beneficial impact.

Short-term impacts to steelhead may increase with implementation of Alternative 2a as a result of downstream sediment transport. Alternative 2a has a greater potential to affect downstream habitat conditions than Alternative 1. Large quantities of sediment suspended in the water column would eventually accumulate in downstream reaches of Matilija Creek and the Ventura River, which could potentially impact aquatic organisms in a variety of ways including, mechanical suffocation, abrasion, reduced oxygen loads, and suffocation or smothering of egg masses. Although the effects would be short-lived, adverse and significant, spawning habitat for migrating steelhead would eventually expanded in the Ventura River watershed, and steelhead populations would have access to the Ventura River and Pacific Ocean . This would provide a beneficial impact to the species.

Alternative 2a would have higher temporary and permanent impacts on habitat acreage than Alternative 1. Under Alternative 2a, 225.33 acres of habitat would be temporarily impacted, and 63.83 acres of habitat would be subject to permanent impacts (refer to Table 5.3-1, Section 5.3 in the EIS/EIR). In addition, Alternative 2a would result on 678 average annual habitat units for steelhead and riparian habitat, as well as hydrologic and sedimentation processes, as it is indicated by the HEP analysis for the EIS/EIR.

Alternative 2b – Natural Transport of "Reservoir Fines." Giant reed would be treated as discussed above and in Section 3.1of the EIS/EIR under Alternative 2b. Instead of the sediment behind the dam being slurried downstream, approximately 520,000 cubic yards of sediment would be excavated and stockpiled on the eastern half of the existing reservoir area by clam shell dredges and land-based clamshells. The sediment would be placed upstream within the basin and allowed to erode naturally. Following removal of the dam, all sediment would be eroded by storms and transported downstream. Increased impacts at the Robles Diversion Dam resulting in missed water diversion opportunities to Lake Casitas necessitates the procurement of up to 48,000 acre-feet of water for Casitas Municipal Water District from other water purveyor sources.

Similar to Alternative 2a, the remaining 5.2 million cubic yards of sediment trapped behind the dam would be allowed to erode over time to a condition resembling the pre-dam contours of the canyon. The remaining sediment would be stockpiled in the excavated reservoir area of the dam, but, as with Alternative 2a, would not include any additional landscaping, stabilization, or armoring so that storm events of any size may carry the sediment downstream. By relying on storm flows to convey the sediment out of the canyon, eventually Matilija Canyon would be returned to a more-natural condition resembling the pre-dam terrain contours of the area. It is anticipated that the majority of the sediment would be scoured from the canyon in few two- to five-year storm events. While dam removal activities would be complete within two years, it is estimated that this alternative would require approximately seven years for excavated sediment to be transported from the canyon.

Alternative 2b would have the same impacts on water quality standards as described in Alternative 2a. The impacts of Alternative 2b are greater than those of Alternative 2a, but with mitigation described in 2a, both are less than significant.

Impacts resulting from lateral erosion, streambed scour, or long-term channel aggradation/degradation are the same as described for Alternative 2a. The impacts of Alternative 2b are greater than those of Alternative 2a, but with the project features in Alternative 2b designed to reduce the effects of erosion and aggradation, impacts would be less than significant. Impacts related to flood hazards would be the same as described for Alternative 1. Impacts to groundwater would be the same as described for Alternative 1. Affects to groundwater or surface water from giant reed removal would be similar to Alternative 1.

Overall Alternative 2 would have temporary effects on the waters of the U.S. Short-term impacts would result from removing the dam in a single phase, as it would cause all the sediment to be available for immediate transport. Other short-term impacts would result from removal of the dam, construction of downstream improvements, and transport or disposal of sediment. However, as all impacts would be short term, they would have a long-term benefit to the overall ecosystem of the Ventura River. Therefore, these impacts would be less than significant.

Ecological effects under Alternative 2b would be largely the same as those described for Alternative 2a. With natural transport of fine sediments from the reservoir area, impacts due to downstream sediment aggradation would be greater than described for Alternative 2a. However, the aggradation would be less than significant due to the rapid rate of recovery exhibited by Ventura River vegetation communities and the expectation that turbidity would stabilize to twice normal levels following the first three storm events.

Similarly to Alternative 1, Alternative 4b would have short term impacts to sensitive plant communities within lacustrine and palustrine systems and levee expansion areas. These impacts would result in the permanent and temporal removal of sensitive species. In addition, impacts to flora and fauna would also be short term, with long-term benefits.

Alternative 2b would have a less significant temporary impact on habitat acreage than Alternative 1 and Alternative 2a. Alternative 2b would temporarily impact 173.00 acres of habitat. However, this alternative would permanently impact 63.83 acres of habitat, which is the highest amount of total acreage that could be impacted with the proposed project (please refer to Table 5.3-1, Section 5.3 in the EIS/EIR). In addition, according to the HEP analysis, Alternative 2b would result on 678 average annual habitat units for steelhead and riparian habitat, as well as natural processes.

Alternative 3 - Incremental Dam Removal/Natural Sediment Transport. Under this alternative the dam would be removed in several stages and impacts from sediment downstream of the dam would be monitored. The advantage of the incremental dam removal alternative would be a greater measure of control over the rate of sediment release. Dam and sediment removal techniques for this alternative would be similar to those described in Alternative 2a, but the incremental dam removal is distinguished from the full dam removal by the interruption of the dam demolition process at one stage of the demolition. This interval of interruption is assumed to be two years, although may require more time to allow erosion of a sufficient quantity of impounded sediments. Interruption of demolition would allow eroded reservoir sediments to stabilize downstream of the dam and provide the river with an opportunity to adjust to sediment inflows. Concrete rubble from the dam would be processed for transportation and hauled to Hanson Aggregates and non-recyclable debris would be sent to the Toland Road Landfill.

Within Alternative 3, there are two major sub-alternatives: 3a and 3b. Both sub-alternatives would require the high-level flood control protection as described above and in Section 3.1 of this EIS/EIR.

Alternative 3a – Slurry "Reservoir Area" Fines Off Site. Alternative 3a would be similar in dam and sediment removal technique to Alternative 2a, but would be accomplished over a longer time period. Sediments from behind the dam would be slurried to one of the three potential disposal sites as discussed in Alternatives 1 and 2a. The dam structure above elevation 1,000 feet would be removed, and a small pilot channel, no greater than 10-feet deep, would be excavated to initially convey flows through the reservoir basin. All downstream dam structures, with the exception of the outlet works, would be removed during the first construction phase. Approximately 39,100 cubic yards of concrete would be removed from the dam at this time. Excavated sediment would be stockpiled behind the dam, but would not be stabilized or protected from storm flows. The sediment trapped behind the dam would be allowed to erode by natural processes to equilibrium with the modified dam height. This first phase of construction (Phase I) is estimated to take approximately 18 months.

An additional 12,000 cubic yards of material would be removed along with the outlet works in the second phase of the project. The remaining sediment would be excavated as described above, and would again be stockpiled to be conveyed downstream by storm flows. Removal of the remaining sediments would be variable and dependent upon the hydrology; although it is assumed that the second construction phase (Phase II) would be initiated two years after completion of Phase I. As no armoring or protection would be used to stabilize the excavated sediments in the canyon, storm flows would be allowed to create natural meanders and eventually return the canyon to a condition resembling the pre-dam canyon contours. Following Phase II dam removal, the remaining trapped sediment would be allowed to erode by natural fluvial processes.

Impacts to water quality and erosion would be the same as described for Alternative 2a described above and in the EIS/EIR. Impacts to flood hazards would be the same as described for Alternative 1. Impacts and affects to groundwater or surface water from giant reed removal would be similar to Alternative 1 as described above and in the EIS/EIR.

The impacts of Alternative 3a would be very similar to those of Alternative 2a discussed above, except that changes to downstream conditions would be moderated by the more gradual release of sediment downstream under this alternative. Although these impacts would be more severe in Matilija Canyon, sediment aggradation downstream would be less severe. Therefore, as in Alternative 2a, long-term downstream sediment aggradation impacts on habitats would be less than significant.

Habitat and wildlife corridors in Matilija Canyon would be disrupted for a longer period than described for Alternative 2a, though not as long as Alternative 1. Impacts to sensitive plant communities within Lacustrine and Palustrine systems and levee expansion areas, and impacts to sensitive plant species would be similar to those described in Alternative 1.

Short-term impacts to steelhead may increase with implementation of Alternative 3a versus with Alternatives 1 or 2b due to the re-occurrence of sedimentation and turbidity in storm flows. Aggradation of material in the channel under this alternative could result in short-term significant impacts to steelhead populations.

In addition, Alternatives 3a would result in the temporary loss of habitat for sensitive species during demolition and construction, including lacustrine, riverine, palustrine, and upland habitat types. The demolition and construction activities associated with dam removal and sediment slurrying would result in the potential loss of individuals of protected and sensitive wildlife species inhabiting the Matilija Dam reservoir area, including, arroyo chub, California red-legged frog, southwestern pond turtle, coastal western whiptail, and two-striped garter snake similar to impacts described in Alternative 2a.

As summarized in Table 5.3-1 in Section 5.3 of the EIS/EIR, Alternative 3a would temporarily impact 225.33 acres of habitat, while it would permanently impact 48.83 acres of habitat. Similarly to Alternatives 2a and 2b, Alternative 3a would result in 678 average annual units for steelhead and riparian habitat, as well as for natural processes.

Alternative 3b- Natural Transport of "Reservoir Fines." Alternative 3b would be similar in dam and sediment removal technique to Alternative 2b, but would be accomplished over a longer time period. In Phase I, the dam would be lowered to elevation 1,030 feet and approximately 27,100 cubic yards of concrete would be removed. Approximately 300,000 cubic yards of sediment immediately behind the dam would be excavated by a barge-mounted clamshell dredge and stockpiled along the eastern half of the existing reservoir area as described in Alternative 2b. Fluvial processes would naturally erode this sediment. The remaining sediment trapped behind the dam would be allowed to erode by natural processes to equilibrium with the modified dam height. A small pilot channel, no greater than 10-feet deep, would be excavated to initially convey flows through the reservoir basin. No armoring or riprap protection would be used to stabilize the excavated sediments and allow storm flows to scour these materials downstream.

An additional 24,000 cubic yards of material would be removed in Phase II of the project to complete the dam removal. In Phase II, 320,000 cubic yards of sediment would be excavated using a combination of clamshell excavation from the top of the remaining dam and a truck-mounted dragline. The project's duration is estimated to require 18 months for the first phase of construction. Removal of the remaining sediments would be variable and dependent upon the hydrology; although it is assumed that the second construction phase would be initiated two years after completion of Phase I. Following Phase II dam removal, the remaining trapped sediment would be allowed to erode by natural fluvial processes. Storm flows, unconstrained by hardened channels, armoring, or riprap, would be allowed to create natural meanders and eventually return the canyon to a condition resembling the pre-dam canyon contours.

Increased impacts at the Robles Diversion Dam resulting in missed water diversion opportunities to Lake Casitas necessitates the procurement of up to 48,000 acre-feet of water for Casitas Municipal Water District from other water purveyor sources.

Impacts to water quality would be the same as described for Alternative 2b. The impacts of Alternative 3b are greater than those described for Alternative 2a, but with the mitigation described in 2a, impacts would be less than significant. Impacts from erosion would be the same as described for Alternative 2b. Impacts from flood hazards would be the same as described for Alternative 1. Impacts and affects to groundwater or surface water from giant reed removal would be similar to Alternative 1.

The majority of impacts of Alternative 3b would be very similar to those of Alternative 2a and 3a discussed above; however, short-term impacts to turbidity would be more severe due to natural transport of reservoir fines. With each phase of dam removal another surge of sediments would occur. As in Alternative 2a, long-term downstream sediment aggradation impacts on habitats would be adverse but less than significant. All other impacts and benefits would be the same as described for Alternative 2a.

Wildlife corridors would be impacted under Alternative 3b similarly as they are under Alternative 3a. These impacts would be significant and unavoidable. In addition, impacts to sensitive plant communities within Lacustrine and Palustrine systems and levee expansion areas would be similar to those identified in Alternative 2b. Impacts to sensitive plant species are similar to those described in Alternative 1. Alternative 3b impacts to sensitive fauna are similar those described for Alternative 3a due to the approximate project duration (up to seven years) and similar to Alternative 2a with respect to loss of habitat and sedimentation (natural transport of reservoir fines). Short-term impacts to steelhead may increase with implementation of Alternative 3b versus with Alternative 2a due to the re-occurrence of sedimentation and turbidity in storm flows. These short-term impacts would be considered significant.

As indicated by the HEP, and similarly to Alternative 2a, 2b and 3a, Alternative 3b would result in 678 average annual habitat units for steelhead and riparian habitat, as well as for natural processes. In addition, Alternative 3b would result in 173.00 habitat acres with permanent impacts, and 63.83 habitat acres with temporary impacts.

Overall, Alternative 3 would have temporary effects on the waters of the U.S., including aquatic and terrestrial habitat. Short-term impacts would result from removal of the dam, construction of downstream improvements, and transport or disposal of sediment. All impacts would be temporary and would be less than significant. Please refer to Section 5 of the EIR/EIR for a more detail description of impacts.

Alternative 4 - Full Dam Removal/ Long-Term Sediment Transport. In this alternative, a channel would be excavated through the sediments upstream of the dam. There are two options under consideration for this alternative: long- and short-term transportation periods for the sediments (4a and 4b). Both Alternatives are designed to fully remove the dam in one continuous process while roughly 2.1 million cubic yards of fine sediment would be excavated and slurried to a disposal site downstream.

Under Alternative 4, the entire concrete dam structure above the original streambed would be removed. The concrete left in place below the streambed would be shaped to ensure fish passage and to simulate the natural pre-dam streambed configuration. A 100-foot-wide channel would be excavated along the reservoir basin, following an alignment similar to the 1947 pre-dam alignment. Side slopes would be excavated to a 3:1 (horizontal to vertical) slope.

Alternative 4a – Long Term Sediment Transport Period. The excavated channel would be designed to convey the 100-year recurrence-level flood. Materials excavated from the channel would be used as fill along the channel. Slope protection would be placed along the channel, extending 11 feet above channel invert and 5 feet below to prevent undercutting of the slope. Slope protection would be designed to be overtopped by 50- to 100-year floods, to allow sediment to be transported downstream over a longer time period. Sediment excavated from the channel would be placed in storage locations within the original reservoir limits. Concrete blocks from the deconstructed dam structure would be buried in the fill. The alignment of the stream channel would be relatively straight and with riprap protection would be inflexible to natural meanderings. With the protection used to stabilize the excavated material, scouring of the excavated material from the canyon and a return to a natural stream contour is anticipated to take 100 years or more. Since Alternative 4a removes all the sediment storage behind Matilija Dam from the Ventura River System, either mechanically or by permanently stabilizing, the downstream impacts associated with this alternative are practically identical to the Alternative 1.

Impacts to water quality would be the same as described for Alternative 1. Impacts from erosion, increased flood hazard, or to groundwater would be the same as described for Alternative 1. Affects to groundwater or surface water from giant reed removal would be similar to Alternative 1.

Graded areas, including the slurry disposal site, would be re-vegetated to control erosion. Alternative 4a would require the low-level flood control protection described above and in Section 3.1 of the EIS/EIR. The expected duration for construction activities under Alternative 4a is three years.

Under Alternative 4a, the impacts associated with the slurry disposal site utilized in Alternatives 1, 2a, 3a, and 4b and the desiltation basin utilized in Alternative 4b would be completely eliminated. Temporary impacts to species, habitat, and wildlife corridors in Matilija Canyon would be considerably less than described for Alternatives 1, 3a, and 3b, due to the shorter duration of disturbance, but would be greater than the impacts in Alternatives 2a and 2b with each phase of deconstruction. Impacts would remain significant even with the implementation of mitigation measures.

Under Alternative 4a, approximately 9,500 linear feet of streambed and bank would eventually be restored. The stream channel in the Matilija Reservoir area would be 100 feet wide and provide 22 acres of stream, exactly the same as with Alternative 4b. Alternative 4a would also restore 83 acres of riparian habitat on the banks and upstream floodplain areas (VCWPD, 2004a), approximately 5 acres less than Alternative 4b. Steelhead habitat would total 22 acres of riverine plus 6.5 acres of lower bank on one side of the new channel over the life of the project, up to 50 years (VCWPD, 2004a).

With Alternative 4a, 213.73 acres of habitat would be temporarily impacted, and 46.83 acres of habitat would be permanently impacted. In addition, this alternative would result in 554 average annual habitat units for steelhead and riparian habitat.

Alternative 4b – Short Term Sediment Transport Period. Under Alternative 4b, the site would be stripped of all vegetation and reservoir-area sediments would be slurried to one of the three potential disposal sites downstream. A channel would be excavated through the remaining sediments and sediment excavated from the channel would be temporarily placed in storage locations within the original reservoir limits. Erosion of trapped sediment by natural fluvial processes would be allowed to occur in areas along the active channel, except in areas in the vicinity of the storage areas. A soil cement revetment varying from three to seven feet above channel invert and five feet below would protect storage areas. The lower soil cement revetment would be designed such that flows of 3,000 to 7,500 cubic feet per second, the equivalent of a two- to five-year storm event, would overtop the revetment and be allowed to erode material from the storage locations. The higher revetment height would be overtopped by flows exceeding 12,500 cubic feet per second, the equivalent of a ten-year storm event.

Revetment would be constructed of soil cement, utilizing aggregate available on site. The soil cement revetments would be removed from the site following sufficient evacuation of trapped sediment from the reservoir basin. This could occur in less than ten years in some segments of the reach, and up to 20 years in other segments, and would depend on adaptive management of sediment evacuation and effects downstream. With the soil cement required for stabilization of the materials, natural river meandering would be possible between the sediment storage areas, but would be limited until the soil cement had been removed. After a large percentage of the sediments have eroded and the soil cement removed, the site would be re-vegetated. For this alternative it is assumed that the re-vegetation activities would occur approximately ten years after notice to proceed.

Alternative 4b would require the high-level flood control protection described above and in Section 3.1 of the EIS/EIR. In addition, this alternative would include a desilting basin, which would allow to divert flows from Ventura River to settle out fine sediment (silts, clays) prior to conveyance of the flows via the canal to Lake Casitas. The intake structure to the canal would be modified and canal waters would be diverted through the desilting basin, reducing the velocity of the flows and allowing the fines to settle in the basin. The proposed basin would require excavation and levee construction to contain the diverted flows. To prevent infiltration losses, a geofabric liner would be installed. Fine sediment would be settled out by the addition of a flocculating polymer. The resulting sludge would require periodic removal and disposal to a nearby storage site.

Under Alternative 4b, the primary water quality concern involves increased turbidity of flows downstream of the dam. Removal of the dam would result in increases in downstream turbidity in the form of water-borne silts and clays. Temporary increases would result from construction activities disturbing sediment within the flow of Matilija Creek. Potential areas of impact include all of Matilija Creek downstream of the dam, all of the Ventura River downstream of the confluence with Matilija Creek, Robles Diversion, the Foster Park Diversion, and Lake Casitas. Alternative 4b includes measures to minimize the effect of increased turbidity through: 1) removal of accumulated sediments behind the dam through slurry to a disposal area downstream of the dam; 2) construction of a low-flow channel (ten-year flood capacity) protected with soil cement from erosion through the excavated area behind the dam; and 3) a desilting basin along the Robles-Casitas canal for the purpose of trapping fine sediments prior to their reaching Lake Casitas.

In the short term, during and shortly after construction, demolition of the dam and the mechanical removal of sediment would introduce fine sediment into the river system. The fine sediment concentrations are estimated to be between two and ten times higher from beginning of dam demolition until the first storm passes through the reservoir area. It would be conservatively assumed that concentrations and turbidity would increase by a factor of ten until the first storm passes. The long-term increase in turbidity after construction is completed should only occur during high flow events.

Because turbidity impacts are temporary or confined to high flow events of ten-year recurrence interval or greater, and this alternative includes structures to minimize turbidity impacts, impacts to water quality standards, waste discharge requirements, or water quality are considered adverse, but less than significant. No mitigation is required.

Another concern related to water quality is the potential to cause lateral erosion, streambed scour, or long-term channel aggradation/degradation that could result in damage to private property, utility lines, or other structures. The removal of the dam would re-supply sediment to Matilija Creek and the Ventura River downstream of the dam and would change the trend from erosion to deposition in the upper reaches. The deposition would continue until the sediment supply equilibrates with the transport capacity. The equilibrium condition would be approximately that of the pre-dam condition that existed prior to 1947.

Within Matilija Canyon (downstream of the dam), over ten feet of aggradation is predicted. The large amount of deposition is due to its proximity to the dam and the sudden increase in sediment loads. The ten feet of aggradation may be temporary and the river channel would likely return to elevations similar to pre-dam conditions. Sediment related impacts are generally beneficial for the reason that the river channel downstream of the dam would return to sediment equilibrium after approximately ten years. Deposition would occur, which should inhibit the channel erosion that has occurred over the years since the construction of the dam. In addition, constructing a sediment bypass would prevent potential adverse impacts at the Robles Diversion and Robles Canal. Because of these potentially adverse impacts at Robles, impacts to private property, utility lines, or other structures caused by lateral erosion, streambed scour, or long-term channel aggradation/degradation are considered adverse, but less than significant

Alternative 4b would result in a potential increase in flood hazards primarily through sediment deposition that would reduce channel and levee capacity, reduce bridge capacity, and raise flood water surface elevations. Current modeling indicates substantial deposition would occur in the channel between the dam (RM 16.5) through the reach occupied by Robles Diversion Dam (at RM 14.15), downstream to San Antonio Creek (RM 13), and further downstream to Casitas Springs (RM 6) during the 50-year project life or during a single, large flood event. The magnitude of the impacts is presented below. However, with the purchase of property located in proximity to the dam site and channel (Reach 6), the modification and/or construction of flood walls and structures along all other reaches, including the Camino Cielo bridge and the replacement of the Santa Ana Bridge, flood hazard impacts would be reduce to less-than-significant levels.

Under Alternative 4b, the overall ecological effects are expected to improve in the long term, as the removal of the dam would cause a reestablishment of natural sediment and hydrologic flows, a subsequent increase in wildlife use of the Ventura River due to the removal of barriers to up and downstream passage for steelhead and other aquatic species. Short-term effects on the ecology of the area would occur as would occur as a result of temporary and permanent removal of sensitive habitats including lacustrine, riverine, palustrine, and upland habitat types.

Long-term effects include the loss of lacustrine habitat and the subsequent reduction in the diversity of organisms that prefer this habitat type. These activities would directly impact one federally endangered species, the California red-legged frog, which is known to utilize lacustrine and emergent wetland habitat types in Reach 7. Furthermore, riverine, palustrine, and upland habitats would be restored after construction, but the quantities of each habitat type would change compared to existing conditions. Aquatic habitats downstream of the dam would be improved through the eradication of exotic predators such as bullfrogs, crayfish, and largemouth bass. Most importantly, the restored stream would provide improved riparian habitat for resident and migratory birds including the least Bell's vireo and southwestern willow flycatcher, and provide access to an additional 16 miles of prime steelhead spawning habitat.

Another important ecological benefit of Alternative 4b would be the permanent eradication of giant reed from the Matilija Reservoir, Matilija Creek, and the Ventura River. Removal of giant reed as a component of the project would provide beneficial impacts to Matilija Creek and the downstream watershed, as the maintained areas would no longer be a source of propagules for future giant reed infestations. This action would increase the habitat value and function of existing and restored habitats within the Ventura River.

It is estimated that this alternative would require approximately two years to complete the slurrying operation of the reservoir area sediment, removal of the dam, excavation of the channel, and construction of the soil cement revetment.

Under Alternative 4b, 225.33 acres of habitat would be temporarily impacted, while 48.83 acres of habitat would have permanent impacts. In addition, Alternative 4b would result in 731 average annual habitat units, resulting as the alternative with the highest existing habitat and potential value of restored habitats.

Alternative 4 would have temporary effects on the waters of the U.S., as the lining in the concrete lined-channel would eventually be removed, and the system would be allowed to return to a more natural environment. Short-term impacts would result from removal of the dam, disposal of sediments and construction of downstream improvements. In addition, Alternative 4b would result in the removal of approximately 46 acres of open water and emergent wetland habitat artificially created by development of the dam. Please refer to Section 5.3 of the EIR/EIR for a more detail description on impacts. However, it has been shown that following dam removal, diversity in aquatic and terrestrial species would dramatically increase, outweighing the loss of the open water and emergent wetland habitat. Furthermore, removal of Matilija Dam would result in overall ecosystem restoration, which would return the site to a more natural state.

Least Environmentally Damaging Practicable Alternative (LEDPA). The No Action Alternative is not considered practicable due to its failure to meet the project purpose of aquatic and terrestrial ecosystem restoration. The No Action Alternative would continue to block upstream passage for steelhead, denying them access to spawning areas in upper Matilija Creek and its tributaries, which compromise up to 50% of the steelhead's prime spawning habitat in the Ventura River system (Moore, 1980). Because the No Action alternative would not meet the overall project purpose nor would it be in the public interest, the No Action Alternative is not the least environmentally damaging practicable alternative.

Although each alternative varies in approach, each proposed alternative would entail dredging and filling activities within the banks of the channel. Excavation activities would occur when removing the dam, removing sediments from behind the dam, excavating a pilot channel to convey flows through the reservoir basin (Alternative 2a and 3a), and excavating a channel along the reservoir basin (Alternatives 4a and 4b). Filling activities would occur when sediments are stored within the existing reservoir (Alternatives 2b and 3b) and from loose soil from the modification/construction to all existing levees, and modification or replacements of bridges (all alternatives).

As described above, Alterative 1 would have temporary impacts on 213.73 acres of habitat and would have permanent impacts on 46.83 acres of habitat. In addition, it would result in an estimated 609 average annual habitat units. Although biological impacts (temporary and permanent impacts to habitat acres) are lower than Alternative 2a, 3a and 4b, the average annual habitat units are significantly lower than all of other alternatives, except for Alternative 4a, resulting in fewer benefits to steelhead and riparian habitats. In addition, Alternative 1 would have more significant (but mitigable) impacts on hydrologic resources including temporary loss of lacustrine, riverine, and palustrine habitats in Matilija Dam, than all the other alternatives on. Therefore, Alternative 1 is not considered to be the least environmentally damaging practicable alternative.

Conversely, Alternative 2a would result in higher temporary and permanent impacts on habitat acreage than Alternative 1. Alternative 2a would have a temporary impact on 225.33 acres of habitat, and permanent impacts on 48.83 acres of habitat. However, Alternative 2a would produce an estimated 678 average annual habitat units, 69 additional average annual habitat units than Alternative 1. All other overall impacts under Alternative 2a would be similar impacts to the other alternatives (these include cultural resources, aesthetics, traffic, socioeconomics, noise and air quality). Because Alternative 2a would have greater temporary impacts on habitat acres than Alternative 1, while having similar overall impacts on all other issue areas, it would not be considered the least environmentally damaging practicable alternative for the Proposed Action.

Alternative 2b would have less temporary impacts on acres of habitat than Alternative 1 and Alternative 2a. Alternative 2b would temporarily impact 173.00 acres of habitat. However, similarly to Alternative 2a, this alternative would permanently impact 63.83 acres of habitat, which is the highest amount of total acreage that could be impacted with the proposed action. In addition, according to the HEP analysis, Alternative 2b would result in an estimated 678 average annual habitat units for steelhead and riparian habitat. All other overall impacts under Alternative 2b would be similar as all of the other alternatives. Although Alternative 2b would account for fewer acres of habitats with temporary impacts and would result in the same amount of average annual habitat units as Alternative 2a, the amount of acres of permanent impacts would be the maximum possible. Therefore, Alternative 2b is not considered to be the least environmental damaging practicable alternative.

Similarly to Alternative 2a, Alternative 3a would temporarily impact 225.33 acres of habitat, while it would permanently impact 48.83 acres of habitat. Alternative 3a would result in an estimated 678 average annual units for steelhead and riparian habitat, similarly to Alternatives 2a and 2b. All other overall impacts under Alternative 3a would be comparable to the other alternatives. Because Alternative 3a would have greater temporary impacts on habitat acres than Alternative 1 and 2b, while having similar overall impacts on all other issue areas, it would not be considered the least environmentally damaging practicable alternative for the Proposed Action.

As indicated by the Habitat Evaluation Procedure, and similar to Alternative 2a, 2b and 3a, Alternative 3b would result in an estimated 678 average annual habitat units for steelhead and riparian habitat, as well as for natural processes. In addition, Alternative 3b would result in 173.00 habitat acres with permanent impacts, and 63.83 habitat acres with temporary impacts. Although Alternative 3b would result significantly fewer acres of habitat that would be temporarily impacted, it would result in the maximum possible amount of total acreage that could be permanently impacted with the proposed project. Therefore, it would not be considered the least environmentally damaging practicable alternative for the Proposed Action.

Under Alternative 4a, 213.73 acres of habitat would be temporarily impacted (less than Alternative 2a, and 3a, and more than Alternative 2b and 3b), and 46.83 acres of habitat would be permanently impacted (less than all other alternatives). In addition, this alternative would result in an estimated 554 average annual habitat units for steelhead and riparian habitat, significantly lower than the rest of the alternatives.

Furthermore, under Alternative 4a, approximately 9,500 linear feet of streambed and bank would eventually be restored to pre-dam conditions. The stream channel in the Matilija Reservoir area would be 100-feet-wide and provide 22 acres of stream, exactly the same as with Alternative 4b. Alternative 4a would also restore 83 acres of riparian habitat on the banks and upstream floodplain areas, approximately 5 acres less than Alternative 4b. Steelhead habitat would total 22 acres of riverine plus 6.5 acres of lower bank on one side of the new channel over the life of the project, up to 50 years.

Although Alternative 4a may provide for greater short-term benefits than all other alternatives, the long-term benefits would be less than Alternative 4b. Alternative 4b would result in more long-term benefits to the overall restoration effort of the proposed project. In addition, because Alternative 4a would result in an estimated 55 fewer average annual habitat units than Alternative 1, and an estimated 124 fewer average annual habitat units than Alternatives 2a, 2b, 3a, and 3b, it would not be considered to be the least environmentally damaging practicable alternative for the Proposed Action.

Under Alternative 4b, 225.33 acres of habitat would be temporarily impacted, while 48.83 acres of habitat would have permanent impacts. In addition, Alternative 4b would result in 731 average annual habitat units, resulting as the Alternative with the highest existing habitat and potential value of restored habitats. Similarly to Alternative 4a, 4b would result in the restoration of approximately 9,500 linear feet of streambed and bank. The stream channel in the Matilija Reservoir area would be 100 feet wide and provide 22 acres of stream, exactly the same as with Alternative 4a. However, Alternative 4b would restore 88 acres of riparian habitat on the banks and upstream floodplain areas, approximately 5 acres more than Alternative 4a.

In addition, Alternative 4b would return in a greater amount of sediment being conveyed to the Ventura River and Ventura beaches. The rate of sediment aggradation under Alternative 4b would be faster than 4a, returning the Matilija Canyon to a more natural, pre-dam condition more rapidly. Sediment stabilization would result in greater flood hazard impacts than Alternatives 1 and 4a. However, Alternative 4b would provide more benefits to beach nourishment and river bottom replenishment over a shorter time than Alternative 4a and 1.

For ecological effects, Alternative 4b would disrupt wildlife movement for longer periods than Alternative 2a, 2b, 3a and 3b, and for shorter periods than Alternatives 1 and 4a. However, Alternative 4b would have less impacts on aquatic organisms than Alternative 2a, 2b, 3a and 3b due to the movement of sediments. Additionally, under Alternative 4b, steelhead would access the upper watershed 7 years earlier than Alternative 2a, 2b, 3a and 3b.

As mentioned above, Alternative 4b would result in the maximum possible annual habitat units (731), making it the Alternative with the highest potential value for restored habitats. Alternative 4b would cause temporary biological impacts on 225.33 acres of habitat, and would result in the removal of approximately 46 acres of open water and emergent wetland habitat artificially created by development of the dam. However, the permanent impacts on habitat acres and on open water would be less than significant, as the habitat that would be loss would be habitat that was created artificially with the construction of the dam. The current habitat that would be lost (created by the dam), has low value for steelhead, therefore, the overall restoration would have more long-term value to fulfilling the project purpose. Alternative 4b would result in the most beneficial long-term benefits than all of the other alternatives, making it the least environmentally damaging alternative.

Since Alternative 4b (the Recommended Plan for the Proposed Action) meets the purpose and need of the project, is practicable to construct and maintain in terms of cost, logistics and technology, and produces the least environmental damage, it is considered to be the least environmentally damaging practicable alternative. In addition, alternative 4b is not contrary to public interest, as it is favored by the surrounding communities and local governments.

III. PROJECT DESCRIPTION

A. **Location.** The area of the proposed action is located within the Ventura River Watershed in Ventura County. The project area includes the reaches of the Old Man, Murrieta, Upper North Fork, and Matilija Creek above Matilija Dam, and below the confluence with the North Fork Matilija Creek, along the entire mainstream of the Venture River.

Matilija Dam is located approximately 16 miles north of the coast, on Matilija Creek in the upper Ventura River watershed (see Figure 1-1 of the EIS/EIR). Matilija Creek and North Fork Matilija Creek join approximately 15.5 miles from the coast to create the Ventura River, South of the confluence of Matilija Creek and North Fork Matilija Creek, the Ventura River flows south past the western edge of the City of Ojai, through the unincorporated areas of Oak View and Casitas

Springs. In its lower reaches, the Ventura River flows through the City of Ventura until it reaches its estuary (CRWQCB-LA, 2002).

For the purposes of the EIS/EIR, Matilija Creek and the Ventura River have been divided into a series of reaches, with Reach 1 beginning at the Ventura River Estuary and Reach 9 extending into the upper Matilija Creek watershed. The project reaches are defined as follows:

- *Reach 1:* Ventura River Lagoon/Mouth to Main Street Bridge
- *Reach 2:* Main Street Bridge to Foster Park (Casitas Vista Road Bridge)
- *Reach 3:* Foster Park to just above San Antonio Creek Confluence
- *Reach 4:* San Antonio Creek Confluence to Highway 150 Bridge
- *Reach 5:* Highway 150 Bridge to the upstream end of Robles Diversion Facilities
- *Reach 6:* Robles Diversion to Matilija Dam
- *Reach 7:* Matilija Reservoir from dam to the upstream end of reservoir influence (i.e., about 2 miles upstream of the dam)
- *Reach 8:* End of the reservoir influence on Matilija Creek upstream to the confluence of Old Man Creek and Matilija Creek
- *Reach 9:* Upper North Fork Creek to its confluence with Matilija Creek, Murrieta Creek to its confluence with Matilija Creek, Old Man Creek to its confluence with Matilija Creek, and Matilija Creek upstream of its confluence with Old Man Creek

B. **General Description of the Proposed Action and Recommended Plan.** The recommended plan is described as Alternative 4b under Alternatives Analysis above, and in Section 3.6 of the EIS/EIR.

Material Required for Construction. Material required for the demolition of the dam and disposal of slurry material to downstream site includes: explosives, carbon steel pipeline, 90,000 gallon water storage tank, high density polyethylene, stationary screen and a 400-horse power pump. In addition, EPA-approved foliar herbicide would be required for giant reed removal, as well as a geofabric liner for lining of the desilting basin. All material required to modify and/or construct levees and bridges and to construct the soil cement revetment would also be needed.

Duration of Construction. It is estimated that the Recommended Plan would require approximately two years to complete. This includes the slurrying operation of the sediment from the reservoir area, removal of the dam, excavation of the channel, and construction of the soil cement revetment.

Staging/Stockpiling Areas. Excavated material will be removed by truck to a permitted landfill or other permitted construction site to be determined at the time of construction. Metal debris from the dam removal operations would be hauled from site and salvaged when possible. Non-salvaged items would be sent to a permitted landfill.

Construction Equipment. The following equipment types are required for dam and sediment removal activities: hoe-ram, haul trucks, bulldozers, graders, loaders, water trucks and cutter head suction dredges. In addition, brush chipper, shredders and flair mower would be required for giant reed removal. Furthermore, any additional equipment necessary for building levees, expanding debris basin and constructing desilting basin would be required.

Future Operation and Maintenance. A five-year operation and maintenance plan would be required for the full eradication of giant reed. A periodic follow up of herbicide treatment and additional monitoring plan would be necessary throughout the life of the project to avoid and prevent re-establishment. In addition, routine maintenance of the existing and proposed levees would occur on an ongoing basis.

C. **Authority and Purpose.** The project is being conducted under the authority of Section 905(b) Reconnaissance Study prepared by the Corps as an initial response to the Resolution of the U.S. House of Representatives Committee on Transportation and Infrastructure (Docket 2593) adopted April 15,1999.

   The purpose of the reconnaissance phase study was to determine if there was a federal interest in participating in a cost-shared feasibility phase study to evaluate environmental restoration opportunities in the Ventura River in the vicinity of Matilija Dam, with particular attention to restoring anadromous fish populations on Matilija Creek and returning natural sand replenishment to Ventura and other southern California beaches. In response to the study authority, the reconnaissance study was initiated February 2000. The reconnaissance study found that there was a federal interest; hence, the Corps initiated the Matilija Dam Ecosystem Restoration Feasibility Study.

D. **General Description of Dredged or Fill Material.** Excavated material will consist of earth, rock, fine sediments, coarse sand (0.62 mm to 2mm in diameter), concrete and metal debris. Sediments that would be removed from behind the dam, in the reservoir area, are composed primarily of coarse-grained gravel, cobbles, and boulders, with fine-grained sediments overlying the alluvium. Fill material would consist of the excavated material from behind the dam and loose topsoil from construction activities.

E. **Description of the Proposed Discharge Site.** Non-salvage material will be transported off site to a landfill or other permitted construction site requiring fill as determined at the time of construction. Approximately 2.1 million cubic yards of fine sediment will be slurried to a disposal site downstream. Please refer to Section 3.1 of the EIR/EIS for a description of all three potential sites. Sediment excavated from the channel (channel excavated through the remaining of the sediments) would be temporarily placed in storage locations within the original reservoir limits.

F. **Description of Disposal Method.** Material excavated during construction within the study area will be slurried to a downstream disposal site via a slurry pipeline. The slurry pipeline would be constructed of high-density polyethylene and would run from the reservoir area to the chosen disposal site. The slurry would pass through a stationary screen to eliminate coarse material and then would enter a thickener. The thickener would serve to increase the solids concentration of the slurry and recycle water for the dredging operations, where a pump would send this water back to the dredges. A make-up water pump would be required to pump water back to the dredges. A single 400-horsepower pump would maintain slurry velocity in the pipeline.

IV. FACTUAL DETERMINATIONS

A. **Disposal Site Physical Substrate Determinations.** The disposal site for the slurry material will be one of the three locations mentioned below.

   Rice Road: Located approximately 2.5 miles downstream of the Matilija Dam on the east side of the river and downstream of Robles Diversion, this site would be at the bottom of a 60-foot cliff in the Ventura River floodway. The average depth of the stock pile at this location would be 15 feet, which would be suitable for slurry operations and de-watering.

Highway 150: The Highway 150 slurry disposal area, consists of four non-contiguous sites totaling approximately 118 acres and would range from 3.6 to 6.3 miles downstream of Matilija Dam. One sub-site, measuring 50 acres, would be located immediately upstream of the Highway 150 bridge. The three remaining sub-sites would all be located downstream of the Highway 150 bridge. Dikes ranging from 6 to 15 feet in height would be constructed for all sub-sites to contain the slurried materials.

North of Baldwin Road: The North of Baldwin Road site would be located 3.6 miles downstream of the Matilija Dam, to the west of the Ventura River, north of Baldwin Road. Approximately 95 acres of this 200-acre parcel would be used for slurry disposal.

Remaining excavated material and non-salvage material would be sent to Toland Road Landfill, which is a permitted landfill.

1. **Substrate Elevation and Slope.** The relevant section of the study area slopes in a generally southerly direction from an elevation of 1,830 meters (6,025 feet) above sea level (highest point of watershed). About 50 percent of the watershed land area lies below 500 meters of elevation, 25 percent between 500 and 1,000 meters, and 25 percent lies between 1,000 and 1,800 meters. The Ventura River watershed has a fairly steep gradient, ranging from forty feet per mile at the mouth of the river to ninety feet per mile at the headwaters.

2. **Sediment Type.** Sediment in the reservoir area, found behind the dam, is characterized by thick sequences of silt with minor amounts of silty sand and gravel. The delta area (which extends from about 1,400 feet upstream of the dam to about 2,900 feet) contains approximately 2.63 million cubic yards of sediment characterized approximately by 13 percent gravel, 54 percent sand, 28 percent silt, and five percent clay. The upstream channel, which extends from about 2,900 feet upstream from the dam, to more than 6,000 feet upstream, contains approximately 39 percent cobbles, 39 percent gravel, 16 percent sand, and six percent silt.

3. **Dredged/Fill Material Movement.** Construction activities would disturb the natural hydrologic regime resulting in incidental movement of local soils and sediment into downstream areas during run-off events. In addition, surface runoff after construction will pick up loose soils and transport them downstream. However, significant impacts will be avoided by developing and adhering to a storm water pollution prevention plan (SWPPP) to prevent or reduce the effects of earth moving, handling of toxic materials, and other disturbances in and adjacent to the channel that may cause accelerated erosion, scouring and water contamination. The SWPPP will describe and show features that may contribute pollutants to stormwater including areas designated for the storage of soil or waste, vehicle storage and service areas, construction material loading, unloading, and access areas, and equipment storage, cleaning, and maintenance areas. The SWPPP will also show BMPs for control of discharges from waste handling and disposal areas, methods of on-site storage and disposal of construction materials and construction waste, and methods to minimize or eliminate the exposure of stormwater to construction materials, equipment, vehicles, waste storage areas, or service areas. A comprehensive erosion control plan will be included as part of the SWPPP.

4. **Physical Effects on Benthos (burial, changes in sediment type, composition, etc.).** Sediment transported downstream of the dam is not expected to substantially alter the benthos in this area. Direct and indirect impacts to the estuary, inter- tidal zone, and marine plants and algae due to sediment transport are not expected, as sediment would be stored in upland sections of the river. Benefits to the estuary by increased sediment transport are not expected to occur for approximately 20 years.

5. **Other Effects.** Operation and maintenance activities to maintain riparian habitat would involve minimal effects.

6. **Actions Taken to Minimize Impacts.** Impacts to the waters of the U.S. are temporary. In-channel construction impacts will be the short-term and would be necessary to achieve the project purpose. Long-term impacts would be beneficial due to the enhancement of the aquatic and terrestrial habitat and ecosystem in the area.

B. Water Circulation, Fluctuation and Salinity Determinations

1. **Effect on Water Quality.** The Recommended Plan would not involved the discharge of wastes into the surface water or groundwater such that the project could violate water quality standards or waste discharge requirements or otherwise substantially degrade water quality. Short-term adverse effects on water quality due to construction activities will be minimized by adherence to the SWPPP described above. Long-term water quality effects will be beneficial due to the enhancement of the aquatic, and thus riparian habitat in the area.

2. **Effect on Current Drainage Patterns and Circulation.** The Recommended Plan would not substantially adversely affect the surface water hydrology or drainage pattern. With or without the project, the Matilija Dam and reservoir would have negligible effects on controlling peak flows in flood events at the 10-year interval. Therefore, there would be not impacts on current drainage patterns and circulations.

3. **Effect on Normal Water Level Fluctuations.** Water levels would be directly impacted from the removal of the dam and from the movement of sediment behind the dam. Various measures have been developed as for downstream flood protection. These measures include modifications to all existing levees, modifications or replacements of bridges, and the acquisition of some properties. The flood control measures would include the purchase and removal of the Matilija Hot Springs retreat facility, two houses at Camino Cielo, and nine cabins at Camino Cielo. The Camino Cielo bridge would also have to be removed. In addition, the Santa Ana Road Bridge would need to be replaced with a higher structure to allow 100-year flood flows to pass underneath. Given the flood control measures described above, impacts on water levels would be less than significant.

4. **Salinity Gradients.** The Recommended Plan would not have any impacts to the salinity gradients.

5. **Actions Taken to Minimize Effects.** An SWPPP will be prepared for project construction, which will describe and identify BMPs that would minimize impacts during on-site and off-site construction activities.

C. Suspended Particulate/Turbidity Determinations at Disposal Site

1. **Expected Change in Suspended Particulate and Turbidity Levels in the Vicinity of Disposal Site.** Removal of the dam would result in increases in downstream turbidity in the form of water-borne silts and clays. Temporary increases would result from construction activities disturbing sediment within the flow of Matilija Creek. Removal of the dam, however, which currently inhibits watershed-generated sediment from being transported downstream, would allow erosion and transport of sediments that have been deposited behind the dam over the years. Potential areas of impact include all of Matilija Creek downstream of the dam, all of the Ventura River downstream of the confluence with Matilija Creek, Robles Diversion, the Foster Park Diversion, and Lake Casitas. The Recommended Plan includes measures to

minimize the effect of increased turbidity through: 1) removal of accumulated sediments behind the dam through slurry to a disposal area downstream of the dam; 2) construction of a low-flow channel (ten-year flood capacity) protected with soil cement from erosion through the excavated area behind the dam; and 3) a desilting basin along the Robles-Casitas canal for the purpose of trapping fine sediments prior to their reaching Lake Casitas.

During and shortly after construction, demolition of the dam and the removal of sediment would introduce fine sediment into the river system. The fine sediment concentrations are estimated to be between two and ten times higher from beginning of dam demolition until the first storm passes through the reservoir area. It would be conservatively assumed that concentrations and turbidity would increase by a factor of ten until the first storm passes. The long-term increase in turbidity after construction is completed should only occur during high flow events. After a period of five to ten years, turbidity levels for high flows would return to baseline levels

2. **Effects (degree and duration) on Chemical and Physical Properties of the Water Column.** Physical properties of the water column will not be affected over the long term.

3. **Effects of Turbidity on Biota.** The Recommended Plan would cause short-term affects of turbidity on biota. This proposed action would temporarily stabilize sediment upstream from the dam in Reach 7 and is designed to allow limited downstream sediment transport during 2- and 5-year flood events and more substantial sediment transport during 10-year storm events or greater. Sediments are expected to erode in the upper and lower portions of Reach 7 over an estimated 20-year period. However, in this same 20-year period, sediment loads would be stabilized after two or three storm events to approximately twice the current levels. This is not considerably higher than what would be expected in a normal, unaltered stream; therefore, the impact to biota due to the deposition of sediment is considered adverse, but less than significant In addition, because the fraction of silt and clay remaining in the delta area would be relatively small, the turbidity impact would be relatively short duration, lasting for the first three storm events (BOR, 2003).

   Slurrying reservoir fines and clays downstream to the slurry disposal site would also impact annual grasslands and oak woodlands within the historic floodplain of the River. Storing the remaining sediments upstream from the dam would temporarily bury wetland plants, including cattails and sedges, as well as sage scrub and chaparral communities. Although vegetation and wildlife would be displaced during these activities, these areas would be restored at the completion of project construction. Impacts resulting from these activities would be considered adverse, but less than significant after restoration.

4. **Actions Taken to Minimize Impacts.** Because turbidity impacts are temporary or confined to high flow events of ten-year recurrence interval or greater, and the Recommended Plan includes structures to minimize turbidity impacts, impacts to water quality standards, waste discharge requirements, or water quality are considered adverse, but less than significant. Therefore, no mitigation is required.

D. Contamination Determination. There are no known contaminated sites in or near the study area.

E. Aquatic Ecosystem and Organism Determination. By implementing mitigation measures B-1 through B-10 described in Section 5.3 of the EIS/EIR, construction-related impacts as well as impacts associated with operation and maintenance would be minimal. Since this is an ecological restoration project, long-term effects would be beneficial.

F. Proposed Disposal Site Determinations. The disposal site will be a permitted landfill or other permitted construction project in need of fill. Since the disposal will be on a permitted site, impacts will be addressed.

G. Determination of Cumulative Effects of Disposal of Fill on the Aquatic Ecosystem. The removal of the Matilija Dam is expected to reverse many of the negative effects of the dam on stream ecology and wildlife over the last 50 years. By removing the dam, there would be a reestablishment of natural sediment and hydrologic flows, and subsequent increase in wildlife use of the Ventura River due to the removal of barriers to up and downstream passage for steelhead and other aquatic species. Although there would be short-term impacts associated with restoring these processes and long-term impacts due to permanently removing habitats created as a result of the dam, the impacts are considered beneficial to the overall ecology of Ventura River.

H. Determination of Secondary Effects of Disposal of Fill on the Aquatic Ecosystem. The project will result in a long-term benefit to the aquatic and terrestrial ecosystem. There are no adverse secondary effects.

V. FINDING OF COMPLIANCE

No significant adaptations of the 404(b)(1) guidelines were made relative to this evaluation.

A review of the proposed project indicates that:

1. As evaluated in the EA, the discharge represents the least environmentally damaging practicable alternative, and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem.
   ___X___ Yes ______ No

2. The activity does not appear to 1) violate applicable state water quality standards or effluent standards prohibited under the CWA, or 2) jeopardize the existence of federally listed endangered or threatened species or designated marine sanctuary.
   ___X___ Yes ______ No

3. The activity will not cause or contribute to significant degradation of waters of the U.S., including adverse effects on human health; life stages of organisms dependent on the aquatic ecosystem; ecosystem diversity; productivity and stability; and recreational, aesthetic, and economic values.
   ___X___ Yes ______ No

4. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.
   ___X___ Yes ______ No

Note: A negative response indicates that the proposed project does not comply with the guidelines.

REFERENCES

BOR 2003. Matilija Dam Removal Project Appraisal Study, Ventura County, California. Prepared for the U.S. Bureau of Reclamation, Division of Planning, Mid-Pacific Region, Sacramento, California.

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USACE (The United States Army Corps of Engineers). 2001. Matilija Dam Ecosystem Restoration Feasibility Study Ventura County, Ca Project Management Plan. June.

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APPENDIX E.

HABITAT VALUATION ANALYSIS

APPENDIX E. HABITAT VALUATION ANALYSIS

1. INTRODUCTION AND PURPOSE

The purpose of this Appendix is to provide a quantitative analysis of the without-Project and with-Project values of habitats in support of the Matilija Dam Ecosystem Restoration Feasibility Study.

The Corps' guidance for ecosystem restoration in the Civil Works Program is provided in Engineer Regulations (ER) 1105-2-210, Appendix E, Section V. The regulations provide information on the purpose and importance of quantifying the environmental outputs of ecosystem restoration projects to assure that civil work investments in ecosystem restoration have the intended beneficial effects, are consistent with Administration policy, and will be conducted in the most cost effective manner.

This guidance requires that the ecosystem outputs of proposed restoration alternatives of a feasibility study be subjected to a detailed cost effectiveness and incremental cost analysis (ER 1105-2-210, Appendix E, Section V, pargs E-33 to E-37). The primary purpose being to allow explicit comparison of the additional cost and additional outputs associated with the alternatives. To perform this type of analysis, it is necessary that the environmental outputs be based on some quantifiable unit (e.g., Habitat Units, Functional Capacity Units). This allows determination of the most cost-effective restoration option or combination of options that best meet the restoration goals. The following analysis uses a habitat-based method to quantitatively characterize biological values of fish and wildlife habitat in the study area.

2. EXISTING ENVIRONMENTAL DEGRADATION AND RESTORATION OPPORTUNITIES

A. HABITAT LOSS AND DEGRADATION

Loss of southern California coastal marshes and riparian habitats. It is estimated that California has lost 91% of its historic wetlands (the highest of any state) since the 1780's as a result of filling, dredging, flood control, agricultural development, and urbanization (Schoenherr 1989). The remaining wetlands have been degraded in quality by fragmentation, water quality degradation, and introduction of exotic plants and animals. These remaining California wetlands are extremely valuable, especially as habitat for rare and endangered species that are restricted to the few remaining wetlands (Dahl 1990; Ferren and Fiedler 1993).

As stated in the EIS/EIR, the study area includes the Ventura River Estuary and the Ventura River. The plant communities of these two ecosystems, coastal estuaries and riparian ecosystems, are two of the most rare vegetative communities in California (Schoenherr 1989.) Faber et al. (1989) and Bowler (1989) estimate that as much as 95% of the historic riparian habitat in the southern California has been lost to agriculture, urban development, flood control, and other human-caused impacts. As with coastal marshes, the remaining riparian habitat is extremely valuable, especially as habitat for a variety of fish and wildlife and for several federal and state-listed threatened and endangered species (see section 4.3.2.1 of the EIS/EIR).

Invasion of Giant Reed. The riparian ecosystems of southern California have also experienced degradation due to the spread of the invasive exotic plant, the giant reed (*Arundo donax*). Giant reed readily invades riparian channels, especially in disturbed areas, is very competitive, and is difficult to control. The following discussion is largely taken from Bell (1997) and Else (1996) and is incorporated by reference (per 40 CFR 1502.21).

Giant reed is a genus of tall perennial reed-like grasses with six species native to warmer parts of the Old World. It is the largest member of the genus and is among the largest of the grasses (Poaceae), growing to more than 25 feet tall. Giant reed is native to Europe and is found in freshwaters in the Mediterranean region. Giant reed was purposefully introduced to California in the 1820's in the Los Angeles area as an erosion control agent in drainage canals. Giant reed was also used as thatching for roofs of sheds, barns, and other buildings.

Giant reed grows along lakes, streams, drains and other wet sites. It uses prodigious amounts of water to supply its incredible rate of growth. Under optimal conditions giant reed can grow more than three inches per day.

Within its introduced range giant reed is an aggressive competitor. Giant reed is well adapted to the high disturbance dynamics of riparian systems as it spreads primarily vegetatively. Flood events break up clumps of giant reed and spread the pieces downstream. Fragmented stem nodes and rhizomes root and establish as new plant clones.

Once established this species tends to form large, continuous, root masses, sometimes covering several acres, usually at the expense of native riparian vegetation that cannot outcompete it. Giant reed is also highly flammable throughout most of the year, and the plant appears highly adapted to extreme fire events. While fire is a natural and beneficial process in many natural communities in southern California it is a largely unnatural and a pervasive threat to riparian areas. Because giant reed is extremely flammable, once established within a riparian area giant reed redirects the fire history of a site by increasing the probability of the occurrence of wildfire, and increasing the intensity of wildfire once it does occur. After a fire, it quickly resprouts and outgrows even fast growing native riparian vegetation that might have otherwise reestablish in a burned-over site. Fire events thus tend to help push riparian stands in the direction of pure giant reed.

All evidence indicates that giant reed provides no food for wildlife, and, at best, only very poor habitat for some nesting birds or shelter/shade for native amphibians. Pure stands are largely depauperate of wildlife.

By current estimates there are tens of thousands of acres of giant reed along the major coastal drainage systems of southern California, including the Santa Ana, Santa Margarita, Ventura, Santa Clara, San Diego, and San Luis Rey rivers. The removal of giant reed from these systems provides numerous downstream benefits in terms of restoring native species habitat, wildfire protection, water quantity and water quality.

Land managers in several watersheds have formed interagency committees to actively eradicate this invasive, exotic species. For example, "Team Arundo" was formed in Orange County in 1991 to control giant reed along the Santa Ana River, and has since become a statewide program. Chapters exist in the Bay Area, San Luis Obispo and surrounding counties, Greater Los Angeles County, and San Diego County. The Ventura County Resources Conservation Agency has assembled a Task Force to make recommendations and plan actions to eradicate giant reed in Ventura County.

Impacts to migrating steelhead. The decline of steelhead in the study area is discussed in detail in section 2.2.1 of the DEIS/EIR.

B. RESTORATION GOAL

As stated in the Purpose & Need Section of the EIS/EIR (section 2.3), the Environmental Working Group (EWG) for the Feasibility Study proposed the following goal and objectives for the project.

Goal: To restore natural processes that maintain aquatic and riparian ecosystems along Matilija Creek and the Ventura River and to restore the natural dynamics of the native fish and wildlife communities, especially for the endangered southern California steelhead.

As such, in the habitat evaluation process, all habitat types and all successional stages of the riparian ecosystem and estuarine ecosystem were considered important to a healthy functioning system.

Objectives:

Retain and minimize impacts to natural (potential and suitable) cottonwood-willow and marsh communities throughout the study area (except at Matilija Reservoir).

Restore steelhead migration along Matilija Creek; restore aquatic habitat to facilitate steelhead migration, spawning, and rearing.

Maintain or improve existing water quality in Matilija Creek and the Ventura River.

Remove and control invasive exotic plants (especially giant reed) from the riparian ecosystem of the study area.

Remove and control invasive exotic animals (including, but not limited to, bullfrogs and crayfish) from the aquatic and riparian ecosystems of the study area.

Enhance habitat quality for threatened and endangered species in the study area.

Restore general fish and wildlife migratory corridor benefits.

Preserve and/or enhance the integrity of archeological and historic sites listed on, or eligible for, the National Register of Historic Places and state and local registries. Provide public education opportunities regarding cultural resources associated with the feasibility study.

(Note that none of the objectives identified retaining or maintaining the man-made Matilija

Reservoir and its associated habitat as an objective for this study.)

3. HABITAT EVALUATION METHOD USED

The EWG (see Main Report and section 1.1 of the EIS/EIR for Feasibility Study Organizational structure) formed a Habitat Evaluation sub-group (HESG) to perform the habitat valuation for the study milestones. Members of the HESG consisted of representatives from the California Department of Fish & Game (CDF&G), National Marine Fisheries Service (NMFS), U.S. Fish & Wildlife Service (USFWS), University of California's Cooperative Extension, Casitas Municipal Water District, the Matilija Coalition, the Southern California Wetlands Recovery Project, Ventura County Flood Control District, and U.S. Army Corps of Engineers.

As mentioned in the Main Report, the working groups met periodically to make recommendations that guided the study. The EWG and HESG met periodically since July 2001 to discuss environmental issues relative to the study and to build consensus on how the "without project" environmental resources should be presented. The EWG also discussed with-project beneficial and adverse impacts for the HEP analysis. In general, the EWG was able to reach a consensus on the most important environmental issues related to the feasibility study. The habitat evaluation greatly benefited from this consensus building approach, and the varied expertise of the members of the EWG was fully utilized in this analysis.

A. MODIFIED HABITAT EVALUATION PROCEDURES ANALYSIS

The consensus of the EWG was to use a modified Habitat Evaluations Procedure (HEP) to quantitatively assess the value of existing habitat and the potential value of restored habitats under various alternatives.

HEP is a habitat-based evaluation procedure used to give a quantitative, numerical value to biological resources of concern. This method was developed by the USFWS [USFWS 1980], as a formal process whereby tested habitat suitability models for certain species are used to measure habitat variables for the selected species (e.g., percent of canopy cover, number of snag trees, stream temperature, percent ground cover, etc . . .) to obtain a Habitat Suitability Index (HSI). This is then used to obtain a numerical rating of Habitat Units (HUs) for the selected species (i.e., Habitat Units = HSI x acres of habitat.) A modified-HEP tailors the HEP process to a particular application and/or to a certain level of effort desired by the user [Wakeley and O'Neil 1988].

The modified-HEP performed for the feasibility study utilized portions of the Draft Guidebook for South Coast Santa Barbara County (Lee et al. 2001) and best professional judgment to quantify habitat values. A numerical rating or value between 0.0 and 1.0 (lowest to highest value) was determined to identify the quality of habitats (HV = Habitat Value) as indicated below. The HV was then multiplied by the area of the habitat to obtain the Habitat Units (HUs) for each habitat type.

As mentioned in the Draft EIS/EIR, section 4.3.1, vegetation surveys were conducted in the study area and like habitat communities were delineated into "polygons" (see Appendix F-1 of the DEIS/EIR). For the evaluation of some ecosystem components, habitat was evaluated on a polygon-by-polygon basis; for other ecosystem components, habitat was evaluated on a river reach-by-reach basis. For this analysis, the study area was divided into the following river reaches (also see Fig 1-3 of the DEIR/EIS).):

Reach	**Description**
1.	Ventura River Lagoon/Mouth to Main St. Bridge
2.	Main St. Bridge to Foster Park (Casitas Vista Road Bridge)
3.	Foster Park to just above San Antonio Creek Confluence
4.	San Antonio Creek Confluence to Highway 150 Bridge
5.	Highway 150 Bridge to the upstream end of Robles Diversion Facilities
6.	Robles Diversion to Matilija Dam
7.	Matilija Reservoir from Dam to the upstream end of Reservoir influence (i.e., about 2 miles upstream of the dam.)
8.	Matilija Creek Upstream of Reservoir Influence to Headwater Tributaries
9.	Matilija Creek Headwaters (Upper Matilija Creek, Upper North Fork Matilija Creek, Murrieta Creek)

B. RIPARIAN ECOSYSTEM COMPONENTS EVALUATED

The consensus of the EWG was that the riparian ecosystem should be evaluated by assessing the quality of the three riparian ecosystem components: 1) steelhead habitat, 2) riparian habitat, and 3) natural processes. The HESG identified the habitat variables that were used to evaluate the quality of the ecosystem components, as indicated below.

(1) Steelhead Habitat Component

(a) Lower River Reaches, 1-7.

For the lower River reaches, this modified HEP analysis assessed steelhead habitat quality by a "best professional judgment" approach informed by the best available data. The EWG tried several approaches to assess steelhead habitat quality, including critical review of the rainbow trout HEP model (Raleigh et al. 1984) and an attempt to identify pertinent habitat variables, as was done for the other habitat components. The consensus of the EWG, however, was that the unique nature of steelhead ecology in southern California, especially in the study area, rendered existing models inadequate to evaluate the quality of steelhead habitat in the study area. The EWG was able to reach the following consensus: by utilizing the judgment of fisheries experts that have performed considerable steelhead surveys and habitat assessments in the study area, with critical review of biologists from the National Marine Fisheries Service, a reasonable assessment of steelhead habitat quality could be produced.

The EWG contracted Entrix, Inc. to perform a "best professional judgment" evaluation of steelhead habitat quality for the lower reaches in the study area (Entrix 2002). The details of the assessment are presented in Appendix 2. As a summary, information from recent investigations and surveys were used to evaluate habitat conditions on a Reach-by-Reach basis. For each Reach, a single score was developed. Scores from 1 to 5 in whole numbers were used (with 5 being the best quality) to portray overall habitat value in reference to historic condition and function. (Note for this analysis, the 1-5 scores were converted to 0.0 to 1.0 values as required by HEP.)

Scoring was performed using the following criteria:

Habitat Value Score	Definitions
1	Very Poor; habitat likely unable to support required lifestages (i.e., migration, spawning, and rearing of young)
2	Poor; habitat of marginal value to pertinent lifestages of steelhead
3	Fair; habitat meets all minimum requirements of pertinent steelhead lifestages; but substantially impaired in relation to historical condition
4	Good; habitat able to support pertinent steelhead lifestages in good condition, but slightly impaired in relation to historical condition
5	Excellent; habitat functioning as in historical condition, and able to support robust populations of pertinent steelhead lifestages

The analysis assumed that prior to the arrival of Europeans fish habitat in the Ventura River was of good-to-excellent quality and functioning ecologically at a high level. A reach believed to be in historic condition in terms of habitat characteristics and ecological function would receive a "5." Perennial flow was not required for the reach to rate highly. Historic conditions provided the best possible habitat for native steelhead even in reaches where flow was seasonal or intermittent. (Also, subsequent to the Entrix (2002) assessment, Ventura Co. Watershed District contracted TRP (2003 & 2004) to provide a more quantitative assessment of steelhead habitat quality above and below the dam to verify the results of the previous assessment. In general, both assessments reached similar conclusions as to the quality of steelhead habitat in the study area (TRP 2004:52).)

(b) Upper River Reaches 8 & 9.

Since the majority of the beneficial effects of a restoration on the steelhead component were to be realized in the upper River reaches and little was known about these areas, it was the consensus of the EWG that a more rigorous evaluation than was performed for the lower Reaches of the habitat quality should be performed for the upper River Reaches. Also, it was the consensus of the EWG that a definitive account be made of the location of natural barriers in the upper Reaches to more accurately quantify the extent of the expected beneficial impacts to steelhead. The EWG contracted Thomas R Payne & Associates to perform a quantitative, habitat evaluation of the upper River Reaches (see Appendix 5). The consultant walked the mainstem Matilija Creek (Reach 8), as well as upper Matilija Creek, Upper North Fork, Murrieta Creek, and Old Man Creek (collectively Reach 9). Vegetation types, steelhead habitat characteristics (including flow, channel type, pH, gravel deposits, and others), and potential barriers to steelhead movement were mapped.

(c) Calculation of the Steelhead Component Habitat Value.

The habitat value of this component was calculated by using the following formula:

Steelhead Habitat Value = $\{(\text{Habitat Value Score}) \times [(\text{Fish Passage}) \times (\text{other steelhead factors})]^{1/2}\}^{1/2}$

Where:

Habitat Value Score is the best professional judgment scores generated in the Appendix 2 of this report (i.e., in the Entrix steelhead habitat evaluation analysis) for River Reaches 1 through 7. For River Reaches 8 and 9 scores were based on the qualitative analysis conducted by TRP (2003) for the feasibility study (see Appendix 5).

Fish Passage is a variable that reflects the percentage of fish passage opportunity relative to discharges through the Robles diversion structure, as follows:

$$\text{Fish passage} = \frac{\text{Passage days through Robles structure with} > 50\text{ cfs}}{\text{Natural passage days pre-Robles with} > 50\text{ cfs}}$$

The value (from 0.0 to 1.0) for this variable was determined as: 0% passage = value of 0.0; 1-10% passage = 0.1; 11-20 % passage = 0.2; 21-30 % = 0.3; 31-40% = 0.4; 41-50% = 0.5, etc…

The Robles fish passage structure was assumed to be constructed and operational by Target Year (TY 5). As such the fish passage variable was calculated to be 0.3 (13 passage days with >50 cfs without a passage structure/44 natural passage days pre-Robles = 30%) for reaches below the Robles diversion structure for Target Years (TYs) prior to construction of a fish passway (i.e., before TY-5). At TY 5 and beyond, the variable was calculated to be 0.5 (i.e., 18 passage days through Robles structure with > 50 cfs/ 44 natural passage days pre-Robles = 41%). This number of "passage days" was obtained from the NMFS that resulted from the outcome of the Biological Assessment and Biological Opinion for the Fish Passage Structure at Robles Diversion (Rogers 2003; NMFS 2003).

The pre-fishway barrier at Robles is considered a complete barrier and results in a "zero" value for fish passage; it causes the habitat value for the steelhead component value in Reaches 6 and above to be nil. Note that the Matilija Dam barrier has the same affect on upstream reaches after the fishway at Robles is constructed. Also, the maximum value for fish passage through Robles is conservatively estimated as affecting all River reaches above it. The maximum passage value for Reaches above the fishway are assumed to be constrained by fishway, an as such, are assumed to be no higher than the "0.5" passage value at the fishway in Reach 6.

Other steelhead factors are those environmental factors that contribute to the quality of steelhead habitat, but are not typically evaluated in most habitat models and/or are not affected by a physical barrier upstream. They are: water availability, stream sediment regeneration (replacement), nutrient movement downstream, riparian plant propagules replenishment downstream, and smolt productivity. The presence of all these factors = "1.0" value; the presence of all factors, but not optimally = 0.75; the presence of only 3 factors = "0.5"; only one factor = "0.1".

(d) Steelhead Habitat Component Area.

It was the consensus of the EWG that the area associated with the Steelhead Habitat Component be the mapped "riverine" type (as identified in the vegetation mapping (see section 4.3.1 of the EIS/EIR), the "forested palustrine," and the "palustrine, emergent wetland" habitats types because they were considered to be important contributors to this Habitat Component. This area included the riparian vegetation adjacent to the stream channel, which contributes to stream bank stability, streamside shading, and vegetation/invertebrate input into the aquatic ecosystem.

(2) Riparian Habitat Component

Riparian habitat includes all the mapped vegetation sub-types that occur in the river corridor, including the vegetation that occurs in the upper alluvial terraces of the 100-year floodplain. Riparian habitat above Matilija Reservoir (Reaches 8 and 9) is not expected to be affected by the action (restoration) alternatives. The giant reed removal in Reaches 8 and 9, while important to the overall success of the giant reed removal component of the ecosystem restoration project, does not result in a measurable change in habitat value. Therefore, with- and without-project conditions for this habitat component were considered to be the same, and these reaches were not evaluated in the modified HEP analysis.

Riparian habitat was evaluated using the following habitat variables in the formula:

Riparian Habitat Value = ([2(%Native Veg. Cover + Giant Reed Cover)] +Listed Species + Adjacent Land Use Character) / 6

Where:

Native Vegetation (veg.) Cover quantifies the percentage of native vegetation cover present in a polygon. For example, higher native vegetation cover values result in higher quality habitat.

Giant Reed Cover is the amount of cover of the non-native, invasive exotic *Arundo donax.* For this component, the more giant reed that a polygon has, the lower the habitat value of the polygon.

Listed Species is a "by reach" variable that places value on the habitat if a state or federally listed threatened or endangered species occurs or has been known to occur within the reach.

Adjacent Land Use Character is a "by reach" variable that measures the quality of the habitat based on the adjacent land use of the area. A reach adjacent to unaltered upland areas is considered more valuable than a reach than is adjacent to highly disturbed areas.

The consensus of the HESG was that the percentage of native vegetation and the presence of giant reed should have more weight that the "Listed Species" and "Adjacent Land Use Character" variables. For more details on the justification/rational for the variables and the scaling of the variables on a 0.0 to 1.0 [i.e., lowest to highest] basis – see Appendix 1.

(3) Natural Processes

The consensus of the EWG was that a natural sediment regime and natural hydrologic regime were important natural processes that affect the quality in the riparian ecosystem. As such the natural process were evaluated by averaging the two processes as indicated below:

Natural Processes = (Natural Hydrological Regime + Natural Sediment Regime)/2

Where:

Natural Hydrological Regime is a variable that evaluates the amount of hydrologic disturbances (e.g., dams, water diversions, watershed urbanization, groundwater pumping) as factors that diminishes the quality of habitats in the riparian ecosystem.

Natural Sediment Regime considers alterations in the river corridor or adjacent watershed, which may have increased or decreased the amount of natural sediment entering the riparian ecosystem, that, in turn, affect the quality of habitats.

The "Natural Processes" above Matilija Reservoir (Reaches 8 and 9) are not expected to be affected by any action (restoration) alternatives. Since with- and without-project conditions for this habitat component were considered to be identical, these reaches were not evaluated in the modified HEP analysis.

For more details on the justification/rational for the variables and the scaling of the variables on a 0.0 to 1.0 (i.e., lowest to highest) basis – see Appendix 3.

C. RIPARIAN ECOSYSTEM HABITAT VALUE

The overall habitat value of the riparian ecosystem for a given Target Year (TY) was a simple sum of the three components, as follows:

Ecosystem Habitat Value = Riparian Habitat Value + Steelhead Habitat Value +Natural Processes

4. NO ACTION ALTERNATIVE

The time period of analysis for the No Action alternative (i.e., existing condition and future without project) is 50 years. The following assumptions were used for the No Action alternative. Many are from conclusions presented in the Hydrology & Hydraulics Appendix of the Main Report:

- Some reaches of the Ventura River have experienced significant erosion in the past thirty years as the thalweg elevation has decreased over 10 feet in many locations. The rate of decrease of thalweg elevation is not expected to decline substantially until many years in the future when larger sediments pass over the dam.
- The location of the main channel in the Ventura River may shift from side to side.
- The channel widths of the Ventura River are expected to remain relatively stable.
- The riverbed sediment particle size distribution is expected to remain relatively stable.
- Matilija Reservoir, presently containing about 500 acre-feet capacity, will be reduced to a maximum of about 50 acre-feet as a body of water by about 2020. Effects to biological resources were predicted for the future HEP conditions based on the trends observed in the reservoir area to date.
- Matilija Reservoir area will continue to fill with sediment and an equilibrium slope will be reached about the year 2038. The existing reservoir (i.e., as profiled in Dec 1999) is predicted to be covered with some 30’- 40’ of sediment and slope from the dam to about 9,400 feet (1.8 miles) upstream (see Fig 20 of the H&H Appendix of the Main Report). Matilija Creek would carve a path through the deposited sediment and spill over the top of the dam. The HEP values for Reach 7 reflect this predicted condition.
- The relative abundance of plant communities of the riparian ecosystem below Matilija Dam remains approximately the same throughout the period of analysis.
- The fishway at Robles Diversion dam will be constructed by Target Year 5 and it will allow up and downstream steelhead migration
- Giant reed patches in the riparian ecosystem below the dam will continue to spread under suitable conditions. This invasive exotic lowers the habitat quality (value) of the riparian habitat over time. (See details in discussion in Section 4.B)
- Giant reed in the Matilija Reservoir will continue to spread and will nearly completely displace native riparian vegetation by TY 50.

The HEP team assigned habitat values for the following time line.

- Target Year (TY) 0 is present day existing conditions,
- TY 3 is when a fishway becomes operational at Robles diversion dam,
- TY 20 is when the biological effects of Matilija Lake filling with sediment are expected, and
- TY 50 is the end of the period of analysis of the feasibility study using the procedure described in Section 3.A above (see Tables 1-6).

(Note: By TY-36, the Hydrologic and Hydrology analysis predicts that the buildup of sediment behind the reservoir will have reached an “equilibrium” slope. The existing reservoir (i.e., as profiled in Dec 1999) is predicted to be covered with some 30’- 40’ of sediment and slope from the dam some 9400 feet (1.8 miles) upstream (see Fig 5.11of the H&H Appendix of the Main Report). Matilija Creek would have a path carved through the build-up of sediment and spill over the top of the dam. The values presented for TY 50 in this section are at the end of the period of analysis for the feasibility study well after "equilibrium" was reached.)

Existing conditions are discussed in this No Action Alternative section to provide the baseline condition for the study. These data are not discussed again at length in the later project discussions.

A. STEELHEAD HABITAT COMPONENT VALUES

Steelhead Habitat Values (TY 0). Steelhead habitat was evaluated as below average quality throughout most of the feasibility study area (see Table 1 and Appendix 2). Reach 3, the "Casitas Springs Reach" has surface flows that are almost always present; this Reach was evaluated as having average migrating, spawning, and rearing habitat (0.5 out of 1.0 habitat value).

The Robles diversion dam was considered an impassible barrier to steelhead migration. As such for TY-0, the River Reaches upstream of the diversion dam (Reaches 6-9) were assessed as having no value for steelhead.

Steelhead Habitat Values (TY 3). It was assumed that by Target Year 3 the fishway passage structure at the Robles diversion dam would be operational and would allow steelhead to migrate pass the dam. Also, as per the Biological Opinion for the fishway structure (NMFS 2003), a minimum of 50 cfs flow is to be provided at the diversion structure to provide sufficient depth in the river channel below the structure to allow upstream migration. This results in increased habitat value for Reaches downstream of the Robles fishway (per the "fish passage" variable) after TY 3.

In the study area, the Matilija Dam would now become the sole barrier to migrating steelhead. As such, per consensus of the HEP team (and EWG), the River Reaches above Matilija Dam was evaluated as having no habitat value to steelhead since it is completely inaccessible to upstream migrants, regardless of whether there is a remnant steelhead population extant in the upper watershed.

Steelhead Habitat Values (TY 20). Habitat quality is expected to remain the same as Target Year 3.

Steelhead Habitat Values (TY 50). Same as for TY-20

B. RIPARIAN HABITAT VALUES

Existing riparian habitat (in TY 0), on average, was evaluated to be of good quality (i.e., 0.6-0.7 out of a possible 1.0 habitat value) in the feasibility study area (Table 1). The total Riparian Habitat Units today (TY 0) is approximately 1,032 out of a total possible 1,618 Habitat Units.

(Note: for comparison purposes existing and/or future riparian habitat units for a given Target Year (TY) will be compared to the total [maximum] riparian habitat units that are available (possible) within the study area. In the feasibility study area there is a total of 1618 acres of riparian habitat; with a maximum habitat value of "1.0", the total riparian habitat units that are possible is 1618 Habitat Units [i.e., H.V x acres = HUs]. With verses without project Average Annual Habitat Unit comparisons will be made in Section 7)

The presence of non-native vegetation, especially Giant Reed, was the primary factor that tended to lower the quality of riparian habitat. Giant Reed outcompetes native vegetation for water, nutrients, and space. Increased fire frequency caused by and tolerated by giant reed provides another competitive edge over native vegetation. Giant reed does not provide habitat resources for most native wildlife, and therefore is considered of very low value compared to native riparian vegetation.

A large decrease in riparian habitat units (from 1032 to 945) occurs by TY 20, due to the spread of Giant Reed. It was expected that Giant Reed would spread (increase cover) in areas where it is already established in the river floodplain (i.e., the palustrine areas). It was conservatively estimated that Giant Reed would not further invade the riverine and upland areas of the feasibility study area. Review of several historical photographs of the study area (from 1969 to 2001) indicate that in the riverine system, Giant Reed gets established but is flushed out after significant flood events. Upland areas are, in general, not suitable habitat for giant reed and are not easily invaded by propagules. In the floodplains, however, Giant Reed has increased substantially and measurably within the study area (Appendix 4).

For this analysis it was the consensus of the HEP team that the existing value of the riparian habitat currently infested with giant reed would be degraded by a full value step by the end of the TY 20. For example, areas that were evaluated as having a habitat value of "0.75" for TY 0 for the "Giant Reed Cover" variable (per formula in section 3.B(2)) are expected to be devalued in quality to "0.50" due to the spread of Giant Reed in the area. This was considered a reasonable assumption due to the aggressive, invasive nature of giant reed (also see previous discussion in section 2.B).

The Matilija Reservoir area is expected to become nearly fully infested with Giant Reed that would be an increased source of new clones washed downstream during storm events. As Matilija Reservoir fills, the open water is expected to become additional riparian habitat. The newly formed riparian habitat, however, is expected to be quickly invaded by Giant Reed. The spread of Giant Reed in Matilija Reservoir is clear from the historical photo record. Giant reed has rapidly spread into all wetland communities in the reservoir (see Appendix 4 and USFWS 2000: Fig. 2). Habitat quality at the reservoir is expected to decline significantly as the reservoir fills and becomes invaded with Giant Reed.

As the former Matilija Reservoir continues to fill with sediment and reach equilibrium, giant reed is expected to fully occupy that area and continue to be a source of new plant fragments to be washed downstream. In addition to the devaluing the habitat value of this former reservoir area as a result of the spread of Giant Reed as discussed earlier, it was assumed that the "Native Vegetation Cover" variable of Riparian Habitat component (per formula in section 3.B(2)) was also reduced by a full value increment. Although, native willow trees in some of the filled reservoir area survive and provide overstory canopy among the dense giant reed stands, they may not persist in the long-term. By TY 50, the Riparian Habitat Units decrease to 784, a drop of nearly 250 units (15 percent of total available habitat units) from existing conditions (TY 0).

C. NATURAL PROCESSES VALUES

As previously stated, this component considered the natural hydrologic regime and the natural sediment regime as the variables important to evaluating the natural processes of a riparian ecosystem. Dams, levees, wells, and agricultural use have adversely affected these natural processes throughout most of the study area. Only Reach 6 was considered of near average quality (Table 1). Current conditions (TY 0) rate only 228 habitat units of a possible 1,940, or only 12 percent of the pre-European condition.

Without implementation of a project, the natural processes values remain the same until TY 50. Minor increases in "Natural Process" values occur by TY-50 due to sediment spilling over the dam, which begins to replenish the mid-river reach with gravels and cobbles. Reaches 5 and 6 benefit from receiving sediments that aggrade the river bottom closer to pre-dam conditions. This delay in change for natural processes values is primarily because the dam continues to catch and hold sediment for so many years. Once sediments do begin to pass, the river will then catch and hold sediments in the spaces left by the erosion of terraces and riverbeds caused by more than 75 years of sediment-deficient flows.

The hydrology portion of this habitat component is not affected by the "No Action Alternative", as water usage and flood control facilities are expected to remain the same as existing conditions for the next 50 years. Matilija Dam does not currently provide flood flow attenuation, even for the average annual storm. Therefore, the current hydrology values remain unchanged throughout the 50-year study period.

5. RESTORATION ALTERNATIVES

All restoration alternatives involve full removal of Matilija Dam, and all restoration alternatives include the removal of the giant reed in all reaches of the study area. More detailed information on Arundo removal will be provided in Appendix 4. Complete descriptions of the restoration alternatives appear in section of the Main Report and Section 3.5 of the preliminary EIS/EIR. The alternatives are briefly described in Section 6, below.

A. Mechanical Sediment Transport, Dispose fines, Sell Aggregate (Alter. 1)

B. Removal of Dam in one increment/ Natural Sediment Transport (Alter.2)
(Alter. 2a – Slurry Fines; Alter. 2b – No Slurry of Fines)

C. Removal of Dam in two increments/Natural Sediment Transport (Alter. 3)
(Alter. 3a – Slurry Fines; Alter. 3b – No Slurry of Fines)

D. Stabilize Sediment On-Site (Alter. 4)
(Alter. 4a – Long-term sediment transport; Alter. 4b – Short-term transport)

6. ENVIRONMENTAL OUTPUTS OF RESTORATION ALTERNATIVES

All restoration alternatives are expected to produce substantially higher total environmental outputs than without project conditions. All alternatives are expected to produce significant benefits to all 3 habitat components (Steelhead, Riparian, Natural Processes) evaluated.

The Steelhead Habitat Component gains a substantial increase in environmental outputs (habitat units) following removal of the dam as over 17 miles of high quality habitat, including important spawning and rearing habitat, becomes available to steelhead (TRP 2003:19) (Also see discussion in the Biological Assessment - Appendix C1, Section III.B.4). For Alternatives 2 and 3, fish passage through the deconstructed dam area is expected to occur about 7 years after completions of dam deconstruction activities (or in TY 10 since deconstruction is estimated to take 2-3 years). This is primarily due to the need for several storm events to naturally erode enough dam-trapped sediment to a level that fish passage can occur. Fish passage for the other restoration alternatives (Alternatives 1 and 4) is predicted to occur immediately after completions of deconstruction activities (i.e., TY 3), since a channel would be constructed through the formerly dam-trapped sediment. (Note: In HEP, Target Year 1 (TY 1) is generally considered as the first year of construction (i.e., the first year that the proposed project causes land and water use conditions to deviate from baseline conditions.)

The Riparian Habitat Component values increase substantially over the No Action Alternative due to the removal of Giant Reed in the study area. Appendix 4 describes the process for removal and associated HEP evaluation. Appendix 5 discusses the incremental benefits (i.e., the increased environmental outputs) associated with incrementally removing Arundo from the upper River Reaches of the study area (Reaches 9-7) down to the Ventura River Estuary (Reach 1).

The Natural Process Component values improve as a more natural hydrologic regime results from dam removal. Note that, as previously stated, the Riparian Habitat value and the Natural Processes value in Reaches 8 & 9 are not expected to change substantially under with-Project conditions. As such, these reaches were not evaluated for these components in Reaches 8 and 9.

Many of the restoration alternatives have the same project components, which are described here to reduce redundancy in the subsequent text. The modified HEP analysis considered impacts associated with components of the restoration alternatives as described.

Flood protection downstream of Matilija Dam is a component of all restoration alternatives. Instead of protecting the Matilija Hot Springs facility in place, it would be purchased and removed. At Camino Cielo, the current low-flow crossing and many existing residential structures would be purchased and removed. In addition, a floodwall would be built along Highway 33 to protect the road from flooding.   The Santa Ana bridge will be widened to provide additional flow capacity beneath it. The construction of new or raising levees and floodwalls at Meiners Oaks, Live Oak Acres, Casitas Springs, and Canada Larga would occur to protect properties from impacts associated with additional sediment in flood flows. The HEP analysis reduced the impacted area's riparian habitat values to "0" (zero) at the location of most of these structures for TY 5. By TY 20, the temporary impacts to riparian habitat associated from construction activities associated with the structures were returned to TY 0 values. The levees reduced the "Adjacent Land Use Area" variable value of the Riparian Habitat Component value at Camino Cielo, but did not affect the other area values. This is primarily because the levees are placed along the borders of residential or other non-habitat land uses.

Modifications to the Robles Diversion will occur to reduce sediment impacts to the facility. These include installation of high-flow sediment bypass radial gates and changes to the existing timber overflow weir. Modifications to the fish ladder (under construction now) may also be conducted. Because all project alternatives include these components, the HEP analysis did not address them specifically. Basically, the bypass gates would allow more sediment to pass downstream during large storm events. This was taken into consideration when evaluating the "Natural Processes" values.

For the alternatives that include the slurry of "Reservoir Area" sediments (Alternatives 2a and 3a), a slurry disposal site was evaluated as the receiving area for them. In the HEP analysis, the mapped area was reduced to a riparian habitat value of "0" (zero) for TY 5, then recovered to one value step below pre-impact value by TY 20, then to full pre-impact value by TY 50. (Note that re-vegetation of the slurry disposal site is considered part of the restoration alternative.)

For alternatives that allow sediment to erode naturally downstream once the dam has been removed (Alternatives 2b and 3b), impacts caused by delivery of sediment to the river were evaluated. Maps of expected sediment deposition areas were generated and reviewed. Short-term sedimentation impacts of more than three feet in depth by TY 5 were considered to impact Riparian Habitat values. For these areas of impact, the riparian habitat values were reduced to "0" (zero) for Target Year 5, and then recovered in full by Target Year 20. Sediment accumulations of less than three feet in five years or over three feet in more than five years were both considered to simulate natural flood flow conditions to which the habitat is adapted. Giant Reed values in the sediment impact areas remained the same for Target Years 0 and 5, and then were reduced in value one increment for Target Year 20 and another by Target Year 50. Figures 1 and 2 illustrate the areas of expected riparian habitat impact during the first 5 years for the restoration alternatives.

The results of the modified HEP analysis for each of the restoration alternatives are described in the following sections.

A. MECHANICAL SEDIMENT TRANSPORT, SLURRY 'RESERVOIR AREA' SEDIMENT TO DISPOSAL SITE/SELL AGGREGATE (ALTERNATIVE 1)

Under this alternative 2.1 million cubic yards of fine sediment would be excavated and slurried about 3 miles downstream to a disposal site below Robles diversion dam. The lake would be drained and the dam removed. Of the remaining 3.8 million of sediment, 2.6 million cubic yards of sand and gravel would be sold from the site for use as aggregate. The dam would be removed within 24 months. Residual fine sediment (1.2 million cubic yards) would be stockpiled at the downstream end of the work area at an elevation that would allow for natural erosion and fluvial transport downstream during larger storms.

A 60-foot wide channel will be excavated through the Delta and Upstream Channel areas in Reach 7. To protect the sand and gravel from erosion during major events, the south bank will be temporarily armored with slope protection with a 10-foot wide section of soil cement placed on a 3H:1V slope. The height of the soil cement will be 8.5 feet in order to contain a 15-year event. The slope protection would be completely removed and the material recycled at completion of the aggregate operation. Reach 7 will be returned to near pre-dam topographical conditions with a straighter, slightly deeper channel upon completion of the aggregate operation. The river channel would be allowed to braid freely upon removal of the slope protection. Re-vegetation of the work area would be conducted to restore habitat and provide erosion protection.

Flood control protection would include the purchase of the Matilija Hot Springs facility, purchase and removal of structures and bridge at Camino Cielo, and raising of the Santa Ana bridge, construction of new or raising levees and floodwalls at Meiners Oaks, Live Oak Acres, and Casitas Springs.

(1) Steelhead Component Values

Approximately 380 acres of habitat (River Reaches 7, 8, and 9) are expected to be opened to steelhead and, as a result, significant environmental outputs are produced in TY 3. By TY 3 Reach 7 is expected to have only below average quality as it recovers from deconstruction of the dam and removal of sediment. Reaches 8 and 9 are considered high quality steelhead habitat (Table 2).

The quality of habitat in River Reaches 6 and 7 are projected to improve into TY-20 as beneficial effects from removal of the dam continue to be felt downstream (e.g., increased smolt productivity and more efficient movement of nutrients downstream). Reach 7 will be returned to near pre-dam conditions, allowing for best steelhead passage opportunities.

The quality of habitat in Reach 7 is projected to continue to improve into TY-50 as beneficial effects from removal of the dam continue to influence that portion of the Creek.

(2) Riparian Component Habitat Values

The habitat units for this component increase over the period of analysis due to the removal of Giant Reed within the study area. For Reach 7 (area of the existing dam and reservoir) the amount of riparian habitat changes during project construction, first increasing slightly by TY 5, then stabilizing at TY 20. Reaches 5 and 6 aggrade in some areas quickly, resulting in slight impacts to riparian habitat, but these recover by Target Year 20. Reach 7 will be returned to topography similar to pre-dam conditions, once the stored sediment is removed. Over the 50-year life of the project, restoration activities result in an increase in riparian habitat value from 1,032 to 1,176, or about 9 percent compared to the total (1618) available riparian habitat units. When compared to the without project conditions, the value increase is 392 units, or about 24 percent of the total available units.

(3) Natural Processes Values

By TY 50, values increase throughout the project area as sediment generated in the upper Matilija watershed is transported downstream just after dam removal. Because the river has lost much of the bed and terrace material over the past 50 years to erosion, it will take until TY 50 for the ambient sediment movement to replace what was lost, especially in the lower reaches. Upstream reaches will be replenished sooner than the downstream reaches. (Also see H&H Report, section 9.1 of Main Report.)

Reach 7 is returned to near pre-dam topography within 10 years, increasing the natural processes value relatively quickly. Hydrology and sediment values in this reach increase from 0.19 in TY 0 to 0.25 in TY 5 because a narrow channel is constructed that carries water and sediment efficiently; the dam sediment trap is no longer present. The value is still low due to partial armoring of banks and un-natural fluvial conditions. By TY 20, most of the sediment stockpiles have been removed and the stream processes and floodplain interactions have been restored to near pre-dam conditions of an alluvial valley. Hydrology and sediment values are both 0.5 due to the short time period that conditions have restored and the pilot channel placement in an un-natural alignment.

By TY 50 both hydrology and sediment components have improved to 0.75 value as the fluvial processes are now restored to near pre-dam conditions. Values of 1.0 may not be achieved in Reach 7 due to roads, recreation, or other residual impact conditions, but they may improve beyond 0.75.

In Reach 6, by TY 5 hydrology (0.5) and sediment (0.25) conditions will not change much due to the short time period. Hydrology is essentially the same as with dam conditions because with dam peak flows are not attenuated with or without the dam. Ambient sediment and water will discharge out of Reach 7 via a narrow, relatively straight channel with stabilized banks keeping velocities unnaturally high. By TY 20 both values have increased incrementally because Reach 7 is more like natural conditions for sediment and storm flows because the artificial channel will be removed upstream allowing the stream to interact with the alluvial floodplains. Reach 7 conditions directly affect Reach 6. By TY 50 both sediment and hydrology values in Reach 6 may reach 0.75 values because within this period large storm events will reduce armoring and produce a more natural bed. Reach 6 is not expected to reach a 1.0 value due to the missing 4 million cubic yards of large sediments in the system removed by sale and many artificial conditions affecting this reach of the watershed.

Reaches 1-5 generally have very low values for sediment until after TY 20. Although ambient sediments pass through reaches 7 and 6 by TY 5, the effects in the lower river mainstem are minor and are affected by other existing conditions. By TY50, Reaches 1, 3 and 5 accumulate sediments and fill in the deficits caused by Matilija Dam. These values illustrate the benefits of assorted sediments now passing through the mainstem at TY20 for Reaches 1,3, and 5, which would accumulate sands and cobbles more so than narrow reaches 2 and 4. By TY 50, all River Reaches would receive some benefit due to periodic storm events moving and sorting 50 years worth of ambient material generated in the Matilija Creek watershed.

The hydrology portion of this component is not affected much by this alternative (Mechanical Sediment Removal), as water usage and flood control facilities are expected to remain the same as existing conditions for the next 50 years.

Natural Processes habitat units increase from 228 to 496 within the 50-year period-of-analysis. This increase of 268 units is an increase of 14 percent, from 12 percent to 26 percent, of the total available (possible) 1,940 units.

B. NATURAL SEDIMENT TRANSPORT; SLURRY ‘RESERVOIR AREA’ FINES TO DISPOSAL SITE – DAM REMOVED IN 1 OR 2 INCREMENTS (ALTERNATIVE 2A & 3A)

Under these alternatives the dam is removed in its entirety within 24-36 months (i.e., in one or two increments).

These alternatives involve excavating and transporting (by slurryline) approximately 2.1 million cubic yards of fine material about 3 miles downstream to a slurry disposal site just below Robles diversion dam. A small pilot channel would be excavated to initially convey flows through the former reservoir area. Erosion and transport of remaining sediments would occur via natural storm flows. Much of the sediment is expected to be eroded within the first several years. However, it is estimated to take about 7 years after the completion of construction for enough sediment to be eroded so that fish passage could be achieved through the former dam area.. Revegetation of the work area would be accomplished within about 7 years of project initiation. It is estimated that it would take about 7 years for

In the modified HEP analysis, the quantified environmental outputs for the removal of the dam in two-increments is essentially the same as the removal in one-increment alternative because: 1) the 2nd increment of removal is expected to occur within 2-5 years (and resolution of the HEP analysis is not fine enough to discern any meaningful differences), and 2) the physical extent (i.e., the footprint) of the sedimentation impacts on downstream riparian habitats is essentially the same under these two alternatives. This, however, should not be construed as implying that other environmental effects (especially those not quantified in the modified HEP analysis) are not different.   As such, in the modified HEP analysis, the one and two-notch alternatives are assumed to generate identical environmental outputs (habitat units).

This alternative involves the installation of all flood control structures previously described and the modifications to the Robles facility.

(1) Steelhead Habitat Component Values

By TY 10 approximately 17 miles of habitat (Reaches 7, 8, and 9) are expected to be opened to steelhead. Reach 7 is expected to have below average quality as it recovers from deconstruction of the dam and removal of sediment. Reaches 8 and 9 are considered high quality steelhead habitat (Table 2).

The quality of habitat in reaches 6 and 7 are projected to improve into TY 20 as beneficial effects from removal of the dam continue to be felt in the project area (e.g., increased smolt productivity and more efficient movement of nutrients downstream) (Table 2).

The quality of habitat in Reach 7 is projected to continue to improve into TY 50 as beneficial effects from removal of the dam continue to influence that portion of the Creek.

(2) Riparian Habitat Values

In River Reaches 5 and 6, substantial aggradation of cobbles and gravels will occur during the first five years, replacing sediments lost to erosion in the past 50 years. This results in short term decreases in riparian habitat values for those areas. Riparian habitats buried under more than three feet will take to Target Year 20 to recover (Table 2; Fig. 2).

For Reach 7 additional habitat units are predicted as riparian habitat quality is improved by removing existing Giant Reed and the quantity of habitat is improved by planting riparian vegetation. It is expected that Reach 7 will have topography similar to the pre-dam conditions, but large areas of sediment may be left behind and the area may behave more like a narrow canyon bottom than a wide alluvial plain.

Overall, the riparian habitat values increase incrementally over the 50-year period as the giant cane is removed and the ecosystem returns to a more normal condition. Short-term sediment impacts are offset by long-term exotic plant removal and the expected recovery of the riparian vegetation. The riparian habitat value increases from 1,032 to 1,169 by TY 50, an increase of 135 units, or approximately 8 percent of the total available units (Table 2)

(3) Natural Processes Values

Natural processes values remain effectively low until TY 20. By TY 5, although the bulk of the sediment may have left Reach 7, it is still moving along the mainstem, causing unnatural conditions. At TY 20, the sediment and hydrological regimes of the river improve substantially due to the loss of Matilija Dam as a sediment trap and the natural sorting of sediments in the channel bottom improve hydrologic conditions. Reaches 6 and 7 have high values by TY 20 and 50 due to the return of near pre-dam conditions through these reaches (Table 2).

In Reach 7 for TY 5, sediment and hydrology values remain the same as existing low values because a new channel will not have had much time to erode and from a natural condition. Instead of sediment trapping, sediments are being evacuated at an artificially high rate. By TY20, both hydrology and sediment values have improved to 0.5 as the natural floodplain conditions are restoring as much of the sediments have been evacuated by erosion. By TY 50, both improve to 0.75 because large storms and enough time have passed to re-establish near natural conditions. Conditions where values of 1.0 exist for both components are not expected due to potential incomplete evacuation of stored sediments and persistence of roads/developments in the reach and upper watershed.

Existing low value conditions persist in Reach 6 through TY5 due to un-naturally high sediment evacuation conditions from Reach 7. By TY 20, sediment and hydrology conditions increase in value one increment. Sediment values increase again by TY 50, bringing all values to 0.75 by TY50. Reach 6 benefits are highly dependent on the conditions of Reach 7, similar to conditions described for Alternative 1.

In River Reaches 1-5, hydrology and sediment values remain low through TY 5 because the un-natural sediment starved conditions switch to un-natural sediment over-loaded conditions. By TY20 all reaches show sediment improvements. Reaches 3 and 5 improve more than the other reaches due to the braided nature and ability to store sediments and sort gravels, as well as their positions in the watershed. The other Reaches, 2 and 4, tend to be narrower and less suited for these opportunities. These values remain the same through TY 50. Due to other factors in the watershed, additional substantial improvements are not expected. Hydrology values remain low throughout the term for the mainstem.

Natural Processes Habitat Units increase from 228 to 570 within 50 years of implementing project Alternative 2a or 3a. This increase of 342 Habitat Units is an increase of 18 percent, from 12 percent to 29 percent, of the total available 1,940 Habitat Units (Table 2).

C) NATURAL SEDIMENT TRANSPORT; NO SLURRY OF 'RESERVOIR AREA' FINES – DAM REMOVED IN 1 OR 2 INCREMENTS (ALTERNATIVE 2B & 3B)

"Natural Transport of Reservoir Fines" option allows all the reservoir material (except only a quantity immediately behind the dam that is necessary for construction equipment to allow safe removal of the dam) to be eroded by storms and naturally transported downstream. The features that are important to the HEP analysis, description of this alternative is essentially the same as Alternative 2a and 3a, except that fine sediment trapped behind the reservoir would not be slurryed. (See the description in Section 6.B)

(1) Steelhead Habitat Component Values

Fine material transported downstream by natural fluvial processes is expected to have a short-term adverse effect to steelhead (see Biological Assessment – Appendix C1, Section IV.2). It was the consensus of the Environmental Working Group, however, this short-term impact was not significant to affect habitat quality in any meaningful, long-term manner that could be accounted for in the HEP analysis. As such, the habitat values (and habitat units) for Alternative 2b/3b are the same as for 2a/3a (Table 4). (See discussion in Section 6.B.(1), above.)

(2) Riparian Habitat Values

In Reaches 5 and 6, substantial areas of aggradation of cobbles and gravels will occur during the first five years, replacing sediments lost to erosion in the past 50 years. This results in short-term decreases in riparian habitat values that are directly impacted by 3 feet (or more) of sediment. This alternative has slightly less impact to riparian habitat than the slurry of fines option (see Section 6.B.2), because the slurry disposal site is not a component of this alternative. A potential risk not quantified by HEP is the deposition of fines in the estuary for this alternative. Depending on the rainfall regime, the initial 'slug' of fines washed from the dam area may be carried out to the ocean beyond the estuary, or may be stranded along the river and deposit in the estuary. For Reach 7 (area of the existing dam and reservoir) additional habitat units are predicted as riparian habitat quality is improved by removing existing giant reed and the quantity of habitat is improved by planting riparian vegetation. All reaches improve over time due to the removal of giant reed.

Overall, the Riparian Habitat Units increase incrementally over the 50-year period-of-analysis as the Giant Reed is removed and the ecosystem returns to a more natural condition. Short-term sediment impacts are offset by extensive exotic plant removal and the expected recovery of the riparian vegetation. The Riparian Habitat Units increases from 1,032 to 1,169 by TY 50, an increase of 135 Habitat Units, or approximately 8 percent of the total available (possible) units (Table 4).

(3) Natural Processes Component Values

The Natural Processes habitat values (and habitat units) for these alternatives 2b/3b) are the same as for 2a/3a (see section 6.B.3, above).

D. SEDIMENT STABILIZATION ON SITE: LONG-TERM TRANSPORT (ALTERNATIVE 4A)

Under this alternative 2.1 million cubic yards of fine sediment would be excavated and slurried downstream to a slurry disposal site just below Robles diversion dam. The lake would be drained and the dam removed. The remaining trapped sediment would be permanently stabilized within the original reservoir basin limits. A channel with a 100-foot wide base width would be excavated in Reach 7 following an alignment similar to the 1947 "pre-dam" alignment. The channel would have a design capacity to convey the 100-year level flood event. Side slopes would be 3:1 (horizontal to vertical). Slope protection on both sides of the channel consisting of ungrouted riprap stone would extend 10 feet above the channel invert and 5 feet below to prevent undercutting. Sediment excavated from the channel would be placed in storage locations within the original reservoir limits.

(1) Steelhead Habitat Component Values

By TY 3, approximately 350 acres of steelhead trout habitat is made accessible under this alternative, thereby providing significant environmental outputs. The 100-foot wide channel in Reach 7 (the former reservoir area) will have approximately 3:1 slopes, with one bank armored with stone. The new channel will restore approximately 17 acres of new steelhead habitat and was designed to have flows/velocities that allow steelhead passage. (Note that under the other restoration alternatives, which do not have a constructed channel, it is predicted that 48 acres of channel area would be restored.) A significant improvement in habitat units is predicted as high quality steelhead habitat now becomes accessible (Table 5).

By TY 20, steelhead habitat quality (especially streamside vegetation) in Reach 7 recovers from channel construction activities. By TY 20, the onset of natural movement of sediment downstream is predicted to slightly improve the quality stream substrate (gravels) in Reach 6.

By TY 50 beneficial impacts of a more natural sediment regime is predicted to improve the quality of stream substrate in sediment-starved reaches 5 and 1, thereby improving steelhead habitat quality.

Due to the constricted steelhead habitat in the constructed channel in Reach 7, HEP values for steelhead are slightly lower through Target Year 50 than other restoration alternatives that return Reach 7 to pre-dam conditions.

(2) Riparian Habitat Component Values

Riparian habitat values increase within the first five years like the other restoration alternatives, primarily due to Giant Reed removal. Impacts associated with sediment deposition in the riparian zone in the early years of the project do not occur with this restoration alternative (as they do for the Alternatives 2 and 3) and because only ambient sediment is allowed to be transported downstream from the upper Matilija watershed (cf. Fig 1 and 2). This is similar to Alternative 1. Unlike Alternative 1, however, Reach 7 will not be returned to topography similar to pre-dam conditions, because the stored sediment will not removed. Over the 50-year life of the project, restoration activities result in an increase in Riparian Habitat Units from 1,032 to 1,174, or about 9 percent compared to the total available (possible) Habitat Units. When Alternative 4a is compared to the No Action Alternative at TY 50, the Habitat Unit increase is 390 Habitat Units (1174 HUs – 784 HUs), or about 24 percent of the total available units (see Table 5).

(3) Natural Processes Values

Natural processes values are very similar to Alternative 1. The dam is removed and ambient sediment is allowed to flow unhindered downstream from Reach 7, but the 4 million cubic yards of sediment are lost to the system by permanently stabilizing them in the former Reservoir Area.

In River Reach 7 for TY 5, both sediment and hydrology values are at 0.25, which is a slight improvement over existing conditions. Ambient sediment now passes through a 100-foot wide channel created in a relatively natural alignment. Bank revetments (100-year flood protection) remain in place through TY 50. Therefore, no appreciable erosion of stored sediments in Reach 7 will occur resulting in static values through time (Table 5).

Over time, River Reach 6 improves more than Reach 7 because ambient sediment passing from upstream begins to restore sediment characteristics. By TY 5 no improvement in sediment and hydrology are apparent in this reach. But by TY 20, ambient sediment passing through begins to restore the streambed characteristics raising the sediment value to 0.5 from 0.25. Hydrology values do not improve in this reach over time. By TY 50, the values in Reach 6 do not substantially increase (unlike Alternative 1). The Reach 7 characteristics for Alternative 4a remain artificial and the pre-dam floodplain-streambed interactions are not restored in the long term as they are for other alternatives. Therefore, the sediment and hydrology values in Reach 6 do not benefit from changes in Reach 7; Reach 6 only receives ambient sediment transported through the unnatural channel of Reach 7.

For River Reaches 1-5, sediment and hydrology are the same values as for Alternative 1. Stabilized sediments are not released into the downstream system, but ambient sediments are allowed to pass, which have some benefit by TY 20 and TY 50.

Natural Processes Habitat Units increase from 228 in TY 0 to 395 by TY 50 years. This increase of 167 units is an increase of 9 percent, from 12 percent to 20 percent, of the total available 1,940 units.

E. SEDIMENT STABILIZATION ON SITE: SHORT-TERM TRANSPORT (ALTERNATIVE 4B)

Like Alternative 4a, under this alternative 2.1 million cubic yards of fine sediment would be excavated and slurried downstream to a slurry disposal site just below Robles diversion dam. The lake would be drained and the dam removed. The remaining trapped sediment would be stabilized within the original reservoir basin limits. Unlike Alternative 4a, however, the storage sites are designed to erode and transport sediments downstream during flood events greater than the 2-5 year storm event (i.e., flows exceeding 3000 – 7500 cfs) for upstream storage sites, which has largely coarse-grained sediment, and the 10-year storm event (i.e., flows exceeding 12,500 cfs) for mid-basin storage sites, which will have mostly mid-grained sediment

A channel with a 100-foot wide base width would be excavated in Reach 7 following an alignment similar to the 1947 “pre-dam” alignment. This 100-ft wide channel is expected to allow for a smaller meandering channel to naturally develop in the channel bottom between storm events. The channel 3H:1V sideslopes will be lined with soil cement up to 7 feet above the channel invert and 5 feet below to prevent undercutting of the structure. The soil cement revetment was included in the design to reduce erosion of the trapped sediments for the more frequent events (less than 10 years). Storm events greater than 12,500 cfs (i.e., of 10-year recurrence) would erode the remainder of the trapped sediments over time, including the estimated 770,000 cubic yards of fines that are intermixed with the larger grain-sized material.

(1) Steelhead Habitat Component Values

By TY 3, approximately 350 acres of steelhead trout habitat is made accessible under this alternative, thereby providing significant environmental outputs. The 100-foot wide channel in Reach 7 (the former reservoir area) will have approximately 3:1 slopes, with one bank armored with stone. The new channel will restore approximately 48 acres of new steelhead habitat and was designed to have flows/velocities that allow steelhead passage. A significant improvement in habitat units is predicted as high quality steelhead habitat now becomes accessible (Table 6).

By TY 20, steelhead habitat quality (especially streamside vegetation) in Reach 7 recovers from channel construction activities. (The excavated channel is likely removed by TY 10, but definitely by TY 20.) By TY 20, a more natural sediment regime is predicted to significantly improver improve the quality stream substrate (gravels) in Reach 6 and slightly improve Reaches 5, 3, and 1.

By TY 50, Reach 7 completely recovers and continues to improve in habitat quality. Beneficial impacts of a more natural sediment regime are predicted to improve the quality of stream substrate in sediment-starved River Reaches 1, thereby improving steelhead habitat quality. All other downstream Reaches are expected to have the same values as TY 20.

(2) Riparian Habitat Values

Riparian habitat values increase within the first five years like the other alternatives, primarily due to giant reed removal. Minor impacts associated with sediment in the early years of the project occur but are limited due to the controlled releases associated with the bank protection in River Reach 7. This reach will be returned to topography similar to pre-dam conditions, as stored sediment is eventually removed by erosion, although it may happen more slowly than for Alternative 1. Over the 50-year life of the project, restoration activities result in an increase in Riparian Habitat Units from 1,032 to 1,183, or about 9 percent compared to the total available (possible) units. When Alternative 4b is compared to the No Action Alternative at TY 50, the Habitat Unit increase is 399 Habitat Units (1183 HUs – 784 HUs), or about 25 percent of the total available units (see Table 5).

(3) Natural Processes Values

Natural processes values increase throughout the study area as early as TY 5 because the dam no longer impedes the sediments from the Matilija watershed. Smaller bursts of stored sediments transported over a 10-year period will supply degraded areas downstream gradually. Aggradation will occur sooner than for the mechanical removal alternative, but not as fast as the natural erosion alternatives.

In River Reach 7, sediment and hydrology improve to 0.25 each by TY 5 because a channel is restored in the former lake influence area; also, sediments are able to pass instead of being trapped. By TY 20 the soil cement revetments have been removed, allowing erosion and natural restoration/rebuilding of the channel/floodplain relationship. By TY 50, larger/more storms have further shaped the channel and floodplain into near pre-dam conditions of an alluvial valley floor with braided stream conditions and a steep, narrow canyon transition to Reach 6. Although this alternative begins with a more natural channel configuration than Alternative 1, the natural processes in Reach 7 are nearly the same after 50 years (Table 6).

For River Reach 6, sediment values do not increase by TY 5 primarily because ambient sediments are being transferred through Reach 7. However, by TY 20, Reach 6 sediment values increase incrementally reflecting the more natural conditions in Reach 7 by this time. By TY 50, Reach 6 for Alternatives 4b, 1, 2 and 3 are indistinguishable due to the time sediments have been passing through the near natural conditions of Reach 7. The hydrology value improves from 0.5 to 0.75 by TY 20 and remains there through TY 50 (Table 6).

Moving downstream from River Reach 5 to Reach 1, hydrology and sediment values remain at existing low conditions through T Y5 due to the short time period (and therefore volume of) sediments that have been delivered. By TY 20 all reaches show sediment improvements. As with Alternatives 2 and 3, Reaches 5 and 3 improve more than the other reaches due to the braided nature and ability to store sediments and sort gravels, as well as their positions in the watershed. Sediment values do not substantially improve again from TY 20 to TY 50, primarily due to other factors in the watershed. Hydrology values remain low throughout the term for the mainstem because the fundamental existing hydrology is not affected by dam removal.

Natural Processes Habitat Units increase from 228 in TY 0 to 570 by TY 50. This increase of 342 Habitat Units is an increase of 18 percent (from 12 percent to 30 percent) of the total available (possible) 1,940 Habitat Units in the study area.

7. COMPARISON OF ENVIRONMENTAL OUTPUTS OF RESTORATION ALTERNATIVES

As previously stated in Section 6, all restoration alternatives are expected to produce significant environmental outputs. Additionally, all restoration alternatives meet the goals and objectives identified by the Environmental Working Group (see section 2.B). Tables 7 and 8 compare the environmental outputs of all restoration alternatives (as Average Annual Habitat Units) for No Action Alternative and the Restoration (Action) Alternatives. Figures 3-6 display the total environmental outputs of alternatives and of the individual habitat components over the life of the project.

Steelhead Habitat Component. As stated previously the Steelhead Habitat Component is expected to experience a very significant net benefit in environmental outputs from all restoration alternatives as about 17 miles and over 300 acres of high quality steelhead habitat becomes available after the dam is removed. Alternative 4b (Stabilize on-site, short-term transport) is predicted to have the highest net gain in Average Annual Habitat Units (AAHUs). Compared to Alternatives 2 (Natural Erosion of Sediment, Dam Removed in one increment) and Alternative 3 (Natural Removal of Sediment - Dam removed in two increments), Alternative 4a is expected to have fish passage restored through the former dam area the first year years after completion of construction (i.e., in TY- 3). Whereas, Alternatives 2 and 3 are expected to have passage no sooner than TY 10 since the natural erosion of sediment is predicted to take about that long before enough dam-sequestered sediment is removed to allow fish passage.

Compared to Alternatives 1 (Mechanical Removal of Sediment) and 4a (Stabilize On-site, Long-term Transport), Alternative 4b has more environmental outputs because the beneficial effects of restoring a more natural sediment regime to stream substrate quality is realized under Alternative 4b and not Alternatives 1 and 4a (because sediment is either permanently stored or mechanically removed from the ecosystem). Also Alternatives 1 and 4a requires a long-term (10 years for Alternative 1 and 50 years for 4a) constructed channel through River Reach 7; this hard (constructed) channel limits the quality of steelhead habitat for Alternatives 1 and 4a. (By comparison, alternative 4b is lined with soil cement for less than half of the length of Reach 7 and it is expected to be completely removed within 20 years.)

Riparian Habitat Component. The environmental outputs for the Riparian Habitat Component are very similar for all restoration alternatives. This is primarily because the beneficial effects of removal of Giant Reed is common to all alternatives and the adverse impacts to riparian habitat associated with restoration alternatives are very similar.

Natural Processes Component. For the Natural Process Component, environmental outputs depend largely on the extent that the "Natural Sediment Regime" (per the "Natural Process" formula in section 3.B.(3)) is restored. The more sediment that is allowed to return to the ecosystem, the higher the outputs. As such, the natural erosion alternatives (Alternatives 2 and 3) and Alternative 4b (which allows stored sediment to be gradually released) have very similar outputs. The Alternatives that take sediment out of the ecosystem or prevent it from entering the system by permanently storing it, have significantly less environmental outputs. Overall, the "Natural Hydrology" variable is a minor contributor to the difference in outputs among alternatives.

Total Ecosystem Outputs. When all components are combined, Alternatives 2, 3 and 4b generate the largest ecosystem outputs. Alternative 4b generates more outputs than 2 and 3 largely because fish passage is restored sooner (TY 3 verses TY 10).

8. RECOMMENDED RESTORATION ALTERNATIVE

The Alternative recommend by the Environmental Working Group is Alternative 4b (On site stabilization: Short-Term Transport Period.). This alternative meets all restoration goals and objectives and produces the largest environmental output of the restoration alternatives, as discussed in section 7, above.

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Table 1. Habitat Evaluation of the Riparain Ecosystem Componernts - No Action Alternative

Target Year: 0

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.37	45.34	16.78	0.73	73.53	49.96	0.10	94.97	9.50	
Reach 2	0.37	166.49	61.60	0.65	376.52	233.58	0.10	450.67	45.07	
Reach 3	0.50	53.93	26.97	0.67	104.36	69.03	0.10	142.19	14.22	
Reach 4	0.34	134.67	45.79	0.65	347.82	217.15	0.10	417.16	41.72	
Reach 5	0.31	83.14	25.77	0.65	548.72	354.35	0.10	592.90	59.29	
Reach 6	0.00	49.83	0.00	0.67	58.33	47.27	0.38	79.31	29.74	
Reach 7	0.00	92.76	0.00	0.53	108.58	60.21	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			176.90			1031.55			228.18	1436.64

Target Year: 3

Target Year: 5

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.68	73.53	49.96	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.62	376.52	233.53	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.66	104.36	69.03	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.62	347.82	217.15	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.64	548.72	352.80	0.10	592.90	59.29	
Reach 6	0.60	49.83	29.90	0.80	58.33	46.71	0.38	79.31	29.74	
Reach 7	0.00	92.76	0.00	0.55	108.58	60.21	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			234.19			1029.39			228.18	1491.76

Target Year: 20

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.61	73.53	44.91	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.56	376.52	209.96	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.58	104.36	60.54	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.56	347.82	194.73	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.60	548.72	331.22	0.10	592.90	59.29	
Reach 6	0.60	49.83	29.90	0.73	58.33	42.58	0.38	79.31	29.74	
Reach 7	0.00	64.95	0.00	0.52	118.68	61.56	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			234.19			945.49			228.18	1407.86

Target Year: 50

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.50	73.53	36.56	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.44	376.52	166.94	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.42	104.36	44.35	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.44	347.82	152.17	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.53	548.72	290.41	0.18	592.90	106.72	
Reach 6	0.60	49.83	29.90	0.58	58.33	34.12	0.50	79.31	39.66	
Reach 7	0.00	64.95	0.00	0.50	118.68	59.78	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			234.19			784.33			285.53	1304.05

Table 2. Habitat Evaluation of the Riparain Ecosystem Componnets - Alternative 1

Target Year: 0

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.37	45.34	16.78	0.73	73.53	49.96	0.10	94.97	9.50	
Reach 2	0.37	166.49	61.60	0.65	376.52	233.58	0.10	450.67	45.07	
Reach 3	0.50	53.93	26.97	0.67	104.36	69.03	0.10	142.19	14.22	
Reach 4	0.34	134.67	45.79	0.65	347.82	217.15	0.10	417.16	41.72	
Reach 5	0.31	83.14	25.77	0.65	548.72	354.35	0.10	592.90	59.29	
Reach 6	0.00	49.83	0.00	0.67	58.33	47.27	0.38	79.31	29.74	
Reach 7	0.00	92.76	0.00	0.53	108.58	60.21	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			176.90			1031.55			228.18	1436.64

Target Year: 3

Target Year: 5

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.74	73.53	54.19	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.68	376.52	255.96	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.71	104.36	73.89	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.69	347.82	239.73	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.66	548.72	361.19	0.10	592.90	59.29	
Reach 6	0.55	49.83	27.41	0.83	58.33	48.51	0.38	79.31	29.74	
Reach 7	0.40	19.00	7.60	0.70	143.31	100.82	0.25	162.31	40.58	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			497.60			1134.28			240.11	1871.99

Target Year: 20

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.74	73.53	54.19	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.68	376.52	256.05	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.71	104.36	73.89	0.18	142.19	24.88	
Reach 4	0.40	134.67	53.87	0.69	347.82	239.73	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.66	548.72	363.03	0.18	592.90	103.76	
Reach 6	0.65	49.83	32.39	0.83	58.33	48.51	0.63	79.31	49.57	
Reach 7	0.60	25.50	15.30	0.75	136.81	102.94	0.50	162.31	81.16	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			510.28			1138.33			355.65	2004.26

Target Year: 50

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.50	45.34	22.67	0.75	73.53	55.17	0.18	94.97	16.62	
Reach 2	0.42	166.49	69.93	0.70	376.52	265.37	0.18	450.67	78.87	
Reach 3	0.60	53.93	32.36	0.74	104.36	76.71	0.30	142.19	42.66	
Reach 4	0.40	134.67	53.87	0.73	347.82	252.43	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.67	548.72	368.44	0.18	592.90	103.76	
Reach 6	0.65	49.83	32.39	0.85	58.33	49.59	0.75	79.31	59.48	
Reach 7	0.62	25.50	15.81	0.79	136.81	108.50	0.75	162.31	121.73	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			520.24			1176.21			496.12	2192.57

Table 3. Habitat Evaluation of the Riparain Ecosystem Componnets - Alternatives 2a & 3a

Target Year: 0

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.37	45.34	16.78	0.73	73.53	49.96	0.10	94.97	9.50	
Reach 2	0.37	166.49	61.60	0.65	376.52	233.58	0.10	450.67	45.07	
Reach 3	0.50	53.93	26.97	0.67	104.36	69.03	0.10	142.19	14.22	
Reach 4	0.34	134.67	45.79	0.65	347.82	217.15	0.10	417.16	41.72	
Reach 5	0.31	83.14	25.77	0.65	548.72	354.35	0.10	592.90	59.29	
Reach 6	0.00	49.83	0.00	0.67	58.33	47.27	0.38	79.31	29.74	
Reach 7	0.00	92.76	0.00	0.53	108.58	60.21	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			176.90			1031.55			228.18	1436.64

Target Year: 10

Target Year: 5

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.74	73.53	54.19	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.68	376.52	255.96	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.71	104.36	73.89	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.69	347.82	239.04	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.66	548.72	361.19	0.10	592.90	59.29	
Reach 6	0.55	49.83	27.41	0.83	58.33	48.51	0.38	79.31	29.74	
Reach 7	0.40	28.50	11.40	0.70	133.81	93.22	0.19	162.31	30.66	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			501.40			1125.99			230.19	1857.58

Target Year: 20

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.46	45.34	20.86	0.74	73.53	54.19	0.18	94.97	16.62	
Reach 2	0.46	166.49	76.59	0.68	376.52	256.05	0.18	450.67	78.87	
Reach 3	0.65	53.93	35.05	0.71	104.36	73.89	0.30	142.19	42.66	
Reach 4	0.46	134.67	61.95	0.69	347.82	239.77	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.66	548.72	363.03	0.30	592.90	177.87	
Reach 6	0.68	49.83	33.88	0.83	58.33	48.51	0.63	79.31	49.57	
Reach 7	0.60	35.00	21.00	0.75	127.31	96.00	0.50	162.31	81.16	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			542.55			1131.43			519.74	2193.72

Target Year: 50

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.46	45.34	20.86	0.75	73.53	55.17	0.18	94.97	16.62	
Reach 2	0.46	166.49	76.59	0.70	376.52	265.37	0.18	450.67	78.87	
Reach 3	0.65	53.93	35.05	0.74	104.36	76.71	0.30	142.19	42.66	
Reach 4	0.46	134.67	61.95	0.73	347.82	252.32	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.67	548.72	368.44	0.30	592.90	177.87	
Reach 6	0.68	49.83	33.88	0.85	58.33	49.59	0.75	79.31	59.48	
Reach 7	0.68	35.00	23.80	0.79	127.31	101.06	0.75	162.31	121.73	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			545.35			1168.66			570.24	2284.25

Table 4. Habitat Evaluation of the Riparain Ecosystem Componnets - Alternatives 2b & 3b

Target Year: 0

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.37	45.34	16.78	0.73	73.53	49.96	0.10	94.97	9.50	
Reach 2	0.37	166.49	61.60	0.65	376.52	233.58	0.10	450.67	45.07	
Reach 3	0.50	53.93	26.97	0.67	104.36	69.03	0.10	142.19	14.22	
Reach 4	0.34	134.67	45.79	0.65	347.82	217.15	0.10	417.16	41.72	
Reach 5	0.31	83.14	25.77	0.65	548.72	354.35	0.10	592.90	59.29	
Reach 6	0.00	49.83	0.00	0.67	58.33	47.27	0.38	79.31	29.74	
Reach 7	0.00	92.76	0.00	0.53	108.58	60.21	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			176.90			1031.55			228.18	1436.64

Target Year: 10

Target Year: 5

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.74	73.53	54.19	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.68	376.52	255.96	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.71	104.36	73.89	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.69	347.82	239.04	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.66	548.72	361.19	0.10	592.90	59.29	
Reach 6	0.55	49.83	27.41	0.83	58.33	48.51	0.38	79.31	29.74	
Reach 7	0.40	28.50	11.40	0.70	133.81	93.22	0.19	162.31	30.66	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			501.40			1125.99			230.19	1857.58

Target Year: 20

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.46	45.34	20.86	0.74	73.53	54.19	0.18	94.97	16.62	
Reach 2	0.46	166.49	76.59	0.68	376.52	256.05	0.18	450.67	78.87	
Reach 3	0.65	53.93	35.05	0.71	104.36	73.89	0.30	142.19	42.66	
Reach 4	0.46	134.67	61.95	0.69	347.82	239.77	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.66	548.72	363.03	0.30	592.90	177.87	
Reach 6	0.68	49.83	33.88	0.83	58.33	48.51	0.63	79.31	49.57	
Reach 7	0.60	35.00	21.00	0.75	127.31	96.00	0.50	162.31	81.16	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			542.55			1131.43			519.74	2193.72

Target Year: 50

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.46	45.34	20.86	0.75	73.53	55.17	0.18	94.97	16.62	
Reach 2	0.46	166.49	76.59	0.70	376.52	265.37	0.18	450.67	78.87	
Reach 3	0.65	53.93	35.05	0.74	104.36	76.71	0.30	142.19	42.66	
Reach 4	0.46	134.67	61.95	0.73	347.82	252.32	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.67	548.72	368.44	0.30	592.90	177.87	
Reach 6	0.68	49.83	33.88	0.85	58.33	49.59	0.75	79.31	59.48	
Reach 7	0.68	35.00	23.80	0.79	127.31	101.06	0.75	162.31	121.73	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			545.35			1168.66			570.24	2284.25

Table 5. Habitat Evaluation of the Riparain Ecosystem Componnets - Alternative 4a

Target Year: 0

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.37	45.34	16.78	0.73	73.53	49.96	0.10	94.97	9.50	
Reach 2	0.37	166.49	61.60	0.65	376.52	233.58	0.10	450.67	45.07	
Reach 3	0.50	53.93	26.97	0.67	104.36	69.03	0.10	142.19	14.22	
Reach 4	0.34	134.67	45.79	0.65	347.82	217.15	0.10	417.16	41.72	
Reach 5	0.31	83.14	25.77	0.65	548.72	354.35	0.10	592.90	59.29	
Reach 6	0.00	49.83	0.00	0.67	58.33	47.27	0.38	79.31	29.74	
Reach 7	0.00	92.76	0.00	0.53	108.58	60.21	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			176.90			1031.55			228.18	1436.64

Target Year: 3

Target Year: 5

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.74	73.53	54.19	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.68	376.52	255.96	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.71	104.36	73.89	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.69	347.82	239.04	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.66	548.72	361.19	0.10	592.90	59.29	
Reach 6	0.55	49.83	27.41	0.81	58.33	47.26	0.38	79.31	29.74	
Reach 7	0.40	28.50	11.40	0.70	133.81	93.65	0.25	162.31	40.58	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			501.40			1125.18			240.11	1866.69

Target Year: 20

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.74	73.53	54.19	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.68	376.52	256.05	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.71	104.36	73.89	0.18	142.19	24.88	
Reach 4	0.40	134.67	53.87	0.69	347.82	239.77	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.66	548.72	363.03	0.18	592.90	103.76	
Reach 6	0.65	49.83	32.39	0.83	58.33	48.47	0.50	79.31	39.66	
Reach 7	0.60	28.50	17.10	0.75	133.81	100.46	0.25	162.31	40.58	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			512.08			1135.85			305.16	1953.09

Target Year: 50

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.50	45.34	22.67	0.75	73.53	55.17	0.18	94.97	16.62	
Reach 2	0.42	166.49	69.93	0.70	376.52	265.37	0.18	450.67	78.87	
Reach 3	0.60	53.93	32.36	0.74	104.36	76.71	0.30	142.19	42.66	
Reach 4	0.40	134.67	53.87	0.73	347.82	252.32	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.67	548.72	368.44	0.18	592.90	103.76	
Reach 6	0.65	49.83	32.39	0.85	58.33	49.46	0.50	79.31	39.66	
Reach 7	0.60	28.50	17.10	0.79	133.81	106.02	0.25	162.31	40.58	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			521.53			1173.50			395.14	2090.17

Table 6. Habitat Evaluation of the Riparain Ecosystem Componernts - Alternative 4b

Target Year: 0

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.37	45.34	16.78	0.73	73.53	49.96	0.10	94.97	9.50	
Reach 2	0.37	166.49	61.60	0.65	376.52	233.58	0.10	450.67	45.07	
Reach 3	0.50	53.93	26.97	0.67	104.36	69.03	0.10	142.19	14.22	
Reach 4	0.34	134.67	45.79	0.65	347.82	217.15	0.10	417.16	41.72	
Reach 5	0.31	83.14	25.77	0.65	548.72	354.35	0.10	592.90	59.29	
Reach 6	0.00	49.83	0.00	0.67	58.33	47.27	0.38	79.31	29.74	
Reach 7	0.00	92.76	0.00	0.53	108.58	60.21	0.19	162.31	28.65	
Reach 8	0.00	129.00	0.00	-	-	-	-	-	-	
Reach 9	0.00	200.00	0.00	-	-	-	-	-	-	
TOTAL			176.90			1031.55			228.18	1436.64

Target Year: 3

Target Year: 5

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.42	45.34	19.04	0.74	73.53	54.19	0.10	94.97	9.50	
Reach 2	0.42	166.49	69.93	0.68	376.52	255.96	0.10	450.67	45.07	
Reach 3	0.60	53.93	32.36	0.71	104.36	73.89	0.10	142.19	14.22	
Reach 4	0.40	134.67	53.87	0.69	347.82	239.73	0.10	417.16	41.72	
Reach 5	0.35	83.14	29.10	0.66	548.72	361.19	0.10	592.90	59.29	
Reach 6	0.55	49.83	27.41	0.81	58.33	47.26	0.38	79.31	29.74	
Reach 7	0.40	28.50	11.40	0.70	133.81	93.22	0.25	162.31	40.58	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			501.40			1125.43			240.11	1866.94

Target Year: 20

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.46	45.34	20.86	0.74	73.53	54.19	0.18	94.97	16.62	
Reach 2	0.46	166.49	76.59	0.68	376.52	256.05	0.18	450.67	78.87	
Reach 3	0.65	53.93	35.05	0.71	104.36	73.89	0.30	142.19	42.66	
Reach 4	0.46	134.67	61.95	0.69	347.82	239.73	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.66	548.72	363.03	0.30	592.90	177.87	
Reach 6	0.68	49.83	33.88	0.83	58.33	48.47	0.63	79.31	49.57	
Reach 7	0.60	35.00	21.00	0.86	127.31	109.41	0.50	162.31	81.16	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			542.55			1144.77			519.74	2207.06

Target Year: 50

	Steelhead Habitat Value			Riparian Habitat Value			Natural Process Value			
	Habitat. Value	Acreage	Habitat Units	Avg. Hab. Value	Acreage	Habitat Units	Habitat Value	Acreage	Habitat Units	
Reach 1	0.46	45.34	20.86	0.75	73.53	55.17	0.18	94.97	16.62	
Reach 2	0.46	166.49	76.59	0.70	376.52	265.37	0.18	450.67	78.87	
Reach 3	0.68	53.93	36.67	0.74	104.36	76.71	0.30	142.19	42.66	
Reach 4	0.46	134.67	61.95	0.73	347.82	252.43	0.18	417.16	73.00	
Reach 5	0.42	83.14	34.92	0.67	548.72	368.44	0.30	592.90	177.87	
Reach 6	0.68	49.83	33.88	0.85	58.33	49.46	0.75	79.31	59.48	
Reach 7	0.65	35.00	22.75	0.91	127.31	115.28	0.75	162.31	121.73	
Reach 8	0.70	129.00	90.30	-	-	-	-	-	-	
Reach 9	0.84	200.00	168.00	-	-	-	-	-	-	
TOTAL			545.92			1182.86			570.24	2299.01

Table 7. Comparison of Environmental Outputs - No Action verses Restoration (Action) Alternative

	STEELHEAD HABITAT COMPONENT					RIPARIAN HABITAT COMPONENT						NATURAL PROCESSES COMPONENT					
TARGET YEAR	No Action	Alt. 1	Alts. 2a,2b 3a, 3b[1]	Alt. 4a	Alt 4b	No Action	Alt. 1	Alts. 2a,3a[1] (Slurry)	Alts. 2b,3b[1] (No Slurry)	Alt. 4a	Alt. 4b	No Action	Alt. 1	Alts. 2a,3a[1] (Slurry)	Alts. 2b,3b[1] (No Slurry)	Alt. 4a	Alt. 4b
0	177	177	177	177	177	1032	1032	1032	1032	1032	1032	228	228	228	228	228	228
5	234	498	501	501	501	1029	1134	1126	1126	1125	1125	228	240	230	230	240	240
20	234	510	543	512	543	944	1138	1131	1131	1136	1145	228	356	520	520	305	520
50	234	520	545	522	544	784	1176	1169	1169	1174	1183	286	496	570	570	395	570
AAHUS[3]	231	491	473	493	514	917	1143	1136	1136	1140	1147	245	368	462	462	315	464
Change In AAHUs[4]	----	260	242	262	283	----	226	219	219	223	229	----	123	217	217	70	219
% Change	----	113%	105%	113%	123%	----	25%	24%	24%	24%	25%	----	50%	88%	88%	28%	89%

[1]Natural Erosion under either 1-notch or 2-notch scenarios.

[2]No Action= TY3; Steelhead Component: Alt 1, 3, & 4 = TY 3; Alt 2 & 3 = TY 10; Riparain & Natural Processes = TY 5

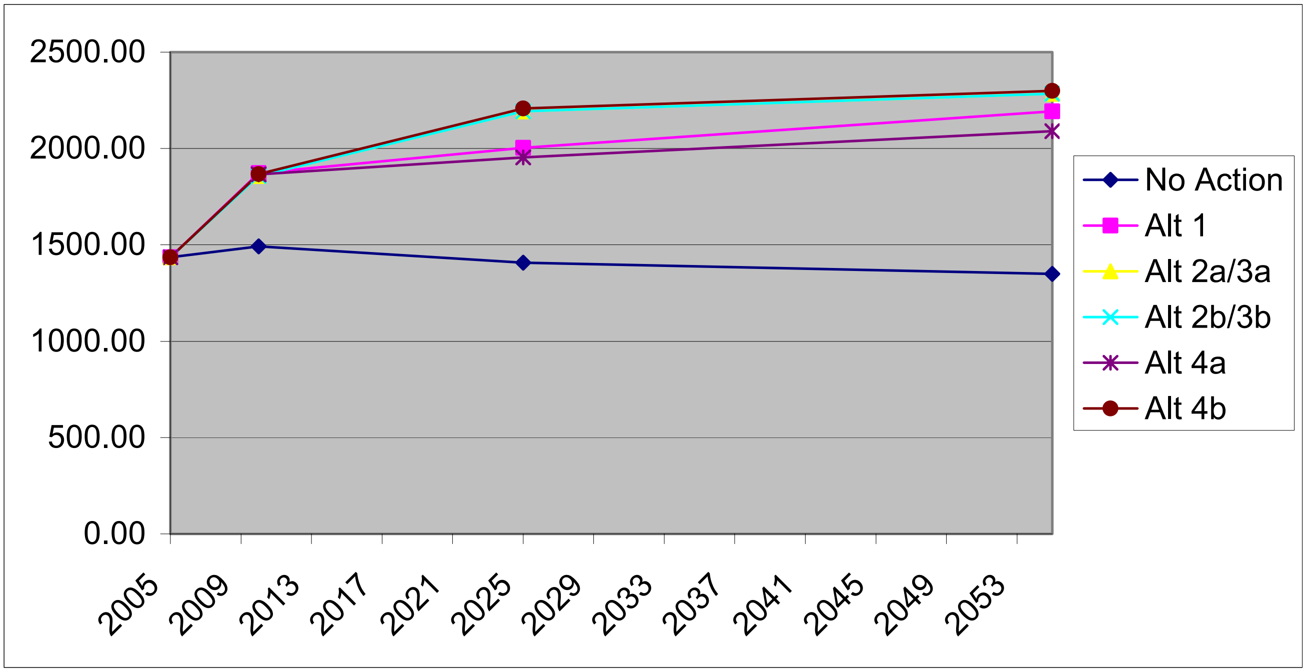
[3]AAHUs = Average Annual Habitat Units over 50 years

[4]Change in AAHUs = (AAHUs of Action Alternative) – (AAHUs of No Action Alternative)

Table 8. Total Net Average Annual Habitat Units (AAHUs) for Restoration Alternatives

ALTERNATIVES TOTAL NET CHANGE IN AAHUs				
ALT	STEELHEAD	RIPARIAN	NAT. PROCESS	TOTAL
1	260	226	123	609
2a	242	219	217	678
2b	242	219	217	678
3a	242	219	217	678
3b	242	219	217	678
4a	262	223	70	554
4b	283	229	219	731

Figures 1. Total Habitat Units for restoration alternatives over the 50-year period-of analysis.
(Vertical axis = Habitat Units; Horizontal axis = Target years)



TARGET YEARS

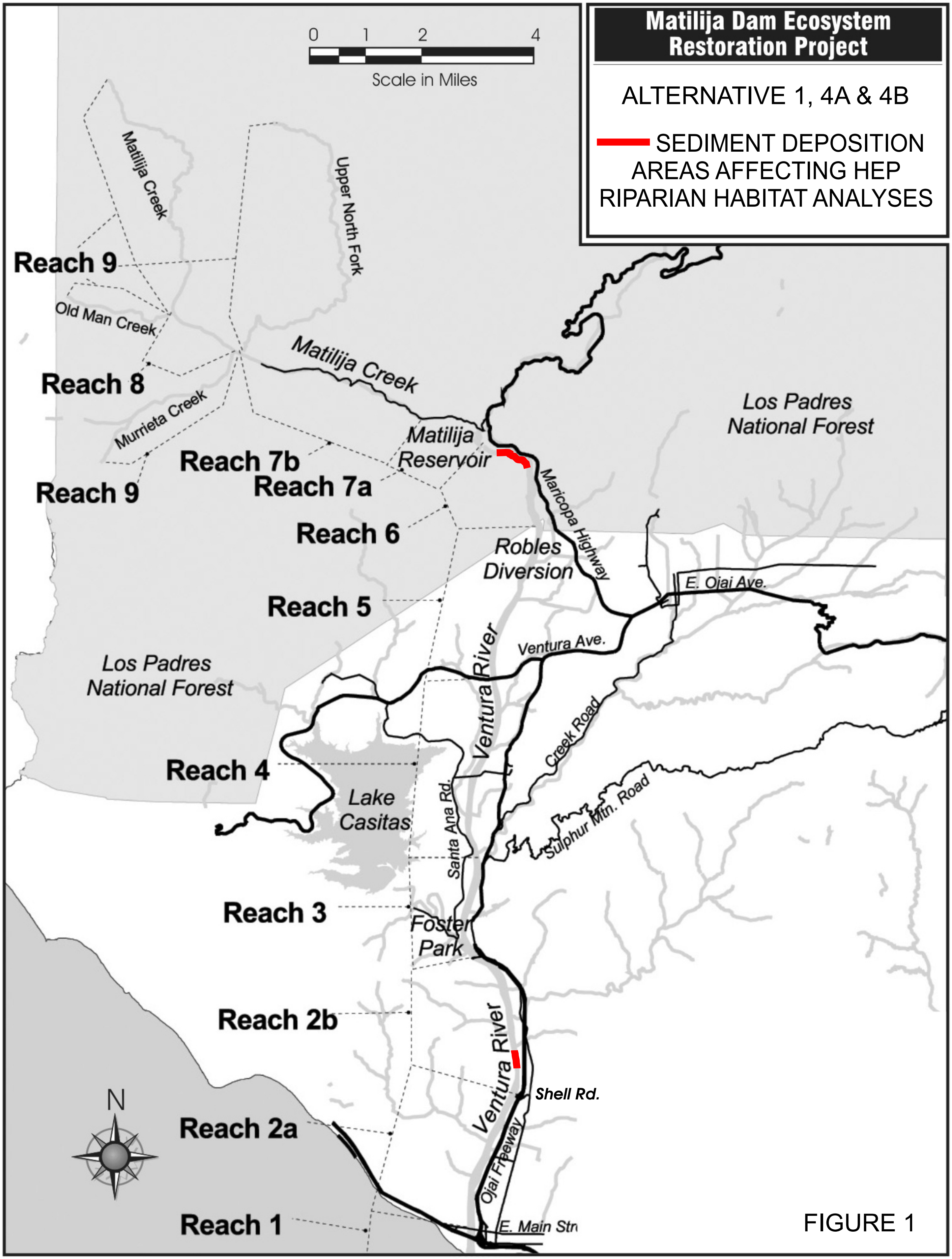

Matilija Dam Ecosystem Restoration Project
ALTERNATIVE 1, 4A & 4B
SEDIMENT DEPOSITION AREAS AFFECTING HEP RIPARIAN HABITAT ANALYSES
0 1 2 4
Scale in Miles
Matilija Creek
Upper North Fork
Reach 9
Old Man Creek
Matilija Creek
Reach 8
Murrieta Creek
Matilija Reservoir
Reach 7b
Reach 9
Reach 7a
Reach 6
Los Padres National Forest
Maricopa Highway
Robles Diversion
Reach 5
E. Ojai Ave.
Ventura Ave.
Ventura River
Los Padres National Forest
Creek Road
Reach 4
Lake Casitas
Santa Ana Rd.
Sulphur Mtn. Road
Reach 3
Foster Park
Reach 2b
Ventura River
Shell Rd.
N
Reach 2a
Ventura River
Ojai Freeway
Reach 1
E. Main Str

FIGURE 1

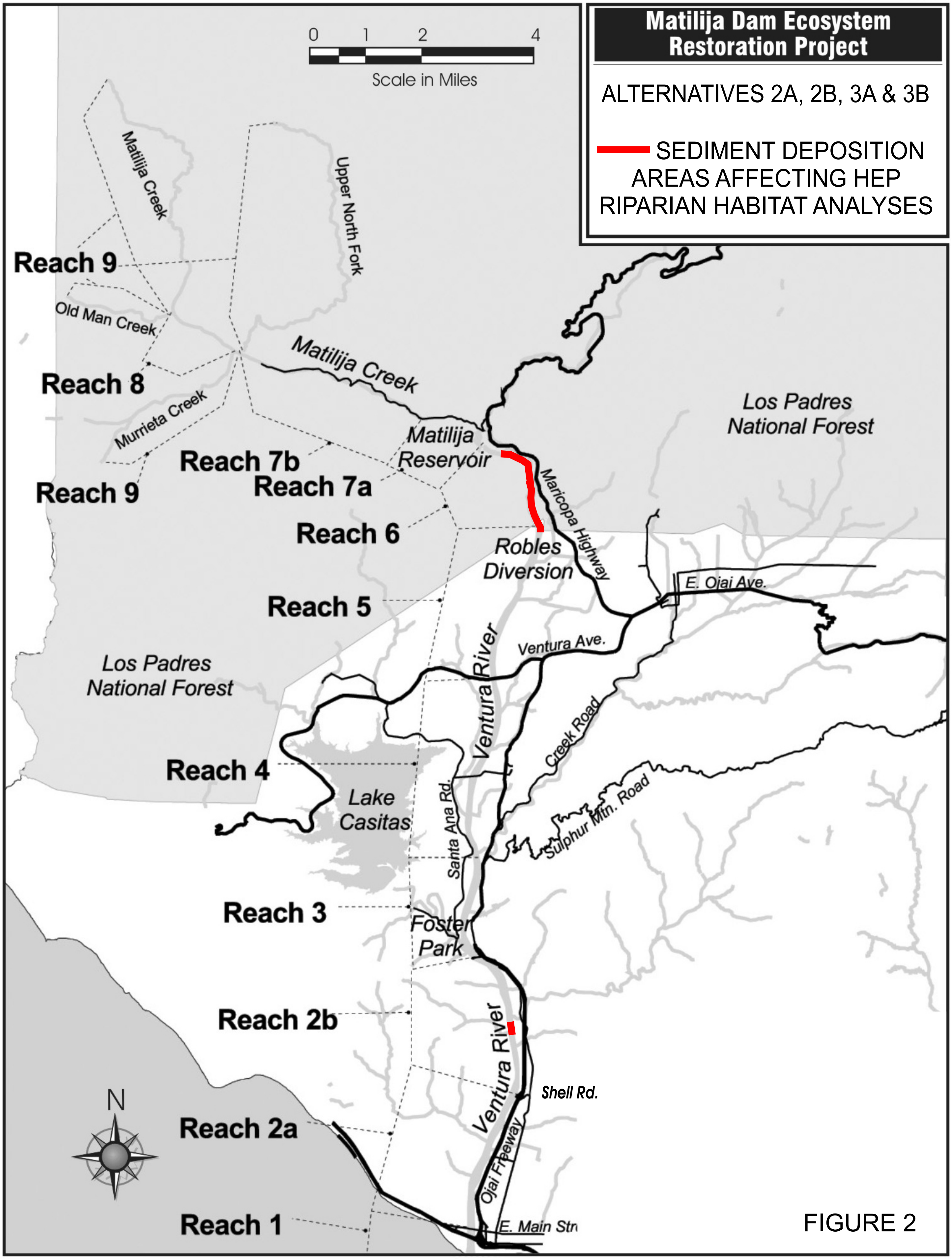

Matilija Dam Ecosystem Restoration Project
ALTERNATIVES 2A, 2B, 3A & 3B
SEDIMENT DEPOSITION AREAS AFFECTING HEP RIPARIAN HABITAT ANALYSES
0 1 2 4
Scale in Miles
Matilija Creek
Upper North Fork
Reach 9
Old Man Creek
Reach 8
Murrieta Creek
Matilija Creek
Reach 7b
Reach 9
Reach 7a
Matilija Reservoir
Maricopa Highway
Reach 6
Robles Diversion
Los Padres National Forest
Reach 5
E. Ojai Ave.
Ventura Ave.
Ventura River
Los Padres National Forest
Creek Road
Reach 4
Lake Casitas
Santa Ana Rd.
Sulphur Mtn. Road
Reach 3
Foster Park
Reach 2b
Ventura River
Shell Rd.
N
Reach 2a
Ojai Freeway
Reach 1
E. Main Str

FIGURE 2

Appendix 1. Riparian Habitat Evaluation Variables and Scaling

Riparian Habitat was evaluated as discussed in section 3.B of this report. The following describes and defines the variables used to evaluate this ecosystem component.

Riparian Habitat = ([2 x (% Native Vegetation Cover + Giant Reed Cover)] + Listed Species + Adjacent Land Character)/6		
Variable	**Justification**	**Habitat Value**
Native Vegetation Cover Of the vegetation cover present, what percentage is native? (Visual estimate within each polygon.)	Native vegetation cover is important to wildlife and forms the backbone of the ecological health of the river system. Allows for characterizing general dominance of native cover independent total cover.	**1.0=** 80 to 100 % native cover **0.75** = 60 to 80% native **0.5**= 40 to 60% native **0.25**= 20 to 40 % **0.1** = 5 to 20 % native **0.0 =** less than 5% native
Giant reed cover Of the vegetation cover present, what percentage is giant reed?	Visual estimate of actual spatial cover of giant reed within polygon. This invasive, exotic plant significantly degrades riparian habitat quality.	**1.0=** 0 to 5 % cover **0.75**= 5 to 20% cover **0.5** = 20 to 50% cover **0.25**= 5 to 90 % cover **0.0** = 90 to 100 % cover
Listed species (State or Federally listed Threatened or Endangered species presence within each reach.)	Extra emphasis should be placed on areas where endangered species have been observed in the past 40 years. Information obtained from USFWS. (Most reaches have at least 1 species so most received a 1.0 value)	**1.0 =** more than 1 threatened or endangered species observed in the Reach in the past 40 years **0.5 =** 1 possible endangered species observed in the Reach in the past 40 years **0.1 =** no endangered species observed in the reach in the past 40 years
Adjacent land character (Determined for each River Reach.)	Quality of riparian habitat is dependent upon the amount of impacts in the land adjacent to the riparian habitat. Any land use other than native habitat will be considered altered for simplicity.	**1.0** = 80 to 100% of adjacent land in unaltered state **0.75** = 60 to 80% unaltered **0.5** = 40 to 60% unaltered **0.25**= 20 to 40% unaltered **0.1** = Less than 20% adjacent land unaltered and natural

"Adjacent Land Use Character" Variable - Justification and Determination of Values

Riparian habitats that are isolated from adjacent upland habitats have lower carrying capacities compared to riparian habitats surrounded by uplands. Many wildlife species depend seasonally on both types of habitat to survive. In addition, the ecosystem functions of upland and riparian habitats are dependent upon one another. When truncated or isolated by intervening urban, or other land uses, the ecosystem functions are adversely affected, resulting in lower overall riparian habitat quality.

As such, the Adjacent Land Use Character along the Ventura River affects habitat quality of the riparian ecosystem. Agricultural practices generally increase sediment and nutrient loading in the river. Urbanization increases flood flows while decreasing sediment loading and percolation, the latter of which ultimately reduces river base flows. Some roads and highways can be barriers to animal movement between river and upland habitats, as well as cause noise and night lighting that can disrupt normal feeding and mating behavior. Where the river is wide, these edge effects are minimized; where the river is narrow, the substantial degradation of habitat quality may occur.

Methodology

Land uses along both sides of each river reach were approximately quantified by linear foot. For example, if a Reach totaled 500 feet long, a total of 1000 linear feet of edge types (i.e., both sides of the river) were mapped. The total natural habitat lengths were summed, and then divided in half to determine the percent of adjacent natural areas for a reach. The land use types were:

Urban
Highway (barrier to most wildlife)
Agriculture (orchards or pastures)
Parks
Disturbed natural habitat (oil fields)
Natural upland habitats.

For the evaluation of the "Adjacent Land Use Character," only the natural upland habitats were considered to have intact ecosystem functions. Although the other land uses mentioned above vary by degree of ecosystem impacts, they all preclude or substantially inhibit vital ecosystem functions and values. A two-lane road or levee feature was not considered a substantial barrier to wildlife movement, and if that was the only land use intrusion into an otherwise natural transition from river to upland, the value was considered as natural. For project alternatives that involve changes in adjacent land use character, such as the building of levees or floodwalls, these items were included in the post project habitat value analysis.

For each river reach the value was determined by the percentage of river edge that was natural or in some other land use. The following adjacent land use character measurements were used to generate the value per reach. The Reaches were measured along the centerline of the River, following all the curves. Therefore, the length values may appear high compared to the roadway distances that parallel the river.

Value	**Criterion**
1.0	80 to 100% of the reach edge natural
0.75	60 to 80% of the reach edge natural
0.5	40 to 60% of the reach edge natural
0.25	20 to 40% of the reach edge natural
0.1	Less than 20% of reach edge natural

Analysis Results

Reach 1: Ventura River Estuary. The estuary is bound by Emma Woods State Beach Park and a Recreational Vehicle park on the west side. The east bank is protected by a large levee and beyond that, the Ventura Fairgrounds are present. The east edge of the estuary reach comprises non-natural, urban/park land uses. The west edge downstream of Highway 101 is a natural park where riparian habitat has recently been restored. Therefore, this Reach receives a value of 0.25 since about 30% of the adjacent land is natural habitat. No changes in adjacent land use will occur as part of the future with or without project conditions.

Reach 2. Estuary to Casitas Vista Road Bridge at Foster Park. The length of this reach is approximately 27,000 linear feet, or about 5 miles. Only about 4,000 linear feet on the west side of the river is adjacent to natural habitat, which comprises steep hills with sage scrub and chaparral vegetation. This constitutes a 0.1 value for this reach, as only 15% of the adjacent land use is considered natural habitat. The potential addition of a small levee structure near Canada Larga as part of the with project conditions, does not affect the adjacent land use value because the area is already disturbed.

Reach 3. Foster Park to just Upstream of San Antonio Creek confluence. This much shorter reach of the river is approximately 10,000 linear feet, or about 2 miles. Little of the river edge comprises land uses that are natural habitat; most of the area is agricultural and urban. This reach receives a 0.1 value, as the adjacent land use is less than 20% natural habitat. The potential addition to the existing levee structure at Casitas Springs as part of the with project conditions, does not affect the adjacent land use value.

Reach 4. San Antonio to Hwy 150 Bridge. This reach is approximately 15,000 linear feet, or just less than three miles. Similar to Reach 3, the river is flanked by urban and agricultural development. This reach receives a 0.1 value as the adjacent land use is less than 20% natural habitat. The potential addition to the existing and potential extension of a levee structure at Live Oak Acres as part of the with project conditions, does not affect the adjacent land use value because the area is already disturbed.

Reach 5. Hwy 150 to just above Robles Diversion Facility. This reach of the river is approximately 16,000 linear feet, or just about 5 miles. Short portions of this reach, primarily on the western banks, have natural hillside vegetation as an adjacent land use type. The entire eastern bank is bordered by urban and agricultural land uses. Although this reach has 16% of the bank bordered by natural habitat, the value remains 0.1, as it is less than 20%. The potential addition of a levee/floodwall structure along the east bank of this reach as part of the with project conditions, does not affect the adjacent land use value because the area is residential or agriculture.

Reach 6: Robles Diversion to Matilija Dam. In this reach of the river, the canyon steepens, reducing the land available for urban and agricultural uses, especially towards the upstream end. Natural habitat occurs along 43% of this 10,000 linear foot stretch of the river. Agriculture and some ranch housing is the other primary land use category present in this reach. This reach receives a value of 0.5. With project, a floodwall at Camino Cielo Road reduces the adjacent land use value to 0.25, because the percent of the reach with natural habitat adjacent drops from 43 percent to 36 percent.

Reach 7. Matilija Reservoir and lake influenced river reaches. Matilija Reservoir was formed by flooding a very steep canyon. Little room was left along the lake edge for development of any kind. The canyons are dry and very steep, making them unsuitable for agriculture. Small residential parcels occur upstream of the lake where topography is more favorable. This reach receives a value of 1.0 for adjacent land use, because nearly 100% is natural habitat. Matilija Road, the primary access route into the canyon is not a substantial barrier for wildlife movement. With or without project conditions for the future do not change the adjacent habitat value for this reach.

Upstream Matilija Reservoir. Although not directly measured, reaches 8 and 9 also receive values of 1.0.

Appendix 2. Steelhead Trout Habitat Evaluation

Entrix, Inc. 2002. Steelhead habitat evaluation, Ventura River Watershed. Prepared for Matilija Dam Ecosystem Restoration, Environmental Working Group. Project No. 3310004. July 30, 2002.

AVAILABLE UPON REQUEST

Appendix 3. Natural Process Evaluation Variables and Scaling

The Natural Riparian Ecosystem Processes were evaluated as discussed in Section 3.B of this report. The following describes and defines the variables used to evaluate this ecosystem component.

Natural Processes = Natural Hydrologic Regime + Natural Sediment Regime/2		
Variable	**Justification**	**Habitat Value**
Natural hydrologic regime *Value determined per reach*	The hydrology of the river has been substantially altered by: dams, diversion/ groundwater pumping, urbanization, channelization, and agriculture. Each reach of the river has been affected differently, and a value will be applied per reach or subset of reach, depending on the data available/logical application.	**1.0 =** natural hydrologic regime **0.75** = minimal alteration **0.5** = moderate alteration **0.25** = substantial alteration **0.1** = extreme alteration
Natural sedimentation regime *Value determined per reach.*	The geomorphology of the river has been substantially altered by damming which has trapped sediments behind the dam. Each River Reach has been affected differently. Urban and agricultural development has also affected the river's sediment regime.	**1.0 =** natural sedimentation regime **0.75** = minimal alteration **0.5** = moderate alteration **0.25** = substantial alteration **0.1** = not natural at all

Analysis Results

The "Natural Hydrologic Regime" and "Natural Sediment Regime" of each River Reach was assigned values based on an assessment of existing, substantial impacts in the study area. A substantial impact was considered one that results in a regime different than normal conditions.

Those restoration alternatives that return stored sediments to the river system have higher "Natural Sediment Regime" values. Much of the river has a deficit of sediment caused in part by the 50 years of storage behind Matilija Dam. This affect is reduced towards the coast because other sediment sources, including old terraces within the upper reaches of the mainstem, have been available during this time period. Therefore, sediment resupply, as a result of dam removal, affects the upper reaches more than the lower reaches.

Hydrology (per the "Natural Hydrologic Regime" variable) was assessed as playing a minor role in the study area with or without restoration because Matilija Dam currently does not provide any flood peak attenuation and low flows pass through the dam during summer months. The Natural Hydrologic Regime in River Reaches 6 and 7 is expected to be improved by deconstruction of the dam and is evaluated in this analysis. (Note: the impacts to the "Natural Hydrologic Regime" in the lower reaches [Reach 5 downstream to Reach 1] may be affected by operations at Robles Diversion, but were considered to occur with or without any proposed restoration alternative and, therefore, were not analyzed.)

The following Table documents the rational for the values assigned to the "Natural Processes Habitat Component".

River Reach	Notes on existing Impacts	Hydrological Value	Sediment Value
1. Estuary to Main St.	Floodplain delta highly modified by fill, bridges, levees, urbanization, presence of Giant Reed	0.10	0.10
2. Main St. to Foster Park	Canada larga input: a relatively natural large Watershed, OVSD releases clean and small amts of water, few wells, some oil field disturbance and urban inputs, likely 0.5-0.25 alone but with u/s inputs value is lowered, presence of Giant Reed	0.10	0.10
3. Foster Park to San Antonio (incl. both features)	Levees, Giant Reed, urban inputs, wells, buried dam, plus Coyote Creek tributary dammed	0.10	0.10
4. San Antonio to Hwy 150	Both Matilija and Robles affect hydrology and sediment capture; numerous wells, many urban inputs, presence of Giant Reed	0.10	0.10
5. Hwy 150 to Robles Diversion	Both Matilija and Robles affect hydrology and sediment capture; numerous wells, some urban inputs, presence of Giant Reed	0.10	0.10
6. Robles to Matilija Dam	Some agriculture and residential wells, Matilija dam releases ok; summer flows and spills during 2-5 yr event, has N. Fork input of hydrology and sediment, some Giant Reed	0.50	0.25
7. Matilija Lake and Lake Influence (7a upstream [delta]) (7b existing lake)	Major hydrological and sedimentation alterations with massive amounts of Giant Reed and lake effect, 7a similar to pre-dam alluvial conditions	0.25 (7a) 0.10(7b)	0.25 (7a) 0.10(7b)
8. Mainstem Matilija Creek	Minor Giant Reed and residential wells occur in this River Reach and together are considered minimal hydrologic alteration. No sediment alteration other than minor roads/trails	0.75	1.00
9. Headwater Drainages	Upper North Fork, Murrieta, Old Man, and Upper Matilija Creeks have no substantial hydrological degradation or sedimentation alteration.	1.00	1.00

Appendix 4. Review of Giant Reed (*Arundo donax*) Distribution, Expansion Rates, and Eradication Methodologies

To explore giant reed *(Arundo donax)* colonization rates in the Ventura River, aerial photos were reviewed for dates between 1969 and 2001. Although much of the river system was reviewed, the best views of giant reed expansion rates were in Matilija Lake and the Ventura River estuary. As background information, the study area totals approximately 2,000 acres. Within this area, based on the recently mapped cover categories for giant cane, there are over 250 acres of giant reed.

Giant reed appears to colonize low flood terraces within the river. Although giant reed does occur in scattered masses along the active river channels, the channels are scoured often enough to remove giant reed and native woody vegetation before it matures. Therefore, the active channels usually have very low giant reed cover values. On the lower flood terraces that are often washed over by floodwaters but not necessarily scoured, giant reed and native willow scrub vegetation colonizes or resprouts following flood events. Over time, the giant reed outcompetes the native vegetation on the terraces, resulting in the displacement of native willow scrub habitat with nearly solid stands of giant reed.

At the estuary, the area chosen to study through time was the eastern flood terrace between the railroad tracks and Highway 101. In February of 1969 the terrace was fully flooded with most surface vegetation removed. By 1983, 14 years later, the native willow scrub vegetation had recovered to nearly 90% cover, but a few giant reed clumps had become established, making up between 5 and 10% of the overall cover. By 1995, the giant reed had spread to comprise 30 to 40% of the cover. In 1998, the giant reed cover was estimated to be over 50% of the present vegetation, and by 2001, the giant reed cover value was over 75%. In 12 years, giant reed cover increased from 5 to 10% cover to 30 to 40 % cover, and in 6 more years it reached more than 75% cover. This rate is exponential for cover expansion. The terrace was not flooded extensively enough to remove surface vegetation during this time period. Once the giant reed rhizomes are established, it is expected that the giant reed would outcompete regenerating willow scrub vegetation if such a flood event occurred in the future.

At Matilija Lake in 1969, a few giant reed clumps were present in an upstream section of a floodplain terrace approximately 5,000 feet upstream of the dam. The rest of the terrace vegetation appeared to be early seral willow scrub vegetation. This terrace vegetation was not extensively scoured during the flood event that year. Unfortunately, the next clear photo date available for review was 2001. In the 32 years that passed, the terrace that once contained a few clumps of giant reed, comprising less than 5% of the total vegetation cover, had been completely colonized by giant reed that now forms nearly 100% cover. The willows had not been completely extirpated, but had grown tall enough to be an overstory over the giant reed in some areas. (Also see USFWS 2000: Figure 2).

Low flood terraces are extremely vulnerable to invasion by giant reed. Giant reed colonization will persist as a problem until it is systematically removed from the watershed. It is difficult to forecast the rate of giant reed expansion in the future, as flood terraces change shape now and then. However, it can be demonstrated that in 30 years it can completely take over willow scrub habitat and will likely continue to do so in the future.

For without project conditions, giant reed patches in the riparian ecosystem below the dam is expected to continue to spread under suitable conditions. It was estimated that by Target Year 20, Matilija Lake will almost completely fill with sediment and be dominated by giant reed. Giant reed will also have invaded and spread in downstream terraces. By TY 20, and again by TY 50, the giant reed cover values were increased one step in value in the modified HEP analysis. For example, a polygon (as identified in the vegetation mapping for the study) with a HEP value of 0.5 at TY 0 was changed to 0.25

by TY 20, and to 0.0 by TY 50. This reflects how the invasive exotic lowers the habitat quality (value) of riparian habitat over time. To further model the giant reed increases over time, the native habitat cover values were decreased one step by TY 50. For example, a polygon with a native vegetation cover value of 0.5 at TY 0 was reduced to 0.25 by TY 50.

With all restoration alternatives, giant reed would be removed from the study area in the initial five years of project construction. All polygons were then increased in giant reed values to 1.0 by TY 5.   To reflect recovery of native cover, these values were increased one increment between TY 20 and TY 50. Giant reed removal would occur systematically during construction from the upper portion of the study area and working downstream. Four common methods may be used:

1. cut and remove biomass with cut-stump application of herbicide
2. cut and remove biomass
3. cut and remove biomass and remove below ground rhizomes
4. aerial application of herbicides.

All methods require at least 5 years of treatment of resprouting canes with herbicide. Method 3 would likely be used in Reach 7 during recontouring of the site for any of the alternatives. Method 4 would likely be used for large areas of dense reed. Methods 1 and 2 are most commonly used and would be the best choices for most of the study area.

Once cut and removed, giant reed must be dried and disposed of to prevent reinfestation. The most effective treatment is chipping the material to less than 4 inches in length, then spreading and drying it. Once dry, the material may be used for landscaping mulch as a substitute for bark or wood chips, it may be used in composting, or perhaps paper pulp.

Since reinfestation of the Ventura River by giant reed may occur following completion of deconstruction activities associated with the project, routine maintenance herbicide treatments are considered part of the future Operations and Maintenance for the project. Upland and tributary sources of giant reed may also be identified and eradicated from the watershed.

Appendix 5. Environmental Outputs Resulting from Incremental Removal of Arundo within the Study Area under the Recommended Alternative (4b).

Under all circumstances, Arundo would be removed starting from the top of the watershed (River reaches 9-7) and moving downstream, to River Reach 1 (Ventura Estuary)

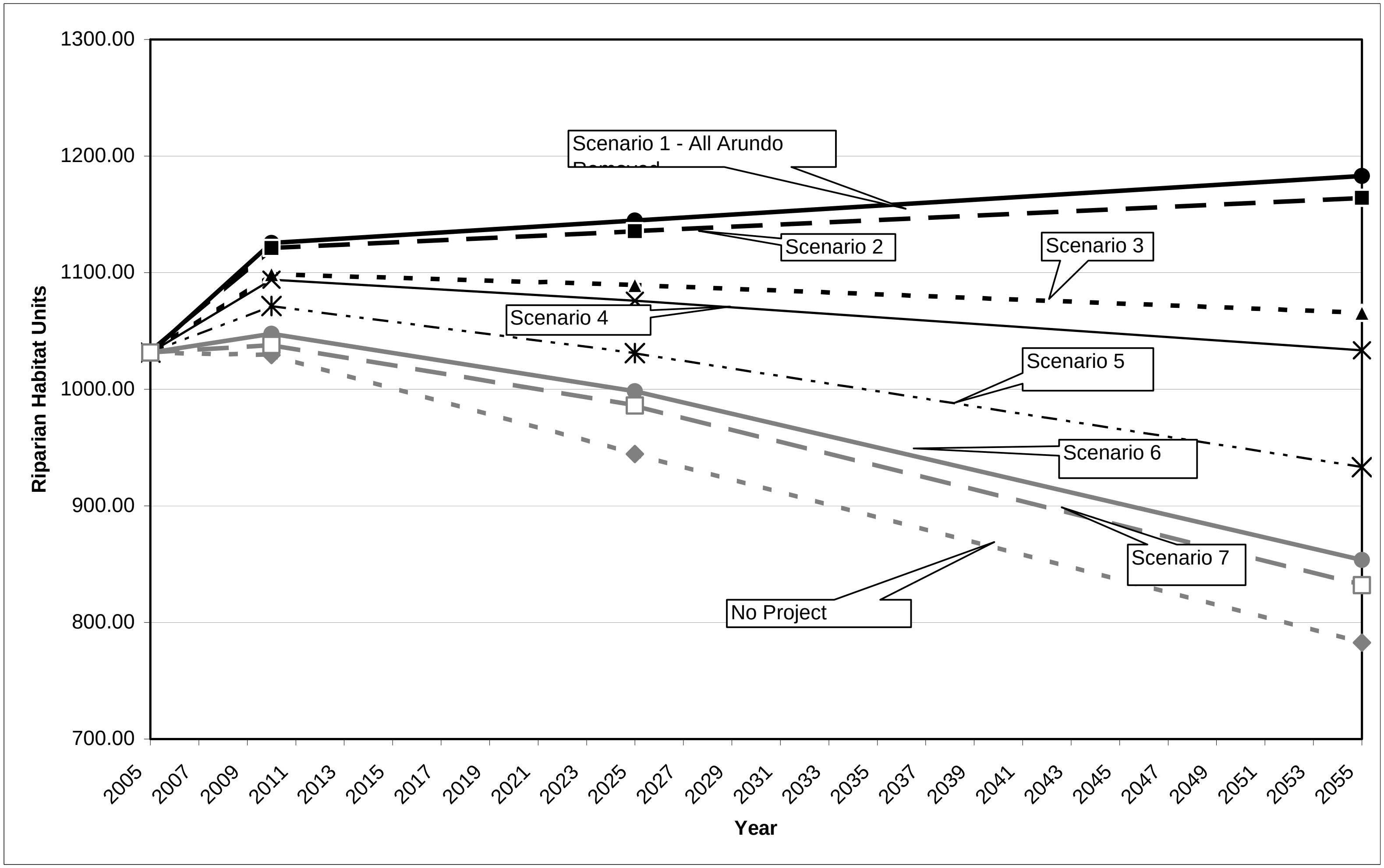
The following Table shows the expected Average Annual Habitat Units (AAHUs) if Arundo is removed from only Reaches 9-7, and then incrementally from additional downstream River Reaches for the Recommended Alternative (Alternative 4b).

		Alternative 4b (Temp Stabilize on-site) Riparian Habitat Component						
Target Year	No Action	Reaches* 9-7	Reaches 9-6	Reaches 9-5	Reaches 9-4	Reaches 9-3	Reaches 9-2	All Reaches
0	1032	1032	1032	1032	1032	1032	1032	1032
5	1029	1038	1048	1071	1094	1099	1121	1125
20	944	986	998	1031	1076	1089	1135	1145
50	784	832	845	933	1033	1066	1164	1183
AAHUs	917	952	966	1009	1064	1081	1135	1145
Change AAHUs	---	35	49	92	147	164	218	229
% Change	---	4%	5%	10%	16%	18%	24%	25%
*River Reaches where Arundo is eradicated.								

Since Arundo would be removed in a similar method for all action alternatives, the incremental increase in AAHUs is similar for all action alternatives. (Tables displaying the incremental increase for the other action alternatives are in the project files.)

The following figure illustrates the above information. Note that a fundamental assumption of the HEP analysis relative to the Riparian Habitat Component is that Arundo is expected to continue to spread throughout the study area, if left untreated. Any scenario that does not completely (significantly) remove this invasive species from the upstream reaches will allow the plant to spread in the future to areas in the River reach that it remains.

Expected Riparian Habitat Component AAHUs from the incremental removal of Arundo from the Study Area



Scenario 1 - All Arundo removed from all Reaches
Scenario 2 – Arundo removed from Reaches 2-9
Scenario 3 – Arundo removed from Reaches 3-9
Scenario 4 – Arundo removed from Reaches 4-9
Scenario 5 - Arundo removed from Reaches 5-9
Scenario 6 - Arundo removed from Reaches 6-9
Scenario 7 - Arundo removed from Reaches 7-9

Appendix 6. Assessment of Steelhead Trout Habitat in the Upper Matilija Creek Basin.

Thomas R. Payne & Associates. (TRP) 2003. Assessment of steelhead habitat in the Upper Matilija Creek Basin. Stage 1: Qualitative Stream Survey. Prepared for Ventura Co. Flood Control District. 9 June 2003.

Thomas R. Payne & Associates (TRP). 2004. Assessment of steelhead habitat in the Upper Matilija Creek Basin. Stage 2: Qualitative Stream Survey. Prepared for Ventura Co. Flood Control District. 30 January 2004.

Appendix C of (TRP 2003) contain " Photographs of all possible barriers identified during the first-stage survey.

TRP 2003 and TRP 2004 are AVAILABLE UPON REQUEST

APPENDIX F.

BIOLOGICAL RESOURCES

F.1 MAPS OF VEGETATION COMMUNITIES WITHIN THE STUDY AREA

F.2 PLANT SPECIES REPORTED AND OBSERVED IN THE VENTURA RIVER

F.3 WILDLIFE SPECIES OBSERVED DURING FIELD SURVEYS OF THE VENTURA RIVER

F.4 NATURAL VEGETATION OF THE VENTURA RIVER

APPENDIX F.1

MAPS OF VEGETATION COMMUNITIES WITHIN THE STUDY AREA

Legend

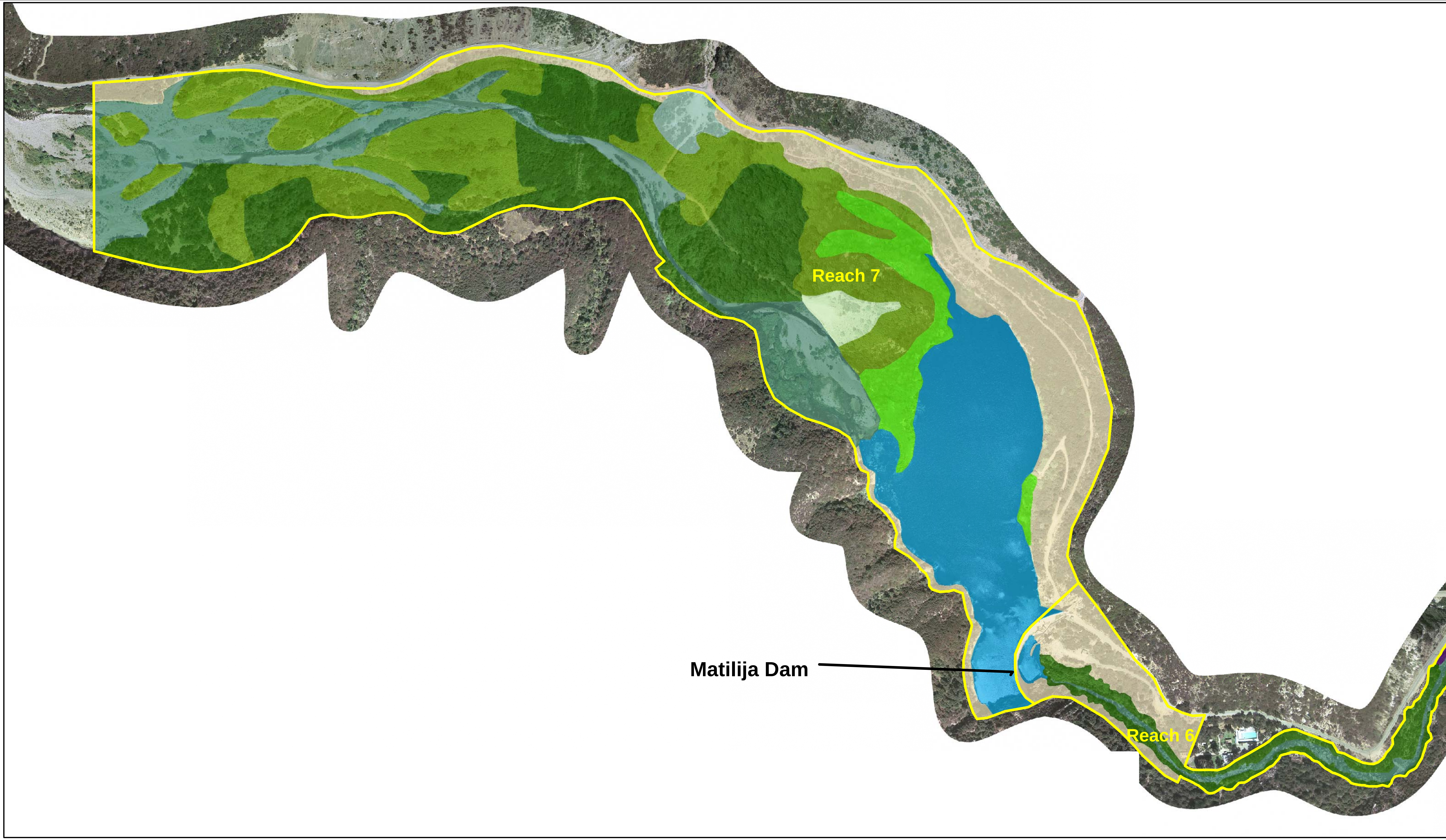
reach

habitats.lyr

Map_Class

Grassland	Orchard	Lacustrine
Scrub	Pond	Marine-Intertidal-Beach/Bar
Chaparral	Concrete/Road	Palustrine-Unconsolidated Shore
California Walnut Series	Rip-Rap Levee	Palustrine-Emergent
Coast Live Oak Series	Sand-verbena-Beach Bursage Series	Palustrine-Scrub/Shrub
	Sand	Palustrine-Forested
	Estuarine-Intertidal	Riverine-Intermittent
	Estuarine-Subtidal	Riverine-Lower Perennial
		Riverine-Upper Perennial

Prime Contractor: Aspen Environmental Group *Subcontractor: David Magney Env. Consulting* *Geo InSight International, Inc.*		**Matilija Dam Ecosystem Restoration Project** **U.S. Army Corps of Engineers, Los Angeles District** **Ventura County Watershed Protection District**	**Natural Vegetation of the Ventura River** **June 2002**	**Map Legend**



Prime Contractor: *Aspen Environmental Group*
Subcontractor: *David Magney Env. Consulting*
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 1

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Geo InSight International, Inc.

N

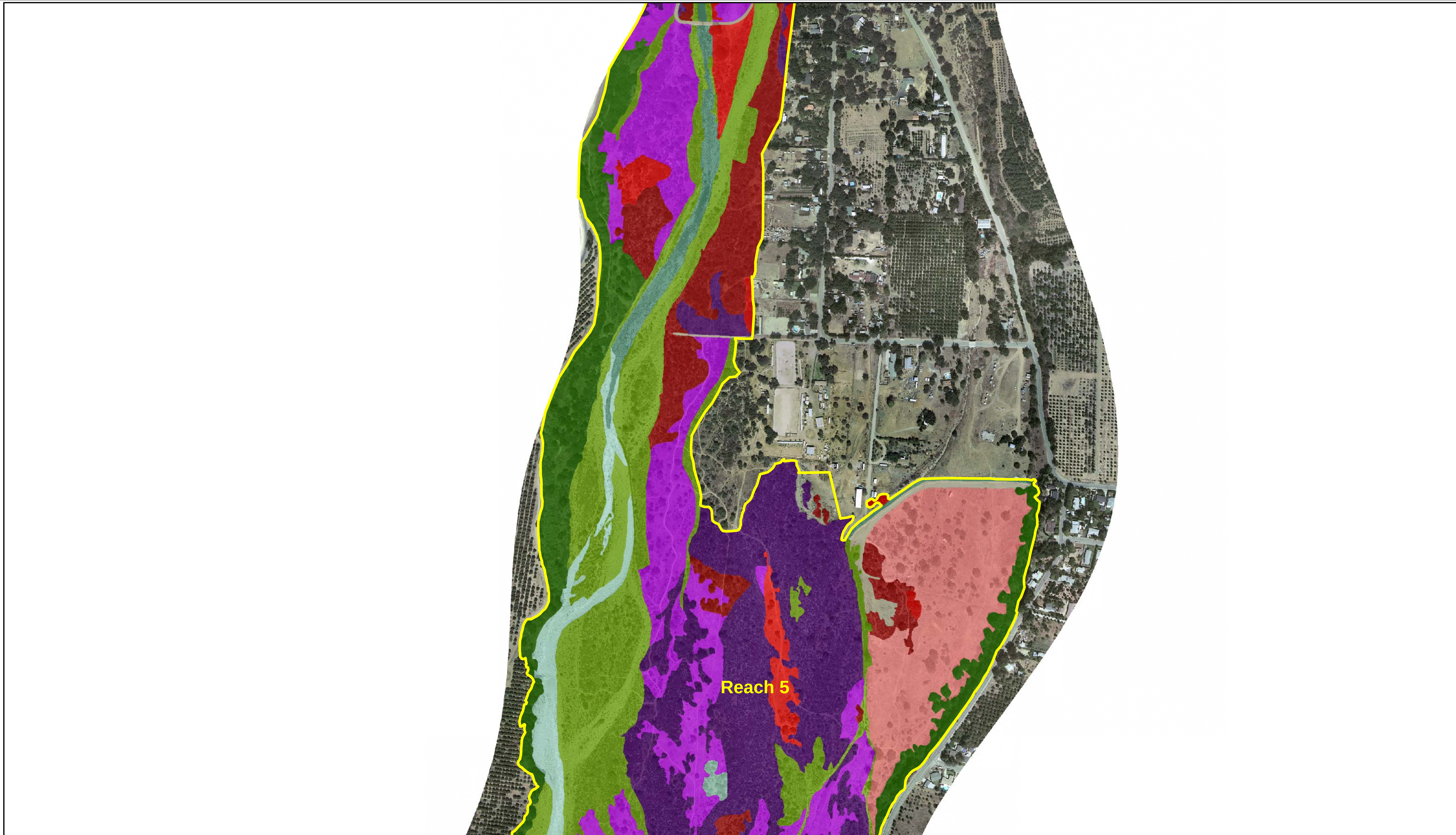
Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map
2

Prime Contractor: Aspen Environmental Group *Subcontractor: David Magney Env. Consulting* *Geo InSight International, Inc.*	N *Scale: 1" = 500'*	**Matilija Dam Ecosystem Restoration Project** **U.S. Army Corps of Engineers, Los Angeles District** **Ventura County Watershed Protection District**	**Natural Vegetation of the Ventura River** **June 2002**	**Map** **3**



Prime Contractor: *Aspen Environmental Group*
Subcontractor: *David Magney Env. Consulting*
Geo InSight International, Inc.

N

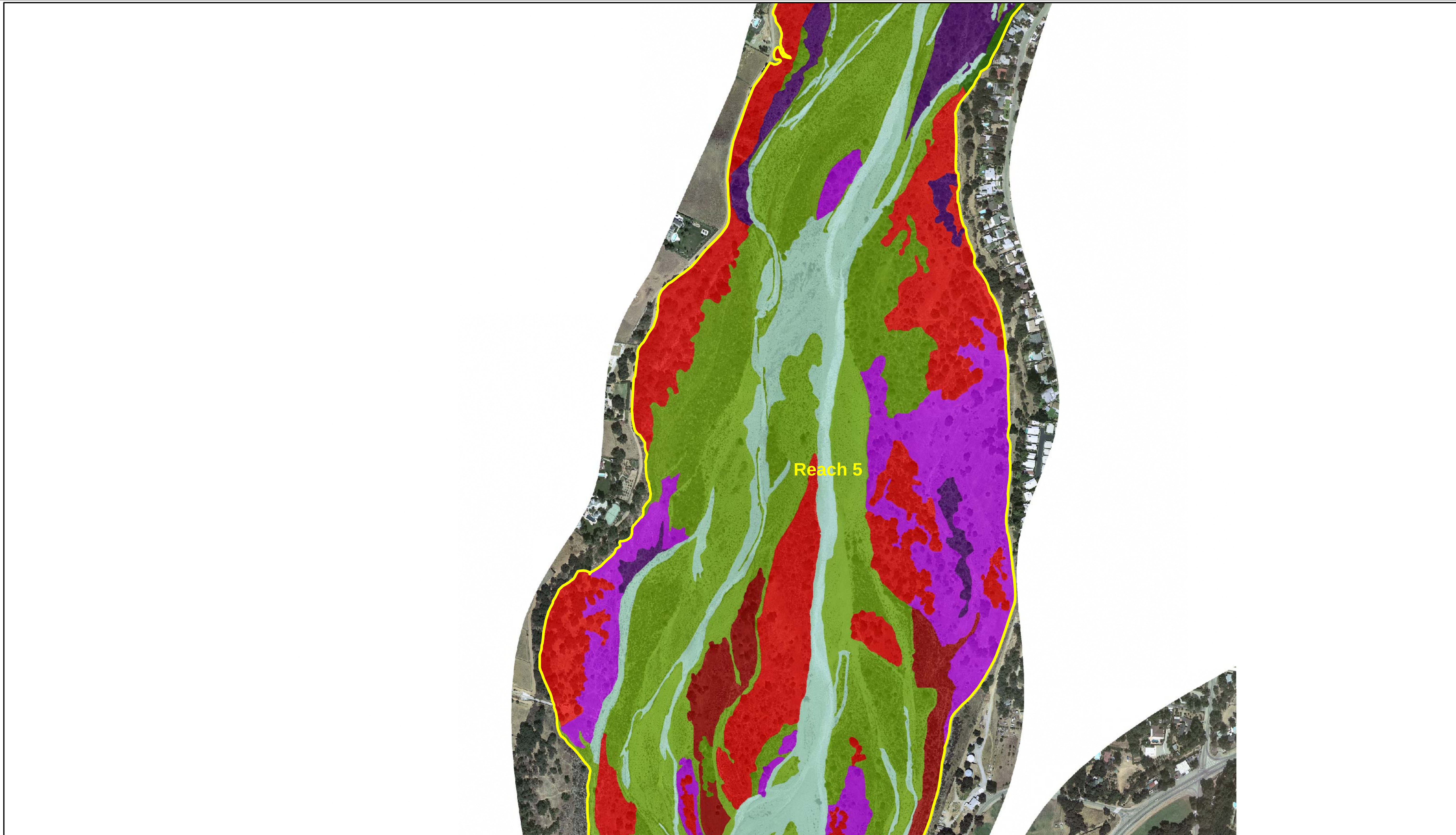
Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 4

Prime Contractor: Aspen Environmental Group Subcontractor: David Magney Env. Consulting Geo InSight International, Inc.	N Scale: 1" = 500'	**Matilija Dam Ecosystem Restoration Project** **U.S. Army Corps of Engineers, Los Angeles District** **Ventura County Watershed Protection District**	**Natural Vegetation of the Ventura River** **June 2002**	**Map** **5**



Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

N
Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 6

Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map
7

Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 8

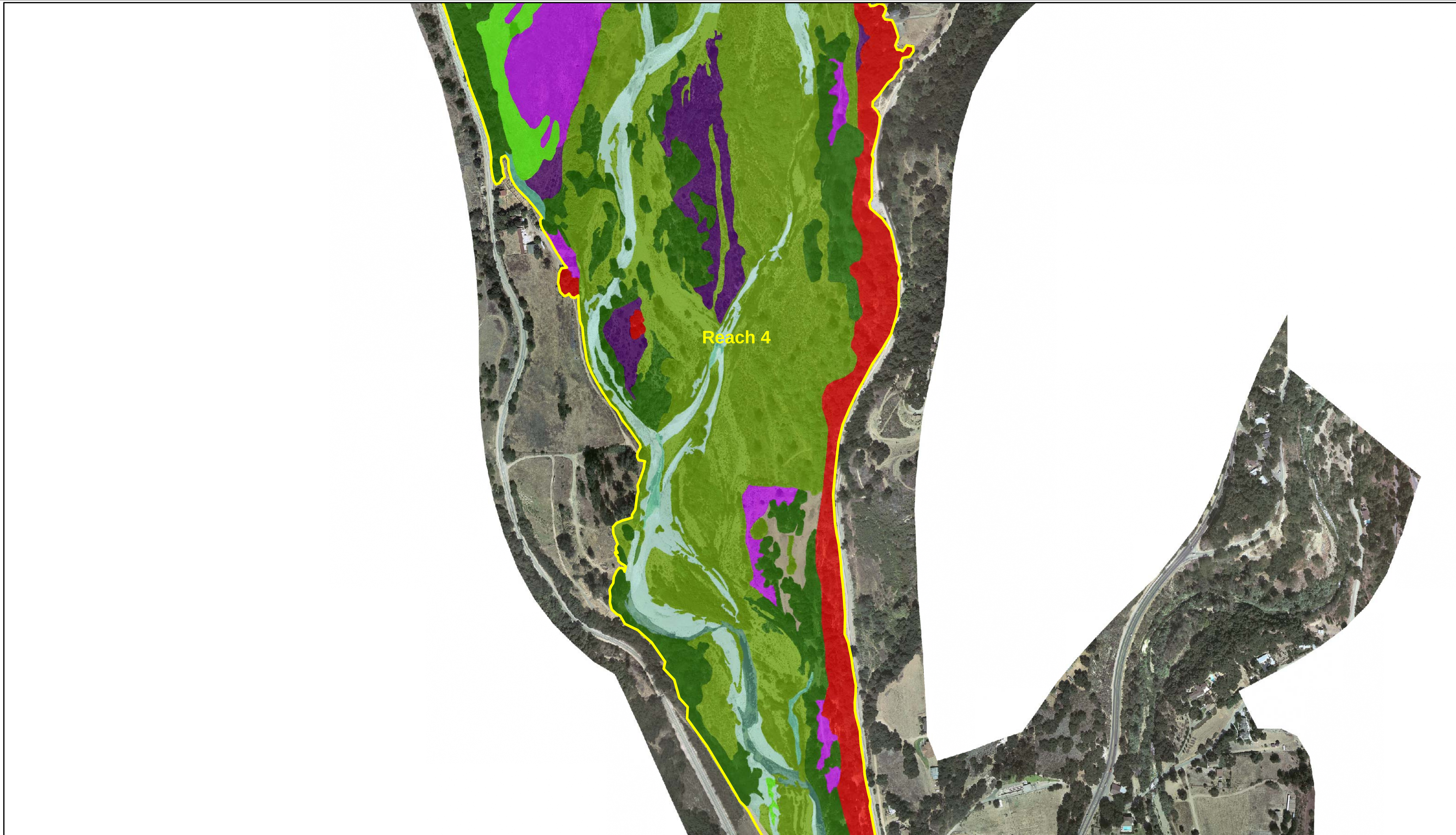
Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

N
Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River June 2002

Map 9



Prime Contractor: *Aspen Environmental Group*
Subcontractor: *David Magney Env. Consulting*
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map
10

Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 11

Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
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Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 12

Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

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Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 13

Prime Contractor: *Aspen Environmental Group*
Subcontractor: *David Magney Env. Consulting*
Geo InSight International, Inc.

N

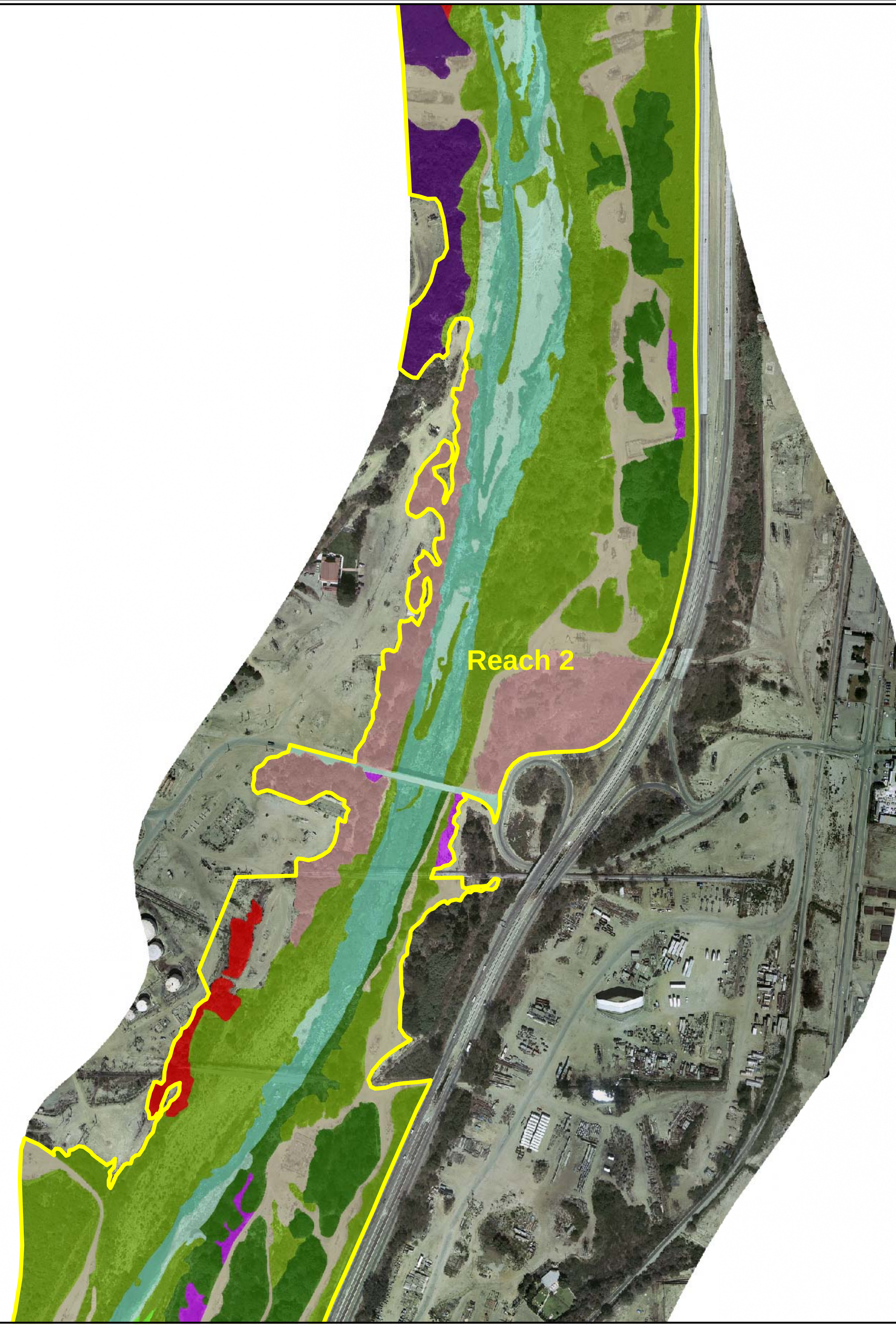
Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 14

Prime Contractor: Aspen Environmental Group *Subcontractor: David Magney Env. Consulting* *Geo InSight International, Inc.*	N *Scale: 1" = 500'*	**Matilija Dam Ecosystem Restoration Project** **U.S. Army Corps of Engineers, Los Angeles District** **Ventura County Watershed Protection District**	**Natural Vegetation of the Ventura River** **June 2002**	**Map** **15**



Prime Contractor: *Aspen Environmental Group*
Subcontractor: *David Magney Env. Consulting*
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 16

Prime Contractor: *Aspen Environmental Group*
Subcontractor: *David Magney Env. Consulting*
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 17

Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 18

Prime Contractor: Aspen Environmental Group
Subcontractor: David Magney Env. Consulting
Geo InSight International, Inc.

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 19

Prime Contractor: *Aspen Environmental Group*
Subcontractor: *David Magney Env. Consulting*
Geo InSight International, Inc.

N

Scale: 1" = 500'

Matilija Dam Ecosystem Restoration Project
U.S. Army Corps of Engineers, Los Angeles District
Ventura County Watershed Protection District

Natural Vegetation of the Ventura River
June 2002

Map 20

APPENDIX F.2

PLANT SPECIES REPORTED AND OBSERVED IN THE VENTURA RIVER

Appendix F-2

Plant Species Reported and Observed in the Ventura River

Botanical Name[1]	Common Name	Habit[2]	Family
Abronia maritima	Red Sand-verbena	PH	Nyctaginaceae
Abronia maritima X *umbellata*	Hybrid Sand-verbena	PH	Nyctaginaceae
Abronia umbellata ssp. *umbellata*	Beach Sand-verbena	PH	Nyctaginaceae
Acer macrophyllum	Bigleaf Maple	T	Aceraceae
Acer negundo var. *californicum*	Box Elder	T	Aceraceae
Achnatherum coronatum	Giant Needlegrass	PG	Poaceae
Adenostoma fasciculatum	Chamise	S	Rosaceae
Agoseris heterophylla var. *cryptopleura*	Mountain Dandelion	AH	Asteraceae
*Agrostis viridis**	Green Bentgrass	PG	Poaceae
*Allium neapolitanum**	Onion	PH	Alliaceae
Alnus rhombifolia	White Alder	T	Betulaceae
*Amaranthus albus**	Tumbleweed	AH	Amaranthaceae
*Amaranthus deflexus**	Low Amaranth	AH	Amaranthaceae
*Amaranthus hybridus**	Hybrid Amaranth	AH	Amaranthaceae
Amaranthus palmeri	Palmer Amaranth	AH	Amaranthaceae
Amblyopappus pusillus	Dwarf Amblyopappus	AH	Asteraceae
Ambrosia acanthicarpa	Burweed	AH	Asteraceae
Ambrosia chamissonis	Beach Bur	PH	Asteraceae
Ambrosia psilostachya var. *californica*	Western Ragweed	BH	Asteraceae
Amsinckia spectabilis var. *spectabilis*	Showy Fiddleneck	AH	Boraginaceae
*Anagallis arvensis**	Scarlet Pimpernel	AH	Primulaceae
Anemopsis californica var. *californica*	Yerba Mansa	PH	Sauraceae
*Anredera cordifolia**	Mignonetta Vine	PV	Basellaceae
*Anthemis cotula**	Mayweed	AH	Asteraceae
Antirrhinum multiflorum	Sticky Snapdragon	S	Scrophulariaceae
Apiastrum angustifolium	Mock Parsley	AH	Apiaceae
*Apium graveolens**	Celery	PH	Apiaceae
Arctostaphylos glauca	Bigberry Manzanita	S	Ericaceae
*Artemisia biennis**	Biennial Wormwood	BH	Asteraceae
Artemisia californica	California Sagebrush	S	Asteraceae
Artemisia douglasiana	Mugwort	PH	Asteraceae
*Arundo donax**	Giant Reed	PG	Poaceae
Aster chilensis	Common California Aster	PH	Asteraceae
Aster subulatus var. *ligulatus*	Annual Saltmarsh Aster	AH	Asteraceae
Astragalus trichopodus var. *phoxus*	Antisell Three-pod Milkvetch	PH	Fabaceae
Astragalus trichopodus var. *trichopodus*	Three-pod Milkvetch	PH	Fabaceae
Athysanus pusillus	Dwarf Athysanus		Brassicaceae
Atriplex californica	California Saltbush		Chenopodiaceae
Atriplex triangularis	Spearscale		Chenopodiaceae
Atriplex lentiformis ssp. *breweri*	Brewer Big Saltbush	S	Chenopodiaceae
Atriplex leucophylla	Whiteleaf		Chenopodiaceae
*Atriplex rosea**	Redscale		Chenopodiaceae
*Atriplex semibaccata**	Australian Saltbush		Chenopodiaceae
Atriplex serenana var. *davidsonii*	Davidson Bractscale		Chenopodiaceae
*Avena barbata**	Slender Wild Oat	AG	Poaceae
*Avena sativa**	Cultivated Oat	AG	Poaceae

[1] Scientific nomenclature generally follows Hickman (1993). An "*" indicates non-native species which have become naturalized or persist without cultivation.

[2] Habit definitions: PG = perennial grass or monocot ally; BH = biennial herb; PF = perennial fern or fern ally; AG = annual grass or monocot ally; PH = perennial herb; AH = annual herb; PV = perennial vine; S = shrub; T = tree; GA = green algae.

Botanical Name[1]	Common Name	Habit[2]	Family
Azolla filiculoides	Mosquito Fern		Azollaceae
Baccharis douglasii	Saltmarsh Baccharis	S	Asteraceae
Baccharis pilularis	Coyote Brush	S	Asteraceae
Baccharis plummerae var. *plummerae*	Plummer Baccharis	S	Asteraceae
Baccharis salicifolia	Mulefat	S	Asteraceae
*Bassia hyssopifolia**	Five-hook		Chenopodiaceae
Berula erecta	Cutleaf Water-parsnip		Apiaceae
Bidens laevis	Bur-marigold		Asteraceae
*Brassica nigra**	Black Mustard	AH	Brassicaceae
*Brassica rapa**	Field Mustard		Brassicaceae
Brickellia californica	California Brickellbush	S	Asteraceae
Brickellia nevinii	Nevin's Brickellbush	S	Asteraceae
Bromus ?	Brome	PG	Poaceae
Bromus carinatus var. *carinatus*	California Brome	PG	Poaceae
*Bromus diandrus**	Ripgut Grass	AG	Poaceae
*Bromus hordeaceus**	Soft Chess	AG	Poaceae
Bromus madritensis ssp. *rubens**	Red Brome	AG	Poaceae
Cakile edentula ssp. *edentula*	American Searocket	AH	Brassicaceae
*Cakile maritima**	European Searocket	AH	Brassicaceae
Calystegia macrostegia ssp. *cyclostegia*	Morning-glory	PV	Convolvulaceae
Calystegia malacophylla spp. *pedicellata*	Sierra Morning-glory	PV	Convolvulaceae
Calystegia purpurata ssp. *purpurata*	Purple Morning-glory	PV	Convolvulaceae
Calystegia soldanella	Beach Morning-glory	PV	Convolvulaceae
Camissonia bistorta	California Sun-cup	AH	Onagraceae
Camissonia boothii ssp. *decorticans*	Booth Shreading Primrose	AH	Onagraceae
Camissonia californica	Mustard Primrose	AH	Onagraceae
Camissonia cheiranthifolia ssp. *suffruticosa*	Beach Primrose	S	Onagraceae
Camissonia micrantha	Tiny Primrose	AH	Onagraceae
Camissonia strigulosa	Strigose Primrose	AH	Onagraceae
*Cardaria draba**	Heart-podded Hoary Cress	PH	Brassicaceae
*Carduus pycnocephalus**	Italian Thistle	AH	Asteraceae
Carex praegracilis	Clustered Field Sedge	PH	Cyperaceae
Carex triquetra	Triangular-fruited Sedge	PH	Cyperaceae
*Carpobrotus chilensis**	Sea Fig	S	Aizoaceae
Carpobrotus edulis	Hottentot Fig	S	Aizoaceae
*Carthamus tincotrius**	Distaff Thistle	BH	Asteraceae
Castilleja exserta ssp. *exserta*	Purple Owl's Clover	AH	Scrophulariaceae
Castilleja foliolosa	Woolly Indian Paintbrush	PH	Scrophulariaceae
Ceanothus crassifolius var. *crassifolius*	Snowball	S	Rhamnaceae
Ceanothus crassifolius var. *planus*	Flatleaf Snowball	S	Rhamnaceae
Ceanothus cuneatus	Wedgeleaf Ceanothus	S	Rhamnaceae
Ceanothus megacarpus var. *megacarpus*	Bigpod Ceanothus	S	Rhamnaceae
Ceanothus oliganthus var. *oliganthus*	Hoary Ceanothus	S	Rhamnaceae
Ceanothus spinosus	Greenbark Ceanothus	S	Rhamnaceae
*Centaurea melitensis**	Tocalote	AH	Asteraceae
*Centaurea solstitialis**	Yellow Star-thistle	AH	Asteraceae
Cercocarpus betuloides betuloides	Birchleaf Mountain Mahogany	S	Rosaceae
*Chamomilla suaveolens**	Pineapple Weed	AH	Asteraceae
Chara	green algae	GA	
Chenopodium ambrosioides var. *ambrosioides**	Mexican Tea	PH	Chenopodiaceae
Chenopodium berlandieri	Pitseed Goosefoot	PH	Chenopodiaceae
Chenopodium californicum	California Goosefoot	PH	Chenopodiaceae
Chenopodium macrospermum var. *halophilum**	Coast Goosefoot	AH	Chenopodiaceae
*Chenopodium murale**	Nettle-leaved Goosefoot	AH	Chenopodiaceae
Chorizanthe staticoides	Turkish Rugging	AH	Polygonaceae

Botanical Name[1]	Common Name	Habit[2]	Family
*Chrysanthemum parthenium**	Chrysanthemum	PH	Asteraceae
*Cichorium intybus**	Chicory	PH	Asteraceae
Clarkia sp.	Clarkia	AH	Onagraceae
Clarkia purpurea ssp. *quadrivulnera*	Four-spotted Purple Clarkia	AH	Onagraceae
Clarkia unguiculata	Elegant Farewell-to-Spring	AH	Onagraceae
Clematis ligusticifolia	Virgin's Bower	PV	Ranunculaceae
Clematis lasiantha	Pipestem Clematis	PV	Ranunculaceae
*Cnicus benedictus**	Blessed Thistle	PH	Asteraceae
*Conium maculatum**	Poison Hemlock	PH	Apiaceae
*Conyza bonariensis**	Flax-leaved Fleabane	AH	Asteraceae
Conyza canadensis	Common Horseweed	AH	Asteraceae
Conyza coulteri	Coulter Horseweed	AH	Asteraceae
*Coronopus didymus**	Wart Cress	PH	Brassicaceae
*Cortaderia jubata**	Andean Pampas Grass	PG	Poaceae
*Cotula coronopifolia**	African Brass-buttons	PH	Asteraceae
Crepis occidentalis ssp. *pumila*	Western Hawksbeard	AH	Asteraceae
*Crypsis vaginiflora**	Prickle Grass	PG	Poaceae
Cryptantha corollata	Crowned Forget-Me-Not	AH	Boraginaceae
Cryptantha muricata	Jones Prickly Forget-Me-Not	AH	Boraginaceae
Cucurbita foetidissima	Coyote Melon	PV	Cucurbitacaeae
Cupressus macrocarpa	Monterey Cypress	T	Cupressaceae
Cuscuta subinclusa	Canyon Dodder	AV	Cuscutaceae
*Cynodon dactylon**	Bermuda Grass	PG	Poaceae
Cyperus eragrostis	Umbrella-sedge	PH	Cyperaceae
Cyperus esculentus	Yellow Nutgrass	PH	Cyperaceae
*Cytisus scoparius**	Scotch Broom	S	Fabaceae
Datisca glomerata	Dragon Root	PH	Datiscaceae
Datura wrightii	Jimson Weed	AH	Solanaceae
Dendromecon rigida var. *rigida*	Bush Poppy	S	Papaveraceae
Descurainia pinnata spp. *menziesii*	Menzies Tansy Mustard	AH	Brassicaceae
Distichlis spicata	Saltgrass	PG	Poaceae
Dudleya lanceolata	Lanceleaf Live-Forever	PH	Crassulaceae
Dudleya pulverulenta var. *pulverulenta*	Chalk Live-Forever	PH	Crassulaceae
Elymus glaucus ssp. *glaucus*	Blue Wildrye	PG	Poaceae
Emmenanthe penduliflora var. *penduliflora*	Whispering Bells	AH	Hydrophyllaceae
Encelia californica	California Bush Sunflower	S	Asteraceae
Epilobium brachycarpum	Panicled Willow-herb	AH	Onagraceae
Epilobium canum ssp. *canum*	California Fuchsia	S	Onagraceae
Epilobium ciliatum ssp. *ciliatum*	Northern Willow-herb	AH	Onagraceae
Equisetum laevigatum	Smooth Scouring-Rush	PF	Equisetaceae
Equisetum telmateia ssp. *braunii*	Giant Horsetail	PF	Equisetaceae
Eremocarpus setigerus	Dove Weed	AH	Euphorbiaceae
Eriastrum saphirinum	Few-flowered Woolly Star	AH	Polemoniaceae
Erigeron foliosus var. *foliosus*	Slender Fleabane	PH	Asteraceae
Eriodictyon crassifolium var. *crassifolium*	Yerba Santa	S	Hydrophyllaceae
Eriodictyon crassifolium var. *nigrescens*	Yerba Santa	S	Hydrophyllaceae
Eriogonum elongatum var. *elongatum*	Slender Buckwheat	PH	Polygonaceae
Eriogonum fasciculatum var. *fasciculatum*	California Buckwheat	S	Polygonaceae
Eriogonum fasciculatum var. *foliolosum*	Leafy California Buckwheat	S	Polygonaceae
Eriogonum fasciculatum var. *polifolium*	Hairy California Buckwheat	S	Polygonaceae
Eriogonum gracile var. *gracile*	Slender Woolly Buckwheat	AH	Polygonaceae
Eriogonum parvifolium var. *parvifolium*	Dune Buckwheat	S	Polygonaceae
Eriophyllum confertiflorum var. *confertiflorum*	Golden Yarrow	PH	Asteraceae
*Erodium cicutarium**	Redstem Filaree	AH	Geraniaceae
Eryngium vaseyi	Coyote Thistle	PH	Apiaceae

Botanical Name[1]	Common Name	Habit[2]	Family
*Eucalyptus camaldulensis**	River Red Gum	T	Myrtaceae
*Euphorbia lathyris**	Gopher Spurge	PH	Euphorbiaceae
*Euphorbia peplus**	Petty Spurge	AH	Euphorbiaceae
Euthamia occidentalis	Western Goldenrod	PH	Asteraceae
*Festuca arundinacea**	Tall Fescue	PG	Poaceae
Filago californica	California Filago	AH	Asteraceae
*Foeniculum vulgare**	Sweet Fennel	PH	Apiaceae
Frankenia salina	Alkali Heath	S	Frankeniaceae
Fraxinus dipetala	California Flowering Ash	T	Oleaceae
Galium angustifolium ssp. *angustifolium*	Chaparral Bedstraw	S	Rubiaceae
Garrya veatchii	Silk-tassel Bush	S	Garryaceae
Gnaphalium bicolor	Bicolored Everlasting	BH	Asteraceae
Gnaphalium californicum	Green Everlasting	AH	Asteraceae
Gnaphalium canescens ssp. *beneolens*	Coastal Everlasting	PH	Asteraceae
Gnaphalium canescens ssp. *microcephalum*	White Everlasting	PH	Asteraceae
Gnaphalium leucocephalum	Woolly Everlasting	BH	Asteraceae
*Gnaphalium luteo-album**	Lowland Cudweed-Everlasting	AH	Asteraceae
Grindelia camporum var. *camporum*	Great Valley Gumplant	AH	Asteraceae
Guillenia lemmonii	Lemmon Mustard	AH	Brassicaceae
Hazardia squarrosa var. *grindellioides*	Sawtooth Goldenbush	S	Asteraceae
Hazardia squarrosa var. *squarrosa*	Sawtooth Goldenbush	S	Asteraceae
Helenium puberulum	Rosilla	PH	Asteraceae
Heliotropium curassavicum	Alkali Heliotrope	PH	Hydrophyllaceae
Heteromeles arbutifolia	Toyon	S	Rosaceae
Heterotheca grandiflora	Telegraph Weed	AH	Asteraceae
Heterotheca sessiliflora var. *camphorata*	Camphor Golden-aster	PH	Asteraceae
Heterothca sessiliflora var. *echioides*	Hairy Golden-aster	PH	Asteraceae
Heterotheca sessiliflora var. *fastigiata*	Hairy Golden-aster	PH	Asteraceae
*Hirschfeldia incana**	Summer Mustard	BH	Brassicaceae
Hoita macrostachya	Leather Root	S	Fabaceae
*Hypochaeris glabra**	Smooth Cat's-ear	AH	Asteraceae
Isocoma menziesii var. *vernonioides*	Coastal Goldenbush	S	Asteraceae
Jaumea carnosa	Fleshy Jaumea	PH	Asteraceae
Juglans californica var. *californica*	Southern Calif. Black Walnut	T	Juglandaceae
Juglans californica var. *hindsii*	Hinds Black Walnut	T	Juglandaceae
Juncus acutus ssp. *leopoldii*	Spiny Rush	PH	Juncaceae
Juncus bufonius var. *bufonius*	Toad Rush	PH	Juncaceae
Juncus macrophyllus	Largeleaf Rush	PH	Juncaceae
Juncus patens	Spreading Rush	PH	Juncaceae
Juncus phaeocephalus var. *paniculatus*	Brown-fruited Rush	PH	Juncaceae
Juncus textilis	Basket Rush	PH	Juncaceae
Juncus xiphioides	Iris-leaved Rush	PH	Juncaceae
Keckiella cordifolia	Heart-leaved Penstemon	S	Scrophulariaceae
*Kickxia elatine**	Arrowleaf Fluellin	AH	Scrophulariaceae
*Lactuca serriola**	Prickly Wild Lettuce	AH	Asteraceae
*Lamarckia aurea**	Goldentop	AG	Poaceae
*Lamium amplexicaule**	Henbit	AH	Lamiaceae
Lemna gibba	Gibbose Duckweed	AH	Lemnaceae
Lemna minor	Duckweed	AH	Lemnaceae
Lemna minuscula	Tiny Duckweed	AH	Lemnaceae
Lemna turionifera	Duckweed	AH	Lemnaceae
Lemna valdiviana	Duckweed	AH	Lemnaceae
Lepidospartum squamatum	Scalebroom	S	Asteraceae
Lessingia filaginifolia var. *filaginifolia*	California Cudweed-Aster	PH	Asteraceae
Leymus condensatus	Giant Wildrye	PG	Poaceae

Botanical Name[1]	Common Name	Habit[2]	Family
Leymus triticoides	Creeping Wildrye	PG	Poaceae
*Lobularia maritima**	Sweet Alyssum	AH	Brassicaceae
*Lolium multiflorum**	Italian Ryegrass	AG	Poaceae
Lonicera subspicata var. *denudata*	Southern Honeysuckle	S	Caprifoliaceae
*Lotus corniculatus**	Birdsfoot Treefoil	PH	Fabaceae
Lotus purshianus var. *parishianus*	Pursh Lotus	AH	Fabaceae
Lotus salsuginosus var. *salsuginosus*	Coastal Lotus	AH	Fabaceae
Lotus scoparius var. *scoparius*	Deerweed	S/PH	Fabaceae
Lotus strigosus var. *strigosus*	Strigose Lotus	AH	Fabaceae
Lotus wrangelianus	Chile Lotus	AH	Fabaceae
Ludwigia peploides ssp. *peploides*	Floating Seedbox	PH	Onagraceae
Lupinus longifolius	Long-leaved Bush Lupine	S	Fabaceae
Lupinus succulentus	Fleshy Lupine	AH	Fabaceae
Lupinus truncatus	Truncate-leaved Lupine	AH	Fabaceae
Lythrum californicum	California Loosestrife	AH	Lythraceae
Madia?	Madia	AH	Asteraceae
Malacothamnus fasciculatus var. *fasciculatus*	Fascicled Bushmallow	S	Malvaceae
Malacothamnus nuttallii	Nuttall Bushmallow	S	Malvaceae
Malacothrix saxatilis var. *saxatilis*	Cliff-aster	PH	Asteraceae
Malacothrix saxatilis var. *tenuifolia*	Tenuate Cliff-Aster	PH	Asteraceae
Malosma laurina	Laurelleaf Sumac	S	Anacardiaceae
*Malva nicaensis**	Bull Mallow	AH	Malvaceae
Marah fabaceus var. *agrestis*	California Man-root	PV	Cucurbitacaeae
*Marrubium vulgare**	White Horehound	S	Lamiaceae
*Medicago polymorpha**	Bur-clover	AH	Fabaceae
*Medicago sativa**	Alfalfa	AH	Fabaceae
Melica imperfecta	Coast Melic Grass	PG	Poaceae
*Melilotus alba**	White Sweetclover	AH	Fabaceae
*Melilotus indica**	Yellow Sweetclover	AH	Fabaceae
*Mentha arvensis**	Field Mint	PH	Lamiaceae
Mentha spicata var. *spicata*	Spearmint	PH	Lamiaceae
Mentzelia laevicaulis	Blazing Star	AH	Loasaceae
Mentzelia micrantha	Tiny-flowered Stickleaf	AH	Loasaceae
*Mesembryanthemum crystallinum**	Crystalline Iceplant	AH	Aizoaceae
Mimulus aurantiacus var. *pubescens*	Fuzzy Bush Monkeyflower	S	Scrophulariaceae
Mimulus cardinalis	Scarlet Monkeyflower	BH	Scrophulariaceae
Mimulus guttatus	Streamside Monkeyflower	PH	Scrophulariaceae
Mimulus longiflorus ssp. *longiflorus*	Sticky Bush Monkeyflower	S	Scrophulariaceae
*Mirabilis jalapa**	Four O'Clock	S	Nyctaginaceae
Monanthochloa littoralis	Shoregrass	PG	Poaceae
*Morus alba**	White Mulberry	T	Moraceae
*Myoporum laetum**	Myoporum	S	Myoporaceae
*Nerium oleander**	Oleander	S	Apocynaceae
*Nicotiana glauca**	Tree Tobacco	S	Solanaceae
Olea europea	Olive	T	Oleaceae
Opuntia littoralis	Coastal Prickly Pear	S	Cactaceae
*Osteospermum ecklonis**	African Daisy	PH	Asteraceae
*Oxalis pes-caprae**	Bermuda Buttercup	PH	Oxalidaceae
Parkinsonia aculeata	Palo Verde	T	Fabaceae
Parthenocissus vitacea	Woodbine	PV	Vitaceae
*Paspalum dilatatum**	Dallis Grass	PG	Poaceae
Pellaea andromedifolia var. *andromedifolia*	Coffee Fern	PF	Pteridiaceae
*Pennisetum clandestinum**	Kikuyu Grass	PG	Poaceae
*Pennisetum setaceum**	African Fountain Grass	PG	Poaceae
*Pennisetum villosum**	Fountain Grass	PG	Poaceae

Botanical Name[1]	Common Name	Habit[2]	Family
Penstemon centranthifolius	Scarlet Buglar	PG	Scrophulariaceae
Phacelia cicutaria var. *hispida*	Hispid Caterpillar Phacelia	AH	Hydrophyllaceae
Phacelia cicutaria var. *hubbyi*	Hubby Caterpillar Phacelia	AH	Hydrophyllaceae
Phacelia ramosissima var. *austrolitoralis*	South Coast Branching Phacelia	AH	Hydrophyllaceae
Phacelia viscida var. *viscida*	Sticky Phacelia	AH	Hydrophyllaceae
Phoradendron sp.	Mistletoe	S	Viscaceae
Phyllospadix torreyi	Torrey Surf-grass	PG	Zosteraceae
*Picris echioides**	Bristly Ox-tongue	AH	Asteraceae
Pinus halepensis	Allepo Pine	T	Pinaceae
*Piptatherum miliaceum**	Smilo Grass	PG	Poaceae
Plantago erecta	California Plantain	PG	Plantaginaceae
*Plantago lanceolata**	Narrowleaf Plantain	PG	Plantaginaceae
*Plantago major**	Broadleaf Plantain	PG	Plantaginaceae
Platanus racemosa var. *racemosa*	California Sycamore	T	Platanaceae
Polygala cornuta var. *fishiae*	Fish's Milkwort	S	Polygalaceae
Polygonum amphibium var. *emersum*	Swamp Knotweed	PH	Polygonaceae
*Polygonum arenastrum**	Common Knotweed	PH	Polygonaceae
*Polygonum capitatum**	Capitate Knotweed	PH	Polygonaceae
Polygonum lapathifolium	Willow Weed	PH	Polygonaceae
Polygonum punctatum	Dotten Smartweed	PH	Polygonaceae
Polypodium californicum	California Polypody Fern	PF	Polypodiaceae
*Polypogon monspeliensis**	Rabbitsfoot Beardgrass	AG	Poaceae
*Populus alba**	White Poplar	T	Salicaceae
Populus balsamifera ssp. *trichocarpa*	Black Cottonwood	T	Salicaceae
Populus fremontii ssp. *fremontii*	Fremont Cottonwood	T	Salicaceae
Populus fremontii X trichocarpa	Hybrid Fremont Cottonwood	T	Salicaceae
Portulaca oleracea	Common Purslane	AH	Portulacaceae
Potamogeton foliosus var. *foliosus*	Leafy Pondweed	PG	Potamogetonaceae
Potamogeton pectinatus	Fennelleaf Pondweed	PG	Potamogetonaceae
Potentilla anserina ssp. *pacifica*	Pacific Coast Silverweed	PH	Rosaceae
Prunus ilicifolia	Hollyleaf Cherry	S	Rosaceae
Quercus agrifolia var. *agrifolia*	Coast Live Oak	T	Fagaceae
*Raphanus raphanistrum**	Wild Radish	AH	Brassicaceae
*Raphanus sativus**	Wild Radish	AH	Brassicaceae
Rhamnus californica ssp. *californica*	California Coffeeberry	S	Rhamnaceae
Rhamnus ilicifolia	Hollyleaf Redberry	S	Rhamnaceae
Rhus integrifolia	Lemonade Berry	S	Anacardiaceae
Rhus ovata	Sugar Bush	S	Anacardiaceae
Rhus trilobata var. *malacophylla*	Skunkbrush	S	Anacardiaceae
Rhus trilobata var. *quinata*	Skunkbrush	S	Anacardiaceae
Ribes malvaceum var. *malvaceum*	Chaparral Currant	S	Grossulariaceae
Ribes malvaceum var. *viridifolium*	Sticky Chaparral Currant	S	Grossulariaceae
*Ricinus communis**	Castor Bean	S	Euphorbiaceae
*Robinia pseudoacacia**	Black Locust	T	Fagaceae
Romneya coulteri	Coulter Matilija Poppy	PH	Papaveraceae
Romneya trichocalyx	Matilija Poppy	PH	Papaveraceae
Rorippa nasturtium-aquaticum	Water Cress	PH	Brassicaceae
Rosa californica	California Wild Rose	S	Rosaceae
Rubus ursinus	California Blackberry	PV	Rosaceae
*Rumex conglomeratus**	Green Dock	PH	Polygonaceae
*Rumex crispus**	Curly Dock	PH	Polygonaceae
Rumex salicifolius var. *crassus*	Willow Dock	PH	Polygonaceae
Rumex salicifolius var. *salicifolius*	Willow Dock	PH	Polygonaceae
Ruppia cirrhosa	Spiral Wigeon-grass	AG	Potamogetonaceae
Salicornia virginica	Virginia Pickleweed	PH	Chenopodiaceae

Botanical Name[1]	Common Name	Habit[2]	Family
Salix exigua	Narrow-leaved Willow	S	Salicaceae
Salix laevigata	Red Willow	S/T	Salicaceae
Salix lasiolepis var. *lasiolepis*	Arroyo Willow	S/T	Salicaceae
Salix lucida ssp. *lasiandra*	Shining Willow	S/T	Salicaceae
Salix macrostachya var. *leucodendroides*	Sandbar Willow	S	Salicaceae
*Salsola tragus**	Russian Thistle	AH	Chenopodiaceae
Salvia apiana	White Sage	S	Lamiaceae
Salvia columbariae	Chia	AH	Lamiaceae
Salvia leucophylla	Purple Sage	S	Lamiaceae
Salvia mellifera	Black Sage	S	Lamiaceae
Sambucus mexicana	Blue Elderberry	S/T	Caprifoliaceae
Schinus molle	Peruvian Pepper Tree	T	Anacardiaceae
*Schismus barbatus**	Mediterranean Grass	AG	Poaceae
Scirpus americanus	American Bulrush	PH	Cyperaceae
Scirpus californicus	California Bulrush	PH	Cyperaceae
Scirpus maritimus	Saltmarsh Bulrush	PH	Cyperaceae
Scirpus pungens	Common Threesquare	PH	Cyperaceae
Scrophularia californica ssp. *californica*	California Figwort	PH	Scrophulariaceae
Senecio flaccidus var. *douglasii*	Douglas Butterweed	S	Asteraceae
*Senecio mikanioides**	Cape Ivy	PV	Asteraceae
*Silene gallica**	Windmill Pink	AH	Caryophyllaceae
*Silybum marinanum**	Milk Thistle	AH	Asteraceae
*Sisymbrium irio**	London Rocket	AH	Brassicaceae
*Solanum americanum**	White Nightshade	S	Solanaceae
Solanum douglasii	Douglas Nightshade	S	Solanaceae
*Solanum rostratum**	Buffalo-bur	PH	Solanaceae
Solanum xantii var. *xantii*	Chaparral Nightshade	S	Solanaceae
Solidago confinis	Southern Goldenrod	PH	Asteraceae
Sonchus asper ssp. *asper**	Prickly Sow-thistle	AH	Asteraceae
*Sonchus oleraceus**	Common Sow-thistle	AH	Asteraceae
*Spartium junceum**	Spanish Broom	S	Fabaceae
Spergula arvensis ssp. *arvensis*	Stickwort	AH	Caryophyllaceae
Spergularia macrotheca var. *macrotheca*	Large Sandspurrey	AH	Caryophyllaceae
Spergularia marina	Saltmarsh Sandspurry	AH	Caryophyllaceae
Stachys albens	Woolly Hedge-nettle	PH	Lamiaceae
Stachys bullata	Pink Hedge Nettle	PH	Lamiaceae
*Stellaria media**	Common Chickweed	AH	Caryophyllaceae
Stephanomeria cichoriacea	Fort Tejon Milk-aster	PH	Asteraceae
Suaeda taxifolia	Woolly Seablite	S	Chenopodiaceae
Symphoricarpos mollis	Common Snowberry	S	Caprifoliaceae
*Tamarix ramosissima**	Saltcedar	T	Tamaricaceae
*Tetragonia tetragonioides**	New Zealand Spinach	PH	Aizoaceae
Toxicodendron diversilobum	Poison Oak	S/PV	Anacardiaceae
Trifolium fucatum var. *gambellii*	Gambel Bull Clover	AH	Fabaceae
*Tropaeolum majus**	Garden Nasturium	PH	Tropaeolaceae
Typha domingensis	Southern Cattail	PH	Typhaceae
Typha latifolia	Broad-leaved Cattail	PH	Typhaceae
Typha X *domingensis*	Southern Cattail Hybrid	PH	Typhaceae
Umbellularia californica	California Bay	T	Lauraceae
*Urtica dioica holosericea**	Giant Stinging Nettle	PH	Urticaceae
Urtica urens	Dwarf Nettle	AH	Urticaceae
Venegasia carpesioides	Canyon Sunflower	S	Asteraceae
Verbena lasiostachys var. *lasiostachys*	Western Verbena	AH	Verbenaceae
*Veronica anagallis-aquatica**	Water Speedwell	PH	Scrophulariaceae
Vicia ludoviciana var. *ludoviciana*	Slender Vetch	AH	Fabaceae

Botanical Name[1]	Common Name	Habit[2]	Family
*Vinca major**	Greater Periwinkle	PV	Apocynaceae
Vitis californica	California Wild Grape	PV	Vitaceae
Vulpia myuros var. *hirsuta**	Foxtail Fescue	AG	Poaceae
Vulpia myuros var. *myuros*	Rattail Fescue	AG	Poaceae
*Washingtonia robusta**	Mexican Fan Palm	AS/T	Arecaceae
Xanthium spinosum	Spiny Clotbur	S	Asteraceae
Xanthium strumarium	Cocklebur	AH	Asteraceae
Yucca whipplei ssp. *whipplei*	Our Lord's Candle	S	Liliaceae
Zannichellia palustris	Horned-Pondweed	PG	Zannichelliaceae
*Zantedeschia aethiopica**	Calla Lily	PG	Aracaceae

APPENDIX F.3

WILDLIFE SPECIES OBSERVED DURING FIELD SURVEYS OF THE VENTURA RIVER

Appendix F-3
Wildlife Species Observed During Field Surveys of the Ventura River

This Table was developed from recent field surveys and existing literature (USFWS, April and October 2000, Austin 2000, Aspen 2002, and Entrix, 2002).
Abbreviations: * = special status species

Common Name	Scientific Name
Fishes:	
Partly armored three-spined stickleback	*Gasterosteus aculeatus microcephalus*
Rainbow trout	*Oncorhynchus mykiss*
Largemouth bass	*Micropterus salmoides*
Redear sunfish	*Lepomis microlophus*
Bluegill	*Lepomis macrochirus*
Green sunfish	*Lepomis cyanellus*
Carp	*Cyprinus carpio*
Mosquito fish	*Gambusia affinis*
Amphibians:	
California treefrog	*Hyla cadaverina*
Pacific treefrog	*Hyla regilla*
Bullfrog*	*Rana catesbeiana*
California red-legged frog*	*Rana aurora draytonii*
California toad	*Bufo boreas halphilus*
Reptiles:	
Southern alligator lizard	*Elgaria multicarinata*
Coastal whiptail*	*Cnemidophorus tigris multiscutatus*
Western fence lizard	*Sceloporus occidentialis*
Side-blotched lizard	*Uta stansburiana*
Southwestern pond turtle*	*Clemmys marmorata pallida*
Two-striped garter snake*	*Thamnophis hammondii*
Gopher snake	*Pituophis melanoleucus*
Southwestern pond turtle*	*Clemmy's marmota pallida*
Birds:	
Pied-billed grebe	*Podilymbus podiceps*
Eared grebe	*Podiceps nigricollis*
Western grebe	*Aechmophorus occidentalis*
Double-crested cormorant*	*Phalacrocorax auritus*
California brown pelican*	*Pelecanus occidentalis*
Great egret*	*Adrea alba*
Great blue heron*	*Adrea herodias*
Snowy egret	*Egretta thula*
Black-crowned night-heron	*Nycticorax nycticorax*
Green heron	*Butorides virescens*
California condor*	*Gymnogyps californianus*
Turkey vulture	*Cathartes aura*
Hooded merganser	*Lophodytes cucullatus*
Common merganser	*Mergus merganser*
Ring-necked duck	*Aythya collaris*
American wigeon	*Anas americana*
Greater scaup	*Aythya marila*
Canvasback	*Aythya valisineria*
Gadwall	*Anas strepera*
Bufflehead	*Bucephala albeola*
Mallard	*Anas platyrhyncos*

Common Name	Scientific Name
Green-winged teal	*Anas crecca*
Ruddy duck	*Oxyura jamaicensis*
White-tailed kite*	*Elanus caerulus*
Cooper's hawk*	*Accipiter cooperii*
Red-tailed hawk	*Buteo jamaicensis*
Red-shouldered hawk	*Buteo lineatus*
American kestrel	*Falco sparverius*
Peregrine falcon*	*Falco peregrinus*
California quail	*Callipepia californica*
Mountain quail	*Oreortyx pictus*
Virginia rail	*Rallus limicola*
American coot	*Fulica Americana*
Sora	*Porzana Carolina*
Killdeer	*Charadrius vociferous*
Spotted sandpiper	*Actitus macurlaria*
Western snowy plover*	*Charadrius alexandrinus nivosus*
Sanderling	*Calidris alba*
Common snipe	*Gallinago gallinago*
Herring gull	*Larus argentatus*
Western gull	*Larus occidentalis*
Glaucous-winged gull	*Larus glaucescens*
California least tern*	*Sterna antilarum browni*
Caspian tern	*Sterna caspia*
Band-tailed pigeon	*Columba fasciata*
Mourning dove	*Zenaida macoura*
Rock dove*	*Columba livia*
Greater roadrunner	*Geococcyx californianus*
Great horned owl	*Bubo virginianus*
Vaux's Swift*	*Chaetura*
White-throated swift	*Areonautes saxatalis*
Black-chinned hummingbird	*Archilochus alexandri*
Anna's hummingbird	*Calypte anna*
Costa's hummingbird	*Calypte costae*
Belted kingfisher	*Ceryle alcyon*
Acorn woodpecker	*Melanerpes formicivorus*
Northern flicker	*Colaptes auratus*
Nuttall's woodpecker	*Picoides nuttallii*
Downy woodpecker	*Picoides pubescens*
Hairy woodpecker	*Picoides villosus*
Ash-throated flycatcher	*Myiarchus cineraascens*
Black phoebe	*Sayornis nigricans*
Southwestern willow flycatcher*	*Empidonax trallii extimus*
Pacific-slope flycatcher	*Empidonax difficilis*
Western wood-peewee	*Contopus sordidulus*
Olive-sided flycatcher*	*Contopus borealis*
Say's phoebe	*Sayornis saya*
Least Bell's vireo*	*Vireo bellii pusillus*
Hutton's vireo	*Vireo huttoni*
Warbling vireo	*Vireo gilvus*
American crow	*Corvus brachyrhynchos*
Common raven	*Corvus corax*
Steller's jay	*Cyanocitta stelleri*
Western scrub jay	*Aphelocoma californica*

Common Name	Scientific Name
Cliff swallow	*Petrochelidon pyrrhonota*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Violet-green swallow	*Tachycineta thalassina*
Oak titmouse	*Baeolophus inornatus*
Bushtit	*Psaltriparus minimus*
Bewick's wern	*Thryomanes bewickii*
Canyon wren	*Catherpes mexicanus*
Marsh wren	*Cistothorus palustris*
House wren	*Troglodytes aedon*
Blue-grey gnatcatcher	*Polioptila caerulea*
Ruby-crowned kinglet	*Regulus calendula*
Hermit thrush	*Catharus guttatus*
American robin	*Turdus migratorius*
Wrentit	*Chamaea fasciata*
California thrasher	*Toxostoma redivivum*
Northern mockingbird	*Mimus polyglottis*
Western bluebird	*Sialia mexicana*
Cedar waxwing	*Bombycilla cedrorum*
European starling	*Sturnus vulgaris*
Phainopepla	*Phainopepla nitens*
Common yellowthroat	*Geothlypis trichas*
Yellow-breasted chat*	*Geothlypis trichas*
Yellow warbler*	*Dendrocia petechia*
Yellow-rumped warbler	*Dendrocia coronata*
Western tanager	*Piranga iudoviciana*
California towhee	*Piplio crissalis*
Spotted towhee	*Piplio maculates*
Song sparrow	*Melospiza melodia*
Belding savannah sparrow*	*Passerculus sandwichensis beldingi*
Golden-crowned sparrow	*Zonotrichia atricapilla*
Southern California rufous-crowned sparrow*	*Aimophila ruficeps canescens*
White-crowned sparrow	*Zonotrichia leucophrys*
Dark-eyed junco	*Junco hyemalis*
House sparrow	*Passer domesticus*
Black-headed grosbeak	*Pheucticus melanocephalus*
Blue grosbeak	*Guiraca caerulea*
Lazuli bunting	*Passerine amoena*
Brown-headed cowbird	*Molothrus ater*
Bullock's oriole	*Icterus bullockii*
Great-tailed grackle	*Quiscalus mexicanus*
Hooded oriole	*Icterus cucullatus*
Western meadowlark	*Sturnella neglecta*
Tricolored blackbird*	*Agelaius tricolor*
Brewer's blackbird	*Euphagus cyanocephalus*
Red-winged blackbird	*Agelaius phoeniceus*
House finch	*Carpodacus mexicanus*
Lesser goldfinch	*Carduelis psaltria*
Lawrence's goldfinch*	*Carduelis lawrencei*
Purple finch	*Carpodacus purpureus*
American goldfinch	*Carduelis tristis*
Mammals:	
Pallid bat	*Antrozous pallidus*
Unidentified bat	
Black bear	*Ursus americanus*
Ringtail	*Bassariscus astutus*

Common Name	Scientific Name
Raccoon	*Procyon lotor*
Coyote	*Canis latrans*
Gray fox	*Urocyon cinereoargenteus*
Bobcat	*Lynx rufus*
Mountain lion	*Felis concolor*
Western gray squirrel	*Sciurus griseus*
Ground squirrel	*Spermophilus beecheyi*
Merriam chipmunk	*Eutamias merriami*
Brush rabbit	*Sylvilagus bachmani*
California vole	*Microtus californicus*
Dusky-footed woodrat	*Neotomys fuscipes*
Mule deer	*Odocoileus hemionus*

APPENDIX F.4

NATURAL VEGETATION OF THE VENTURA RIVER

David Magney Environmental Consulting

NATURAL VEGETATION OF THE VENTURA RIVER

Prepared for:

**ASPEN ENVIRONMENTAL GROUP
AND U.S. ARMY CORPS OF ENGINEERS**

June 2002

DME

Natural Vegetation of the Ventura River

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SECTION I. METHODS

David Magney Environmental Consulting (DMEC) was contracted by Aspen Environmental Group to map and classify the natural vegetation of the Ventura River from the mouth of the river at San Buenaventura to the Matilija Dam, plus the area at, and immediately upstream of, the Matilija Reservoir.

VEGETATION MAPPING

This section provides the methods used to map and classify the natural vegetation of the Ventura River. Polygons were delineated on color aerial photographs, provided by Geo InSight, of the study area. The study area includes approximately a 17-mile stretch of the Ventura River. DMEC identified distinct vegetation/habitat types on the aerial photographs using standard aerial photograph interpretation techniques and verified the boundaries and vegetation/habitat types present through field mapping and ground-truthing. Also included here are the protocols followed for classifying and describing the plant communities and wetland habitats of the surveyed portion of the Ventura River.

AERIAL PHOTOGRAPH POLYGON DISTINCTIONS

Botanists, David Magney and Cher Batchelor, were provided (by GeoInsight, Inc.) color aerial photographs (field maps) showing the vegetation of the Ventura River and its associates landscape as viewed by the air. The field maps/aerial photographs dissect the Ventura River into approximately 70 plots, or tiles, (depending on the scale of the particular set of maps), that provided a large work scale, and enabled botanists to map vegetative polygons directly on field maps.

The polygons were drawn with ink pens in an amorphous fashion, which enabled precise delineation of specific vegetative areas. In addition to the vegetation signatures, apparent on the maps, botanists also considered elevation differences and substrate changes in order to delineate and separate polygons for field mapping and computer digitizing.

FIELD SURVEYS AND GROUND-TRUTHING

Field mapping surveys and ground-truthing were performed by DMEC along the Ventura River on twelve (12) separate occasions:

- 16, 17, 20, 21, 22, 23, 28, 29, 30, & 31 of May 2002; and,
- 4 & 19 of June 2002.

The vegetation was mapped for representative reaches of the 17-mile Ventura River stretch, including: from the bridge at Foster Park to the San Antonio Creek Confluence, Baldwin Road bridge to the Robles Diversion, from the Matilija Dam downstream to the north end of Rice Road, and Live Oak Acres area in Oak View. The narrower areas (predominantly in the upper reaches) of the survey area were surveyed roadside, as many polygons from specific maps were mapable from existing roads. Other areas were surveyed only from river crossings, such as the Shell Road crossing, the Main Street crossing, and the railroad crossing at the Ventura River Estuary.

Botanists searched for the vegetation that was specifically designated by the delineated polygons and surveyed as many unique plant communities and wetland habitats as possible within time and budget constraints. They walked portions of the Ventura River survey area in a meandering pattern designed to maximize ground-truthing of the polygons and ensure that each vegetation/habitat type was observed on the ground. Botanists used as precise accuracy as possible to locate and indicate in the field the exact areas that matched their respective polygons on the aerial photographs. Once this was accomplished, botanists could describe each polygon with a short species list of predominant taxa, and by briefly describing substrate, canopy cover density, and species dominance and habit, the vegetation could then be classified. No measurements of boundary delineation errors were taken; however, DMEC estimates that the delineated boundaries are accurate within two meters, and more accurate for most delineated boundaries.

As time and budget constraints prevented ground-truthing of all polygons during the surveys of 2002, DMEC based its polygon classifications on *a priori* knowledge of the survey area and on previous studies, such as *Botanical Resources at Emma Wood State Beach and the Ventura River Estuary, California* (Ferren et al. 1990). The remaining polygons were mapped on the low-altitude color aerial photographs and classified using standard aerial photographic interpretation methods supported by the extensive data gathered in the field from other ground-truthed polygons (vegetative signatures). For example, polygons located in wetland and upland habitats were classified according to the apparent habit (herbaceous, scrub, or tree canopies), density, texture, patterns, and coloration of the general vegetation as it appeared on the aerial photographs. (See Habitat Classification Protocols below for vegetation classification methods.)

Note that although some estuary ground-truthing was performed from the railroad crossing, some variations occur in that study area reach since the existing conditions on the ground during May and June 2002 were slightly different from the date of the aerial photography. This is especially true for the mouth of the river, where the mouth is presently (June 2002) approximately 50 meters west of that mapped and delineated on the aerial photograph. However, the location mapped on the aerial photograph is nearly identical to that previously mapped in 1987 (Ferren et al. 1990). Therefore most of the Estuarine and Marine systems were appropriately mapped and classified based on the vegetation mapping and classification conducted at the Ventura River Estuary in 1987 (Ferren et al. 1990). Since not all polygons were verified in 2002 by ground-truthing, errors of omission and comission occur at various levels throughout the study area.

The Matilija Dam and Lake areas are mapped based on the mapping performed by the US Fish and Wildlife Service.

BOTANICAL RESOURCES ASSESSMENT

Botanical survey objectives were to account for the plant species inhabiting the project area and to indicate the plant communities and wetland habitats comprised of those species. Botanists used direct observation to identify and account for all plant species present at the time of the survey. If necessary, plant specimens were collected for further/accurate identification. A species list was compiled consisting of all plant species observed by DMEC, and it also includes all other plant species reported as being observed within the Ventura River (Table 1 in the following section). Specific protocols were followed to classify the upland and wetland habitats of the Ventura River, which are defined in the following subsection.

HABITAT CLASSIFICATION PROTOCOLS

Cowardin et al. (1979) present the *Classification of Wetlands and Deepwater Habitats of the United States*, which is the hierarchical classification convention followed for naming and describing plant communities dominated by hydrophytic plant species (wetlands). The primary objective of this classification is to impose boundaries on natural ecosystems for the purposes of inventory, evaluation, and management. The structure of this classification is hierarchical, and the levels of classification, used for the purposes of this project, progress from systems (a complex of wetlands and deepwater habitats that share the influence of similar factors) to subsystems (more specific categories of systems) to class (describing the general appearance of the habitat in terms of either the dominant vegetative life form or the physiography and composition of the substrate).

Sawyer and Keeler-Wolf (1995) present the California Native Plant Society's approach to hierarchical classification in *A Manual of California Vegetation*, which is the classification approach followed here for plant communities dominated by upland plant species. Their approach for vegetative hierarchical classification forms a baseline for classifying the Ventura River upland vegetation into floristically based plant series, or plant communities, which include a dominant species (one taxon contributing to greatest percent ground cover of the vegetation), or two co-dominant plant species (two, equally important, canopy-contributing plant species), and one or more associate species (taxa that are not dominant in percent cover, but are important secondary canopy contributors making plant communities increasingly species-specific and unique). The CNPS vegetation manual has been formally adopted by all federal and California resource and regulatory agencies for plant community mapping and classification.

These protocols are followed here for the classification of all polygons observed in the field during the vegetation mapping and field surveys. Laboratory classification of the remaining polygons is not as strict, however, especially for the upland plant communities, since dominant plant species were indeterminable via the aerial photographs. Therefore, the remaining polygons were described using vegetative signatures from ground-truthed polygons. For example, if a polygon appeared to consist of scattered shrubs, with an areal coverage of more than 30%, and existed as a cobble/gravel bar in the primary channel of the Ventura River, then that polygon was mapped as Palustrine Scrub/Shrub. If a similar polygon had less than 30% areal coverage by vegetation, it was then described as Riverine Intermittent Unconsolidated Shore. If an upland (on an elevated terrace or upland from the river banks) scrub plant community (which *does* require a designation of dominant plant species to be classified) was observed on the aerial photograph, botanists determined that after observing upland scrub communities in the field, that describing such polygons as Mixed Sage Scrub is reasonably accurate, considering the low level of classification required for describing the wetland habitats.

SECTION II. VENTURA RIVER FLORA

The habitats within the surveyed 17-mile reach of the Ventura River are composed of a diverse and species-rich flora, each requiring different microhabitats/microclimates. Table 1, Plant Species Reported and Observed in the Ventura River, lists the plant taxa (common and scientific names) observed during field surveys as forming the plant communities within the survey area. Table 1 also includes each species' habit and family name. Voucher specimens were collected for 111 observed plant species, according to CNPS (2001) and California Department of Fish and Game (CDFG) (CDFG 1991) protocols. Voucher plant specimens collected to support the findings of this report are available for examination and verification at the Herbarium of the University of California, Santa Barbara.

Table 1. Plant Species Reported and Observed in the Ventura River

Botanical Name[1]	Common Name	Habit[2]	Family
Abronia maritima	Red Sand-verbena	PH	Nyctaginaceae
Abronia maritima X *umbellata*	Hybrid Sand-verbena	PH	Nyctaginaceae
Abronia umbellata ssp. *umbellata*	Beach Sand-verbena	PH	Nyctaginaceae
Acer macrophyllum	Bigleaf Maple	T	Aceraceae
Acer negundo var. *californicum*	Box Elder	T	Aceraceae
Achnatherum coronatum	Giant Needlegrass	PG	Poaceae
Adenostoma fasciculatum	Chamise	S	Rosaceae
Agoseris heterophylla var. *cryptopleura*	Mountain Dandelion	AH	Asteraceae
*Agrostis viridis**	Green Bentgrass	PG	Poaceae
*Allium neapolitanum**	Onion	PH	Alliaceae
Alnus rhombifolia	White Alder	T	Betulaceae
*Amaranthus albus**	Tumbleweed	AH	Amaranthaceae
*Amaranthus deflexus**	Low Amaranth	AH	Amaranthaceae
*Amaranthus hybridus**	Hybrid Amaranth	AH	Amaranthaceae
Amaranthus palmeri	Palmer Amaranth	AH	Amaranthaceae
Amblyopappus pusillus	Dwarf Amblyopappus	AH	Asteraceae
Ambrosia acanthicarpa	Burweed	AH	Asteraceae
Ambrosia chamissonis	Beach Bur	PH	Asteraceae
Ambrosia psilostachya var. *californica*	Western Ragweed	BH	Asteraceae

[1] Scientific nomenclature generally follows Hickman (1993). An "*" indicates non-native species that have become naturalized or persist without cultivation.

[2] Habit definitions: PG = perennial grass or monocot ally; BH = biennial herb; PF = perennial fern or fern ally; AF = annual fern or fern ally; AG = annual grass or monocot ally; PH = perennial herb; AH = annual herb; PV = perennial vine; S = shrub; T = tree; GA = green algae.

Botanical Name[1]	Common Name	Habit[2]	Family
Amsinckia spectabilis var. *spectabilis*	Showy Fiddleneck	AH	Boraginaceae
*Anagallis arvensis**	Scarlet Pimpernel	AH	Primulaceae
Anemopsis californica var. *californica*	Yerba Mansa	PH	Sauraceae
*Anredera cordifolia**	Mignonetta Vine	PV	Basellaceae
*Anthemis cotula**	Mayweed	AH	Asteraceae
Antirrhinum multiflorum	Sticky Snapdragon	S	Scrophulariaceae
Apiastrum angustifolium	Mock Parsley	AH	Apiaceae
*Apium graveolens**	Celery	PH	Apiaceae
Arctostaphylos glauca	Bigberry Manzanita	S	Ericaceae
*Artemisia biennis**	Biennial Wormwood	BH	Asteraceae
Artemisia californica	California Sagebrush	S	Asteraceae
Artemisia douglasiana	Mugwort	PH	Asteraceae
*Arundo donax**	Giant Reed	PG	Poaceae
Aster chilensis	Common California Aster	PH	Asteraceae
Aster subulatus var. *ligulatus*	Annual Saltmarsh Aster	AH	Asteraceae
Astragalus trichopodus var. *phoxus*	Antisell Three-pod Milkvetch	PH	Fabaceae
Astragalus trichopodus var. *trichopodus*	Three-pod Milkvetch	PH	Fabaceae
Athysanus pusillus	Dwarf Athysanus	AH	Brassicaceae
Atriplex californica	California Saltbush	PH/S	Chenopodiaceae
Atriplex lentiformis ssp. *breweri*	Brewer Big Saltbush	S	Chenopodiaceae
Atriplex leucophylla	Whiteleaf	PH	Chenopodiaceae
Atriplex patula	Spear-leaved Saltbush	AH	Chenopodiaceae
*Atriplex rosea**	Redscale	AH	Chenopodiaceae
*Atriplex semibaccata**	Australian Saltbush	PH	Chenopodiaceae
Atriplex serenana var. *davidsonii*	Davidson Bractscale	AH	Chenopodiaceae
Atriplex triangularis	Spearscale	AH	Chenopodiaceae
*Avena barbata**	Slender Wild Oat	AG	Poaceae
*Avena sativa**	Cultivated Oat	AG	Poaceae
Azolla filiculoides	Mosquito Fern	AF	Azollaceae
Baccharis douglasii	Saltmarsh Baccharis	S	Asteraceae
Baccharis pilularis	Coyote Brush	S	Asteraceae
Baccharis plummerae var. *plummerae*	Plummer Baccharis	S	Asteraceae
Baccharis salicifolia	Mulefat	S	Asteraceae
*Bassia hyssopifolia**	Five-hook	AH	Chenopodiaceae
Berula erecta	Cutleaf Water-parsnip	PH	Apiaceae
Bidens laevis	Bur-marigold	AH/PH	Asteraceae
*Brassica nigra**	Black Mustard	AH	Brassicaceae
*Brassica rapa**	Field Mustard	AH	Brassicaceae

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Botanical Name[1]	Common Name	Habit[2]	Family
Brickellia californica	California Brickellbush	S	Asteraceae
Brickellia nevinii	Nevin's Brickellbush	S	Asteraceae
Bromus ?	Brome	PG	Poaceae
Bromus carinatus var. *carinatus*	California Brome	PG	Poaceae
*Bromus diandrus**	Ripgut Grass	AG	Poaceae
*Bromus hordeaceus**	Soft Chess	AG	Poaceae
Bromus madritensis ssp. *rubens**	Red Brome	AG	Poaceae
Cakile edentula ssp. *edentula*	American Searocket	AH	Brassicaceae
*Cakile maritima**	European Searocket	AH	Brassicaceae
Calystegia macrostegia ssp. *cyclostegia*	Morning-glory	PV	Convolvulaceae
Calystegia malacophylla spp. *pedicellata*	Sierra Morning-glory	PV	Convolvulaceae
Calystegia purpurata ssp. *purpurata*	Purple Morning-glory	PV	Convolvulaceae
Calystegia soldanella	Beach Morning-glory	PV	Convolvulaceae
Camissonia bistorta	California Sun-cup	AH	Onagraceae
Camissonia boothii ssp. *decorticans*	Booth Shredding Primrose	AH	Onagraceae
Camissonia californica	Mustard Primrose	AH	Onagraceae
Camissonia cheiranthifolia ssp. *suffruticosa*	Beach Primrose	S	Onagraceae
Camissonia micrantha	Tiny Primrose	AH	Onagraceae
Camissonia strigulosa	Strigose Primrose	AH	Onagraceae
*Cardaria draba**	Heart-podded Hoary Cress	PH	Brassicaceae
*Carduus pycnocephalus**	Italian Thistle	AH	Asteraceae
Carex praegracilis	Clustered Field Sedge	PH	Cyperaceae
Carex triquetra	Triangular-fruited Sedge	PH	Cyperaceae
*Carpobrotus chilensis**	Sea Fig	S	Aizoaceae
Carpobrotus edulis	Hottentot Fig	S	Aizoaceae
*Carthamus tincotrius**	Distaff Thistle	BH	Asteraceae
Castilleja exserta ssp. *exserta*	Purple Owl’s Clover	AH	Scrophulariaceae
Castilleja foliolosa	Woolly Indian Paintbrush	PH	Scrophulariaceae
Ceanothus crassifolius var. *crassifolius*	Snowball	S	Rhamnaceae
Ceanothus crassifolius var. *planus*	Flatleaf Snowball	S	Rhamnaceae
Ceanothus cuneatus	Wedgeleaf Ceanothus	S	Rhamnaceae
Ceanothus megacarpus var. *megacarpus*	Bigpod Ceanothus	S	Rhamnaceae
Ceanothus oliganthus var. *oliganthus*	Hoary Ceanothus	S	Rhamnaceae
Ceanothus spinosus	Greenbark Ceanothus	S	Rhamnaceae
*Centaurea melitensis**	Tocalote	AH	Asteraceae
*Centaurea solstitialis**	Yellow Star-thistle	AH	Asteraceae
Cercocarpus betuloides ssp. *betuloides*	Birchleaf Mountain Mahogany	S	Rosaceae
*Chamomilla suaveolens**	Pineapple Weed	AH	Asteraceae

Botanical Name[1]	Common Name	Habit[2]	Family
Chara	green algae	GA	
Chenopodium ambrosioides var. *ambrosioides**	Mexican Tea	PH	Chenopodiaceae
Chenopodium berlandieri	Pitseed Goosefoot	PH	Chenopodiaceae
Chenopodium californicum	California Goosefoot	PH	Chenopodiaceae
Chenopodium macrospermum var. *halophilum**	Coast Goosefoot	AH	Chenopodiaceae
*Chenopodium murale**	Nettle-leaved Goosefoot	AH	Chenopodiaceae
Chorizanthe staticoides	Turkish Rugging	AH	Polygonaceae
*Chrysanthemum parthenium**	Chrysanthemum	PH	Asteraceae
*Cichorium intybus**	Chicory	PH	Asteraceae
Clarkia sp.	Clarkia	AH	Onagraceae
Clarkia purpurea ssp. *quadrivulnera*	Four-spotted Purple Clarkia	AH	Onagraceae
Clarkia unguiculata	Elegant Farewell-to-Spring	AH	Onagraceae
Clematis ligusticifolia	Virgin's Bower	PV	Ranunculaceae
Clematis lasiantha	Pipestem Clematis	PV	Ranunculaceae
*Cnicus benedictus**	Blessed Thistle	PH	Asteraceae
*Conium maculatum**	Poison Hemlock	PH	Apiaceae
*Conyza bonariensis**	Flax-leaved Fleabane	AH	Asteraceae
Conyza canadensis	Common Horseweed	AH	Asteraceae
Conyza coulteri	Coulter Horseweed	AH	Asteraceae
*Coronopus didymus**	Wart Cress	PH	Brassicaceae
*Cortaderia jubata**	Andean Pampas Grass	PG	Poaceae
*Cotula coronopifolia**	African Brass-buttons	PH	Asteraceae
Crepis occidentalis ssp. *pumila*	Western Hawksbeard	AH	Asteraceae
*Crypsis vaginiflora**	Prickle Grass	PG	Poaceae
Cryptantha corollata	Crowned Forget-Me-Not	AH	Boraginaceae
Cryptantha muricata	Jones Prickly Forget-Me-Not	AH	Boraginaceae
Cucurbita foetidissima	Coyote Melon	PV	Cucurbitacaeae
Cupressus macrocarpa	Monterey Cypress	T	Cupressaceae
Cuscuta subinclusa	Canyon Dodder	AV	Cuscutaceae
*Cynodon dactylon**	Bermuda Grass	PG	Poaceae
Cyperus eragrostis	Umbrella-sedge	PH	Cyperaceae
Cyperus esculentus	Yellow Nutgrass	PH	Cyperaceae
*Cytisus scoparius**	Scotch Broom	S	Fabaceae
Datisca glomerata	Dragon Root	PH	Datiscaceae
Datura wrightii	Jimson Weed	AH	Solanaceae
Dendromecon rigida var. *rigida*	Bush Poppy	S	Papaveraceae
Descurainia pinnata spp. *menziesii*	Menzies Tansy Mustard	AH	Brassicaceae
Distichlis spicata	Saltgrass	PG	Poaceae

Botanical Name[1]	Common Name	Habit[2]	Family
Dudleya lanceolata	Lanceleaf Live-Forever	PH	Crassulaceae
Dudleya pulverulenta var. *pulverulenta*	Chalk Live-Forever	PH	Crassulaceae
Elymus glaucus ssp. *glaucus*	Blue Wildrye	PG	Poaceae
Emmenanthe penduliflora var. *penduliflora*	Whispering Bells	AH	Hydrophyllaceae
Encelia californica	California Bush Sunflower	S	Asteraceae
Epilobium brachycarpum	Panicled Willow-herb	AH	Onagraceae
Epilobium canum ssp. *canum*	California Fuchsia	S	Onagraceae
Epilobium ciliatum ssp. *ciliatum*	Northern Willow-herb	AH	Onagraceae
Equisetum laevigatum	Smooth Scouring-Rush	PF	Equisetaceae
Equisetum telmateia ssp. *braunii*	Giant Horsetail	PF	Equisetaceae
Eremocarpus setigerus	Dove Weed	AH	Euphorbiaceae
Eriastrum sapphirinum	Few-flowered Woolly Star	AH	Polemoniaceae
Erigeron foliosus var. *foliosus*	Slender Fleabane	PH	Asteraceae
Eriodictyon crassifolium var. *crassifolium*	Yerba Santa	S	Hydrophyllaceae
Eriodictyon crassifolium var. *nigrescens*	Yerba Santa	S	Hydrophyllaceae
Eriogonum elongatum var. *elongatum*	Slender Buckwheat	PH	Polygonaceae
Eriogonum fasciculatum var. *fasciculatum*	California Buckwheat	S	Polygonaceae
Eriogonum fasciculatum var. *foliolosum*	Leafy California Buckwheat	S	Polygonaceae
Eriogonum fasciculatum var. *polifolium*	Hairy California Buckwheat	S	Polygonaceae
Eriogonum gracile var. *gracile*	Slender Woolly Buckwheat	AH	Polygonaceae
Eriogonum parvifolium var. *parvifolium*	Dune Buckwheat	S	Polygonaceae
Eriophyllum confertiflorum var. *confertiflorum*	Golden Yarrow	PH	Asteraceae
*Erodium cicutarium**	Redstem Filaree	AH	Geraniaceae
Eryngium vaseyi	Coyote Thistle	PH	Apiaceae
*Eucalyptus camaldulensis**	River Red Gum	T	Myrtaceae
*Euphorbia lathyris**	Gopher Spurge	PH	Euphorbiaceae
*Euphorbia peplus**	Petty Spurge	AH	Euphorbiaceae
Euthamia occidentalis	Western Goldenrod	PH	Asteraceae
*Festuca arundinacea**	Tall Fescue	PG	Poaceae
Filago californica	California Filago	AH	Asteraceae
*Foeniculum vulgare**	Sweet Fennel	PH	Apiaceae
Frankenia salina	Alkali Heath	S	Frankeniaceae
Fraxinus dipetala	California Flowering Ash	T	Oleaceae
Galium angustifolium ssp. *angustifolium*	Chaparral Bedstraw	S	Rubiaceae
Garrya veatchii	Veatch Silk-tassel Bush	S	Garryaceae
Gnaphalium bicolor	Bicolored Everlasting	BH	Asteraceae
Gnaphalium californicum	Green Everlasting	AH	Asteraceae
Gnaphalium canescens ssp. *beneolens*	Coastal Everlasting	PH	Asteraceae

Botanical Name[1]	Common Name	Habit[2]	Family
Gnaphalium canescens ssp. *microcephalum*	White Everlasting	PH	Asteraceae
Gnaphalium leucocephalum	Woolly Everlasting	BH	Asteraceae
*Gnaphalium luteo-album**	Lowland Cudweed-Everlasting	AH	Asteraceae
Grindelia camporum var. *camporum*	Great Valley Gumplant	AH	Asteraceae
Guillenia lemmonii	Lemmon Mustard	AH	Brassicaceae
Hazardia squarrosa var. *grindellioides*	Sawtooth Goldenbush	S	Asteraceae
Hazardia squarrosa var. *squarrosa*	Sawtooth Goldenbush	S	Asteraceae
Helenium puberulum	Rosilla	PH	Asteraceae
Heliotropium curassavicum	Alkali Heliotrope	PH	Hydrophyllaceae
Heteromeles arbutifolia	Toyon	S	Rosaceae
Heterotheca grandiflora	Telegraph Weed	AH	Asteraceae
Heterotheca sessiliflora var. *camphorata*	Camphor Golden-aster	PH	Asteraceae
Heterotheca sessiliflora var. *echioides*	Hairy Golden-aster	PH	Asteraceae
Heterotheca sessiliflora var. *fastigiata*	Hairy Golden-aster	PH	Asteraceae
*Hirschfeldia incana**	Summer Mustard	BH	Brassicaceae
Hoita macrostachya	Leather Root	S	Fabaceae
*Hypochaeris glabra**	Smooth Cat's-ear	AH	Asteraceae
Isocoma menziesii var. *vernonioides*	Coastal Goldenbush	S	Asteraceae
Jaumea carnosa	Fleshy Jaumea	PH	Asteraceae
Juglans californica var. *californica*	Southern Calif. Black Walnut	T	Juglandaceae
Juglans californica var. *hindsii*	Hinds Black Walnut	T	Juglandaceae
Juncus acutus ssp. *leopoldii*	Spiny Rush	PH	Juncaceae
Juncus bufonius var. *bufonius*	Toad Rush	PH	Juncaceae
Juncus macrophyllus	Largeleaf Rush	PH	Juncaceae
Juncus patens	Spreading Rush	PH	Juncaceae
Juncus phaeocephalus var. *paniculatus*	Brown-fruited Rush	PH	Juncaceae
Juncus textilis	Basket Rush	PH	Juncaceae
Juncus xiphioides	Iris-leaved Rush	PH	Juncaceae
Keckiella cordifolia	Heart-leaved Penstemon	S	Scrophulariaceae
*Kickxia elatine**	Arrowleaf Fluellin	AH	Scrophulariaceae
*Lactuca serriola**	Prickly Wild Lettuce	AH	Asteraceae
*Lamarckia aurea**	Goldentop	AG	Poaceae
*Lamium amplexicaule**	Henbit	AH	Lamiaceae
Lemna gibba	Gibbose Duckweed	AH	Lemnaceae
Lemna minor	Duckweed	AH	Lemnaceae
Lemna minuscula	Tiny Duckweed	AH	Lemnaceae
Lemna turionifera	Duckweed	AH	Lemnaceae
Lemna valdiviana	Duckweed	AH	Lemnaceae

DME

Botanical Name[1]	Common Name	Habit[2]	Family
Lepidospartum squamatum	Scalebroom	S	Asteraceae
Lessingia filaginifolia var. *filaginifolia*	California Cudweed-Aster	PH	Asteraceae
Leymus condensatus	Giant Wildrye	PG	Poaceae
Leymus triticoides	Creeping Wildrye	PG	Poaceae
*Lobularia maritima**	Sweet Alyssum	AH	Brassicaceae
*Lolium multiflorum**	Italian Ryegrass	AG	Poaceae
Lonicera subspicata var. *denudata*	Southern Honeysuckle	S	Caprifoliaceae
*Lotus corniculatus**	Birdsfoot Trefoil	PH	Fabaceae
Lotus purshianus var. *parishianus*	Pursh Lotus	AH	Fabaceae
Lotus salsuginosus var. *salsuginosus*	Coastal Lotus	AH	Fabaceae
Lotus scoparius var. *scoparius*	Deerweed	S/PH	Fabaceae
Lotus strigosus var. *strigosus*	Strigose Lotus	AH	Fabaceae
Lotus wrangelianus	Chile Lotus	AH	Fabaceae
Ludwigia peploides ssp. *peploides*	Floating Seedbox	PH	Onagraceae
Lupinus longifolius	Long-leaved Bush Lupine	S	Fabaceae
Lupinus succulentus	Fleshy Lupine	AH	Fabaceae
Lupinus truncatus	Truncate-leaved Lupine	AH	Fabaceae
Lythrum californicum	California Loosestrife	AH	Lythraceae
Madia?	Madia	AH	Asteraceae
Malacothamnus fasciculatus var. *fasciculatus*	Fascicled Bushmallow	S	Malvaceae
Malacothamnus nuttallii	Nuttall Bushmallow	S	Malvaceae
Malacothrix saxatilis var. *saxatilis*	Cliff-aster	PH	Asteraceae
Malacothrix saxatilis var. *tenuifolia*	Tenuate Cliff-Aster	PH	Asteraceae
Malosma laurina	Laurelleaf Sumac	S	Anacardiaceae
*Malva nicaensis**	Bull Mallow	AH	Malvaceae
Marah fabaceus var. *agrestis*	California Man-root	PV	Cucurbitacaceae
*Marrubium vulgare**	White Horehound	S	Lamiaceae
*Medicago polymorpha**	Bur-clover	AH	Fabaceae
*Medicago sativa**	Alfalfa	AH	Fabaceae
Melica imperfecta	Coast Melic Grass	PG	Poaceae
*Melilotus alba**	White Sweetclover	AH	Fabaceae
*Melilotus indica**	Yellow Sweetclover	AH	Fabaceae
*Mentha arvensis**	Field Mint	PH	Lamiaceae
Mentha spicata var. *spicata*	Spearmint	PH	Lamiaceae
Mentzelia laevicaulis	Blazing Star	AH	Loasaceae
Mentzelia micrantha	Tiny-flowered Stickleaf	AH	Loasaceae
*Mesembryanthemum crystallinum**	Crystalline Iceplant	AH	Aizoaceae
Mimulus aurantiacus var. *pubescens*	Fuzzy Bush Monkeyflower	S	Scrophulariaceae

Botanical Name[1]	Common Name	Habit[2]	Family
Mimulus cardinalis	Scarlet Monkeyflower	BH	Scrophulariaceae
Mimulus guttatus	Streamside Monkeyflower	PH	Scrophulariaceae
Mimulus longiflorus ssp. *longiflorus*	Sticky Bush Monkeyflower	S	Scrophulariaceae
*Mirabilis jalapa**	Four O'clock	S	Nyctaginaceae
Monanthochloë littoralis	Shoregrass	PG	Poaceae
*Morus alba**	White Mulberry	T	Moraceae
*Myoporum laetum**	Myoporum	S	Myoporaceae
*Nerium oleander**	Oleander	S	Apocynaceae
*Nicotiana glauca**	Tree Tobacco	S	Solanaceae
Olea europea	Olive	T	Oleaceae
Opuntia littoralis	Coastal Prickly Pear	S	Cactaceae
*Osteospermum ecklonis**	African Daisy	PH	Asteraceae
*Oxalis pes-caprae**	Bermuda Buttercup	PH	Oxalidaceae
Parkinsonia aculeata	Palo Verde	T	Fabaceae
Parthenocissus vitacea	Woodbine	PV	Vitaceae
*Paspalum dilatatum**	Dallis Grass	PG	Poaceae
Pellaea andromedifolia var. *andromedifolia*	Coffee Fern	PF	Pteridiaceae
*Pennisetum clandestinum**	Kikuyu Grass	PG	Poaceae
*Pennisetum setaceum**	African Fountain Grass	PG	Poaceae
*Pennisetum villosum**	Fountain Grass	PG	Poaceae
Penstemon centranthifolius	Scarlet Bugler	PG	Scrophulariaceae
Phacelia cicutaria var. *hispida*	Hispid Caterpillar Phacelia	AH	Hydrophyllaceae
Phacelia cicutaria var. *hubbyi*	Hubby Caterpillar Phacelia	AH	Hydrophyllaceae
Phacelia ramosissima var. *austrolitoralis*	South Coast Branching Phacelia	AH	Hydrophyllaceae
Phacelia viscida var. *viscida*	Sticky Phacelia	AH	Hydrophyllaceae
Phoradendron sp.	Mistletoe	S	Viscaceae
Phyllospadix torreyi	Torrey Surf-grass	PG	Zosteraceae
*Picris echioides**	Bristly Ox-tongue	AH	Asteraceae
Pinus halepensis	Aleppo Pine	T	Pinaceae
*Piptatherum miliaceum**	Smilo Grass	PG	Poaceae
Plantago erecta	California Plantain	PG	Plantaginaceae
*Plantago lanceolata**	Narrowleaf Plantain	PG	Plantaginaceae
*Plantago major**	Broadleaf Plantain	PG	Plantaginaceae
Platanus racemosa var. *racemosa*	California Sycamore	T	Platanaceae
Polygala cornuta var. *fishiae*	Fish's Milkwort	S	Polygalaceae
Polygonum amphibium var. *emersum*	Swamp Knotweed	PH	Polygonaceae
*Polygonum arenastrum**	Common Knotweed	PH	Polygonaceae
*Polygonum capitatum**	Capitate Knotweed	PH	Polygonaceae

DME

Botanical Name[1]	Common Name	Habit[2]	Family
Polygonum lapathifolium	Willow Weed	PH	Polygonaceae
Polygonum punctatum	Dotten Smartweed	PH	Polygonaceae
Polypodium californicum	California Polypody Fern	PF	Polypodiaceae
*Polypogon monspeliensis**	Rabbitsfoot Beardgrass	AG	Poaceae
*Populus alba**	White Poplar	T	Salicaceae
Populus balsamifera ssp. *trichocarpa*	Black Cottonwood	T	Salicaceae
Populus fremontii ssp. *fremontii*	Fremont Cottonwood	T	Salicaceae
Populus fremontii X trichocarpa	Hybrid Fremont Cottonwood	T	Salicaceae
Portulaca oleracea	Common Purslane	AH	Portulacaceae
Potamogeton foliosus var. *foliosus*	Leafy Pondweed	PG	Potamogetonaceae
Potamogeton pectinatus	Fennelleaf Pondweed	PG	Potamogetonaceae
Potentilla anserina ssp. *pacifica*	Pacific Coast Silverweed	PH	Rosaceae
Prunus ilicifolia	Hollyleaf Cherry	S	Rosaceae
Quercus agrifolia var. *agrifolia*	Coast Live Oak	T	Fagaceae
*Raphanus raphanistrum**	Wild Radish	AH	Brassicaceae
*Raphanus sativus**	Wild Radish	AH	Brassicaceae
Rhamnus californica ssp. *californica*	California Coffeeberry	S	Rhamnaceae
Rhamnus ilicifolia	Hollyleaf Redberry	S	Rhamnaceae
Rhus integrifolia	Lemonade Berry	S	Anacardiaceae
Rhus ovata	Sugar Bush	S	Anacardiaceae
Rhus trilobata var. *malacophylla*	Skunkbrush	S	Anacardiaceae
Rhus trilobata var. *quinata*	Skunkbrush	S	Anacardiaceae
Ribes malvaceum var. *malvaceum*	Chaparral Currant	S	Grossulariaceae
Ribes malvaceum var. *viridifolium*	Sticky Chaparral Currant	S	Grossulariaceae
*Ricinus communis**	Castor Bean	S	Euphorbiaceae
*Robinia pseudoacacia**	Black Locust	T	Fagaceae
Romneya coulteri	Coulter Matilija Poppy	PH	Papaveraceae
Romneya trichocalyx	Matilija Poppy	PH	Papaveraceae
Rorippa nasturtium-aquaticum	Water Cress	PH	Brassicaceae
Rosa californica	California Wild Rose	S	Rosaceae
Rubus ursinus	California Blackberry	PV	Rosaceae
*Rumex conglomeratus**	Green Dock	PH	Polygonaceae
*Rumex crispus**	Curly Dock	PH	Polygonaceae
Rumex salicifolius var. *crassus*	Willow Dock	PH	Polygonaceae
Rumex salicifolius var. *salicifolius*	Willow Dock	PH	Polygonaceae
Ruppia cirrhosa	Spiral Wigeon-grass	AG	Potamogetonaceae
Salicornia virginica	Virginia Pickleweed	PH	Chenopodiaceae
Salix exigua	Narrow-leaved Willow	S	Salicaceae

DME

Botanical Name[1]	Common Name	Habit[2]	Family
Salix laevigata	Red Willow	S/T	Salicaceae
Salix lasiolepis var. *lasiolepis*	Arroyo Willow	S/T	Salicaceae
Salix lucida ssp. *lasiandra*	Shining Willow	S/T	Salicaceae
Salix macrostachya var. *leucodendroides*	Sandbar Willow	S	Salicaceae
*Salsola tragus**	Russian Thistle	AH	Chenopodiaceae
Salvia apiana	White Sage	S	Lamiaceae
Salvia columbariae	Chia	AH	Lamiaceae
Salvia leucophylla	Purple Sage	S	Lamiaceae
Salvia mellifera	Black Sage	S	Lamiaceae
Sambucus mexicana	Blue Elderberry	S/T	Caprifoliaceae
*Schinus molle**	Peruvian Pepper Tree	T	Anacardiaceae
*Schismus barbatus**	Mediterranean Grass	AG	Poaceae
Scirpus americanus	American Bulrush	PH	Cyperaceae
Scirpus californicus	California Bulrush	PH	Cyperaceae
Scirpus maritimus	Saltmarsh Bulrush	PH	Cyperaceae
Scirpus pungens	Common Threesquare	PH	Cyperaceae
Scrophularia californica ssp. *californica*	California Figwort	PH	Scrophulariaceae
Senecio flaccidus var. *douglasii*	Douglas Butterweed	S	Asteraceae
*Senecio mikanioides**	Cape Ivy	PV	Asteraceae
*Silene gallica**	Windmill Pink	AH	Caryophyllaceae
*Silybum marinanum**	Milk Thistle	AH	Asteraceae
*Sisymbrium irio**	London Rocket	AH	Brassicaceae
*Solanum americanum**	White Nightshade	S	Solanaceae
Solanum douglasii	Douglas Nightshade	S	Solanaceae
*Solanum rostratum**	Buffalo-bur	PH	Solanaceae
Solanum xantii var. *xantii*	Chaparral Nightshade	S	Solanaceae
Solidago confinis	Southern Goldenrod	PH	Asteraceae
Sonchus asper ssp. *asper**	Prickly Sow-thistle	AH	Asteraceae
*Sonchus oleraceus**	Common Sow-thistle	AH	Asteraceae
*Spartium junceum**	Spanish Broom	S	Fabaceae
Spergula arvensis ssp. *arvensis*	Stickwort	AH	Caryophyllaceae
Spergularia macrotheca var. *macrotheca*	Large Sandspurrey	AH	Caryophyllaceae
Spergularia marina	Saltmarsh Sandspurrey	AH	Caryophyllaceae
Stachys albens	Woolly Hedge-nettle	PH	Lamiaceae
Stachys bullata	Pink Hedge Nettle	PH	Lamiaceae
*Stellaria media**	Common Chickweed	AH	Caryophyllaceae
Stephanomeria cichoriacea	Fort Tejon Milk-aster	PH	Asteraceae
Suaeda taxifolia	Woolly Seablite	S	Chenopodiaceae

Botanical Name[1]	Common Name	Habit[2]	Family
Symphoricarpos mollis	Common Snowberry	S	Caprifoliaceae
*Tamarix ramosissima**	Saltcedar	T	Tamaricaceae
*Tetragonia tetragonioides**	New Zealand Spinach	PH	Aizoaceae
Toxicodendron diversilobum	Poison Oak	S/PV	Anacardiaceae
Trifolium fucatum var. *gambellii*	Gambel Bull Clover	AH	Fabaceae
*Tropaeolum majus**	Garden Nasturium	PH	Tropaeolaceae
Typha domingensis	Southern Cattail	PH	Typhaceae
Typha latifolia	Broad-leaved Cattail	PH	Typhaceae
Typha X *domingensis*	Southern Cattail Hybrid	PH	Typhaceae
Umbellularia californica	California Bay	T	Lauraceae
Urtica dioica ssp. *holosericea*	Giant Stinging Nettle	PH	Urticaceae
*Urtica urens**	Dwarf Nettle	AH	Urticaceae
Venegasia carpesioides	Canyon Sunflower	S	Asteraceae
Verbena lasiostachys var. *lasiostachys*	Western Verbena	AH	Verbenaceae
*Veronica anagallis-aquatica**	Water Speedwell	PH	Scrophulariaceae
Vicia ludoviciana var. *ludoviciana*	Slender Vetch	AH	Fabaceae
*Vinca major**	Greater Periwinkle	PV	Apocynaceae
Vitis californica	California Wild Grape	PV	Vitaceae
Vulpia myuros var. *hirsuta**	Foxtail Fescue	AG	Poaceae
Vulpia myuros var. *myuros*	Rattail Fescue	AG	Poaceae
*Washingtonia robusta**	Mexican Fan Palm	T	Arecaceae
Xanthium spinosum	Spiny Clotbur	S	Asteraceae
Xanthium strumarium	Cocklebur	AH	Asteraceae
Yucca whipplei ssp. *whipplei*	Our Lord's Candle	S	Liliaceae
Zannichellia palustris	Horned-Pondweed	PG	Zannichelliaceae
*Zantedeschia aethiopica**	Calla Lily	PG	Aracaceae

SECTION III. VENTURA RIVER VEGETATION DESCRIPTIONS

The natural vegetation in the Ventura River study area consists of all five of the major Cowardin [1979] wetland systems (Lacustrine, Riverine, Palustrine, Estuarine, and Marine), and includes the four major upland vegetation types (Grassland, Scrub, Chaparral, and Woodland). Human-influenced areas are also mapped throughout the surveyed portion of the Ventura River and are discussed briefly at the end of this section.

The general wetland systems and upland vegetation types are first described, which are followed by descriptions of the wetland subsystems and classes and the upland plant series, observed and mapped along Ventura River. The vegetation descriptions include the scientific names of the dominant and associate species contributing to the plant communities (common names are only provided once), site requirements, and biological factors.

WETLAND AND DEEPWATER HABITATS

Wetlands are lands where saturation with water (at least periodically saturated or covered by water) is the dominant factor determining the nature of the soil development and the type of plant and animal communities occupying the land. Water creates severe physiological problems for most plants and animals, except for those adapted for life in water or saturated soil. Wetlands are transitional between terrestrial and aquatic systems, where the water table is at or near the soil surface, or the land is covered by shallow water. Wetlands consist of one or more of the following three attributes: (1) the land supports predominantly hydrophytic vegetation (plants are adapted to living in water), (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season. (Cowardin et al. 1979.)

Deepwater habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where surface water is permanent and often deep, so that water rather than air, is the principal medium within which the dominant organisms live (attached to the substrate or not). The substrates are considered nonsoils here because the water is too deep to support emergent vegetation. (Cowardin et al. 1979.)

The Marine, Estuarine, Riverine, and Lacustrine systems include both wetland and deepwater habitats; however, the Palustrine system includes only wetland habitats. Table 2 (Wetland and Deepwater Habitats of the Ventura River) shows a summary of how the wetland habitats mapped and observed in the surveyed portion of the Ventura River are classified.

Table 2. Wetland and Deepwater Habitats of the Ventura River

System	Subsystem	Class
Lacustrine		
Lacustrine	Limnetic	Unconsolidated Bottom
Lacustrine	Littoral	Emergent
Riverine		
Riverine	Upper Perennial	Rock Bottom
Riverine	Upper Perennial	Unconsolidated Bottom
Riverine	Upper Perennial	Emergent
Riverine	Lower Perennial	Unconsolidated Bottom
Riverine	Lower Perennial	Aquatic Bed
Riverine	Lower Perennial	Emergent
Riverine	Intermittent	Streambed
Riverine	Intermittent	Unconsolidated Shore
Riverine	Intermittent	Rocky Shore
Riverine	Intermittent	Emergent
Palustrine		
Palustrine	(None)	Emergent
Palustrine	(None)	Scrub/Shrub
Palustrine	(None)	Forested
Estuarine		
Estuarine	Subtidal	Aquatic Bed
Estuarine	Intertidal	Streambed
Estuarine	Intertidal	Beach/Bar
Estuarine	Intertidal	Emergent
Estuarine	Intertidal	Scrub/Shrub
Marine		
Marine	Intertidal	Beach/Bar

LACUSTRINE SYSTEM

The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, and emergents with greater than 30% areal coverage, and (3) total area exceeds 8 ha (20 acres). Similar habitats less than 8 ha are also included here if an active wave-formed, or bedrock shoreline, feature makes up the boundary, or if the deepest water depth exceeds 2 meters (6.6 feet) at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5‰. (Cowardin et al. 1979.)

Lacustrine Limnetic Unconsolidated Bottom Deepwater Habitat

The Limnetic subsystem includes all deepwater habitats lacking emergent vegetation, and is further classed as Unconsolidated Bottom, which includes at least 25% cover of particles smaller than stones and a vegetative cover less than 30%. Water regimes are restricted to subtidal, permanently flooded (as observed in the project area), intermittently exposed, and semipermanently flooded. This class is characterized by the lack of large stable surfaces for plant and animal attachment. Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms. Most animals in unconsolidated sediments live within the substrate, while some maintain permanent burrows, and others may live on the surface. (Cowardin et al. 1979.)

The Lacustrine system was observed in the study area immediately below (south of) the Matilija Dam as a large deep pool, and this system exists above (northwest of) the dam as Matilija Lake. These two areas of the surveyed portion of Ventura River are further classified as Lacustrine Limnetic Unconsolidated Bottom Deepwater Habitat.

Lacustrine Littoral Emergent Wetland

The Lacustrine system is further defined as Littoral, which extends from the shoreward boundary of the system to a depth of 2 meters (6.6 feet) below low water or to the maximum extent of nonpersistent emergents; and it is further classed as Emergent, which are characterized by a dominance of erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation usually consists of perennial plants that are present for most or all of the growing season. (Cowardin et al.1979.)

Lacustrine Littoral Emergent Wetland was observed as a perimeter to Matilija Lake. The predominant plant species making up the Lacustrine Littoral Emergent Wetland habitat around Matilija Lake includes: *Scirpus*, *Polygonum*, *Cyperus*, and *Juncus* species.

RIVERINE SYSTEM

The Riverine system includes all wetlands and deepwater habitats contained within a channel (or a conduit periodically or continuously containing moving water, or forming a connecting link between two bodies of water), with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and (2) habitats with water containing ocean-derived salts in excess of 0.5‰. The Riverine system is bounded on the landward side by the channel bank, or by wetland dominated by trees, shrubs, and persistent emergents. Water is usually, but not always, flowing in this system. (Cowardin et al. 1979.)

The Riverine system is classified into three subsystems for the Ventura River, and they include Upper Perennial, Lower Perennial, and Intermittent.

Riverine Upper Perennial Wetland

The Riverine Upper Perennial subsystem includes habitats where the gradient is high, water velocity is fast, and floodplain development is low. No tidal influence exists, and some water flows throughout the year. The substrate consists of rock, cobbles, or gravel with occasional patches of sand. The natural dissolved oxygen concentration is normally near saturation. (Cowardin et al. 1979.)

This subsystem is mapped predominantly in the upper reaches of the Ventura River. The three classes mapped for the Ventura River are Rock Bottom, Unconsolidated Bottom, and Emergent.

Riverine Upper Perennial Rock Bottom Wetland

Riverine Upper Perennial Rock Bottom Wetland includes wetland habitats with substrates having an areal cover of stones, boulders, or bedrock 75% or greater and vegetative cover of less than 30%. The rock substrate of the rocky benthic zone determines the abundance, variety, and distribution of organisms. The stability of the bottom allows a rich assemblage of plants and animals to develop. Rock Bottoms are usually high-energy habitats with well-aerated waters. (Cowardin et al. 1979.)

Boulders and cobbles were observed as the predominant substrate type within the Riverine Upper Perennial Rock Bottom Wetlands. The plant species observed scattered throughout this class include *Baccharis salicifolia* (Mulefat), *Salix lasiolepis* (Arroyo Willow [saplings]), *Scirpus californica* (California Bulrush), and *Typha domingensis* (Southern Cattail).

Riverine Upper Perennial Unconsolidated Bottom Wetland

Riverine Upper Perennial Unconsolidated Bottom Wetland includes habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%. Water regimes are restricted to subtidal (not present at the project site), permanently flooded, intermittently exposed, and semipermanently flooded. This class is characterized by the lack of large stable surfaces for plant and animal attachment. Unconsolidated Bottom is usually found in areas with lower energy than Rock Bottoms, and may be very unstable. In the Riverine System, the substrate type of this class is largely determined by current velocity, and plants and animals exhibit a high degree of morphologic and behavioral adaptation to flowing water. (Cowardin et al. 1979.)

Cobble and gravel, with some sand were observed as predominant substrate types within the Riverine Upper Perennial Unconsolidated Bottom Wetlands within the Ventura River. No vegetation was observed inhabiting this class except for the green algae, *Chara*.

Riverine Upper Perennial Emergent Wetland

Riverine Upper Perennial Emergent Wetland is characterized by a dominance of erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation usually consists of perennial plants that are present for most or all of the growing season. (Cowardin et al.1979.)

The predominant herbaceous plant species, making up the Riverine Upper Perennial Emergent Wetland along the Ventura River channel, include: young plants of *Arundo donax* (Giant Reed), *Cyperus eragrostis* (Umbrella Sedge), *Epilobium ciliatum* ssp. *ciliatum* (Northern Willow-herb), *Juncus xiphioides* (Iris-leaved Rush), *Melilotus alba* (White Sweetclover), *Polypogon monspeliensis* (Rabbitsfoot Grass), *Rorippa nasturtium-aquaticum* (Water Cress), *Typha domingensis*, and *Veronica anagallis-aquatica* (Water Speedwell). Saplings of the shrubs *Baccharis salicifolia* and *Salix exigua* (Narrow-leaved Willow) were also common. Note: this class is closely related to, and can sometimes be considered synonymous to Palustrine Emergent or Scrub/Shrub Wetland depending on the length of time since the area was scoured by flooding.

Riverine Lower Perennial Wetland

The Riverine Lower Perennial subsystem includes habitats where the gradient is low and water velocity is slow. No tidal influence exists, and some water flows throughout the year. The substrate consists of mainly sand and mud. Oxygen deficits may occur, the fauna is composed of species that reach their maximum abundance in still water, and true planktonic organisms are common. The gradient is lower than that of the Upper Perennial system, and the floodplain is well developed. (Cowardin et al. 1979.)

This subsystem is mapped predominantly in the lower reaches of the surveyed portion of the Ventura River. The three classes mapped for the Ventura River are Unconsolidated Bottom, Aquatic Bed, and Emergent.

Riverine Lower Perennial Unconsolidated Bottom Wetland

Riverine Lower Perennial Unconsolidated Bottom Wetland includes habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%. Water regimes are restricted to subtidal (not present at the project site), permanently flooded, intermittently exposed, and semipermanently flooded. This class is characterized by the lack of large stable surfaces for plant and animal attachment. Unconsolidated Bottom is usually found in areas with lower energy than Rock Bottoms, and may be very unstable. In the Riverine System, the substrate type of this class is largely determined by current velocity, and plants and animals exhibit a high degree of morphologic and behavioral adaptation to flowing water. (Cowardin et al. 1979.)

Cobble, gravel, and sand were observed as predominant substrate types within the Riverine Lower Perennial Unconsolidated Bottom Wetlands of the Ventura River.

Riverine Lower Perennial Aquatic Bed Wetland

Riverine Lower Perennial Aquatic Bed Wetland includes habitat dominated by plants that grow on or below the water surface for most of the growing season. Aquatic Beds represent a diverse group of plant communities that require surface water for optimum growth and reproduction. (Cowardin et al. 1979.). This habitat class is characterized by seasonally or permanently flooded freshwater channel/bed that is dominated by floating or attached vascular aquatic plants. Two floating aquatic plant species are documented as occurring within the study area and include *Azolla filiculoides* (Mosquito Fern) and *Lemna* spp. (Duckweed). These two annual plants are typically present in quiet water during the warm summer months. An example of this wetland type occurs on the west side of the river at Foster Park immediately upstream of its confluence with Coyote Creek.

Riverine Lower Perennial Emergent Wetland

Riverine Lower Perennial Emergent Wetland is dominated by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation usually consists of perennial plants that are present for most or all of the growing season. (Cowardin et al.1979.)

The predominant herbaceous plant species, making up the Riverine Lower Perennial Emergent Wetland along the Ventura River channel, include: *Apium graveolens*

(Celery), *Berula erecta* (Cutleaf Water-parsnip), *Cotula coronopifolia* (African Brass-buttons), *Cyperus eragrostis*, *Epilobium ciliatum* ssp. *ciliatum*, *Helenium puberulum* (Rosilla), *Melilotus alba*, *Polypogon monspeliensis*, *Rorippa nasturtium-aquaticum*, *Rumex crispus* (Curly Dock), *R. salicifolius* var. *salicifolius* (Willow Dock), *Stachys albens* (Woolly Hedge Nettle), and *Veronica anagallis-aquatica*. Saplings of shrub species are also common, including *Baccharis salicifolia* and *Salix* spp.

Riverine Intermittent Wetland

The Riverine Intermittent Wetland subsystem exists where the channel contains nontidal flowing water for only part of the year. When active flows are not present, surface water may be absent or water may remain in isolated pools. (Cowardin et al. 1979.) The areas of the Ventura River where water was not present during the time of the survey and where the substrate was not dominated by vegetation are classified as Riverine Intermittent Wetland.

Riverine Intermittent Streambed Wetland

The Streambed class includes all wetlands contained within the Intermittent subsystem of the Riverine system. Riverine Intermittent Streambed Wetland varies greatly in substrate and form depending on the gradient of the channel, velocity of the water, and sediment load. In most cases, streambeds are not vegetated because of the scouring effect when moving water is present, but like Unconsolidated Shore (description follows), they may be colonized by pioneering annuals and perennials during periods of low flows, or they may be too scattered to qualify as an Emergent or Scrub/Shrub Wetland. (Cowardin et al. 1979.)

All non-active, unvegetated, primary channels and secondary drainages with no flows at the time of the survey, are classified as Riverine Intermittent Streambed Wetland. The substrate varied from boulders and cobbles to cobbles and gravel with patches of sand. Scattered pioneering annual and perennial herbs include: *Artemisia douglasiana* (Mugwort), *Astragalus trichopodus* var. *phoxus* (Antisell Three-pod Milkvetch), *Conium maculatum* (Poison Hemlock), *Conyza canadensis* (Common Horseweed), *Hirschfeldia incana* (Summer Mustard), *Ricinus communis* (Castor Bean), *Sonchus oleraceus* (Common Sow-thistle), and *Xanthium strumarium* (Cocklebur).

Riverine Intermittent Unconsolidated Shore Wetland

Riverine Intermittent Unconsolidated Shore Wetland includes all wetland habitats having three characteristics: unconsolidated substrates with less than 75% areal cover of stones, boulders, or bedrock; having less than 30% areal cover of vegetation other than pioneering plants; and having almost any particular flooding water regime. This habitat is characterized by substrates lacking vegetation except the pioneering plants that become established during brief periods when growing conditions are favorable. Erosion and deposition by waves and currents produce landforms such as beaches, bars, and flats, all of which are included in this class. Unconsolidated Shores are typically found adjacent to Unconsolidated Bottoms (and Streambeds, which are very similar to Unconsolidated Bottoms) in all systems, and particle size of the substrate and the water regime are the important factors determining the types of plant and animal communities present. (Cowardin et al. 1979.)

All raised bars or banks (adjacent to Streambeds and Unconsolidated Bottom classes), with less than 30% cover by vegetation, and with less than 75% cover of stones, boulders, or bedrock, during the time of the survey, are classified as Riverine Intermittent Unconsolidated Shore. The substrates observed in this class include boulder/cobble bar with sand, cobble/gravel bar, cobble/gravel bar with sand, gravel bar, and sand bar. Scattered pioneering annual and perennial herbs include *Artemisia douglasiana*, *Astragalus trichopodus* var. *phoxus*, *Gnaphalium canescens* ssp. *beneolens* (Coastal Everlasting), *Heterotheca sessiliflora* var. *fastigiata* (Hairy Golden-aster), *Hirschfeldia incana*, and *Xanthium strumarium* (Cocklebur). Scattered shrub pioneer saplings are common as well, and they include: *Baccharis salicifolia, Brickellia californica* (California Brickellbush), *Lepidospartum squamatum* (Scalebroom), *Lotus scoparius* var. *scoparius* (Deerweed), *Malosma laurina* (Laurel Sumac), *Ricinus communis*, and *Spartium junceum* (Spanish Broom).

Riverine Intermittent Rocky Shore Wetland

Riverine Intermittent Rocky Shore Wetland includes wetland environments characterized by bedrock, stones, or boulders, which singly or in combination have an areal cover of 75% or more and an areal coverage by vegetation of less than 30%. Rocky Shores are high-energy habitats, which lie exposed as a result of continuous erosion by strong currents, and in Riverine habitats Rocky Shores support sparse plant and animal communities. The Riverine Intermittent Rocky Shore Wetland mapped for the Ventura River includes bedrock substrate covering at least 75%.

Riverine Intermittent Emergent Wetland

Riverine Intermittent Emergent Wetland is characterized as being dominated by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation usually consists of perennial plants that are present for most or all of the growing season. (Cowardin et al.1979.)

The predominant herbaceous plant species, making up Riverine Intermittent Emergent Wetlands along the Ventura River no-flow bars and channels, include a mixture of typical plant species of both the Riverine Lower Perennial Emergent and Riverine Intermittent Unconsolidated Shore Wetlands; however, the vegetative cover is at least 30%.

PALUSTRINE SYSTEM

The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergent plants, emergent mosses or lichens, and all such wetlands that occur in tidal areas, where salinity due to ocean-derived salts is below 0.5‰. This system is bounded by upland habitats or by any other system. The Palustrine system was developed to group the vegetated wetlands traditionally called such names as marshes, swamps, bogs, prairies, and ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. The erosive forces of wind and water are of minor importance except during severe floods. No subsystems exist for the Palustrine system. (Cowardin et al. 1979.)

Palustrine Emergent Wetland

Palustrine Emergent Wetlands are characterized by a dominance of erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation usually consists of perennial plants that are present for most or all of the growing season. (Cowardin et al.1979.)

Palustrine Emergent Wetlands were observed primarily as bars and banks adjacent to Unconsolidated Bottom and Streambed Wetlands with at least a 30% cover by herbaceous vegetation. The predominant herbaceous plant species, observed making up Palustrine Emergent Wetlands along the riparian zone of the Ventura River, include typical plant species of the other system Emergent Wetlands described above, as well as some nonnative pioneering plants including *Bromus diandrus* (Ripgut Grass), *Carduus pycnocephalus* (Italian Thistle), and *Piptatherum miliaceum* (Smilo Grass). Saplings of trees and shrubs, such as *Baccharis salicifolia*, *Salix lasiolepis*, *Platanus racemosa* var. *racemosa* (California Sycamore), are also common.

Palustrine Scrub/Shrub Wetland

Palustrine Scrub/Shrub Wetlands occur only in the Estuarine and Palustrine systems, but are one of the most widespread classes in the U.S. This habitat type includes areas dominated by woody, generally broad-leaved deciduous plants less than six meters (20 feet) tall. The plant species of this wetland include true shrubs, young trees, and trees or shrubs that are small or stunted due to environmental conditions. Scrub/Shrub Wetlands may represent a successional stage leading to Forested Wetland, or may be relatively stable communities. All water regimes are included except subtidal. (Cowardin et al. 1979.)

Palustrine Scrub/Shrub Wetlands require at least seasonal flooding and are dominated predominantly by shrubs located on bars and banks of river channels and form significant riparian habitat in floodplain areas as well. Although this habitat is typically characterized by the presence of broad-leaved winter-deciduous shrubs, such as *Salix exigua*, *S. lasiolepis*, and *S. lucida* ssp. *lasiandra* (Shining Willow), the floodplain areas may consist of several evergreen shrubs (*Baccharis salicifolia*, *Ceanothus* spp. [Greenbark, Hoary, Bigpod, and Snowball Ceanothus], *Lepidospartum squamatum*, and *Malosma laurina*) and summer-deciduous shrubs (typical of Coastal Sage Scrub [described in the Upland Plant Communities section below]), including *Artemisia californica* (California Sagebrush), *Salvia apiana* (White Sage), and *S. mellifera* (Black Sage). *Arundo donax* (a large, shrub/tree-sized, invasive, perennial grass), *Nicotiana glauca* (Tree Tobacco), *Ricinus communis* (a robust, shrub-sized, invasive perennial herb), and *Spartium junceum* (invasive shrub) create highly competitive conditions for other native riparian plant species within the Scrub/Shrub layer of the Palustrine system.

Other common associate Palustrine Scrub/Shrub Wetland plant species observed contributing to the shrub canopy include: *Antirrhinum multiflorum* (Sticky Snapdragon), *Baccharis pilularis* (Coyote Brush), *Brickellia californica*, *Eriodictyon crassifolium* var. *nigrescens* (Yerba Santa), *Eriogonum fasciculatum* var. *foliolosum* (Leafy California Buckwheat), *Lotus scoparius* var. *scoparius*, *Lupinus longifolius* (Long-leaved Bush Lupine), *Malacothamnus fasciculatus* var. *fasciculatus* (Chaparral Bushmallow), *Polygala cornuta* var. *fishiae* (Fish's Milkwort), *Rhus trilobata* (Skunkbrush), *Sambucus* *mexicanus* (Blue Elderberry), *Solanum americanum* (White Nightshade), and *S. douglasii* (Douglas Nightshade). Saplings and emergent trees, such as *Alnus rhombifolia* (White Alder), *Platanus racemosa* var. *racemosa*, *Populus balsamifera* ssp. *trichocarpa* (Black Cottonwood), are also common. Herbaceous plant species, observed occupying the ground layer, include: *Artemisia douglasiana*, *Cyperus eragrostis*, *Piptatherum miliaceum*, *Polypogon monspeliensis*, *Gnaphalium canescens* ssp. *microcephalum* (White Everlasting), *Heterotheca sessiliflora* var. *fastigiata*, *Hirschfeldia incana*, *Melilotus alba*, and *Xanthium strumarium*.

Palustrine Forested Wetland

Palustrine Forested Wetlands are characterized by woody vegetation that is 6 meters tall or taller. All water regimes are included except subtidal. Forested Wetlands only occur in the Palustrine and Estuarine systems and normally possess an overstory of trees, an understory of young trees and shrubs, and an herbaceous layer. Moisture must be relatively abundant, and wetlands in this subclass generally occur on mineral soils or highly decomposed organic soils. (Cowardin et al. 1979.)

Palustrine Forested Wetlands are important riparian plant communities as they provides suitable, structurally diverse, and often species-rich habitat for many species of wildlife that frequent and inhabit the Ventura River. Dominant trees that are typical of Palustrine Forested Wetland along the Ventura River are predominantly broad-leaved winter-deciduous species, including *Acer macrophyllum* (Bigleaf Maple), *Alnus rhombifolia*, *Fraxinus dipetala* (California Flowering Ash), *Juglans californica* var. *californica* (Southern California Black Walnut), *Platanus racemosa* var. *racemosa*, *Populus balsamifera* ssp. *trichocarpa*, *P. fremontii* (Fremont Cottonwood), *Quercus agrifolia* var. *agrifolia* (Coast Live Oak), *Salix laevigata* (Red Willow), *Salix lasiolepis*, *S. lucida* ssp. *lasiandra*, and *Umbellularia californica* (California Bay). Shrub and herbaceous species include those typical of Palustrine Emergent and Scrub/Shrub Wetlands (described above).

ESTUARINE SYSTEM

The Estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. The Estuarine system includes both estuaries and lagoons. It is more strongly influenced by its association with the land than is the Marine system. Estuarine water regimes and water chemistry are affected by several environmental forces (tides, precipitation, freshwater runoff, evaporation, and wind), and salinities range from hyperhaline to oligohaline. (Cowardin et al. 1979.)

Estuarine Subtidal Aquatic Bed Wetland

Estuarine Subtidal Aquatic Bed Wetlands include substrate that is continuously submerged (subtidal) and consists of habitat dominated by plants that grow floating on, or rooted below, the water surface for most of the growing season. Aquatic Beds represent a diverse group of plant communities that require surface water for optimum growth and reproduction. (Cowardin et al. 1979.)

The mouth of the Ventura River Estuary is closed for long periods by a sandbar, which results in the formation of a nontidal lagoon. Permanently flooded habitats are not exposed at low tide when the mouth is open to the ocean. Most of the habitat is not vegetated; however, fragments of *Ruppia cirrhosa* (Spiral Wigeon-grass) was observed up-rooted and floating in the estuary, which is an important food source for water fowl (Sculthorpe 1967), and may be characteristic of brackish estuaries in central southern California. *R. cirrhosa* probably grows submerged in subtidal habitats in the Ventura River Estuary, but it has not been observed in those conditions. It does grow in permanently flooded estuarine habitats at the Second Mouth Estuary, where salinity conditions vary. (Ferren et al. 1990.)

Floating aquatic bed vegetation also occurs in the Estuarine Subtidal Aquatic Bed Wetlands of the Ventura River mouth. Under lagoonal conditions, when the surface salinity approximates 0.5-2‰, Lemna minor (Duckweed) and *Azolla filiculoides* (Mosquito Fern) occur in floating masses on the margins of the lagoon. Masses of the floating the green algae, *Enteromorpha intestinalis*, often occurs with them. Duckweed and Duckweed Fern are characteristic of freshwater habitats, such as in the channels of the Ventura River. They are probably washed down the river to the estuary, where they persist under slightly brackish (oligohaline) or freshwater conditions. (Ferren et al. 1990.)

Estuarine Intertidal Wetland

Estuarine Intertidal Wetlands include habitat of the Estuarine system with substrate that is exposed and flooded by tides, and it includes the associated splash zone (Cowardin et al. 1979).

Estuarine Intertidal Streambed Wetland

Estuarine Intertidal Streambed Wetlands include all channels of the Estuarine system that are completely dewatered at low tide. Streambed Wetlands vary greatly in substrate and form depending on the gradient of the channel, velocity of the water, and sediment load. In most cases, streambeds are not vegetated because of the scouring effect when moving water is present, but like Unconsolidated Shore (description follows), they may be colonized by pioneering annuals and perennials during periods of low flows, and may be too scattered to qualify as an Emergent or Scrub/Shrub Wetland. (Cowardin et al. 1979.)

Estuarine Intertidal Beach/Bar Wetland

Estuarine Intertidal Beach/Bar Wetland includes habitat of the Estuarine system with substrate (sand or cobbles and gravel) that is exposed and flooded by tides, and it includes the associated splash zone (Cowardin et al. 1979). This habitat is largely unvegetated.

Estuarine Intertidal Emergent Wetland

Estuarine Intertidal Emergent Wetlands are characterized by a dominance of erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation usually consists of perennial plants that are present for most or all of the growing season. (Cowardin et al.1979.)

Estuarine Nonpersistent Emergent Wetlands generally lack aboveground persistent parts and are frequently composed of annual plants that colonize seasonally or regularly exposed habitats. In the Ventura River Estuary, nonpersistent emergent vegetation occurs in Intertidal wetlands consisting of exposed lagoonal bars, flats, and shallow channel beds. These vegetated wetlands are uncommon in southern California and may be characteristic of, or even restricted to, lagoonal estuaries that occur at river mouths. Because brackish, rather than saline or hypersaline, conditions prevail, and because habitats are often exposed for weeks, annual plants can colonize habitats that do not exist in estuaries with greater marine influence. In the Ventura River Estuary, Estuarine Nonpersistent Emergent Wetland is characterized by the native species *Atriplex patula* (Spear-leaved Saltbush), *Chenopodium macrospermum* (Coast Goosefoot), and *Spergularia marina* var. *halophilum* (Salt Marsh Sandspurrey). Introduced species include *Cotula coronopifolia* and *Polypogon monspeliensis*. (Ferren et al. 1990.)

Estuarine Persistent Emergent Wetlands are dominated by perennial herbaceous species that usually have aboveground parts that persist from year to year. Several examples of Estuarine Persistent Emergent Wetlands occur in the study area. In the Ventura River Estuary, the dominant example is a brackish marsh on the margins of the estuary near high water of flooded lagoonal conditions. Characteristic species include *Typha domingensis* and *Scirpus californicus*. Similar vegetation occurs in and on the margins of the permanently flooded basin of the Second Mouth Estuary of the Ventura River with *Scirpus* spp. as the dominant vegetation. Also associated with the Second Mouth Estuary are seasonally flooded saline soils dominated by “salt marsh” vegetation consisting of succulent and suffrutescent perennials, including *Frankenia salina* (Alkali Heath), *Jaumea carnosa* (Jaumea), *Salicornia virginica* (Pickleweed), and *Distichlis spicata* (Coastal Saltgrass). Open, dissected substrates are often colonized by the naturalized biennial *Artemisia biennis* (Marsh Subshrub). (Ferren et al. 1990.)

Estuarine Intertidal Scrub/Shrub Wetland

Estuarine Intertidal Scrub/Shrub Wetlands occur only in the Estuarine and Palustrine systems, but are one of the most widespread classes in the U.S. This habitat type includes areas dominated by woody, generally broad-leaved deciduous plants less than six meters (20 feet) tall. The plant species of this wetland include true shrubs, young trees, and trees or shrubs that are small or stunted due to environmental conditions. Scrub/Shrub Wetlands may represent a successional stage leading to Forested Wetland, or may be relatively stable communities. All water regimes are included except subtidal. (Cowardin et al. 1979.)

In the study area, Estuarine Scrub/Shrub Wetlands occur in two forms, but is poorly developed and is largely transitional to Palustrine Scrub/Shrub Wetlands. On the margins of the Ventura River Estuary, it occurs near the limit of the high water during lagoonal conditions and is characterized by narrow interrupted bands of *Baccharis salicifolia*, *Salix lasiolepis*, and *Salix sessilifolia* (Sandbar Willow). In the vicinity of the Second Mouth Estuary, Estuarine Scrub/Shrub Wetland occurs north and south of the railroad on the margins of the Estuarine Persistent Emergent Wetland. *Atriplex lentiformis spp. breweri* (Brewer’s Saltbush) is the dominant shrub of the saline soils and is largely mixed with herbaceous species such as *Salicornia virginica* and *Euthamia occidentalis* (Western Goldenrod. This form of Estuarine Scrub/Shrub Wetland is transitional to Palustrine

Scrub/Shrub Wetland in the study area and is largely distinguished from the latter by proximity to the estuary and association with salt marsh species. Other woody scrub species that contribute to this Estuarine Scrub/Shrub Wetland type include *Baccharis salicifolia, Salix lasiolepis,* and *Tamarix ramosissima* (an invasive exotic). (Ferren et al. 1990.)

MARINE SYSTEM

The Marine System consists of the open ocean overlaying the continental shelf and its associated high-energy coastline. Marine habitats are exposed to the waves and currents of the open ocean are the water regimes are determined primarily by the ebb and flow of oceanic tides. Salinities exceed 30‰, with little or no dilution except outside the mouths of estuaries. (Cowardin et al. 1979.)

The Marine wetland and deepwater habitats in the study area are an extension of the Ventura River Delta. The delta is a product of the tectonic and related erosional and depositional processes of the Ventura River and the influence of the Pacific Ocean. The Intertidal and Subtidal habitats consist of rock and cobble deposited by the Ventura River and sorted by the ocean waves, tides, and currents. The cobble material ranges in size from 4 to 36 inches in diameter and is composed primarily of various types of sandstones derived from inland terrestrial formations. (Ferren et al. 1990.)

Marine Intertidal Beach/Bar Wetland

Marine Intertidal Beach/Bar Wetlands include habitat of the Marine system with substrate (sand or cobbles and gravel) that is exposed and flooded by tides, and it includes the associated splash zone (Cowardin et al. 1979).

Marine Intertidal Beach/Bar Wetlands (or High Intertidal Rocky Shore [Ferren et al. 1990]) occurs on the upper margins of the entire shoreline frontage of the study area. This area is flooded and exposed by the tides diurnally. The upper tidal areas are dominated by a variety of green algae, including *Enteromorpha* spp., *Ulva* spp., and *Chaetomorpha linum*. *Bryopsis corticulans* is relatively common here also. A number of red algae, such as *Pophyra* spp. and *Grateloupia doryphora*, can also be seasonally abundant as an overstory. (Ferren et al. 1990.)

UPLAND PLANT COMMUNITIES

Upland plant communities include vegetation dominated by plant species that do not require a permanent source of water (xerophytes), as opposed to plant species that are adapted to areas that are seasonally flooded or have saturated soils for at least a portion of the growing season (hydrophytes). Generally, upland plant communities consist of plant species that are adapted to dryer conditions and typically require only seasonal precipitation to obtain adequate water resources for growth and reproduction. Although most of the survey area is occupied by wetland habitats, several plant communities occupy the upland areas as well, including upland islands occurring as elevated terraces within the river floodplain, or immediately adjacent to the river's edge. The upland vegetation types observed in the surveyed portion of the Ventura River are classified as:

- ***Grassland***
  California Annual Grassland Series
  Ruderal Grassland Series
- ***Scrub***
  Black Sage Series
  Black Sage-California Sagebrush Series
  Mixed Sage Series
  California Buckwheat Series
  California Buckwheat-Black Sage Series
  California Buckwheat-California Sagebrush Series
  Coyote Brush Series
- ***Chaparral***
  Chamise Series
  Sumac Series
  Sumac-Black Sage Series
  Sumac-California Sagebrush Series
  Sumac-Ceanothus Series
  Sumac-White Sage Series
- ***Woodland***
  California Walnut Series
  Coast Live Oak Series
- ***Sand Dunes***
  Beach Sand
  Sand-verbena—Beach Bursage Series
- ***Human Influenced***
  Roads/Trails
  Citrus Orchard
  Riprap Levee
  Planted Trees
  Pond
  Concrete

GRASSLAND

Grassland consists of predominantly low-growing herbaceous and graminoid vegetation that forms a continuous groundlayer covering open hillsides, or forms understory patches below emergent shrubs, shrublands, and woodlands. Many native flowering annual herb and perennial bulb species (wildflowers), as well as naturalized annual forbs and invasive exotics, are important contributors to grassland.

Grassland typically grows in well-developed, deeper, fine textured soils on gentle slopes and flats, coastal terraces, and in disturbed sandy sites. Areas dominated by grasses are often in early successional stages, and over time, grassland tends to revert back to shrublands, and eventually even to woodlands, if burning and disturbance frequencies are minimal (Zedler et al. 1997).

The two mapped Grassland plant communities include California Annual Grassland Series and Ruderal Grassland Series.

California Annual Grassland Series

Although species composition varies among stands, alien and native annual grasses (genera including *Avena*, *Bromus*, *Hordeum*, *Lolium*, and *Vulpia*) typically dominate this plant community, while many native wildflowers, as well as naturalized annual forbs and invasive exotics, are important contributors to annual grassland. The major factors determining grassland composition include fall temperatures and precipitation, light intensity and shading, and microtopography variations. (Zedler et al. 1997).

California Annual Grassland Series occurs on all topographic locations, especially gradual slopes, flats, coastal terraces, and in disturbed sandy sites; it typically grows in well-developed, deep, fine textured soils; and it occurs at elevations below 1,200 meters (Sawyer and Keeler-Wolf 1995). California Annual Grassland Series observed scattered throughout the surveyed portion of the Ventura River exists as an understory growing below the Coast Live Oak Series (described below), it predominates on open terraces, and contributes to the Scrub and Chaparral plant communities as well.

The predominant nonnative annual grasses forming California Annual Grassland Series of the Ventura River include *Avena barbata* (Slender Wild Oat), *A. sativa* (Cultivated Oat), *Bromus diandrus*, *B. hordeaceus* (Soft Chess), *B. madritensis* ssp. *rubens* (Red Brome), *Lolium multiflorum* (Italian Ryegrass), *Schismus barbatus* (Mediterranean Grass), and *Vulpia myuros* (Fescue). The nonnative perennial grasses observed onsite are *Cynodon dactylon* (Bermuda Grass) and *Piptatherum miliaceum* (Smilo Grass).

The native herbaceous species recorded for California Annual Grassland Series include: *Ambrosia psilostachya* var. *californica* (Western Ragweed), *Camissonia* spp. (primroses), *Castilleja exserta* ssp. *exserta* (Purple Owl's Clover), *Chorizanthe staticoides* (Turkish Rugging), *Clarkia purpurea* ssp. *quadrivulnera* (Four-spotted Purple Clarkia), *C. unguiculata* (Elegant Farewell-to-Spring), *Conyza canadensis* (Horseweed), *Cryptantha* spp. (forget-me-nots), *Eremocarpus setigerus* (Dove Weed), *Heterotheca grandiflora* (Telegraphweed), *Lessingia filaginifolia* var. *filaginifolia* (California Cudweed-aster), *Lotus parishianus* var. *purshianus* (Parish Lotus), *Lupinus truncatus* (Truncate-leaved Lupine), *L. succulentus* (Fleshy Lupine), *Phacelia viscida* var. *viscida* (Sticky Phacelia), and *Verbena lasiostachys* (Western Verbena). Some of the naturalized, and often invasive, herbs scattered throughout California Annual Grassland Series include many of those listed below in Ruderal Grassland Series.

Ruderal Grassland Series

Ruderal Grassland Series forms plant communities that are typically in early successional stages as a result of severe human disturbance, or as a result of a recurrent natural disturbance. This plant community is dominated by herbaceous, introduced, pioneering plant species that readily colonize open disturbed soil and thrive as a result of human impacts. Ruderal communities may provide a certain degree of erosion control for recently disturbed or graded areas, but such communities are also a threat to the natural biodiversity. They continually distribute invasive, highly competitive, nonnative propagules into otherwise native vegetation; however, if ruderal grassland stands are not disturbed for more than five years, they can undergo succession towards more stable, and less weedy, plant communities such as coastal or riparian scrub. (Zedler et al. 1997.)

Ruderal Grassland Series observed in the disturbed portions of the Ventura River are most commonly dominated by *Hirschfeldia incana*, *Centaurea melitensis* (Tocalote), and *Picris echioides* (Bristly Ox-tongue). Some of the naturalized, and often invasive, associate herbs scattered throughout Ruderal Grassland Series include: *Amaranthus albus* (Tumbleweed), *Anagallis arvensis* (Scarlet Pimpernel), *Anthemis cotula* (Mayweed), *Bassia hysopifolia* (Five-hook), *Brassica nigra* (Black Mustard), *Chamomilla suaveolens* (Pineapple Weed), *Carduus pycnocephalus*, *Chenopodium ambrosioides* var. *ambrosioides* (Mexican Tea), *Erodium cicutarium* (Redstem Filaree), *Foeniculum vulgare* (Sweet Fennel [invasive]), *Gnaphalium luteo-album* (Lowland Cudweed), *Hypocharis glabra* (Smooth Cats-ear), *Lactuca serriola* (Prickly Wild Lettuce), *Marrubium vulgare* (White Horehound), *Medicago polymorpha* (Bur-clover), *Raphanus* spp. (wild radishes), *Salsola tragus* (Russian Thistle), *Silene gallica* (Windmill Pink), *Silybum marianum* (Milk Thistle), and *Sonchus* spp. (sow-thistles).

SCRUB

Scrub vegetation occupying the Ventura River is predominantly Coastal Sage Scrub, which is a type of shrubland that is dominated by drought-deciduous, low-growing shrubs and subshrubs. Coastal Sage Scrub forms various stands dominated by several different soft-leaved and grayish-green shrub species, and forms stands with specific characteristics and site requirements; therefore, Coastal Sage Scrub is often considered as a collection of species-specific plant series.

Scrub plant size and species composition is relative to the available water supply present at each site; however, these semi-woody plants are typically already low growing since drought seasons accompanied with high temperatures and drying winds cause severe moisture stress (Zedler et al. 1997). Scrub species form various canopy densities; they occupy shallow or heavy soils of dry gentle to steep, moderately rocky, predominantly southern-facing slopes; and they generally occur at lower elevations. Some larger evergreen shrubs, typically categorized as chaparral species, are also often observed as emergent shrubs within Coastal Sage Scrub.

Important associate shrub and herbaceous species observed contributing to the Coastal Sage Scrub Series throughout the Ventura River include: *Artemisia californica*, *Baccharis pilularis*, *Brickellia californica*, *Ceanothus spinosus* (Greenbark Ceanothus), *Dendromecon rigida* var. *rigida* (Bush Poppy), *Encelia californica* (California Bush Sunflower), *Epilobium canum* ssp. *canum* (California Fuchsia), *Eriogonum fasciculatum* var. *foliolosum*, *Galium angustifolium* ssp. *angustifolium* (Chaparral Bedstraw), *Hazardia squarrosa* (Sawtooth Goldenbush), *Lotus scoparius*, *Malacothamnus fasciculatus* var. *fasciculatus*, *Malosma laurina*, *Mimulus longiflorus* ssp. *longiflorus* (Sticky Bush Monkeyflower), *Opuntia littoralis* (Coast Prickly Pear), *Rhus integrifolia* (Lemonade Berry), *Ribes malvaceum* (Chaparral Currant), *Salvia apiana, Solanum xantii* var. *xantii* (Chaparral Nightshade), and *Yucca whipplei* ssp. *whipplei* (Our Lord’s Candle).

Typical Coastal Sage Scrub series subshrubs, perennial vines, and herbaceous plant species include: *Astragalus trichopodus* var. *phoxus*, *Calystegia* spp. (morning-glories), *Dudleya lanceolata* (Lanceleaf Live-forever), *Eriophyllum confertiflorum* var. *confertiflorum* (Golden Yarrow), *Gnaphalium californicum* (Green Everlasting), *Gnaphalium canescens* ssp. *beneolens*, *Heterotheca sessiliflora* var. *fastigiata*, *Keckiella* *cordifolia* (Heart-leaved Penstemon), *Leymus condensatus* (Giant Wildrye), and *Melica imperfecta* (Coast Melic Grass).

Black Sage Series

Black Sage Series is dominated by *Salvia mellifera*. *S. mellifera* resprouts both between and after recurring fires, although post-fire resprouting is sensitive to fire intensity. It responds to seasonal drought by reducing transpiring surface area through leaf curling and loss of larger leaves. Except for the driest years, few small green leaves remain on these shrubs even during the summer. This retention of some leaves makes it possible for *S. mellifera* to respond quickly to the first fall rains. (Zedler et al. 1997.) Black Sage Series forms a continuous or intermittent low canopy over a variable ground layer, it occurs on steep slopes with shallow soils, and is a common species of elevations less than 1,200 meters (Sawyer and Keeler-Wolf 1995). The associate shrub and herbaceous plant species observed as contributors to Black Sage Series include many of those listed above in the Coastal Sage Scrub (Scrub) section.

California Sagebrush-Black Sage Series

California Sagebrush-Black Sage Series is a scrub community that is co-dominated by *Artemisia californica* and *Salvia mellifera*. Sawyer and Keeler-Wolf (1995) describe California Sagebrush-Black Sage Series as being considered part of the Coastal Sage Scrub collection of series, and it forms a continuous or intermittent canopy over a variable ground layer. This series requires steep, south-facing slopes with colluvial-derived soils, and inhabits sites at elevations between 250 and 750 meters. The associate shrub and herbaceous plant species observed as contributors to California Sagebrush-Black Sage Series include many of those listed above in the Coastal Sage Scrub (Scrub) section.

Mixed Sage Series

The Mixed Sage Series observed within the Ventura River survey area is co-dominated by the highly aromatic *Salvia mellifera*, *S. apiana*, and *Artemisia californica* (*Eriogonum fasciculatum* is important as well). No single species or pair of species can dominate stands of this series; instead, three or more must equally share commonness and cover. This series is the most typical Coastal Sage Scrub plant community. Mixed Sage Series forms an intermittent to continuous canopy over a variable ground layer, and grows on sandy, rocky, shallow soils of upland slopes at elevations below 1,200 meters (Sawyer and Keeler-Wolf 1995). Associate species include those listed in Coastal Sage Scrub description (above).

California Buckwheat Series

California Buckwheat Series is dominated by *Eriogonum fasciculatum* (in this case, var. *foliolosum*). California Buckwheat Series forms an intermittent canopy (less than 1 meter tall) over a variable or grassy ground layer. This series requires shallow and rocky soils of dry, predominantly south-facing slopes and canyons, and is typically found scattered throughout terraces, foothills, and mountains at elevations below 1,200 meters. This series is likely to be seral to other plant communities and is most often found on slopes that have been disturbed within the last ten years. Other co-dominant California Buckwheat Series mapped for the Ventura River include the following:

- **California Buckwheat-Black Sage Series:** co-dominated by *Eriogonum fasciculatum* var. *foliolosum* and *Salvia mellifera*. *S. mellifera* is a common species of elevations below 1,200 meters (Hickman 1993). Sawyer and Keeler-Wolf (1995) list *S. mellifera* as an important shrub contributing to the canopy of California Buckwheat Series.

- **California Buckwheat-California Sagebrush Series:** co-dominated by *Eriogonum fasciculatum* var. *foliolosum* and *Artemisia californica*. *A. californica* is common on dry foothills especially near the coast below 800 meters (Hickman 1993). Sawyer and Keeler-Wolf (1995) list *A. californica* as an important shrub contributing to California Buckwheat Series.

These series are very similar to California Buckwheat Series, require similar site conditions, and include many of the same associate species. The associate shrub and herbaceous plant species observed as contributors to California Buckwheat Series, California Buckwheat-Black Sage Series, and California Buckwheat-California Sagebrush Series include many of those listed above in the Coastal Sage Scrub (Scrub) section.

Coyote Brush Series

Coyote Brush Series is dominated by *Baccharis pilularis*. Coyote Brush Series occurs in scrub and oak woodland communities on stabilized dunes of coastal bars, river mouths, coastline spits, coastal bluffs, open slopes (sometimes serpentine soils), and ecotonal areas with grasslands below 1,000 meters (3,281 feet) in elevation. This series forms a continuous or intermittent canopy (less than 2 meters tall), growing over a variable ground layer. The associate shrub and herbaceous plant species observed as contributors to Coyote Brush Series include many of those listed above in the Coastal Sage Scrub (Scrub) section.

CHAPARRAL

Chaparral is a type of shrubland that is dominated by evergreen shrubs with small, thick, leathery, dark green, sclerophyllous leaves. The shrubs of chaparral are relatively tall and dense, and are adapted to periodic wildfires by stump sprouting or by germination from a dormant seed bank. These evergreen shrubs are also adapted to drought by deep extensive root systems, while their small thick leaf structure prevents permanent damage from moisture loss (Zedler et al. 1997). Many typical Coastal Sage Scrub species also grow intermixed as associates with chaparral species. Chaparral typically occurs on moderate to steep south-facing slopes with dry, rocky, shallow soils, becoming more abundant with higher elevations where temperatures are lower and moisture supplies are more ample.

Important associate shrub species observed contributing to the Chaparral plant communities in the Ventura River include: *Arctostaphylos glauca* (Bigberry Manzanita), *Artemisia californica*, *Baccharis pilularis*, *Ceanothus crassifolius* (Snowball), *C. cuneatus* (Wedgeleaf Ceanothus), *C. megacarpus* var. *megacarpus* (Bigpod Ceanothus), *C. oliganthus* var. *oliganthus* (Hoary Ceanothus), *C. spinosus, Cercocarpus betuloides* var. *betuloides* (Birchleaf Mountain Mahogany), *Eriodictyon crassifolium* var. *nigrescens, Eriogonum fasciculatum* var. *foliolosum, Heteromeles arbutifolia* (Toyon), *Malacothamnus fasciculatus* var. *fasciculatus, Malosma laurina, Rhamnus ilicifolia* (Hollyleaf Redberry), *Rhus integrifolia, R. ovata* (Sugar Bush), *Salvia apiana, S. mellifera, Solanum xantii* var. *xantii,* and *Yucca whipplei* ssp. *whipplei.*

Chamise Series

Chamise Series is dominated by *Adenostoma fasciculatum*, a needle-leaved, evergreen shrub, which is the most abundant species in the non-desert shrublands of California. Chamise Series is the most common chaparral type throughout California. It is adapted to California's Mediterranean climate by a dual root system with both deep and shallow roots, and individuals recover from fire by both resprouting and seedling recruitment. *A. fasciculata* is usually associated with drier steep to gradual south- and west-facing slopes and ridges, and also occurs on xeric slopes on very shallow soils (often mafic-derived) at elevations below 1,600 meters. (Zedler et al. 1997.)

Sawyer and Keeler-Wolf (1995) describe Chamise Series as forming a continuous tall shrub canopy growing over a variable groundlayer, where herbaceous species are uncommon in older stands. Important associate shrub species observed contributing to the Chamise canopy include those listed above in the Chaparral description. Understory (ground layer) species are typically sparse, but include annual grasses and herbaceous species typical of the Coastal Sage Scrub plant communities.

Sumac Series

Sumac Series is dominated by *Malosma laurina,* which is a large shrub known to occur predominantly in chaparral series and as an important associate to scrub communities. This evergreen shrub has a deep, extensive root system that penetrates deep moisture reserves during summer drought and has thick, curved, reddish leaves that are folded at the leaf margin.

Sumac Series forms an open canopy over lower-growing shrubs with a sparse ground layer. This series typically requires steep north- and south-facing slopes with shallow coarse soils at elevations below 400 meters (1,312 feet). (Sawyer and Keeler-Wolf 1995.). Other co-dominant Sumac Series observed and mapped within the Ventura River survey area include the following:

- **Sumac-Black Sage Series:** co-dominated by *Malosma laurina* and *Salvia mellifera*. *S. mellifera* is a common species of elevations below 1,200 meters (Hickman 1993). Sawyer and Keeler-Wolf (1995) list *S. mellifera* as an important shrub contributing to the canopy of Sumac Series.
- **Sumac-White Sage Series:** co-dominated by *Malosma laurina* and *Salvia apiana*. *S. apiana* is common on dry slopes at elevations below 1,500 meters (Hickman 1993). Sawyer and Keeler-Wolf (1995) list *S. apiana* as an important contributor to Sumac Series.
- **Sumac-California Sagebrush Series:** co-dominated by *Malosma laurina* and *Artemisia californica*. *A. californica* is common on dry foothills especially near

the coast below 800 meters (Hickman 1993). Sawyer and Keeler-Wolf (1995) also list *A. californica* as an important shrub contributing to the Sumac Series canopy.

- **Sumac-Ceanothus Series:** co-dominated by *Malosma laurina* and one *Ceanothus* species (either *Ceanothus crassifolius*, *C. megacarpus* var. *megacarpus*, *C. oliganthus* var. *oliganthus*, or *C. spinosus*).

WOODLAND

Woodland describes vegetation dominated by woody trees and tall tree-like shrubs, forming an open to closed canopy, growing over a scattered variety of low-growing shrubs and a graminoid ground layer. Some woodland communities may not contain a shrub stratum, and may only form a tall canopy over annual or perennial grasslands. Woodland understory is directly related to the density of the tree canopy and its total percent canopy cover. Permanent shade, created by dense tree canopies, typically inhibits the growth of stratified canopy layers.

The two mapped Woodland plant communities include California Walnut Series and Coast Live Oak Series.

California Walnut Series

California Walnut Series is dominated by *Juglans californica* var. *californica* (Southern California Black Walnut), a broad-leaved winter-deciduous, monoecious, tree that blooms from March to May. *J. californica* is an uncommon and endemic species, ranging from Santa Barbara to Los Angeles County (coastal southern California), and is primarily found on canyon slopes of all slope aspects.

California Walnut Series occurs in intermittently flooded or saturated wetland soils of freshwater riparian corridors, floodplains, incised canyons, seeps, and stream or riverbanks; however, this woodland may also grow in deep, shale-derived soils of rarely flooded upland north-facing slopes, terraces, and flats at elevations between 150 and 900 meters. California Walnut Series forms an open to closed canopy (less than 10 meters tall) growing over a variable understory of common or infrequent shrubs and a sparse or grassy ground layer. (Sawyer and Keeler-Wolf 1995.)

J. californica was observed throughout the Ventura River area as a scattered tree in the Palustrine Forested Wetland (described above), and was observed as forming a woodland on several raised terraces, canyon slopes, and banks of the river corridor. The tree and shrub species growing as important associates to *J. californica* include: *Baccharis pilularis*, *B. plummerae var. plummerae* (Plummer Baccharis), *Clematis ligusticifolia* (Virgin Bower), *C. lasiantha* (Pipestem Clematis), *Heteromeles arbutifolia*, *Malosma laurina*, *Mimulus* spp., *Quercus agrifolia* var. *agrifolia*, and *Solanum* spp. (nightshades). The groundlayer is typically sparse.

Coast Live Oak Series

Coast Live Oak Series is dominated by *Quercus agrifolia* var. *agrifolia*, which is a broad-leaved, evergreen, broad-canopied tree with dark green leaves. *Q. agrifolia* is the most widely distributed species of the evergreen oaks, and it is capable of achieving large size and old age. This oak typically occurs in valleys on predominantly north-facing slopes, along riparian woodland fringes, scattered in grassland or Coastal Sage Scrub communities, as an element of Mixed Evergreen Forest, or as a contributor to other oak woodlands (Zedler et al. 1997).

Coast Live Oak Series forms an intermittent, 30-meter tall, tree canopy growing over an understory of occasional shrubs and a grassy/herbaceous groundlayer. It also requires sandstone or shale-derived soils of elevations below 1,200 meters (Sawyer and Keeler-Wolf 1995). Although *Q. agrifolia* was observed scattered along the Palustrine Forested Wetland and as an emergent tree in Coastal Sage Scrub and Chaparral plant communities (all described above), Coast Live Oak Series is primarily mapped as occurring on raised terraces between channels and is influenced significantly by California Annual Grassland Series (creating scattered oak savannahs throughout the river).

The native trees and large shrubs observed contributing to the oak canopy include *Juglans californica* var. *californica*, *Sambucus mexicana*, and *Umbellularia californica*; however, other introduced trees, such as *Eucalyptus* spp. and *Schinus molle* (Peruvian Pepper Tree) were also observed. The shrub stratum growing below the oak canopy typically includes many native species listed above in the Scrub section; however, other site specific species were observed as well, and they include: *Achnatherum coronatum* (Giant Needlegrass), *Baccharis plummerae* var. *plummerae*, *Calystegia macrostegia* ssp. *cyclostegia* (Morning-glory), *Garrya veatchii* (Silk-tassel Bush), *Heteromeles arbutifolia*, *Lonicera subspicata* var. *denudata* (Southern Honeysuckle), *Malosma laurina*, *Mimulus longiflorus* ssp. *longiflorus*, *Prunus ilicifolia* (Hollyleaf Cherry), *Rhamnus ilicifolia*, *R. californica* ssp. *californica* (California Coffeeberry), *Rosa californica* (California Wild Rose), *Symphoricarpos mollis* (Common Snowberry), *Toxicodendron diversilobum* (Poison Oak), and *Venegasia carpesioides* (Canyon Sunflower). The groundlayer associate species include those typical of California Annual Grassland Series (described above).

SAND DUNES

Sand Dune habitats consist of sparse to dense vegetation growing in aeolian sand deposits, primarily along the coast. The Sand Dune habitats mapped at the Ventura River mouth include Beach Sand and Sand-verbena--Beach Bursage Series.

Beach Sand

Beach Sand is a Sand Dune habitat mapped at the Ventura River mouth that is subject to wave action or deposition/removal of sand and gravel. Beach Sand consists primarily of sand substrate, and is inhabited by little to no vegetated

Sand-Verbena--Beach Bursage Series

Sand-verbena--Beach Bursage Series is a beach habitat mapped at the Ventura River mouth and is co-dominated by different species of *Abronia* (Sand-Verbena) and *Ambrosia chamissonis* (Beach Bursage). Sand-verbena--Beach Bursage Series occurs on upland habitats, such as sand dunes of coastal bars, river mouths, and spits along the immediate coastline, and is typically only found at sea level. Important associate plant species contributing to the intermittent vegetative cover include *Amsinckia spectabilis* var. *spectabilis* (Showy Fiddleneck), *Atriplex leucophylla* (Whiteleaf Saltbush), *Cakile maritima* (Sea Rocket), *Calystegia soldanella* (Beach Morning-glory), *Camissonia cheiranthifolia* ssp. *suffruticosa* (Beach Primrose), *Carpobrotus edulis* (Hottentot Fig [a succulent invasive exotic species that is colonizing some dune habitat]), *Croton californicus* (California Croton), *Distichlis spicata* (Saltgrass), *Eriogonum latifolium* (Dune Buckwheat), *Isocoma menziesii* var. *vernonioides* (Coastal Goldenbush), and *Lupinus chamissonis* (Dune Lupine). Individual emergent shrubs (such as *Baccharis pilularis* and *Atriplex lentiformis* spp. *breweri* [Brewer's Saltbush]) may be present throughout the scattered groundlayer created by this series. (Sawyer and Keeler-Wolf 1995.)

HUMAN-INFLUENCED

Land cover types, not dominated by naturally occurring vegetation, are included under the category of "Human-Influenced" types. Within the Ventura River, there are six specific land cover types in this category: roads/trails, citrus orchard, riprap levee, planted trees, pond, and concrete.

Roads/Trails

Road/Trails include all areas that have been altered by humans to incorporate access to different portions of the property. Roads and trails are generally graded and cleared of all or most vegetation to ensure that the access ways are kept maintained and functional for vehicle passage. Typically the nonnative, invasive species attempt to establish in these areas of high traffic, as they are generally the only species adapted for such severe conditions.

Citrus Orchard

Orchards are permanent crops of trees or large shrubs, usually for producing fruit. The ground surface may or may not be kept clear of herbaceous natural vegetation, depending on the farmer's maintenance practices. All natural vegetation is typically removed before an orchard is planted.

Riprap Levee

Riprap Levee is simply human-placed large boulders for the purposes of streambank protection from erosion. The substrate is typically angular boulders of foreign origin, but sometimes made of native rock. Riprap is largely unvegetated.

Planted Trees

Planted Trees often forms a nonnative woodland type habitat that exists as a result of planting introduced tree species for landscaping purposes. The ornamental trees observed within this mapping unit include *Cupressus macrocarpa* (Monterey Cypress), *Eucalyptus* spp. (eucalyptus), *Morus alba* (White Mulberry), *Olea europea* (Olive), *Pinus halepensis* (Aleppo Pine), *Populus alba* (White Poplar), *Robinia pseudoacacia* (Black Locust), *Schinus molle* (Peruvian Pepper Tree), *Tamarix ramosissima* (Saltcedar), and *Washingtonia robusta* (Mexican Fan Palm).

Pond

A pond is mapped once in the Ventura River floodplain area as a small man-made impoundment of freshwater.

Concrete

Concrete is a man-made, hard, strong building material that is formed by mixing a cementing material, sand and/or gravel, and water. The cement sets and binds together the entire mass. Concrete is mapped as river-crossings, a weir-diversion, and man-made cemented canals.

SECTION IV. ACKNOWLEDGEMENTS

This vegetation mapping and botanical resources report was written by Cher Batchelor and edited by David Magney. Mr. Magney and Ms. Batchelor conducted the floristic survey, habitat classification, and vegetation mapping.

SECTION V. CITATIONS

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APPENDIX G.

AIR QUALITY

G.1 AIR POLLUTANT CALCULATIONS

G.2 GENERAL CONFORMITY

APPENDIX G.1

AIR POLLUTANT CALCULATIONS

AIR POLLUTANT CALCULATIONS

Introduction

The air pollutant emissions for each alternative were estimated. The project scope for each of the work tasks and their respective schedules were determined for each alternative to form a basis of comparison when estimating the emissions for each alternative. The comparison of the Alternative tasks and schedules is provided in **Table G.1-1**.

The number and type of offroad construction equipment needed for each project task, or task group, was determined through consultation with the Corps and through equipment use estimates determined using the *Caterpillar Performance Handbook* (Caterpillar 1998). **Table G.1-2** presents the equipment use estimate summary for Project Alternative 4b.

The quantity of onroad traffic trips, for construction employees and material deliveries/waste disposal, were estimated for Alternative 4b, as shown in **Table G.1-3,** and this estimate was revised for each alternative based on its respective schedule and estimate of material use and waste disposal quantities. **Table G.1-4** provides the comparison of estimated onroad traffic trips and mileage for each of the project alternatives.

The air pollutant emissions were calculated using the project schedule, equipment, and traffic data developed for each alternative. The major project tasks through the completion of the dam removal were included in the emission estimate. The long-term restoration and recreation plan tasks that will be completed after completion of the dam removal were not included in the emission estimates. The project initiation date is estimated to be 2007.

Air Pollutant Emission Calculation Methodology

The air pollutant emission estimate methodology can be broken up into three separate subcategories: 1) offroad and stationary construction equipment tailpipe emissions; 2) Onroad vehicle tailpipe emissions; and 3) fugitive dust emissions (includes both offroad and onroad equipment).

The offroad diesel emission factors were developed using the emission factors and emission factor adjustments provided in USEPA's *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition* (USEPA 2002) reference. Emission factors were developed for an unmitigated case that assumed that the offroad equipment, including any stationary sources, would meet EPA Tier 0 equipment average emission factors; and for a mitigated case where it was assumed that the equipment would be required to be EPA Tier 1 or better. Other emission factor assumptions include: 1) the use of ultra-low sulfur diesel fuel (15 ppm sulfur by weight); and 2) no emission factor adjustment for engine deterioration based on the fact that for both cases there would be engines of higher Tiers than the base Tier assumed in the equipment mix that would more than compensate for the deterioration in performance of individual engines. The unmitigated and mitigated offroad equipment emission factor summary is presented in **Table G.1-5**. The methodology presented in this table was also used to determine the emission factors used for stationary diesel engines.

The onroad emission factors were determined using CARB's EMFAC2002 model (CARB 2004). The EMFAC model was used to develop emission factors for the specific trip distances used for employee trips to each of the project task locations and material delivery/waste disposal trips to and from each of the project task site locations. The EMFAC2002 default idle time assumptions were used and soak emissions were estimated based on the number of trips per vehicle per day (one round trip for employee vehicles with two soak intervals, and single or multiple round trips for material and waste delivery vehicles with a single overnight soak interval). The emission factors are conservatively based on Ventura County vehicle profiles in the year 2007. **Table G.1-6** presents the emission factors estimated by trip length and the heavy-duty diesel (HDD) vehicle daily soak emissions.

Fugitive dust emissions were calculated using the *Improvement of Specific Emission Factors (BACM Project No. 1)* report (MRI 1996) prepared for the South Coast Air Quality Management District. The Level 2 (area and amount of earthmoving known) factors were used to determine a conservative estimate of fugitive dust emissions. Both uncontrolled and controlled emissions were determined. Using the mitigation specified in Section 5.6 of the Draft EIS/EIR a total fugitive dust control of 85% was estimated. The specific fugitive dust emission factors, project assumptions, and calculation results for Alternative 4b are presented in **Table G.1-7**.

The offroad, onroad, and fugitive dust emission estimates for all of the project tasks were combined for each alternative to estimate the total project emissions. The emission summary and general assumptions used for the unmitigated and mitigated case for Alternative 4b are provided in **Table G.1-8**. A summary of the total emissions calculated for each project alternative including the maximum 12-month emissions for each alternative are presented **Table G.1-9**.

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Table G.1-1 - Project Schedule

Schedule From Notice to Proceed

Alternative 4b

Month - Start 2007 (best case)

#	**Preparation Tasks**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Notes
1	Clear Arundo, etc.			X	X	X																				Waste trucked to Slurry Disposal Area
2	Install Slurry Pipeline					X	X																			
3	Install Water Pipeline				X	X	X																			
4	Makeup Water Pipeline						X																			
5	Fauna Rescue, Relocation, Eradication	X	X																							
6	Prepare Slurry Disposal Area				X	X	X																			
7	Thickener/Water Tank/Cofferdam Installation				X	X																				
	Offsite Tasks completed prior to Dam Removal																									
8	Camino Cielo Protection															X										
9	Meiners Oaks Protection														X	X										
10	Live Oaks Protection													X	X											
11	Casitas Protection												X	X												
12	Canada Larga Protection											X	X													
13	Camino Cielo Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
14	Santa Ana Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15	Robles Diversion Dam/Sediment Bypass						X	X	X	X																
16	Robles Desiltation Basin																						X	X		
	Major Onsite Tasks																									
17	Dredging/Slurrying							X	X	X	X	X	X	X	X	X										
18	Channel/Other Excavation										X	X	X	X	X	X	X	X	X	X	X	X				
19	Soil Cement Wall											X	X	X	X	X	X	X	X	X	X	X				(this task may be deleted)
20	Dam Removal													X	X	X	X	X	X	X	X	X	X	X	X	
	Misc. Offsite Tasks																									
21	Foster Park Wells			X																						
22	Restoration																									After Completion of Dam Removal
23	Recreation Plan																									After Completion of Dam Removal
24	Demo Structures	X	X																							
25	Downstream Arundo Removal						X	X	X																	Waste trucked to Slurry Disposal Area

Table G.1-1 - Project Schedule

Schedule From Notice to Proceed
Alternative 1

Month - Start 2007 (best case)

#	**Preparation Tasks**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Notes
1	Clear Arundo, etc.			X	X	X																				Waste trucked to Slurry Disposal Area
2	Install Slurry Pipeline					X	X																			
3	Install Water Pipeline				X	X	X																			
4	Makeup Water Pipeline						X																			
5	Fauna Rescue, Relocation, Eradication	X	X																							
6	Prepare Slurry Disposal Area			X	X	X	X																			1.37 times Alt 4b
7	Thickener/Water Tank/Cofferdam Installation				X	X																				
	Offsite Tasks completed prior to Dam Removal																									
8	Camino Cielo Protection													X												
9	Meiners Oaks Protection													X												Total protection 0.33 times Alt 4b
10	Live Oaks Protection												X													
11	Casitas Protection											X														
12	Canada Larga Protection																									
13	Camino Cielo Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
14	Santa Ana Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15	Robles Diversion Dam/Sediment Bypass						X	X	X	X																
16	Robles Desiltation Basin																									
	Major Onsite Tasks																									
17	Dredging/Slurrying							X	X	X	X	X	X	X	X	X										
18	Channel Excavation										X	X	X	X	X	X	X	X	X	X	X	X				2.7 times Alt 4b excavation
19	Soil Cement Wall																									
20	Dam Removal													X	X	X	X	X	X	X	X	X	X	X	X	
	Misc. Offsite Tasks																									
21	Foster Park Wells																									
22	Restoration																									After Completion of Dam Removal
23	Recreation Plan																									After Completion of Dam Removal
24	Demo Structures	X	X																							
25	Downstream Arundo Removal						X	X	X																	Waste trucked to Slurry Disposal Area

- Not Required as part of this Alternative

Table G.1-1 - Project Schedule

Schedule From Notice to Proceed
Alternative 2a

Month - Start 2007 (best case)

#	Preparation Tasks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Notes
1	Clear Arundo, etc.			X	X	X																				Waste trucked to Slurry Disposal Area
2	Install Slurry Pipeline					X	X																			
3	Install Water Pipeline				X	X	X																			
4	Makeup Water Pipeline						X																			
5	Fauna Rescue, Relocation, Eradication	X	X																							
6	Prepare Slurry Disposal Area				X	X	X																			
7	Thickener/Water Tank/Cofferdam Installation				X	X																				
	Offsite Tasks completed prior to Dam Removal																									
8	Camino Cielo Protection																			X						
9	Meiners Oaks Protection																		X	X						
10	Live Oaks Protection																	X	X							
11	Casitas Protection																X	X								
12	Canada Larga Protection															X	X									
13	Camino Cielo Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
15	Santa Ana Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15	Robles Diversion Dam/Sediment Bypass												X	X	X	X										
16	Robles Desiltation Basin																									
	Major Onsite Tasks																									
17	Dredging/Slurrying							X	X	X	X	X	X	X	X	X										
18	Channel Excavation														X	X										0.15 times Alt 4b excavation
19	Soil Cement Wall																									
20	Dam Removal													X	X	X	X	X	X	X	X	X	X	X	X	
	Misc. Offsite Tasks																									
21	Foster Park Wells			X																						
22	Restoration																									After Completion of Dam Removal
23	Recreation Plan																									After Completion of Dam Removal
24	Demo Structures	X	X																							
25	Downstream Arundo Removal						X	X	X																	Waste trucked to Slurry Disposal Area

- Not Required as part of this Alternative

Table G.1-1 - Project Schedule

Schedule From Notice to Proceed
Alternative 2b

Month - Start 2007 (best case)

#	**Preparation Tasks**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18							Notes
1	Clear Arundo, etc.			X	X	X																				Waste Transported to Landfill
2	Install Slurry Pipeline																									
3	Install Water Pipeline																									
4	Makeup Water Pipeline																									
5	Fauna Rescue, Relocation, Eradication	X	X																							
6	Prepare Slurry Disposal Area																									
7	Cofferdam Installation				X	X																				Assume 50% activity of Alt 4b
	Offsite Tasks completed prior to Dam Removal																									
8	Camino Cielo Protection													X												
9	Meiners Oaks Protection												X	X												
10	Live Oaks Protection											X	X													
11	Casitas Protection										X	X														
12	Canada Larga Protection									X	X															
13	Camino Cielo Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
15	Santa Ana Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							This task may take two years
15	Robles Diversion Dam/Sediment Bypass										X	X	X	X												
16	Robles Desiltation Basin																									
	Major Onsite Tasks																									
17	Clamshell Dredging						X	X	X	X																
18	Channel Excavation								X	X																0.15 times Alt 4b excavation
19	Soil Cement Wall																									
20	Dam Removal							X	X	X	X	X	X	X	X	X	X	X	X							
	Misc. Offsite Tasks																									
21	Foster Park Wells			X																						
22	Restoration																									After Completion of Dam Removal
23	Recreation Plan																									After Completion of Dam Removal
24	Demo Structures	X	X																							
25	Downstream Arundo Removal						X	X	X																	Waste Transported to Landfill

- Not Required as part of this Alternative

Table G.1-1 - Project Schedule

Schedule From Notice to Proceed

Alternative 3a

Month - Start 2007 (best case)

#	Preparation Tasks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18							Notes
1	Clear Arundo, etc.			X	X	X																				Waste trucked to Slurry Disposal Area
2	Install Slurry Pipeline					X	X																			
3	Install Water Pipeline				X	X	X																			
4	Makeup Water Pipeline						X																			
5	Fauna Rescue, Relocation, Eradication	X	X																							
6	Prepare Slurry Disposal Area				X	X	X																			
7	Thickener/Water Tank/Cofferdam Installation				X	X																				
	Offsite Tasks completed prior to Dam Removal																									
8	Camino Cielo Protection															X										
9	Meiners Oaks Protection														X	X										
10	Live Oaks Protection													X	X											
11	Casitas Protection												X	X												
12	Canada Larga Protection											X	X													
13	Camino Cielo Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
15	Santa Ana Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							This task may take two years
15	Robles Diversion Dam/Sediment Bypass						X	X	X	X																
16	Robles Desiltation Basin																									
	Major Onsite Tasks																									
17	Dredging/Slurrying							X	X	X	X	X	X	X	X	X										
18	Channel/Other Excavation											X	X	X	X	X										0.15 times Alt 4b excavation
19	Soil Cement Wall																									
20	Dam Removal											X	X	X	X	X	X	X	X							60% of Alt 4b
	Misc. Offsite Tasks																									
21	Foster Park Wells			X																						
22	Restoration																									After Completion of Dam Removal
23	Recreation Plan																									After Completion of Dam Removal
24	Demo Structures	X	X																							
25	Downstream Arundo Removal						X	X	X																	Waste trucked to Slurry Disposal Area

- Not Required as part of this Alternative

Table G.1-1 - Project Schedule

Schedule From Notice to Proceed
Alternative 3b

Month - Start 2007 (best case)

#	**Preparation Tasks**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18							Notes
1	Clear Arundo, etc.			X	X	X																				Waste Transported to Landfill
2	Install Slurry Pipeline																									
3	Install Water Pipeline																									
4	Makeup Water Pipeline																									
5	Fauna Rescue, Relocation, Eradication	X	X																							
6	Prepare Slurry Disposal Area																									
7	Cofferdam Installation				X	X																				Assume 50% activity of Alt 4b
	Offsite Tasks completed prior to Dam Removal																									
8	Camino Cielo Protection														X											
9	Meiners Oaks Protection													X	X											
10	Live Oaks Protection												X	X												
11	Casitas Protection											X	X													
12	Canada Larga Protection										X	X														
13	Camino Cielo Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
15	Santa Ana Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							This task may take two years
15	Robles Diversion Dam/Sediment Bypass								X	X	X	X														
16	Robles Desiltation Basin																									
	Major Onsite Tasks																									
17	Clamshell Dredging						X	X	X																	
18	Channel Excavation									X	X															0.15 times Alt 4b excavation
19	Soil Cement Wall																									
20	Dam Removal															X	X	X	X							30% of Alt 4b
	Misc. Offsite Tasks																									
21	Foster Park Wells			X																						
22	Restoration																									After Completion of Dam Removal
23	Recreation Plan																									After Completion of Dam Removal
24	Demo Structures	X	X																							
25	Downstream Arundo Removal						X	X	X																	Waste Transported to Landfill

- Not Required as part of this Alternative

Table G.1-1 - Project Schedule

Schedule From Notice to Proceed
Alternative 4a

Month - Start 2007 (best case)

#	Preparation Tasks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Notes
1	Clear Arundo, etc.			X	X	X																				Waste trucked to Slurry Disposal Area
2	Install Slurry Pipeline					X	X																			
3	Install Water Pipeline				X	X	X																			
4	Makeup Water Pipeline						X																			
5	Fauna Rescue, Relocation, Eradication	X	X																							
6	Prepare Slurry Disposal Area				X	X	X																			
7	Thickener/Water Tank/Cofferdam Installation				X	X																				
	Offsite Tasks completed prior to Dam Removal																									
8	Camino Cielo Protection													X												
9	Meiners Oaks Protection													X												Total protection 0.33 times Alt 4b
10	Live Oaks Protection												X													
11	Casitas Protection											X														
12	Canada Larga Protection																									
13	Camino Cielo Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X							
15	Santa Ana Bridge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15	Robles Diversion Dam/Sediment Bypass						X	X	X	X																
16	Robles Desiltation Basin																									
	Major Onsite Tasks																									
17	Dredging/Slurrying							X	X	X	X	X	X	X	X	X										
18	Channel Excavation										X	X	X	X	X	X	X	X	X	X	X	X				
19	Channel Protection/RipRap											X	X	X	X	X	X	X	X	X	X	X				116,500 cy of riprap placement
20	Dam Removal													X	X	X	X	X	X	X	X	X	X	X	X	
	Misc. Offsite Tasks																									
21	Foster Park Wells																									
22	Restoration																									After Completion of Dam Removal
23	Recreation Plan																									After Completion of Dam Removal
24	Demo Structures	X	X																							
25	Downstream Arundo Removal						X	X	X																	Waste trucked to Slurry Disposal Area

- Not Required as part of this Alternative

Table G.1-2 Offroad Diesel Equipment Assumptions - Alternative 4B

#	Preparation tasks	D7 Dozer	Loader - 962G	Landscape Loader - 210LE	Excavator 330B L (also used as crane/wrecker/compactor)	Excavator/Hoe-Ram 320B L	Excavator/Drill 315B	Scrapers - 657E	Crane - Link Belt Hylab 5	Compactor 824G	Motor Grader 140H	Pile Driver - APE 14	Chippers	Chainsaws	Welder	Drill Rig	Water Trucks	Dump Trucks (or equivalent)	Dredge - Ellicott 670 Dragon
1	Clear Arundo, etc.	1		2	2								2	8					
2-4	Install Pipelines	1		1						1	1						1		
5	Fauna Rescue, Relocation, Eradication																		
6	Prepare Slurry Disposal Area	1	1		1			2									2		
7	Thickener/Water Tank/Cofferdam Installation	1	1		1						1				1		1		
	Offsite Tasks																		
8-12	Protection Areas	1	1					1									1		
13,14	Bridges	1	1		1	1			2	1	1	1					1		
15	Robles Diversion Dam/Sediment Bypass	1	1		1			1									1		
16	Robles Desiltation Basin	1	1		1			1									1		
	Onsite Tasks																		
17	Dredging/Slurrying																		2
18	Channel Excavation	1	1		1	1		2			1						2	2	
19	Soil Cement Wall	1	1														1	1	
20	Dam Removal	2	1		1	1	1										1	1	
	Misc. Tasks																		
21	Foster Park Wells															1			
22	Restoration																		
23	Recreation Plan																		
24	Demo Structures	1	1		1										1		1		
25	Downstream Arrundo Removal	1		2	2								2	8					

Table G.1-3 - Onroad Trip Assumptions
Alternative 4B

Import Trips

		Daily Avg	Cement/Concrete		Rock/Rip Rap		Earth		Pipe		Steel, etc.		Other Materials		
#	Preparation tasks	Employees	Amount cy	Trips	Amount cy	Trips	Amount cy	Trips	Amount (ft)	Trips	Amount lbs	Trips	Misc	trips	#
1	Clear Arundo, etc.	14											equip, herbicide	16	1
2	Install Slurry Pipeline	8							18,000	23			equip, tank, pumps	12	2
3	Install Water Pipeline	8							42,240	105			equipment, pumps	12	3
4	Makeup Water Pipeline	8							5,280	14			pumps	1	4
5	Fauna Rescue, Relocation, Eradication	12											rescue	100	5
6	Prepare Slurry Disposal Area	12											equip, vegetation	20	6
7	Thickener/Water Tank/Cofferdam Installation	12	90	10									Materials	10	7
	Project tasks														
	Offsite Tasks														
8	Camino Cielo Protection	12	562	63									equip	10	8
13	Camino Cielo Bridge	17	536	60	205	14	2,050	137			176,567	5	equip	10	13
9	Meiners Oaks Protection	12	480	54	1,440	97	55,020	3,668					equip	10	9
10	Live Oaks Protection	12	1,434	160	4,302	287	38,720	2,582					equip	10	10
14	Santa Ana Bridge	17	785	88	300	21	3,000	201			258,390	7	equip	10	14
11	Casitas Protection	12	1,880	209	5,642	377	84,740	5,650					equip	10	11
12	Canada Larga Protection	12	783	88	2,619	175	22,700	1,514					equip	10	12
15	Robles Diversion Dam/Sediment Bypass	12	2,500	278									equip	10	15
16	Robles Desiltation Basin	12											equip	10	16
	Onsite														
17	Dredging/Slurrying	17											equip	20	17
18	Channel Excavation	14											equip	12	18
19	Soil Cement Wall	10	5,082	323									equip	6	19
20	Dam Removal	20									46,513	2	equip	12	20
21	Foster Park Wells	3											equip, materials	3	21
22	Restoration	12													22
23	Recreation Plan	12													23
24	Demo Structures	12											equip	8	24
25	Downstream Arundo Removal	14											equip, herbicide	16	25
		Totals	14,132	1,333	14,508	971	206,230	13,752	65,520	142	481,470	14		338	

(equip trips incl. export)

Assumptions
1) concrete - 9cy per trip
2) rip/rap/soil -15 cy per trip
3) Offroad soil/rock volume - 15 cy per trip
4) concrete waste - 10 cy per trip then add 1.5 bulking factor
5) aggregate (wet) - 10 cy per trip
6) metal wastes - 40000 lb/trip
7) Misc wastes either 40000 lb/trip, or 15 cy per trip for light bulk loads (vegetation
8) 24 inch iron pipe - 400 linear ft per load (for ^40,000 lb load)
9) 20 inch HDPE pipe - 800 linear ft per load (from mfg website)
10) cement - 40000 lbs/trip
11) soilcrete is 10% cement, 90% native materials

Table G.1-3 - Onroad Trip Assumptions
Alternative 4B

Export Trips

	Concrete		Rock/Rip Rap		Earth		Pipe		Steel, etc.		Other Wastes	
Preparation tasks	Amount cy	Trips	Amount cy	Trips	Amount cy	Trips	Amount (ft)	Trips	Amount lbs	Trips	Misc	trips
Clear Arundo, etc.											veg removal	12,707
Install Slurry Pipeline (then remove?)							21,120	27			veg removal	34
Install Water Pipeline (then remove?)							42,240	105			veg removal	67
Makeup Water Pipeline (then remove?)							5,280	14				
Fauna Rescue, Relocation, Eradication												
Prepare Slurry Disposal Area												
Thickener/Water Tank/Cofferdam Installation												
Project tasks												
Offsite												
Camino Cielo Protection											veg removal	2
Camino Cielo Bridge	421	43	186	13	4,806	321			219,186	6	fence/rail	2
Meiners Oaks Protection											veg removal	2
Live Oaks Protection											veg removal	2
Santa Ana Bridge	617	62	272	19	7,033	469			320,760	9	fence/rail	3
Casitas Protection											veg removal	2
Canada Larga Protection											veg removal	2
Robles Diversion Dam/Sediment Bypass												
Robles Desiltation Basin												
Onsite												
Dredging/Slurrying												
Channel Excavation												
Soil Cement Wall												
Dam Removal	72,285	7,229									Wastes	210
Foster Park Wells											Wastes	1
Restoration												
Recreation Plan												
Demo Structures											Debris	472
Downstream Arundo Removal											veg removal	14,352
Totals	73,323	7,334	458	32	11,839	790	68,640	146	539,946	15		27,858

Assumptions
1) concrete - 9cy per trip
2) rip/rap/soil -15 cy per trip
3) Offroad soil/rock volume - 15 cy per trip
4) concrete waste - 10 cy per trip
5) aggregate (wet) - 10 cy per trip
6) metal wastes - 40000 lb/trip
7) Misc wastes either 40000 lb/trip, or 15 cy per trip for light bulk loads (vegetation
8) 24 inch iron pipe - 400 linear ft per load (for ^40,000 lb load)
9) 20 inch HDPE pipe - 800 linear ft per load (from mfg website)
10) cement - 40000 lbs/trip
11) soilcrete is 10% cement, 90% native materials

Table G.1-4 Onroad Trip Summary by Alternative

	Employee Vehicles		Heavy Duty Vehicles		Notes
Alternative	Trips	Miles	Trips	Miles	
4b	33,992	1,495,392	53,125	1,290,234	
1	37,730	1,720,004	187,682	8,159,678	Aggregate sales comprise majority of trips and miles
2a	31,090	1,353,604	52,786	1,270,546	
2b	22,754	940,116	52,207	2,817,134	Biomass sent to landfill vs. slurry disposal site
3a	24,130	1,048,804	49,685	1,081,706	
3b	16,648	678,016	46,999	2,521,664	Biomass sent to landfill vs. slurry disposal site
4a	30,830	1,375,004	43,455	717,948	Waste concrete remains onsite

	Employee Vehicles		Heavy Duty Vehicles	
Alternative	Avg Trips/Day	Avg. Miles/Day	Avg Trips/Day	Avg. Miles/Day
4b	68	2,991	107	2,581
1	76	3,441	376	16,320
2a	63	2,708	106	2,542
2b	61	2,507	140	7,513
3a	65	2,797	133	2,885
3b	45	1,809	126	6,725
4a	62	2,751	87	1,436

Note: assumes 250 days/year (however slurrying activities will operate 24/7)

Table G.1-5 Offroad Equipment Emission Factors

	Engine Assumptions				Base Emission Factors g/bhp					Load Adjustment Factors						Fuel Sulfur Adjustment	Fuel Rate Adjustment	Adjusted Emission Factors g/BHP				
Equipment	**HP**	**HP Cat.**	**Tier**	**BSFC lb/hp-hr**	**NOx**	**CO**	**VOC**	**SOx**	**PM10**	**Adj. Type**	**NOx**	**CO**	**VOC**	**SOx**	**PM10**	**PM10 Fuel S**	**BSFC**	**NOx**	**CO**	**VOC**	**SOx**	**PM10**
D7 Dozer	200	175-300	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Tractor - D7G	200	175-300	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Loader - 962G	200	175-300	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Landscape Loader - 210LE	73	50-100	0	0.408	6.9	3.49	0.99	0.00555	0.722	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.113	0.481	7.59	8.97	2.27	0.0063	1.31
Excavator 330B L	222	175-300	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Excavator/Hoe-Ram 320B L	128	100-175	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Excavator/Drill 315B	99	50-100	0	0.408	6.9	3.49	0.99	0.00555	0.722	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	6.56	5.34	1.04	0.0055	0.79
Excavator/Compactor 330B L	222	175-300	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Scrapers - 657E	950	300-600	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Offroad Truck - Cat 771D	510	300-600	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Offroad Watertruck - Cat 769D	510	300-600	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Compactor 824G	315	300-600	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Compactor CB-534C	107	100-175	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Motor Grader 12H	140	100-175	0	0.367	8.38	2.7	0.68	0.00499	0.402	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	7.96	4.13	0.71	0.0049	0.41
Chippers - WC 342G	100	100-175	0	0.367	8.38	2.7	0.68	0.00499	0.402	None	1	1	1	1	1	-0.086	0.367	8.38	2.70	0.68	0.0049	0.32
Excavator/Pipelayers 315B	99	50-100	0	0.408	6.9	3.49	0.99	0.00555	0.722	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	6.56	5.34	1.04	0.0055	0.79
Crane Mounted Clamshell Dredges	187	175-300	0	0.367	8.38	2.7	0.68	0.00499	0.402	None	1	1	1	1	1	-0.086	0.367	8.38	2.70	0.68	0.0049	0.32
Diesel Powered Welder - DAW500SS	34.5	25-50	0	0.408	6.9	5	1.8	0.00555	0.8	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.094	0.40	7.59	12.85	4.12	0.0052	1.48
Chainsaws Stihl MS 460	6	3-6	na	0.870	4	449.66	120.06	0.02368	7.7	None	1	1	1	1	1	0	0.40	4.00	449.66	120.06	0.0034	7.70
Equipment	**HP**	**HP Cat.**	**Tier**	**BSFC lb/hp-hr**	**NOx**	**CO**	**VOC**	**SOx**	**PM10**	**Adj. Type**	**NOx**	**CO**	**VOC**	**SOx**	**PM10**	**PM10 Fuel S**	**BSFC**	**NOx**	**CO**	**VOC**	**SOx**	**PM10**
D7 Dozer	200	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Tractor - D7G	200	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Loader - 962G	200	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Landscape Loader - 210LE	73	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.113	0.481	6.16	6.08	1.19	0.0064	0.82
Excavator 330B L	222	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Excavator/Hoe-Ram 320B L	128	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Excavator/Drill 315B	99	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Excavator/Compactor 330B L	222	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Scrapers - 657E	950	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.71	2.00	0.21	0.0049	0.16
Offroad Truck - Cat 771D	510	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.71	2.00	0.21	0.0049	0.16
Offroad Watertruck - Cat 769D	510	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.71	2.00	0.21	0.0049	0.16
Compactor 824G	315	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.71	2.00	0.21	0.0049	0.16
Compactor CB-534C	107	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Motor Grader 12H	140	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Chippers - WC 342G	100	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	None	1	1	1	1	1	-0.086	0.367	5.65	0.87	0.34	0.0049	0.19
Excavator/Pipelayers 315B	99	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.473	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Crane Mounted Clamshell Dredges	187	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	None	1	1	1	1	1	-0.086	0.367	5.58	0.75	0.31	0.0049	0.17
Diesel Powered Welder - DAW500SS	34.5	25-50	1	0.408	4.7279	1.5323	0.2789	0.00555	0.3389	Lo LF	1.1	2.57	2.29	1.18	1.97	-0.094	0.40	5.20	3.94	0.64	0.0053	0.57
Chainsaws Stihl MS 460	6	3-6	na	0.870	4	449.66	120.06	0.02368	7.7	None	1	1	1	1	1	0	0.40	4.00	449.66	120.06	0.0034	7.70

Table G.1-6 - On-Road Equipment Emission Factors

Passenger Vehicles

	Emission Factors g/trip				
Trip Length (miles)	NOx	CO	VOC	SOx	PM10
22	9.60	97.42	8.82	0.08	0.68
24	10.35	103.67	9.24	0.09	0.74
26	11.09	109.93	9.69	0.10	0.80
28	11.84	116.18	10.13	0.11	0.86
44	17.79	166.24	13.49	0.16	1.33
46	18.54	172.49	13.93	0.17	1.39
48	19.28	178.75	14.37	0.18	1.45
50	20.03	185.00	14.81	0.18	1.51
100	38.65	341.41	25.75	0.36	2.97

Heavy Duty Diesel Vehicles

	Emission Factors g/trip				
Trip Length (miles)	NOx	CO	VOC	SOx	PM10
2	27.68	23.40	3.78	0.04	1.02
6	75.86	43.86	7.43	0.13	2.35
12	134.73	70.02	11.59	0.25	3.90
16	174.77	80.79	13.00	0.31	4.61
20	221.02	92.18	14.15	0.39	5.22
22	241.89	101.00	15.47	0.42	5.71
24	262.76	109.81	16.80	0.46	6.21
26	283.62	118.63	18.12	0.50	6.70
28	304.49	127.45	19.40	0.54	7.19
32	346.23	145.08	22.04	0.61	8.18
34	367.10	153.89	23.36	0.65	8.68
36	387.96	162.71	24.68	0.69	9.17
38	408.83	171.53	26.01	0.73	9.66
48	513.17	215.61	32.62	0.92	12.13
52	554.91	233.24	35.26	0.99	13.12
54	575.78	242.05	36.58	1.03	13.62
56	596.64	250.87	37.90	1.07	14.11
58	617.51	259.69	39.23	1.11	14.60
62	659.25	277.32	41.87	1.18	15.59
72	763.59	321.40	48.48	1.37	18.06
74	784.46	330.21	49.80	1.41	18.56
78	826.19	347.85	52.45	1.49	19.54
80	847.06	356.66	53.77	1.53	20.04
82	867.93	365.48	55.09	1.56	20.53
90	951.40	400.74	60.38	1.72	22.51
100	1055.74	444.82	66.99	1.91	24.98
150	1577.44	665.22	100.04	2.86	37.33
160	1891.56	777.67	121.73	3.15	44.54
200	2099.14	885.62	133.09	3.81	49.68

Notes

1) EMFAC2002 emission factors for Ventura County 2007.

2) EMFAC2002 default idle times for each vehicle type included in estimate.

3) Daily soak emissions included as separate emission factor for HDD vehicles.

	NOx	CO	VOC	SOx	PM10
HDD Soak g/day	24.43	324.76	24.23	0.01	0.04

Table G.1-7 - Fugitive Dust PM_{10} Emission Calculations
Alternative 4b

#	Onsite Fugitive Dust Emissions Preparation Tasks	Disturbed Acres	Duration Month	Onsite Earthmoving Cubic Yards	Offsite Earthmoving Cubic Yards	Uncontrolled Emissions Tons/task	Controlled* Emissions Tons/task	Notes
1	Clear Arundo, etc.	59	3	0	0	1.9	0.3	118 acres with 1/2 disturbed at any one time
2	Install Slurry Pipeline	5.8	2	0	0	0.1	0.0	4 miles x 24 feet with 1/2 disturbed on average
3	Install Water Pipeline	11.6	3	0	0	0.4	0.1	8 miles x 24 feet with 1/2 disturbed on average
4	Makeup Water Pipeline	1.5	1	0	0	0.0	0.0	1 mile x 24 feet with 1/2 disturbed on average
5	Fauna Rescue, Relocation, Eradication	--	--	--	--	--	--	
6	Prepare Slurry Disposal Area	47	3	500000	0	31.1	4.7	94 acre site with 1/2 disturbed on average
7	Thickener/Water Tank/Cofferdam Installation	2	2	10000	0	0.6	0.1	Engineering estimate
	Offsite Tasks completed prior to Dam Removal							
8	Camino Cielo Protection	0.5	1	0	0	0.0	0.0	Estimate from Draft Feasibility Study
9	Meiners Oaks Protection	5.9	2	0	55020	12.2	1.8	
10	Live Oaks Protection	7.6	2	0	38720	8.7	1.3	
11	Casitas Protection	5.9	2	0	84740	18.8	2.8	
12	Canada Larga Protection	7	2	0	22700	5.1	0.8	
13	Camino Cielo Bridge	0.25	18	8516.5	0	0.6	0.1	Engineering estimates
14	Santa Ana Bridge	0.5	24	17033	0	1.1	0.2	Disturbed acres engineering estimate
15	Robles Diversion Dam/Sediment Bypass	25	4	324074	0	20.2	3.0	
16	Robles Desiltation Basin	5	2	120000	0	7.2	1.1	
	Major Onsite Tasks							
17	Dredging/Slurrying	--	--	--	--	--	--	Wet activity - negligible fugitive dust potential
18	Channel Excavation	18.4	12	1300000	0	79.1	11.9	200 feet x 8000 feet total with 1/2 disturbed on average at any one time
19	Soil Cement Wall	0	11	90000	0	5.3	0.8	90000 cy disced (1.5 feet deep) - disturbed acres assumed in Task 18
20	Dam Removal	5	12	8500	0	1.2	0.2	Engineering estimates
	Miscellaneous Tasks							
21	Foster Park Wells	--	--	--	--	--	--	Negligible fugitive dust potential
22	Restoration	--	--	--	--	--	--	
23	Recreation Plan	--	--	--	--	--	--	
24	Demo Structures	5	2	1000	0	0.2	0.0	Engineering estimates
25	Downstream Arundo Removal	67	3	0	0	2.2	0.3	134 acres with 1/2 disturbed at any one time

* - Fugitive Dust Control Efficiency Assumption 85%

Paved Road Fugitive Dust Emissions	Miles	Emission Factor Lbs/VMT	Uncontrolled Emissions Tons/task	Controlled Emissions Tons/task
Passenger Vehicle	1495392	0.000269233	0.2	0.2
Heavy Duty Diesel	1290234	0.027715802	17.9	17.9
		Total Emissions	**214.2**	**47.5**

BACM Level 2 emission factors	Emission Factor	Units
Disturbed Acres	0.011	ton/acre-month
Onsite Cut/Fill Earthmoving	0.059	ton/1000 cuyd
Offsite Cut/Fill Earthmoving	0.22	ton/1000 cuyd

Paved Road Emission Calculation	**k (const)**	**sL (g/m2)**	**W (tons)**	**C (lbs/VMT)**	**P (days)**	**E (lbs/VMT)**
E = [k(sL/2)^0.65*(W/3)^1.5 -C]*(1-P/(4*365))	0.016	0.03	2.4	0.00047	40	0.00026923
E = [k(sL/2)^0.65*(W/3)^1.5 -C]*(1-P/(4*365))	0.016	0.03	27.5	0.00047	40	0.0277158

Table G.1-8 - Task Emission Estimate Summary - Alternative 4B

		Unmitigated Case Task Daily Emissions (lbs/day)					Unmitigated Case Task Emissions (tons/task)					Mitigated Case Task Daily Emissions (lbs/day)					Mitigated Case Task Emissions (tons/task)				
#	Task	NOx	CO	VOC	SOx	PM10	NOx	CO	VOC	SOx	PM10	NOx	CO	VOC	SOx	PM10	NOx	CO	VOC	SOx	PM10
1	Arundo Removal Reaches 7-9	86.36	235.40	60.04	0.05	8.34	2.09	5.53	1.41	0.00	0.21	59.53	207.29	55.28	0.05	6.22	1.45	4.85	1.29	0.00	0.15
2-4	Pipeline Installation	52.42	27.20	4.70	0.03	2.68	1.81	0.94	0.16	0.00	0.09	36.26	10.38	1.81	0.03	1.30	1.25	0.36	0.06	0.00	0.04
5	Fauna Resc/relo/erad.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Prepare Slurry Disposal Area	274.80	142.59	24.65	0.17	14.07	9.48	4.92	0.85	0.01	0.49	194.54	63.40	8.07	0.17	5.94	6.71	2.19	0.28	0.01	0.21
7	Dam Site Preparation	77.86	44.74	8.66	0.05	4.52	0.73	0.39	0.07	0.00	0.04	52.63	14.14	3.19	0.05	2.30	0.49	0.13	0.03	0.00	0.02
8-12	Protection Areas	152.85	79.31	13.71	0.09	7.83	8.79	4.56	0.79	0.01	0.45	107.55	33.92	4.66	0.09	3.41	6.18	1.95	0.27	0.01	0.20
13,14	Bridges	123.53	55.39	10.70	0.07	5.73	1.89	0.89	0.17	0.00	0.09	83.74	18.52	4.52	0.07	2.94	1.28	0.29	0.07	0.00	0.05
15	Robles Diversion Dam/Sediment Bypass	172.55	89.53	15.48	0.11	8.84	7.35	3.81	0.66	0.00	0.38	120.66	36.75	5.46	0.11	3.96	5.17	1.63	0.22	0.00	0.16
16	Robles Desiltation Basin	172.55	89.53	15.48	0.11	8.84	3.53	1.83	0.32	0.00	0.18	120.66	36.75	5.46	0.11	3.96	2.48	0.78	0.11	0.00	0.08
17	Dredging/Slurrying	1731.77	287.43	74.84	1.39	35.02	233.79	38.80	10.10	0.19	4.73	1012.58	263.42	47.73	1.39	15.26	25.54	13.56	1.70	0.05	0.66
18	Channel Excavation	357.39	185.45	32.05	0.22	18.30	44.67	23.18	4.01	0.03	2.29	252.40	81.26	10.74	0.22	7.90	31.55	10.16	1.34	0.03	0.99
19	Soil Cement Wall	34.63	17.97	3.11	0.02	1.77	3.98	2.07	0.36	0.00	0.20	23.81	6.58	1.28	0.02	0.92	2.74	0.76	0.15	0.00	0.11
20	Dam Removal	68.80	35.96	6.23	0.04	3.59	9.39	4.88	0.84	0.01	0.48	46.76	12.06	2.74	0.04	1.96	6.37	1.61	0.37	0.01	0.26
21	Foster Park Wells	38.50	8.78	0.97	0.03	0.89	0.02	0.00	0.00	0.00	0.00	27.24	8.53	1.16	0.03	0.50	0.01	0.00	0.00	0.00	0.00
22	Restoration	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
23	Recreation Plan	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
24	Dam Site Equipment Demo	68.20	39.73	7.79	0.04	4.03	0.16	0.09	0.02	0.00	0.01	46.12	12.53	2.76	0.04	1.99	0.11	0.03	0.01	0.00	0.00
25	Downstream Arundo Removal	86.36	235.40	60.04	0.05	8.34	2.36	6.25	1.59	0.00	0.24	59.53	207.29	55.28	0.05	6.22	1.64	5.48	1.46	0.00	0.17
(2)	On-Road Emissions Passenger Vehicles	na	na	na	na	na	0.67	6.23	0.51	0.01	0.05	na	na	na	na	na	0.67	6.23	0.51	0.01	0.05
(2)	On-Road Emissions HDD Vehicles	na	na	na	na	na	14.66	9.05	1.20	0.03	0.36	na	na	na	na	na	14.66	9.05	1.20	0.03	0.36
	Totals						345.36	113.44	23.05	0.28	10.28						108.31	59.05	9.06	0.14	3.51
	Offroad mobile equipment subtotal						330.04	98.15	21.35	0.25	9.87						92.98	43.77	7.35	0.11	3.10
	On-road mobile equipment subtotal						15.32	15.28	1.71	0.03	0.41						15.32	15.28	1.71	0.03	0.41
	Stationary equipment subtotal						233.79	38.80	10.10	0.19	4.73						25.54	13.56	1.70	0.05	0.66

Unmitigated Case - Includes trucking of biomass to landfill, onsite pumps driven with engines meeting CARB portable engine standards, and average Tier 0 offroad mobile equipment.
Mitigated Case - Includes trucking of biomass to landfill, electrification of all stationary equipment, and Tier 1 offroad mobile equipment.

(1) - These activities are assumed to occur after the main project schedule, and will not occur during the worst-case year and therefore were not estimated.
(2) - Includes all onroad activities except those occuring after the completion of the dam removal.

Table G.1-9 - Project Alternatives Emission Summary

Unmitigated Emissions from Project Initiation Through Dam Removal

Alternative	NOx	CO	VOC	SOx	PM10
4b	345.4	113.4	23.1	0.3	224.4
1	515.0	202.8	35.9	0.5	456.4
2a	299.5	88.5	18.9	0.2	142.5
2b	80.9	56.7	9.6	0.1	127.1
3a	292.7	84.3	18.2	0.2	139.0
3b	67.3	48.7	8.4	0.1	121.4
4a	334.2	107.3	22.2	0.3	174.8

Unmitigated Worst Case 12-month Emissions

Alternative	NOx	CO	VOC	SOx	PM10
4b	302.5	87.3	18.7	0.2	163.3
1	401.0	145.3	25.1	0.4	349.8
2a	274.7	72.0	16.2	0.2	97.5
2b	74.4	52.5	9.0	0.1	122.5
3a	286.7	78.8	17.3	0.2	134.0
3b	61.3	44.8	7.9	0.1	117.2
4a	294.4	82.8	18.0	0.2	127.3

Unmitigated assumes:
1) No electric power will be available onsite or at Lake Casitas
2) Average Tier 0 offroad equipment
3) No fugitive dust controls

Mitigated Emissions from Project Initiation Through Dam Removal

Alternative	NOx	CO	VOC	SOx	PM10
4b	108.3	59.1	9.1	0.1	51.0
1	258.7	129.4	18.0	0.3	168.6
2a	75.9	47.5	7.6	0.1	37.8
2b	66.6	42.1	7.0	0.1	54.0
3a	70.5	44.8	7.1	0.1	34.8
3b	56.1	37.4	6.3	0.1	49.4
4a	98.3	54.1	8.4	0.1	49.5

Mitigated Worst Case 12-month Emissions

Alternative	NOx	CO	VOC	SOx	PM10
4b	76.6	44.2	6.8	0.1	35.3
1	197.7	89.7	11.5	0.3	136.6
2a	56.0	36.1	5.8	0.1	25.0
2b	61.3	39.3	6.6	0.1	50.5
3a	65.6	40.4	6.4	0.1	31.3
3b	51.2	34.7	5.9	0.1	46.1
4a	69.7	41.0	6.5	0.1	39.0

Unmitigated assumes:
1) Electric power will be available for all stationary equipment (except dredges)
2) Minimum Tier 1 offroad equipment
3) Fugitive dust controls

APPENDIX G.2

GENERAL CONFORMITY

1. INTRODUCTION

The U.S. Army Corps of Engineers (Corps) is in the process of evaluating the environmental effects of the Matilija Dam Ecosystem Restoration Project, which aims to remove both Matilija Dam and accumulated sediment. Removal of Matilija Dam would eliminate a barrier to fish passage on Matilija Creek and facilitate the migration, spawning, and rearing of endangered southern steelhead. Accumulated sediment would be removed or re-configured to improve the Matilija Creek flow regime and ultimately restore Matilija Creek to a more natural pre-dam streambed configuration.

Based on the General Conformity requirements (40 CFR Part 93 et seq; November 1993), the Corps must make a determination of whether the Proposed Action "conforms" with the State Implementation Plan (SIP). Conformity is defined as compliance with the SIP's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards, and that the activities will not:

- Cause or contribute to any new violation of any standard;
- Increase the frequency or severity of any existing violation of any standard in any area; or
- Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

2. GENERAL CONFORMITY REQUIREMENTS

Under USEPA regulations, a conformity analysis must be prepared only for criteria pollutants in non-attainment areas (see 58 FR 63214 - November 30, 1993). Moreover, according to 40 CFR Section 93.153 (Applicability of the General Conformity requirements), if the total direct and indirect emissions from the Proposed Action are below the General Conformity Rule "de minimis" emission thresholds, the Proposed Action would be exempt from performing a comprehensive Air Quality Conformity Analysis, and would be considered to be in conformity with the SIP. Table 1 provides the current General Conformity "de minimis" emission thresholds for Ventura County. As indicated in Table 1, emission thresholds for NOx and VOC (precursors to ozone formation) pollutants are very low because Ventura County is designated severe non-attainment of the 1-hour ozone NAAQS. However, current air quality planning documents indicate that Ventura will attain the 1-hour ozone NAAQS by 2005, at least two years before the project begins.

Table 1: General Conformity "de minimis" Emission Thresholds

Pollutant	Threshold (tons/year)
VOC	25
NO_x	25

Source: 40 CFR Part 93.153 (b) (1)

Ventura County has also recently been designated as a moderate non-attainment for the 8-hour ozone NAAQS.[1] The initial PM2.5 attainment designation for Ventura County will occur in December 2004, and it is expected that Ventura County will be designated as attainment or unclassifiable.[2] Ventura County is in attainment for carbon monoxide, nitrogen dioxide, PM_{10}, lead, and sulfur dioxide. Therefore, these five criteria pollutant standards were not evaluated for purposes of conformity.

Section 40 CFR Part 93.158 (a) states that if project emission levels exceed the "*de minimis*" emission rates listed in Part 93.153(b), and there is no applicable exemption, then a conformity analysis must be prepared. A conformity analysis would require that the Federal agency demonstrate (through computer modeling, purchasing offsets, or other avenues) that emissions associated with a proposed project are in compliance with the SIP. In addition, the conformity determination criteria (which are listed in Part 93.158), requires a public participation program. Requirements include a 30-day public comment period, notification in the daily newspaper in the area affected by the Proposed Action, and response to public comments.

While the water conveyance exemption listed in Section 93.158(a)(5)(v) may apply to certain limited aspects of this project, such as the construction of the desiltation basin that would "treat" water conveyed to Lake Casitas which is the main water supply for a large portion of the County, no exemptions are being claimed for this project.

Emissions associated with operations and maintenance of the restored Matilija Creek ecosystem are assumed to be well below the General Conformity "de minimis" thresholds. As a result, operational emissions will not be addressed in this report.

3. PROJECT DESCRIPTION

The main project site at Matilija Dam would be stripped of all vegetation and reservoir-area sediments would be slurried to one of the three potential disposal sites downstream. A channel would be excavated through the remaining sediments. Sediment excavated from the channel would be temporarily placed in storage locations within the original reservoir limits. Erosion of trapped sediment by natural fluvial processes would be allowed to occur in areas along the active channel, except in areas in the vicinity of the storage areas. A soil cement revetment varying from three to seven feet above channel invert and five feet below would protect storage areas.

After a large percentage of the sediments have eroded and the soil cement removed, the site would be re-vegetated. For this alternative, it is assumed that the re-vegetation activities would occur approximately ten years after notice to proceed.

Since there is some increased risk to downstream flooding with the removal of the dam and movement of sediment behind the dam downstream, flood protection measures have been developed for the proposed action. The flood control protection would include the purchase and removal of the Matilija

[1] The current General Conformity Rule requirements will change as of June 15, 2005. At that time the 8-hour ozone designation will become the applicable conformity standard (USEPA 2003). Ventura County has been designated as a moderate non-attainment area for the 8-hour ozone NAAQS, effective June 15, 2004, and will have until June 2010 to attain the standard (USEPA 2004). The NO_x and VOC de minimis emission thresholds for General Conformity in a moderate ozone non-attainment area are 100 tons per year. It is expected that a revised General Conformity finding will be made for this project sometime after June 15, 2005, using a de minimis emission threshold of 100 tons/year for NO_x and VOC.

[2] The current General Conformity Rule does not include de minimis emission thresholds for $PM_{2.5}$. In the unlikely event that Ventura County is designated as non-attainment for $PM_{2.5}$ a revised conformity analysis may be necessary for the project.

Hot Springs retreat facility, two houses at Camino Cielo, and nine cabins at Camino Cielo. The Camino Cielo Bridge would also need to be removed. Additionally, the Santa Ana Road Bridge would need to be replaced with a higher structure to allow 100-year flood flows to pass underneath.

The construction of new levees and floodwalls at Meiners Oaks and the Robles Diversion, Camino Cielo, and Cañada Larga would be performed to provide 100-year flood protection. Levees and floodwalls would be modified at Live Oaks and Casitas to provide 100-year flood protection. Material required for construction and modification of levees, estimated to be a maximum of 200,000 cubic yards of material, would be excavated and brought from the reservoir area to the levees or levee construction sites. Additional riprap stone protection would be placed on any new or modified levees.

Other project tasks include: a desilting basin, requiring between 11 and 14 acres of land, located on one of two identified sites within approximately 0.5 mile of Robles Diversion; modifications to Robles Diversion Dam including an expansion of the sediment debris basin, and installation of radial gate sediment bypass structures in the dam; the drilling of a new potable water well at Foster Park; and the removal of giant reed (*Arundo donax*) at six different downstream locations.

It is estimated that it would take approximately two years to complete the slurrying operation of the Reservoir Area sediment, removal of the dam, excavation of the channel, and construction of the soil cement revetment. Additional project description information is provided in Section 3 of the Draft EIS/EIR.

4. CONSTRUCTION SCHEDULE

Based on the project requirements and restrictions described above, a proposed construction schedule is described below and summarized in Table G.1-1 (for Alternative 4b) provided in Appendix G.1.

a. Preparation Tasks: Includes site preparation such as clearing vegetation and other obstacles, installing water and slurry pipelines, preparing the slurry disposal site, installing the slurry thickening and pumping infrastructure. The total duration of these tasks will be six months and they will begin and end before the dam removal tasks will start.

b. Off Site Tasks Completed Prior to Complete Removal of Dam: These task include preparing several flood control protection improvements, demolishing two existing bridges and installing two replacement bridges, completing a sediment bypass structure, and completing a desiltation basin. These tasks will be completed while the dam removal tasks are ongoing, and with the possible exception of the new bridge construction they will all need to be completed prior to the full removal of the dam. The total duration of these tasks is estimated to be two years.

c. Dam Removal Tasks: These tasks include the sediment dredging and slurrying, the creek channel excavation, the construction of an optional temporary soil cement wall, and the actual physical removal of the Matilija Dam. The total duration of these tasks is estimated to be 18 months.

d. Miscellaneous Offsite Tasks: These tasks include demolishing downstream structures, drilling a new potable water well at Foster Park, and removing arundo downstream of the dam at various locations in the Ventura River channel prior to starting the physical dam removal task. Additionally, the project requires habitat restoration and the implementation of a recreation plan;

however, these tasks will occur after the other main project tasks and will not create significant emissions in comparison to the main project tasks, so they are not included in this analysis.

The overall project schedule for these tasks, not including the restoration and recreation plan, is a total of 24 months.

The Corps provided information about the type of equipment used for the project, hours/day in operation, and the number of days in operation. Based on this information, detailed construction assumptions were made (e.g., equipment type, number of equipment pieces, number of days in operation, etc.) for each of the over two-dozen tasks included in this project (see Appendix G.1).

5. CONSTRUCTION EMISSIONS

Construction emissions for NO_x and VOC can be distinguished as either off-road equipment or on-road equipment. On-site air pollutant emissions during construction would principally consist of exhaust emissions from heavy-duty diesel- and gasoline-powered construction equipment, as well as fugitive particulate matter from demolition and material handling operations. Off-site exhaust emissions would result from workers commuting to and from the job site, as well as from trucks delivering material and equipment to the staging area. The assumptions used in quantifying the total emissions from these sources are described in the following paragraphs.

Off-Road Equipment Emissions

Exhaust Emissions. The methodology for estimating on-site construction emissions consist of two basic steps: first, determining the total number of operating hours for each piece of equipment, and second, applying the appropriate emission factors to compute the associated emissions for each piece of operating equipment. Emission factors used for this project are based on information from the U.S. Environmental Protection Agency's (USEPA) *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-* (USEPA, 2002) and usage factors from the *Caterpillar Performance Handbook* (Caterpillar 1998).

Exhaust emissions were computed by multiplying the emission factors for each equipment type by the number of equipment pieces, the daily hours of operation, the number of days the equipment will be used, and a load factor. Exhaust emissions from all equipment types were then summed to obtain the total exhaust emission levels. Total onsite exhaust emissions are listed in Table 2 below. Refer to Appendix G.1 for a list of other assumptions used in quantifying the total off-road equipment exhaust emission levels.

On-Road Vehicle Emissions

With regard to on-road vehicle emissions, the number of equipment and material haul trips, as well as the daily commuter trips, were estimated for all project tasks. The material haul trip assumptions were developed by dividing the amount of each material to be hauled by the approximate capacity of the haul trucks. The daily commuter trip assumptions are based on the amount of work to be completed within the given construction schedule at each project task site.

On-road mobile emissions were quantified using the California Air Resources Board's (CARB) *EMFAC2002* emission factors for mobile sources (CARB, 2004). Emission factors were determined for

Ventura County assuming a project start in 2007. Table 2 presents the total construction emissions for the on-road vehicle emission sources. Refer to Appendix G.1 for other assumptions used in quantifying the total off-site emission levels.

Table 2: Construction Emissions (tons)

CONSTRUCTION TASK	NO_x	VOC
Offroad Equipment Emissions		
Arundo Removal Reaches 7-9	1.45	1.29
Pipeline Installation	1.25	0.06
Fauna Rescue/relocation/eradication	0.00	0.00
Prepare Slurry Disposal Area	6.71	0.28
Dam Site Preparation	0.49	0.03
Flood Protection Area Improvements	6.18	0.27
Bridge Demolition and Construction	1.28	0.07
Robles Diversion Dam/Sediment Bypass	5.17	0.22
Robles Desiltation Basin	2.48	0.11
Dredging/Slurrying	25.54	1.70
Channel Excavation	31.55	1.34
Soil Cement Wall	2.74	0.15
Dam Removal	6.37	0.37
Foster Park Wells	0.01	0.00
Dam Site Equipment Demolition	0.11	0.01
Downstream Arundo Removal	1.64	1.46
On-Road Equipment Emissions		
On-Road Emissions Passenger Vehicles	0.67	0.51
On-Road Emissions HDD Vehicles	14.66	1.20
TOTAL	**108.31**	**9.06**

The emissions presented in Table 2 are for the 24-month main project tasks construction schedule.

6. CONFORMITY STATUS

As listed in Table 2, the total NO_x emissions generated from the project construction activities would be much greater than the General Conformity "*de minimis*" emission threshold of 25 tons; and the total VOC emissions generated from the project construction activities would be well below the General Conformity "de minimis" emission threshold of 25 tons. The "*de minimis*" emission threshold is an annual emission threshold; therefore, the maximum 12-month emission estimate is used for comparison with the thresholds. Table 3 provides the estimate of the maximum 12-month emission estimate during the 24-month main project schedule. Again, the NOx emissions are above "*de minimis*" emission threshold and the VOC emissions are below the "*de minimis*" emission threshold. Therefore, a conformity analysis has been performed.

Table 3: Maximum 12-Month Construction Emissions (tons)

	NO_x	VOC
Maximum 12-Month Emission Total	76.6	6.8
De Minimis Threshold	25	25
Exceedance of the De Minimis Threshold?	**YES**	**NO**

7. CONFORMITY ANALYSIS

The project emissions exceed the NOx "de minimis" emission threshold of 25 tons per year. Under §93.158 (a) (2) of the General Conformity Rule emission offsets can be used to determine that the action conforms with the applicable SIP. The emission offsets must be provided in an amount so that there is no net increase in emissions of the pollutant in question, and the emission basis includes the sum of the direct and indirect emission from the action. In this case, NOx emission reduction credits (ERCs) registered by the Ventura County Air Pollution Control District (District) in the amount of 76.6 tons shall be leased to offset the maximum 12-month NOx emissions from the project. Alternatively, some or all of these offsets shall be created by funding emission reductions under District emission reduction programs. The offsets shall be leased, at a minimum, for periods where the emissions are forecast to exceed 25 tons per year.

The current District ERC Bank contains over 240 tons of available NOx ERCs; therefore, it is assumed that project should be able to lease the necessary amount of NOx ERCs to offset the project. However, if there are any problems obtaining all of the necessary emission reduction credits additional emission reduction program funding support could be given to the District to create additional permanent or temporary emission reductions necessary to offset the project's NOx emissions. Existing District programs include the Ventura County Clean Air Fund and the Carl Moyer Program.

8. CONCLUSION

As demonstrated in this General Conformity Status Report, the project VOC emission levels associated with the Matilija Dam Ecosystem Restoration Project construction would be well below the current applicable General Conformity "de minimis" emission thresholds. As a result, the VOC emissions associated with the project's construction would be exempt from the detailed conformity analysis, and would be considered to be in conformance with the SIP.

The project's construction NOx emissions are estimated to be greater than the current applicable General Conformity "de minimis" emission threshold. The project's construction NOx construction emissions shall be fully offset using emission reductions from the District's ERC bank, or through funding District emission reduction grant programs. Therefore, per §93.158 (a) (2) of the General Conformity Rule, the project is determined to conform to the SIP.

9. REFERENCES

CARB (California Air Resources Board). 2004. EMFAC2002. http://www.arb.ca.gov/msei/msei.htm. Website accessed 2004.

Caterpillar Inc. 1998. *Caterpillar Performance Handbook*. Edition 29. October 1999.

USEPA (U.S. Environmental Protection Agency). 1993. 40 CFR Part 93, Subpart B. Determining Conformity of General Actions to State or Federal Implementation Plans.

_____. 2002. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition. November. NR-009b.

_____. 2003. Proposed Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard. 40 CFR Part 51. Federal Register, Volume 68, No. 105. June 2, 2003.

_____. 2004. Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard – Phase 1. Accessed USEPA website (http://www.epa.gov/ozonedesignations/finalrule.pdf) May.

APPENDIX H.

FARMLAND PROTECTION POLICY ACT COORDINATION

The Farmland Protection Policy Act (FPPA) of 1981 (7 U.S.C §§ 4201 et seq.) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. In addition, it attempts to assure that Federal programs are administered in a manner that will be compatible with state, local government and private programs and policies protecting farmland.

The Farmland and Protection Policy Act is implemented under Department of Agriculture, which requires that the U.S. Army Corps of Engineers (USACE) contact the Natural Resource Conservation Service (NRCS) for identification of prime or unique farmland that would be impacted by a proposed federal action.

The prime and/or unique farmland determination involves the following process:

- USACE completes the Farmland Conversion Impact Rating Form (Form AD 1600) for NRCS evaluation
- The USACE sends Form AD 1006 with a map of the project site to the NRCS for review
- The NRCS determines whether or not the proposed project would convert prime and/or unique farmlands for nonagricultural use
- The USACE uses the information to develop a conversion rating – evaluation of the impact of converting prime and/or unique farmlands for nonagricultural use.
- The USACE uses the conversion rating to determine whether the proposed conversion is consistent with FPPA and the agency's internal policies.

The Ventura County Resource Management Agency was consulted regarding the mapping of farmlands from the mouth of the Ventura River to the Matilija Dam, specifically designating prime farmland, unique farmland, and farmland of statewide importance in the vicinity of the Ventura River as shown in Figure 1. The results of the mapping were then compared to areas that would be potentially impacted by the Proposed Action. One 50-acre agricultural site was identified that had the potential to be affected by the Proposed Action. Form AD 1600 was submitted to the NRCS under the FPPA to determine and identify the type of farmland that would be impacted should the Proposed Action move forward. The identified site, a proposed desiltation basin, was determined by the NRCS to be located on farmland designated as "Unique." However, that basin has since been withdrawn from inclusion in the project and no other designated farmlands have been identified that would be impacted by the Proposed Action. As no conversions to designated farmlands would occur, the Proposed Action would be considered consistent with the Farmland Protection Policy Act.

Record of Contacts
Date of Contact: February 18, 2004 **Agency**: NRCS **Purpose**: Contacted Natural Resource Conservation Service regarding preliminary information/process to fill out Form AD-1006. **Contact**: Dean Smith, 805.386.4489, Dean.Smith@ca.usda.gov
Date of Contact: February 26, 2004 **Agency**: NRCS **Purpose**: Coordinated with NRCS about the types of maps and graphical representation they needed in order to begin the process. Agreed that an aerial photograph of the site, accompanied with a USGS map would be sufficient, as well as a copy of a Thomas Guide map depicting the area of the proposed project. **Contact**: Steve Jewett, 805.386.4489, Stephen.jewett@ca.usda.gov
Date of Contact: February 27, 2004 **Agency**: NRCS **Purpose/Action**: Per AD-1006 instructions, 3 copies of Form AD-1006 (Farmland Conversion Impact Rating) to Steve Jewitt. The submittal package included the following: • Form AD-1006 with Sections III and I completed. • Matilija 7.5 USGS quad map with depiction of the proposed project • Copy of Thomas Guide for the area of the proposed project with a depiction of the project area. • Aerial photograph provided by Ventura County Watershed District with a more detail representation of the proposed site. **Contact**: Steve Jewett, 805.386.4489, Stephen.jewett@ca.usda.gov
Date of Contact: March 2, 2004 **Agency**: Ventura County Resource Management Agency – GIS Mapping **Purpose/Action**: Contacted Ventura County Resource Management Agency – GIS Mapping, regarding the possibility of mapping all prime farmland, unique farmland, and farmland of state-wide importance in the vicinity of the Ventura River. More specifically, all existent farmland from the mouth of the river to Matilija Dam, that is 2.5 miles west and 1.5 miles east of the river. **Contact**: Kay Clark, 805.654.2630, Kay.Clark@mail.co.ventura.ca.us
Date of Contact: March14, 2004 **Agency**: NRCS **Purpose/Action**: Received one copy of Form AD-1006 "Farmland Conversion Impact Rating" with Sections II, IV and V completed (note: was supposed to receive two copies instead of one) **Contact**: Steve Jewett, 805.386.4489, Stephen.jewett@ca.usda.gov
Date of Contact: March16, 2004 **Agency**: NRCS **Purpose/Action**: Spoke regarding needing an extra copy, and confirmed that is was sufficient to make a copy of the original form to have two copies (no need of original signature in both copies). **Contact**: Steve Jewett, 805.386.4489, Stephen.jewett@ca.usda.gov
Date of Contact: March 22, 2004 **Agency**: Ventura County Resource Management Agency – GIS Mapping **Purpose/Action**: Received the requested map from Kay Clark depicting agricultural land within the specified area around the Ventura River. **Contact**: Kay Clark, 805.654.2630, Kay.Clark@mail.co.ventura.ca.us
Date of Contact: April 26, 2004 **Agency**: Ventura County Resource Management Agency – GIS Mapping **Purpose/Action**: Called Kay Clark and requested the metadata for the map submitted on March 22, 2004. **Contact**: Kay Clark, 805.654.2630, Kay.Clark@mail.co.ventura.ca.us
Date of Contact: May 6, 2004 **Agency**: Ventura County Resource Management Agency – GIS Mapping **Purpose/Action**: Received metadata from Ventura County for map of agricultural land. **Contact**: Kay Clark, 805.654.2630, Kay.Clark@mail.co.ventura.ca.us
Date of Contact: April 28, 2004 & May 2,2004 **Agency**: NRCS **Purpose/Action**: Sent e-mail on April 4,2004 and spoke with Steve Jewett on May 2, 2004. Was informed that the average farm size for Ventura County is 156 acres. Stephen Jewett sent fax of 1991 agricultural landownership information for site. **Contact**: Steve Jewett, 805.386.4489, Stephen.jewett@ca.usda.gov
Date of Contact: May 5,2004 **Agency**: Ventura County Planning Department **Purpose/Action**: Contacted Kelly Scoles regarding Land Conservation Act Program. Was informed that site is owned by the Ojai Valley Land Conservation and that the APN# is 011-0-010-11. In addition, was informed that the site is not under the jurisdiction of the Williamson Act or the Greenbelt Policy (local agricultural policy). **Contact:** Kelly Scoles Planner of Ventura County, 805.654.5042, Kelly.scoles@mail.co.ventura.ca.us
Date of Contact: May 5,2004 **Agency**: Ojai Valley Land Conservancy **Purpose/Action**: Contacted Land Conservancy to find our more information about the size and history of the farm area. Was informed that the site consists of approximately 46 acres of orange trees (with 3 acres still irrigated). Grove was installed in the 1920's. Entire site has been farmed for at least 5 of the last 10 years. **Contact**: Richard Handley, Preserve Manager for Ojai Valley Land Conservancy, 805.646.7930

APPENDIX I.

COASTAL CONSISTENCY DETERMINATION

1. INTRODUCTION

This Coastal Consistency Determination is being submitted to the California Coastal Commission for the Matilija Creek and Ventura River Ecosystem Restoration Project. Both a National Environmental Policy Act (NEPA) (federal) and a California Environmental Quality Act (CEQA) (State) environmental review process are required prior to a decision. NEPA review is triggered by the direct involvement of a federal agency in the project or by the use of federal funds. CEQA review is triggered by the involvement of a State or local agency (in this case, the Ventura County Flood Control District, as the local sponsor). The two environmental review processes are similar and typically are undertaken jointly for projects that require both NEPA and CEQA review. A combined EIS/EIR has been prepared to satisfy the environmental review requirements of both NEPA and CEQA. The purpose of the EIS/EIR is to identify and disclose information about the potentially significant environmental effects of the proposed project and the various alternatives.

In February 2000, the United States Army Corps of Engineers (Corps) initiated a reconnaissance study to determine if the Corps would have an interest in a cost-shared feasibility study of environmental restoration options for the Matilija Creek and Ventura River in the vicinity of Matilija Dam, within Ventura County. The reconnaissance study determined there was a federal interest; consequently, the Corps initiated the Matilija Dam Ecosystem Restoration Feasibility Study. Ventura County Flood Control District (VCFCD), the owner of Matilija Dam, became the local sponsor for the project.

The Feasibility Study investigated options for the ecological restoration of Matilija Creek and the Ventura River (USACE, 2001), with particular attention focused on restoring anadromous fish populations on Matilija Creek and returning natural sand replenishment to Ventura County and other southern California beaches. The federally listed endangered steelhead, which historically had abundant runs in the Ventura River system, has been blocked access to over 50 percent of its prime spawning habitat in the upper reaches of Matilija Creek by the 1948 construction of Matilija Dam (Moore, 1980; Chubb, 1997; Capelli, 1999). In addition, beaches downstream in Ventura County have narrowed since construction of Matilija Dam, which has blocked an estimated 6,000,000 cubic yards of sediment to date (BOR, 2002). With a diminished supply of river-based sand replenishment (caused by dam construction, watershed improvements, and riverbed sand and gravel mining), beaches in the region are becoming increasingly eroded, causing habitat reduction and a loss of beach sand for recreational use (BEACON, 1989).

2. PROJECT DESCRIPTION

The environmentally preferred alternative for this project is the removal of the Matilija Dam, which is a concrete arch dam located about 16 miles from the Pacific Ocean and just over half a mile from the Matilija Creek confluence with the Ventura River. Sediment that has accumulated behind the dam since its construction in 1948 would be removed or re-configured to improve the Matilija Creek flow regime and ultimately restore Matilija Creek to a more natural pre-dam streambed configuration. By restoring Matilija Creek to pre-dam conditions, the Proposed Action would improve terrestrial and aquatic habitat conditions along Matilija Creek and the Ventura River for the benefit of fish and wildlife species. Removal of Matilija Dam would eliminate a barrier to fish passage on Matilija Creek and facilitate migration, spawning, and rearing of southern steelhead, which is an endangered species. The Proposed Action would also restore the natural sediment transport regime of Matilija Creek and the Ventura River, thereby improving downstream coastal beach sand replenishment.

3. PROJECT LOCATION

Matilija Dam is a concrete arch dam located about 16 miles from the Pacific Ocean and just over half a mile from the Matilija Creek confluence with the Ventura River in western Ventura County. Matilija Creek and North Fork Matilija Creek join approximately 15.5 miles from the coast to create the Ventura River, which has a drainage area of approximately 226 square miles (BOR, 2001). Matilija Creek exits the Los Padres National Forest about 7 miles north of Matilija Dam, although it continues to be surrounded on all sides by the Los Padres National Forest until it reaches the northern areas of the City of Ojai. South of the confluence of Matilija Creek and North Fork Matilija Creek, the Ventura River flows south past the western edge of the City of Ojai, through the unincorporated areas of Oak View and Casitas Springs. In its lower reaches, the Ventura River flows through the City of San Buenaventura until it reaches its estuary.

4. PROJECT NEED

The action proposed and analyzed in this EIS/EIR is the restoration of the Matilija Creek and Ventura River ecosystem with particular attention focused on restoring anadromous fish populations in Matilija Creek and returning natural sand replenishment to Ventura and other southern California beaches (USACE, 2001). As explained previously, the flood control and water supply functions of Matilija dam have diminished. The dam now obstructs the natural watershed system of the Ventura River resulting in decline of the steelhead population and alteration of sediment transport of the rivers and the coastline erosion of beaches downstream. Additionally agricultural, industrial and urban development, and flood control structures along the Ventura River have led to degradation of the watershed in the form of reduced riparian habitat, altered stream flows, limited access of species (such as the steelhead) to critical habitat, and altered sediment transport of the rivers and the coastline. Dam and sediment removal are essential for restoring the natural watershed system of the Ventura River.

5. DETERMINATION OF CONSISTENCY

A Consistency Determination is required for the Matilija Creek and Ventura River ecosystem restoration project, since the proposed operation could have an effect upon the California Coastal Zone (Coastal Zone). The following Determination of Consistency is prepared in compliance with the Federal Coastal Zone Management Act of 1972, Section 307 (Title 16, U.S.C. Section 1456(c)), which states that federal actions must be consistent with approved state coastal management programs to the maximum extent practicable. This Consistency Determination summarizes the Matilija Creek and Ventura River ecosystem restoration project EIS/EIR. The EIS/EIR provides greater detail on the environmentally preferred alternative, the existing environment, and the project's potential environmental effects.

Based on a review of the applicable sections of the California Coastal Act (Act) of 1976, and on the data presented in the EIS/EIR, the Matilija Creek and Ventura River Ecosystem Restoration Project is consistent with the Act to the maximum extent practicable. This Determination of Consistency has been prepared with the following sections to address applicable provisions of the Act.

5.1 CHAPTER 3, ARTICLE 2: PUBLIC ACCESS

Section 30210. *In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*

Mitigation measures were presented in the EIS/EIR to address public access and safety, primarily during the construction period. These measures are outlined below.

- Standard construction practices and safety precautions shall be incorporated into the design of the project staging area(s). Construction staging areas shall be clearly marked and appropriately guarded to ensure public safety. Staging areas shall also be located to avoid noise impacts to sensitive receptors (e.g., schools, hospitals, residential areas, etc.).
- The construction contractor shall provide advance notice by mail to all residents and property owners between two and four weeks prior to construction. The announcement shall state specifically where and when construction will occur in the area. If construction delays of more than seven days occur, an additional notice shall be made, either in person or by mail. Notices shall provide tips on reducing noise intrusion, for example, by closing windows facing the planned construction. The contractor shall also publish a notice of the impending construction in local newspapers, stating when and where construction will occur.
- The construction contractor shall identify and provide a public liaison person before and during construction to respond to concerns of neighboring residents about noise disturbance. The construction contractor shall also establish a toll-free telephone number for receiving questions or complaints during construction and develop procedures for promptly responding to callers and recording the disposition of calls. Procedures for reaching the public liaison officer via telephone or in person shall be included in the notices distributed to the public in accordance with the mitigation measure discussed above. If construction noise complaints are received, temporary noise curtains or shields shall be employed to reduce construction noise to levels that would not cause disturbances to anyone working or residing in the area.
- All onshore construction activities shall be conducted between the hours of 7 a.m. and 7 p.m. Monday through Saturday. Finally, construction crews shall maintain properly functioning mufflers on all internal combustion and vehicle engines used in construction and shall direct muffler exhaust away from sensitive receptor locations to reduce noise levels at the receptor locations to the maximum extent feasible.

5.2 CHAPTER 3, ARTICLE 3: RECREATION

Section 30220. *Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.*

Section 30221. *Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.*

Implementation of the proposed project is not anticipated to have any significant adverse effects on recreational resources on the lower reaches of the Ventura River or the ocean shoreline in the vicinity of the Ventura River estuary. Over time, it is expected that a pattern of erosion and deposition along the mainstem of the river, at the river delta, and along nearby ocean beaches will return to a more natural, pre-dam condition. The deposition of sediment is not expected to have a dramatic impact on the Ventura River or the estuary, although portions of Matilija Creek near the dam may experience substantial topographical changes from erosion/deposition of sediment. As more sediment is allowed to migrate down river and eventually enter the littoral zone of the ocean, it could result in more deposition of sand onto local beaches and contribute to increased beach width over time, which would benefit the recreational resources associated with the coastal beaches (e.g., beach-going activities).

5.3 CHAPTER 3, ARTICLE 4: MARINE ENVIRONMENT

Section 30230. *Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231. *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Section 30233(a). *The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.
(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.
(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a biologically productive wetland. The size of the wetland area used

for boating facilities, including berthing space, turning basins, necessary navigation channels, and any necessary support service facilities shall not exceed 25 percent of the degraded wetland.

(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.

(5) Incidental public service purposes, including, but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource-dependent activities.

(b) *Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable longshore current systems.*

(c) *In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the 19 coastal wetlands identified in its report entitled, "Acquisition Priorities for the Coastal Wetlands of California", shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division. For the purposes of this section, "commercial fishing facilities in Bodega Bay" means that not less than 80 percent of all boating facilities proposed to be developed or improved, where such improvement would create additional berths in Bodega Bay, shall be designed and used for commercial fishing activities.*

(d) *Erosion control and flood control facilities constructed on watercourses can impede the movement of sediment and nutrients, which would otherwise be carried by storm runoff into coastal waters. To facilitate the continued delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for such purposes are the method of placement, time of year of placement, and sensitivity of the placement area.*

Vegetation and Wildlife Habitat. The removal of the Matilija Dam would potentially result in short term significant impacts to vegetation and wildlife habitat occurring in the Matilija Reservoir. Specifically, impacts to riparian vegetation and wildlife habitat would occur during demolition of the dam, vegetation clearing within Matilija reservoir and the Ventura River, levee expansion and construction, and the establishment of slurry disposal sites and desiltation basins. Impacts associated with these activities are fully described in the EIS/EIR. Demolition of the Matilija Dam would require the removal of all existing riparian vegetation located within the Matilija Reservoir and sections of giant reed infestation within the Ventura River. Habitat within this area would be temporarily lost and impacts would be considered significant. However, these impacts are expected to be short-term and revegetation of the area after dam removal would ultimately provide quality upland and riparian wildlife habitat and restore several miles of prime steelhead spawning habitat along Matilija Creek. Therefore, the benefits that would occur over time in this area, including the removal of non-native plant and animal species, would likely offset any initial adverse impacts that would occur during dam removal. Further, the implementation of project mitigation measures including clearing vegetation outside the breeding season, trapping and relocating wildlife prior to and during construction, and monitoring vegetation clearing in sensitive areas, would minimize impacts to wildlife.

Impacts to vegetation and wildlife habitat from development of the desiltation basin and slurry disposal site would be considered adverse but not significant. The removal of invasive giant reed from the Ventura River would also temporarily affect wildlife habitat but would be considered a short-term impact and would ultimately provide for the enhancement of riparian and wildlife habitat. No project related impacts to vegetation or wildlife habitat would occur in the estuary, adjacent beach, or inter-tidal zones.

Marine Plants. No marine plants or algae would be directly or indirectly affected by construction activities associated with the removal of Matilija Dam. Macro-algae including feather boa kelp and giant brown kelp occurs in limited quantities near the mouth of the Ventura River. The benthos in this area contains a mixture of sand and cobble with sparse populations of algae. Wave action continually tumbles the cobble and boulders and creates a harsh environment that limits the recruitment of algal species in this area. The closest established kelp beds are located approximately four miles west of the estuary (Section 4.3 of the EIS/EIR). Sediment transported downstream of the dam is not expected to substantially alter the benthos in this area. Direct and indirect impacts to the estuary, inter-tidal zone, and marine plants and algae due to sediment transport are not expected, as sediment would be stored in upland sections of the river. Upstream reaches of the river are currently sediment starved and would accumulate any downstream transport of sediment (BOR, 2003). Benefits to the estuary by increased sediment transport are not expected to occur for approximately 20 years (VCWPD, 2004). The distances of the kelp beds offshore from the mouth of the Ventura River are sufficiently great that significant impacts to marine plants are unlikely to occur as a result of the project. Therefore, these impacts would be considered less than significant.

Fishes. Temporary impacts to the fish community located within the Matilija Reservoir would result from demolition activities including draining of aquatic habitat, vegetation clearing, and during the removal of Matilija Dam. However, this habitat would eventually be eliminated as the reservoir continues to fill with sediment. Although native rainbow trout may occur in the reservoir, exotic predatory fish and amphibians including largemouth bass, green sunfish, and bullfrogs dominate the impoundment located behind the dam. There is some potential for downstream impacts to native fishes from the release of exotic fish species during dam removal. By draining the reservoir prior to dam removal and implementation of mitigation measures, including an exotic species removal program, impacts to native fishes would be reduced to less-than-significant levels. Potentially significant impacts to native fishes could also occur as a result of mechanical smothering, abrasion, or loss of rearing habitat due to sediment deposition in reaches below the dam. These impacts would be considered significant but short term, and would not likely jeopardize the continued existence of native fishes. In addition, long-term benefits from dam removal and the eradication of exotic predatory species would provide overall beneficial impacts to native fishes. Potential impacts could also occur during the removal of giant reed or levee expansion. These impacts would be considered adverse but less than significant with mitigation. Mitigation would include pre-construction surveys for sensitive species, conducting work during the dry season, and implementation of best management practices to reduce impacts from downstream sediment transport.

No impacts are expected to occur to marine fishes as a result of dam removal activities. As discussed above, sediment would be stored in upland areas and would only be washed downstream during significant storm events. In addition, the Ventura River is sediment starved and would accumulate the majority of sediment in upstream reaches of the river. This would limit the amount of material that would wash downstream and potentially affect marine fishes. Therefore, impacts to marine fishes would not be considered significant.

Essential Fish Habitat (EFH). Project activities associated with removal of the Matilija Dam are not expected to impact EFH in marine or estuarine habitats and would not affect any Fishery Management Plan (FMP) species. Impacts to EFH for steelhead may temporarily occur in upstream reaches of the Ventura River and in Matilija Creek. Dam removal may result in downstream sediment transport resulting in the temporary loss of breeding habitat, mechanical smothering, loss of foraging habitat, and increased predation rates. These effects would be short term, and removal of Matilija Dam would allow access to 16 miles of prime steelhead spawning habitat. Because the removal of Matilija Dam is required to provide access to these historic spawning grounds, the proposed project would be considered a beneficial effect despite potentially significant short-term impacts to steelhead.

Marine Mammals. Marine mammals do not regularly use or depend on the study area for food or habitat resources, particularly when compared to the large area of undisturbed water in the region. Although individual sea lions and harbor seals have been sighted along the nearby shoreline, the beach surrounding the estuary is not expected to be utilized as a haul out for marine mammals. Construction impacts associated with dam removal are not likely to cause significant impacts since marine mammals, such as California sea lions, harbor seals, dolphins, and whales, are highly mobile species that could avoid the region during project operations.

Shore- and Waterbirds. Removal of the Matilija Dam and reservoir would reduce the amount of lacustrine habitat available for a variety of shore and water birds. Loss of this habitat would be considered adverse but less than significant. As Matilija reservoir continues to fill with sediment and populations of giant reed expand, this habitat would eventually be reduced or eliminated within several years. The removal of exotic species including giant reed, which currently dominates the vegetation within the reservoir, would allow the reestablishment of native riparian vegetation and a return to natural stream dynamics. In addition, studies have indicated that following dam removal fish and wildlife diversity dramatically increase in formerly impounded streams. Therefore, the overall benefits to shore and water birds in this area by removing Matilija Dam outweigh the loss of this artificial habitat. In addition, suitable lacustrine habitat occurs at nearby Lake Casitas.

No beach areas would be adversely affected by removal of the dam and no significant impacts to marine or shore birds are expected. In addition, the project would not result in the disruption of feeding, resting, or breeding opportunities at the estuary or along the beach. Long-term impacts may be beneficial to the extent that beach nourishment resulting from downstream sediment transport would likely occur after approximately twenty years. As a return to natural stream dynamics occurs on this section of the Ventura River, downstream sediment transport and deposition of materials may lessen the seasonal disappearance of the beach during winter and provide an expanded area that can be utilized by shorebirds for resting and foraging.

Threatened and Endangered Species. No federal- or State-listed plants are expected to be impacted by project activities including vegetation clearing, dam removal, levee expansion, or construction of the desiltation and slurry disposal sites. In addition, there is no indication that any sensitive or rare plants occur in the study area. Extensive botanical surveys and vegetation mapping conducted in 2002 (DMEC, 2002) did not identify any sensitive plant species within areas subject to project disturbance. Although sensitive plants are not expected to occur and have not been observed within the project impact areas, the low levels of rainfall that occurred during the botanical survey period may have prevented detection of some sensitive plant species. To minimize potential impacts to special-status plants, pre-construction focused surveys and biological monitoring would be performed within areas subject to direct impacts prior to and during construction of the proposed project. No construction activities would occur within the estuary or adjacent dune habitat and impacts to sensitive plants are not expected.

Project activities associated with removal of the Matilija Dam have the potential to affect approximately 35 species of threatened, endangered, rare, or of special concern status that are known to occur within or adjacent to the proposed project area. These species are fully described in Table 4.3-3- Section 4.3.2.1 of the EIS/EIR. Some of these species including the California red-legged frog, southwestern pond turtle, steelhead, arroyo chub, osprey, and peregrine falcon have been observed within the study area. California brown pelican, snowy plover, and California least tern have been identified near the estuary but would not be impacted by project construction.

Only eight federal- or State-listed as threatened or endangered species and six federal or State species of special concern have a high likelihood of occurring in the proposed project area. Short-term construction-related impacts could occur as a direct result of demolition activities associated with dam removal, vegetation clearing, and excavation of sediments. Other potential sources of direct mortality to wildlife may include ground disturbance activities and access by construction vehicles during pipeline construction. Clearing, grading, excavating, and/or burying habitats could also lead to mortality of small mammals, reptiles, and nesting birds with eggs or young. Impacts to wildlife and water quality may also occur as a result of accidental fuel spills.

One species has the potential to be significantly impacted by project construction. Short-term significant impacts to the steelhead may result from the dispersion of sediments into the water column during dam removal and sediment stabilization activities. Sediments could damage spawning grounds and negatively impact water, habitat, and food quality. Large sediment pulses may partially or completely fill channels, resulting in temporary or permanent changes to the channel course. Sediment and fine particulate matter can also lower the oxygen content in nesting gravels resulting in mortality to egg masses and emerging steelhead. Increases of sediment may also fill in pools and spawning habitat, clog gill structures, reduce visibility, and result in abrasions to migrating fish. Although potentially significant impacts to this species may occur, these effects would be short-term and the removal of Matilija Dam would allow access to 16 miles of prime steelhead spawning habitat. Demolition of Matilija Dam is required to provide access to these historic spawning grounds, and the proposed project would be considered a beneficial effect despite potentially significant short-term impacts.

Through the implementation of project mitigation measures (fully described in the EIS/EIR), impacts to other listed species including tidewater goby, brown pelican, snowy plover, and California least tern would either be avoided or reduced to less-than-significant levels. Mitigation measures include, but are not limited to, pre-construction biological surveys, trapping and relocating sensitive species such as red legged frog and southwestern pond turtles, conducting initial vegetation clearing outside the breeding season for sensitive birds, construction monitoring by qualified biologists, an exotic species removal program, implementation of construction best management practices to minimize downstream sediment transport, and long-term monitoring of the riparian ecosystem downstream from Matilija Dam. The removal of the dam, exotic predatory species, giant reed, and a return to natural fluvial dynamics would provide an overall net benefit to sensitive species occurring in the Ventura River and estuary. Therefore, long-term significant impacts to sensitive species are not expected.

Section 30232. *Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.*

The proposed project requires operation of mechanized equipment within the Matilija Reservoir, Matilija Creek, and the Ventura River for an estimated twelve months, which could result in spills or leaks of fuels, lubricants, etc. Some leaks, spills, or accidental releases may be significant enough to substantially contaminate the soil. Herbicide spills may also occur during the eradication of giant reed. However, with implementation of the following mitigation measures presented in the EIS/EIR, the potential for adverse effects from spills, leaks, or accidental spills would be minimized.

- Preparation of a Spill Prevention, Containment and Countermeasures Plan that specifies fueling procedures, equipment maintenance procedures, and containment and cleanup measures to be followed in the event of a spill. This Plan, at a minimum, shall include:
  - Handling and storage of construction and maintenance fluids (oils, antifreeze, fuels). Fluids shall be stored in closed containers (no open buckets or pans) and disposed of promptly and properly away from permeable areas to prevent contamination of the site.

- Immediate control, containment and cleanup of fluids released because of spills, equipment failure (broken hose, punctured tank) or refueling, as per federal and State regulations. All contaminated materials should be disposed of promptly and properly to prevent contamination of the site. To reduce the potential for spills on the beach during refueling, refueling of portable equipment shall occur within a contained area. Where that is not possible, barriers shall be placed around the site where the fuel nozzle enters the fuel tank. The barriers shall be such that spills shall be contained and easily cleaned up. Someone shall be present to monitor refueling activities to ensure that spillage from overfilling, nozzle removal, or other action does not occur. No more than one gallon of fuel or other maintenance fluids (transmission fluids, antifreeze, oils) shall be stored on dredging equipment.
- An environmental training program to communicate environmental concerns and appropriate work practices, including spill prevention and response measures, to all field personnel. A monitoring program will be implemented to ensure that the plans are followed throughout the period of construction.

- Preparation of a Giant Reed Eradication Plan. The Corps shall develop and execute a giant reed eradication program that includes monitoring during post deconstruction restoration activities. Eradication efforts shall begin prior to the dam removal in Reach 7, 8, and 9, continuing throughout the downstream reaches immediately afterwards. The Giant Reed Eradication Plan shall be submitted to the CDFG and USFWS for review and comment prior to implementation. The plan shall include measures to prevent permanent or temporary impacts to wetlands and associated sensitive vegetation and wildlife during herbicide treatments of giant reed. The plan shall ensure that all activities requiring herbicide treatment would:
    - Ensure that herbicides are not applied during the wet season (November 1st to April 15th) to avoid potential impacts to downstream vegetation where feasible, and to avoid impacts to fish and wildlife species.
    - Ensure that only water-safe and surfactant-free herbicides are used. Treatments shall use a glyphosate-based herbicide including Rodeo® and/or Aquamaster®, both of which are labeled for use within water.
    - Ensure that herbicides are applied at concentrations that are considered safe for biological resources within and adjacent to the project area.
    - Ensure that herbicides are mixed with a non-toxic water soluble dye of low toxicity that highlights treated areas.
    - Minimize overspray of herbicides onto non-target species by restricting herbicide spraying when wind velocities exceed 6 mph.
    - Minimize trampling of native vegetation by establishing marked trails prior to project implementation.
    - Remove dead giant reed material that was foliar treated and left in place to avoid fire hazard potential prior to the beginning of the fire season. Material shall be removed when spring access is permitted and before the ensuing fire season begins (between April 15 and the beginning of the fire season).
    - Have a licensed professional conduct or oversee herbicides applications.

Section 30235. *Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fishkills should be phased out or upgraded where feasible.*

There are no existing marine structures contributing to pollution and/or fishkills identified in the project area.

5.4 CHAPTER 3, ARTICLE 5: LAND RESOURCES

Section 30240. (a) *Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.*

(b) *Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.*

Flows and sediment transport from the Ventura River affect beaches east of the river mouth by providing a sediment input to the Santa Barbara Littoral Cell, an alongshore flow pattern that delivers sediment along beaches in a west-to-east direction from Ellwood in Santa Barbara County to Point Mugu in Ventura County (BEACON, 1989). The main sources of natural sand supply are from cliff erosion and episodic delivery of sediment from the streams and rivers that discharge into the river on a five- to ten-year periodic basis. Beaches along this region are becoming increasingly eroded due to lack of replenishment from input sources. The region from Emma Wood beach to Point Mugu has a wider berm width than the eastern portion of the littoral cell, but is receiving increased erosion stress, leading to greater sand depletion and beach recession. The removal of the Matilija Dam presents a potential to not only return sediment inputs from the Ventura River closer to original levels, but also the opportunity to provide beach replenishment through the transport of sediment that has collected behind the dam (BEACON, 1989).

Section 30244. *Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.*

The identification of cultural resources in the project's area of potential effects (APE) has not been completed. The potential exists for the presence of National Register eligible properties within the project's APE. Until the identification phase is completed, and National Register evaluations are performed on any sites present, an impact assessment of the preferred alternative cannot be made. However, if National Register eligible properties are present, they may be avoidable through implementation of the following mitigation measures:

- If any sites are determined to be eligible for the National Register of Historic Places, mitigation measures shall be developed and agreed to in a memorandum of agreement. This document would be developed between the California State Historic Preservation Officer, the Corps and local sponsors. Federally Recognized Tribes and interested Native American groups would be invited to participate as concurring parties to the agreement. These procedures shall follow the requirements of Section 106 of the National Historic preservation Act, as implemented by 36 CFR 800.

- A discovery plan shall be developed in consultation with the State Historic Preservation Officer pursuant to 36 CFR 800.13(b) to treat previously unknown resources found during implementation of the project. It shall include procedures to monitor and treat cultural resources discovered during mechanical and natural removal of sediment behind Matilija Dam. It would also include procedures for discoveries made during grading and earth moving activities.

5.5 CHAPTER 3, ARTICLE 6: DEVELOPMENT

Section 30250(a). *New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. In addition, land divisions, other than leases for agricultural uses, outside existing developed areas shall be permitted only where 50 percent of the usable parcels in the area have been developed and the created parcels would be no smaller than the average size of surrounding parcels.*

(b) Where feasible, new hazardous industrial development shall be located away from existing developed areas.

(c) Visitor-serving facilities that cannot feasibly be located in existing developed areas shall be located in existing isolated developments or at selected points of attraction for visitors.

Section 30251. *The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas: and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

Section 30252. *The location and amount of new development should maintain and enhance public access to the coast by (1) facilitating the provision or extension of transit service, (2) providing commercial facilities within or adjoining residential development or in other areas that will minimize the use of coastal access roads, (3) providing non-automobile circulation within the development, (4) providing adequate parking facilities or providing substitute means of serving the development with public transportation, (5) assuring the potential for public transit for high intensity uses such as high rise office buildings, and by (6) assuring that the recreational needs of new residents will not overload nearby coastal recreation areas by correlating the amount of development with local park acquisition and development plans with the provision of onsite recreational facilities to serve the new development.*

Section 30253. *New development shall:*

(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.

(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

(3) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board as to each particular development.

(4) Minimize energy consumption and vehicle miles traveled.

(5) Where appropriate, protect special communities and neighborhoods which, because of their unique characteristics, are popular visitor destination points for recreational uses.

Section 30255. *Coastal dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal dependent developments shall not be sited in a wetland. When appropriate, coastal related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.*

The proposed project would not contribute to new residential, commercial, or industrial development, nor would it create land divisions. In addition, the project would not impede nor impair views of coastal areas. Consequently, this article does not apply to the Matilija Dam Ecosystem Restoration Project.

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APPENDIX J.

MITIGATION MONITORING PLAN

Number	Mitigation Measures	Responsibility	Timing
Earth Resources			
ER-1	Implement Best Management Practices (BMPs). An erosion control and sediment transport control plan shall be prepared in association with the SWPPP and the revegetation plan. This plan shall be prepared in accordance with RWQCB guidelines and other applicable BMPs. Implementation of the plan will help to reduce erosion and sediment degradation. The plan will designate BMPs that will be followed during construction activities. Erosion-minimizing efforts may include measures such as avoiding excessive disturbance of steep slopes; using drainage control structures (e.g., coir rolls or silt fences) to direct surface runoff away from disturbed areas; strictly controlling vehicular traffic; implementing a dust-control program during construction; restricting access to sensitive areas; using vehicle mats in wet areas; and revegetating disturbed areas following construction.	Corps of Engineers	Prior to construction
ER-2	Reduce off-site erosion. During excessive wet and muddy site conditions, the contractor shall implement wheel washing strategies and street cleaning in the project vicinity to reduce off-site erosion from construction vehicles leaving the sites.	Construction contractor	During construction
ER-3	Observe exposed soil. During trenching, grading, or excavation work for the project, the contractor shall observe the exposed soil for visual evidence of contamination. If visual contamination indicators are observed during construction, the contractor shall stop work until the material is properly characterized and appropriate measures are taken to protect human health and the environment. The contractor shall comply with all local, State, and federal requirements for sampling and testing, and subsequent removal, transport, and disposal of hazardous materials. In the event that evidence of contamination is observed, the contractor shall document the exact location of the contamination and shall immediately notify the Corps of Engineers' construction manager. The Corps shall be responsible for formulating and implementing plans to characterize and remediate any contamination encountered during construction. These plans shall specify procedures for monitoring, identifying, handling, and disposing of hazardous waste in accordance with federal and State regulations.	Corps of Engineers and construction contractor	During construction
ER-4	Hazardous substance control. The Corps of Engineers, or its construction contractor, shall prepare a Hazardous Substance Control and Emergency Response Plan that will include preparations for quick and safe cleanup of accidental spills. The Plan will prescribe hazardous-materials handling procedures to reduce the potential for a spill during construction, and will include an emergency response program to ensure quick and safe cleanup of accidental spills. The plan will identify areas where refueling and vehicle-maintenance activities and storage of hazardous materials, if any, will be permitted.	Corps of Engineers or construction contractor	Prior to construction
Biological Resources			
B-1	Pre-Construction biological surveys. The Corps shall conduct pre-construction protocol-level surveys for Least Bell's Vireo and Southwestern Willow Flycatcher. In addition, pre-construction surveys shall be conducted for sensitive birds, active nests or roosts in riparian areas that would be subject to project disturbance. If active nests are located, birds shall be flushed prior to construction activities or nests shall be avoided until the young have fledged. Qualified biologists familiar with species known to inhabit the Ventura River shall be utilized to conduct the surveys.	Corps of Engineers (implemented by a qualified biologist)	Prior to construction
B-2	Pre-Construction plant surveys. The Corps shall conduct pre-construction surveys for special-status plant species within all areas subject to project disturbance.	Corps of Engineers (implemented by a qualified biologist)	Prior to construction
B-3	Capture and relocate. The Corps shall design and implement a capture and relocation program for California red-legged frog, southwestern pond turtle, and two-striped garter snake prior to construction activities in Matilija Lake, Matilija Creek, and the Ventura River.	Corps of Engineers	Prior to construction
B-4	Agency coordination. The Corps shall immediately contact the appropriate regulatory agencies (Corps, VCWPD, CDFG, and USFWS) if federally- or State-listed or otherwise sensitive flora and fauna are identified during pre-construction surveys. The Corps shall coordinate with the appropriate agencies to develop and institute avoidance, minimization, and mitigation measures prior to proceeding with project construction.	Corps of Engineers	Prior to construction
B-5	Restricted initial clearing. The Corps shall conduct initial clearing of open water, freshwater marsh, and riparian habitats in Reach 7 outside of the breeding season (September 15 through March 15). Clearing of riparian vegetation for levee construction shall be conducted between September 15 and March 15.	Corps of Engineers	Between September 15 and March 15
B-6	Fueling. The construction contractor shall conduct all fueling and maintenance activities a minimum of 100 feet from riparian and wetland habitats or in areas where accidental fuel spills may flow into waters of the state.	Construction contractor	During construction
B-7	Construction monitoring. The Corps shall have a qualified biologist present when conducting clearing and grading operations at Matilija	Corps of Engineers	During

Number	Mitigation Measures	Responsibility	Timing
	Lake, slurry disposal sites, levee locations, and during the removal of giant reed in riparian habitat. The monitor shall move or flush non-sensitive wildlife away from project construction to the extent practicable.	(implemented by a qualified biologist)	construction
B-8	**Downstream monitoring.** The USACE shall conduct monitoring of downstream reaches of Matilija Creek and the Ventura River on a quarterly basis during the first two years of construction activity and twice annually for the duration of construction. Monitoring shall be conducted to document riparian and wetland habitat, and shall note the presence of benthic invertebrates, amphibians, reptiles, fishes, birds, and mammals.	Corps of Engineers	During construction
B-9	**Worker training and Best Management Practices.** The USACE shall conduct a Worker Environmental Awareness Plan (WEAP) prior to construction and implement related best management practices (BMPs) to reduce downstream impacts from sediment-laden water. The WEAP shall identify any sensitive biological or cultural resources known to occur in the project area, the appropriate BMPs required to reduce water quality impacts, and appropriate trash disposal and maintenance locations.	Corps of Engineers	Prior to construction
B-10	**Trash removal.** The Contractor shall ensure that food and trash are stored in sealed containers and removed from the job site on a weekly basis.	Construction contractor	During construction
B-11	**Giant Reed Eradication.** The Corps shall develop and execute a giant reed eradication program that includes monitoring during post deconstruction restoration activities. Eradication efforts shall begin prior to the dam removal in Reach 7, 8, and 9, continuing throughout the downstream reaches immediately afterwards. The Giant Reed Eradication Plan shall be submitted to the CDFG and USFWS for review and comment prior to implementation. The plan shall include measures to prevent permanent or temporary impacts to wetlands and associated sensitive vegetation and wildlife during herbicide treatments of giant reed. The plan shall ensure that all activities requiring herbicide treatment would: • Ensure that herbicides are not applied during the wet season (November 1st to April 15th) to avoid potential impacts to downstream vegetation where feasible, and to avoid impacts to fish and wildlife species. • Ensure that only water-safe and surfactant-free herbicides are used. Treatments shall use a glyphosate-based herbicide including Rodeo® and/or Aquamaster®, both of which are labeled for use within water. • Ensure that herbicides are applied at concentrations that are considered safe for biological resources within and adjacent to the project area. • Ensure that herbicides are mixed with a non-toxic water soluble dye of low toxicity that highlights treated areas. • Minimize overspray of herbicides onto non-target species by restricting herbicide spraying when wind velocities exceed six mph. • Minimize trampling of native vegetation by establishing marked trails prior to project implementation. • Remove dead giant reed material that was foliar treated and left in place to avoid fire hazard potential prior to the beginning of the fire season. Material shall be removed when spring access is permitted and before the ensuing fire season begins (between April 15 and the beginning of the fire season). • Have a licensed professional conduct or oversee herbicides applications.	Corps of Engineers (herbicide applications shall be implemented by a licensed professional)	Prior to, during, and after construction
B-12	**Predator removal plan.** The Corps shall develop and implement a predator eradication plan in consultation with the CDFG and USFWS. The plan shall include specific measures to reduce the number of aquatic predators in Matilija Reservoir and minimize the potential for release of these species downstream during dam removal.	Corps of Engineers	Prior to and during construction
B-13	**Restoration plan.** The Corps shall develop and implement a Habitat Restoration Program for all areas disturbed by project construction including giant reed removal.	Corps of Engineers	Prior to, during, and after construction
B-14	**Oak and walnut replanting.** The Contractor shall replace any native oaks or California black walnut trees removed during project construction.	Construction contractor	During and after construction
B-15	**Pre-Construction bat surveys.** The Corps shall conduct pre-construction surveys for sensitive bats at the Santa Ana Bridge and any other structures that may house suitable roosting habitat for this species. If bats are located in the structure, construction would be scheduled to occur outside of the breeding season.	Corps of Engineers (implemented by a qualified biologist)	Prior to construction
B-16	**Development of an Operations and Maintenance Program.** The Corps shall develop and execute an Operation and Maintenance Program limiting the potential of long-term and short-term impacts to sensitive flora and fauna. The Maintenance Program would be submitted to the CDFG and USFWS for review and comment prior to implementation. At a minimum, the following items shall be included in the maintenance	Corps of Engineers	Prior, during, and after construction

Number	Mitigation Measures	Responsibility	Timing
	program: • Utilize existing access roads and ramps for all maintenance activities unless by foot or authorized by the appropriate regulatory agencies. • Ensure that only water-safe and surfactant-free herbicides are used. Treatments would use a glyphosate-based herbicide including Rodeo® and/or Aquamaster®, both of which are labeled for use within water. • Ensure that herbicides are applied at concentrations that are considered safe for biological resources within and adjacent to the project area. • Ensure that herbicides are mixed with a non-toxic water soluble dye of low toxicity that highlights treated areas. • Minimize overspray of herbicides onto non-target species by restricting herbicide spraying when wind velocities exceed six mph. • Have a licensed professional conduct or oversee herbicides applications. • Ensure that herbicides are not applied to ponded features within the 15-feet width to avoid potential impacts to fish and wildlife species. • Remove trash and debris cleared from culverts from the streambed to avoid potential direct impacts from debris being dislodged and carried downstream or by creating water quality impacts for aquatic species. • Maintain access roads outside of breeding season when repair areas are within 300-feet of known breeding pairs of least Bell's vireo, southwestern flycatcher, California gnatcatcher or other sensitive nesting species. • Use proper BMPs when maintaining access roads and ramps including regrading and repaving. • Inspect levees, roads, and ramps on a regular basis and repair small problems to limit the possibly of a large failure that would require extensive repair and potential damage to sensitive habitat.		
Cultural Resources			
CR-1	Survey for historic or prehistoric resources. A field survey of the slurry line, disposal site, levee sites, bridge removal locations, and other previously unsurveyed features will be conducted. If any historic or prehistoric resources are found, additional National Register of Historic Places evaluations will be made.	Corps of Engineers	Prior to construction
CR-2	National Register of Historic Places Evaluation. A test excavation and National Register of Historic Places evaluation shall be conducted of historic/prehistoric site COE#1, COE#2, and others that may be identified by additional surveys. If any are evaluated, and determined to be eligible for the National Register of Historic Places, mitigation measures shall be developed and agreed to in a memorandum of agreement. This document would be developed between the California State Historic Preservation Officer, the Corps and local sponsors. Federally Recognized Tribes and interested Native American groups would be invited to participate as concurring parties to the agreement. These procedures shall follow the requirements of Section 106 of the National Historic preservation Act, as implemented by 36 CFR 800.	Corps of Engineers	Prior to construction
CR-3	Develop discovery plan for previously unknown resources. A discovery plan shall be developed in consultation with the State Historic Preservation Officer pursuant to 36 CFR 800.13(b) to treat previously unknown resources found during implementation of the project. It shall include procedures to monitor and treat cultural resources discovered during mechanical and natural removal of sediment behind Matilija Dam. It would also include procedures for discoveries made during grading and earth moving activities.	Corps of Engineers	Prior to construction
CR-4	Consultation with Native American Tribes. Consultation shall be conducted with Native American Tribes and groups to obtain their concerns with the potential to impact Traditional Cultural Places, and other resources of importance to them.	Corps of Engineers	Prior to construction
Aesthetics			
AE-1	Adjust alignment of levees and floodwalls to allow vegetative screening of flood control improvements. Final levee and floodwall alignments along residential properties at Meiners Oaks and along SR 33 at Camino Cielo shall be designed to be set back from the properties and road ROW to allow vegetation to screen views of the flood control improvements. The distance of the setback would be determined at each location based on site feasibility, but shall be such that views of the levees and floodwalls are partially to completely obscured by intervening vegetation.	Corps of Engineers	Prior to construction

Number	Mitigation Measures	Responsibility	Timing
AE-2	**Screen levees and floodwalls with vegetation planting.** Levees and floodwalls adjacent to SR 33 at Camino Cielo and the Rice Canyon Trail in Meiners Oaks shall be screened from view by the planting of native vegetation. Vegetation selected for screening shall consist native species appropriate to the location and approved by a qualified biologist familiar with species known to inhabit the Ventura River. Species selected must be chosen and maintained to achieve a height as tall or taller than the levee/floodwall height at maturity. Planting of screening vegetation shall be initiated as soon as possible during levee/floodwall construction and shall achieve a minimum of 50% screening of the levee/floodwall within 10 years of project initiation. The goal of the screening should be to maintain the natural character of the remaining area and to screen the levees and floodwalls to the maximum feasible extent. An aesthetic screening plan would be submitted to the Corps by the construction contractor at least 90 days prior to construction and would include, but not be limited to: • A list of proposed tree and shrub species and sizes and a discussion of the suitability of the plants for the site conditions and mitigation objectives; • Maintenance procedures, including any needed irrigation; and • A procedure for replacing unsuccessful plantings.	Construction contractor	Prior to and during construction
AE-3	**Create trails over the Rice Road slurry disposal site following re-vegetation of site.** Prior to completion of slurry disposal activities and re-vegetation of the site, the Corps shall design a system of trails over the completed, re-vegetated site along with a re-vegetation plan for the site. The Ojai Valley Land Conservancy shall be consulted on appropriate trail routes to replace the trails covered by the slurry. Final trail designs and re-vegetation plans shall be submitted to the Ojai Valley Land Conservancy for approval at least 60 days prior to commencement of revegetation activities. Trail route construction shall commence in tandem with revegetation activities and shall be completed to the same level of quality as currently exist on the site or better.	Corps of Engineers	During and after construction
AE-4	**Reduce visibility of project activities and equipment.** If visible from nearby residences, roadways, or recreation facilities, project construction sites, as well as all staging, material, and equipment storage areas shall be visually screened with temporary screening fencing. Fencing shall be of an appropriate design and color for each specific location. All evidence of project activities, including ground disturbance due to staging or storage areas, shall be removed and all disturbed areas shall be returned to an original or improved condition upon completion of project activities including the replacement of any vegetation or paving removed during construction.	Corps of Engineers	During and after construction
Air Quality			
A-1	**Limit engine idling.** Prohibit private vehicle engine idling in excess of two minutes, restrict diesel engine idle time, to the extent practical, to no more than 10 minutes.	Construction contractor	During construction
A-2	**Low-emission diesel engines.** Require the use of certified low emission diesel engines (i.e., CARB/EPA Tier 1, 2, 3, or 4 certified off-road equipment) for diesel off-road equipment and cutterhead dredge pump engines, with the minimum requirement being CARB/EPA Tier 1 engines.	Construction contractor	During construction
A-3	**Limit use of internal combustion engines.** Utilize electrical power from the grid rather than internal combustion engines or internal combustion electric power generators for all stationary equipment, such as, the stationary water pumps, and slurry pumps (except the dredge engines).	Construction contractor	During construction
A-4	**Low-emission vehicles.** Utilize low-emission on-road construction fleet vehicles, if available.	Construction contractor	During construction
A-5	**NOx emission offset.** Provide NOx emission offset to fully offset the project emissions when they are predicted to be more than 25 tons per year.	Construction contractor	During construction
A-6	**Watering areas to reduce dust.** Pre-grading/excavation activities shall include watering the area to be graded or excavated before commencement of grading or excavation operations. Application of water (preferably reclaimed, if available) should penetrate sufficiently to minimize fugitive dust during grading activities.	Construction contractor	During pre-grading/ excavation activities (prior to construction)

Number	Mitigation Measures	Responsibility	Timing
A-7	**Controlling fugitive dust.** Fugitive dust produced during grading, excavation, and construction activities shall be controlled by the following activities: • All trucks shall be required to cover their loads as required by California Vehicle Code §23114. • Sweep streets at the end of the day if visible soil material is carried onto adjacent public paved roads (recommend water sweepers with reclaimed water) • Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash off trucks and any equipment leaving the site each trip • Pave construction roads that have a traffic volume of more than 50 daily trips by construction equipment, 150 daily trips for all vehicles • Pave all construction access roads for at least 100 feet from the main road to the project site • Pave construction roads that have a daily traffic volume of less than 50 vehicular trips • All graded and excavated material, exposed soil areas, and active portions of the construction site, including unpaved on-site roadways, shall be treated to prevent fugitive dust. Treatment shall include, but no necessarily be limited to, periodic watering, application of environmentally-safe soil stabilization materials, and/or roll-compaction as appropriate. Watering shall be done as often as necessary and reclaimed water shall be used whenever possible.	Construction contractor	During pre-grading/ excavation, and construction activities
A-8	**Dust stabilization.** Graded and/or excavated inactive areas of the construction site shall be monitored by the construction contractor at least weekly for dust stabilization. Soil stabilization methods, such as water and roll-compaction, and environmentally safe dust control materials, shall be periodically applied to portions of the construction site that are inactive for over four days. If no further grading or excavation operations are planned for the area, the area should be seeded and watered until grass growth is evident, or periodically treated with environmentally-safe dust suppressants, to prevent excessive fugitive dust.	Construction contractor	During and after construction
A-9	**Traffic signs.** Signs shall be posted onsite that limit traffic to 15 miles per hour or less.	Construction contractor	During construction
A-10	**Excessive winds.** During period of high winds (i.e., wind speed sufficient to cause fugitive dust to impacts adjacent properties), all clearing, grading, earth moving, and excavation operations shall be curtailed to the degree necessary to prevent fugitive dust created by on-site activities and operations from being a nuisance or hazard, either off-site or on-site activities and operations from being a nuisance or hazard, either off-site or on-site. The site superintendent/supervisor shall use his/her discretion in conjunction with the APCD in determining when winds are excessive.	Site superintendent/ supervisor	During construction
A-11	**Street sweeping.** Adjacent streets and roads shall be swept at least once per day, preferably at the end of the day, if visible soil material is carried over to adjacent streets and roads.	Construction contractor	During construction
A-12	**Respiratory protection.** Personnel involved in grading operations, including contractors and subcontractors, should be advised to wear respiratory protection in accordance with California Division of Occupational Safety and Health regulations.	Construction contractor	During construction
Noise			
N-1	**Limit hours of hand-held equipment use.** Use of loud hand-held construction equipment, such as chain saws, heavy-duty construction equipment, and trucks shall not occur between the hours of 7:00 p.m. and 7:00 a.m., except for dredging, slurrying, and associated water conveyance activities, which are planned to occur 24 hours a day, 7 days a week.	Construction contractor	During construction
N-2	**Limit hours of heavy-duty equipment use.** Within the City of Ojai, use of heavy-duty construction equipment or trucks shall not occur between the hours of 7:00 p.m. and 10:00 a.m.	Construction contractor	During construction
N-3	**Use of muffler equipment.** Construction equipment shall be operated with standard factory silencer and/or muffler equipment. Equipment engine covers shall be in place and mufflers shall be in proper working order.	Construction contractor	During construction
N-4	**Locate haul routes away from sensitive receptors.** Haul routes, staging areas, and construction activities shall be located to avoid noise impacts to sensitive receptors (schools, hospitals, residential areas, etc.), whenever possible. If necessary, noise curtains or shields shall be implemented to reduce noise levels to the extent feasible.	Construction contractor	During construction
N-5	**Use of electric motors.** The construction contractor shall use electric motors to the extent feasible for all stationary equipment (i.e., pumps). Stationary equipment located at Lake Casitas shall be enclosed to limit impacts to recreational users.	Construction contractor	During construction
N-6	**Controlled blasts.** All blasts at Matilija Dam shall be controlled. Records detailing each individual blast shall be maintained and available onsite.	Construction contractor	During construction

Number	Mitigation Measures	Responsibility	Timing
N-7	Use of hearing protection. Hearing protection shall be provided to all worksite personnel during blasting operations, and as needed for general construction activities to meet the requirements of OSHA standards (29 CFR 1910.95, Subpart G) and U.S. EPA standards. In the event of complaints by worksite personnel, a Noise Monitoring Program shall be implemented as discussed in OSHA 29 CFR 1910.95, Subpart G, Appendix G.	Construction contractor	During construction
N-8	Public notice of construction. The construction contractor shall provide advance notice of the start of construction for the project to all residences within one mile of the main construction area (i.e., Matilija Dam), and those residences adjacent to the downstream flood protection improvements (levees, floodwalls, and bridges). The announcement shall state specifically where and when construction will occur and provide contact information for public questions or comments. The construction contractor shall serve as the contact person in the event that noise levels during construction become disruptive to local residents. A sign shall be posted at the various sites with the contact phone number, and include general contact information for public questions or comments.	Construction contractor	Prior to and during construction
N-9	Noise monitoring. In the event of complaints by local residents, the construction contractor shall monitor noise from construction activity. Noise shall be measured at the exterior wall(s) of those residents filing a complaint or a representative location. In the event that construction noise exceeds the specified limits (1-hour Leq of 55 dBA), the responsible construction activity shall cease until appropriate measures are implemented to reduce noise levels to the extent feasible.	Construction contractor	During construction
Transportation			
T-1	Transportation Management Plan. The construction contractor shall submit a Transportation Management Plan to the County of Ventura's Public Works Department and to Caltrans for review and approval that demonstrates practices and safety precautions designed to minimize temporary construction traffic impacts. The detailed traffic study shall be performed by a registered civil engineer (or registered traffic engineer) who is qualified to perform traffic engineering studies and is familiar with Ventura County. The Transportation Management Plan shall cover all aspects of construction under the Proposed Action and shall include traffic control measures and other procedures that may be necessary during construction of the project. All recommendations of the Transportation Management Plan shall be incorporated into the description of the Proposed Action.	Construction contractor (traffic study performed by registered civil or traffic engineer)	Prior to construction
T-2	Road repair from construction activities. If damage to roads, sidewalks, and/or medians occurs, the construction contractor shall coordinate repairs with the affected public agencies to ensure that any impacts are adequately repaired. Roads disturbed by construction activities or construction vehicles shall be properly restored to ensure long-term protection of road surfaces. Care shall be taken to prevent damage to roadside drainage structures. Roadside drainage structures and road drainage features (e.g., rolling dips) shall be protected by regrading and reconstructing roads to drain properly.	Construction contractor	After construction
Recreation			
R-1	Construct a ramp to provide access over the Meiners Oaks flood protection. The Corps shall design and construct a ramp from Meyer Road on the east side of the Meiners Oaks flood protection over to the trails on the west side of the flood protection. The OVLC shall be consulted on the design of the ramp. This ramp shall be constructed in conjunction with construction of the Meiners Oaks levee and floodwall. The ramp shall be designed to ensure that pedestrians and equestrians can continue to utilize the Rice Canyon Trail, but designs may also include measures to ensure that the levee itself is not used as a recreation trail.	Corps of Engineers	Prior to and during construction
R-2	Parks agency coordination, notification, and signage. All construction activities, including temporary trail closures, affecting parklands or trail systems along the project route shall coordinate with the respective jurisdictional agency at least 30 days before construction begins in these areas. Signs directing vehicles to alternative park access and parking shall be posted in the event construction temporarily obstructs parking areas near trailheads. The Corps shall also post signs alerting park users to construction activities at least a week in advance of construction near recreation facilities. Signs advising recreation users of construction activities and directing them to alternative trails or bikeways will be posted on both sides of all trail intersections or as determined through Corps coordination with the respective jurisdictional agencies.	Corps of Engineers	Prior to and during construction

APPENDIX K.

MONITORING AND ADAPTIVE MANAGEMENT PLAN

APPENDIX K. MONITORING & ADAPTIVE MANAGEMENT PLAN

I. INTRODUCTION

The Monitoring and Adaptive Management Plan provides an essential element in the overall implementation of the proposed restoration plan. The plan provides an opportunity to review and evaluate the performance of the project components during and after the project implementation. Early identification of ways to improve project performance often results in implementation of necessary revisions to the project components. This Monitoring and Adaptive Management Plan is considered the initial attempt to detail the components to be implemented during project construction. A more detailed Monitoring and Adaptive Management Plan will be prepared during the Pre-construction, Engineering and Design [PED] phase (i.e., more specific monitoring details, e.g., exact transect locations, reference site locations, more specific performance/success criteria, more specific monitoring protocols, etc., will supplement this Monitoring and Adaptive Management Plan).

Some of the primary reasons the plan is justified and being recommended include the following:

► There are no existing projects upon which to obtain and draw ecosystem restoration information from deconstruction of a Dam of the size of Matilija Dam.

► The planning and design assumptions will require field validation to ensure the assumed planning and design benefits are actually realized.

► The expenditures for the Monitoring and Adaptive Management will provide insurance and help eliminate uncertainty for a successful restoration project.

► Protects the Federal and non-Federal investments by ensuring the project functions as intended.

The purpose of this Monitoring and Adaptive Management Plan is to provide a mechanism to evaluate the effectiveness of the restoration measures implemented in this project and implement adaptive changes, if required to obtain project objectives. As outlined in EC 1105-2-100 (Appendix E, Section V, E-30i.), the Monitoring Plan is intended to ascertain whether: the project is functioning as per project objectives; adjustments for unforeseen circumstances are needed; and changes to structures or their operation or management techniques are required. (Also see Pastork et al. 1997; Thom and Wellman 1996; and Yozzo et al. 1996).

The recommended restoration alternative is expected to result in significant benefits to the riparian ecosystem, especially to steelhead/aquatic and riparian habitat. Restoring a more natural sediment regime is expected to allow for channel complexity and aquatic habitat diversity. Removal of Matilija Dam is expected to open 17 miles of habitat to migrating steelhead. Removal of 250 acres of the invasive, exotic Arundo from the riparian zone is expected to result in significant benefits to the riparian habitat and associated riparian birds and amphibians. (For more detailed discussion of beneficial impacts on the riparian ecosystem, see Biological Assessments, Appendix C1 and C2).

The uncertainty associated with the potential adverse effects of sedimentation and turbidity on the riparian ecosystem, however, is the primary reason that an extensive Monitoring and Adaptive Management Plan (M&AMP) is proposed for this feasibility study. Deconstruction of Matilija Dam would be the largest dam removal undertaken to date in the US. This Monitoring and Adaptive Management Plan provides a description of: a) surveys to monitor the sedimentation and turbidity associated with the release of trapped sediment following dam deconstruction; regulated substances that may affect drinking water quality from the release of trapped sediment following dam deconstruction; the natural erosion of sediment from temporary storage sites; the timing of staged removal of the soil cement revetment; the habitats to be restored; the expected, and the natural re-introduction of native wildlife into the restored habitats; 2) the performance criteria and monitoring protocol to evaluate success of the restoration effort; 3) adaptive management actions (or maintenance activities) that may be performed to ensure a successful restoration effort; and 4) reporting requirements.

This Monitoring and Adaptive Management Plan covers monitoring and adaptive management actions during the first 10 years after initial construction. (After the first 10 years, monitoring and/or adaptive management becomes the responsibility of the Local Sponsor.)

II. OBJECTIVES

See Main Report and DEIS/EIR

III. SEDIMENT IMPACTS MONITORING BELOW DECONSTRUCTED DAM

The impacts associated with dam removal have been analyzed to sufficient detail for a feasibility level evaluation. Further evaluation during the next phase of the project (Pre-construction, Engineering and Design) will be performed for specific features of the project, including the sediment bypass at the Robles Diversion Facility. Due to the large scale of the project, the potential for adverse impacts, and the uncertainty associated with large sediment releases, an extensive monitoring and adaptive management program will be implemented. The program will remain in effect until it is deemed by the Ventura County Watershed Protection District that sufficient evacuation of trapped sediment from the Matilija Reservoir has occurred.

The following aspects will be monitored:

1. Streambed deposition/erosion at each of the following sites:
    a. Levee/Floodwall Improvements: Meiners Oaks, Live Oak Levee, and Casitas Springs.
    b. Bridges: Camino Cielo, Baldwin Road (Highway 150), Santa Ana, Shell, and Main Street.
    c. Matilija Hot Springs, Foster Park, and Ventura River Estuary.

Following is the required data gathering to be performed pre- and post-dam deconstruction. Generated data will be used to maintain real-time updating of hydraulic modeling. Updated modeling results will provide important decision-making information to determine whether intervention measures are necessary (e.g. sediment channel clearing at specific locations). Data will be collected once a year if a storm event exceeds a return period of 3 years (5000 cubic feet per second at Matilija Dam).

- Streambed surveys at three to five established cross-sections at each of the identified locations.
- Surface streambed pebble counts and sampling at established sites along the Ventura River, at approximately every mile from river mile 15 to 8, and every 2 to 4 miles downstream of river mile 8. A total of 10 sample locations will suffice. Gradation tests will be performed on the bag samples.

In addition to the above, there will be a complete reconnaissance of the entire river immediately after every flood event greater than a one-year return period to photographically record any areas of concern. After a period of 10 years following dam removal, a complete topographic survey of the river channel will be performed using photogrammetry or lidar.

2. Turbidity and suspended sediment concentrations at each of the following locations:

    a. Upstream of the dam
    b. Downstream of the dam
    c. Robles-Casitas Canal Intake
    d. Foster Park
    e. Confluence at North Fork Matilija Creek and at San Antonio Creek

Currently only Foster Park is equipped to measure turbidity and suspended sediment concentrations. The other specified locations would require installation of gages. Baseline data collection will be initiated after the commencement of Pre-construction, Engineering and Design and will continue until sufficient evacuation of trapped sediment from the Matilija Reservoir has occurred.

3. Performance of sediment bypass, deposition behind Robles Diversion, exclusion of sediment from the Robles Canal intake. This should start as soon as possible to establish baseline data and continue until project completion.

4. Water Quality for Regulated Substances at each of the following locations:

    a. Upstream of the Reservoir Basin
    b. Downstream of the dam and upstream of North Fork Matilija Creek confluence.
    c. Robles-Casitas Canal Intake
    d. Lake Casitas (Utilize data from on-going CMWD data collection)

Consultation with the Regional Water Quality Control Board (RWQCB) will proceed during the Preconstruction, Engineering and Design Phase of the project. Actions as required by the

RWQCB will be pursued to insure that Lake Casitas is not adversely impacted by the introduction of any regulated substances above levels considered to be within the existing background levels pursuant to, and directly attributed to the removal of Matilija Dam. In the event that adverse impacts cannot be avoided, mitigation measures funded by project costs will be pursued as needed at Lake Casitas, including at the reservoir's treatment plant. Baseline data collection will be initiated after the commencement of Pre-construction, Engineering and Design and will continue until sufficient evacuation of trapped sediment from the Matilija Reservoir has occurred.

IV. EROSON AT TEMPORARY STORAGE SITES

The erosion at the temporary storage sites will be monitored through on-site photography, and repeat surveys. The surveys can be completed by the most economical means available, but the information should be sufficient to detail the amount of material eroded after each storm.

V. RESTORED HABITATS

As stated previously, the restoration alternative is expected to result in significant benefits to riparian and aquatic habitat. Below is a discussion of how habitats are expected to be restored.

A. RIPARIAN HABITAT

The riparian habitat is expected to benefit mainly from eradicating Giant Reed from the riparian zone. A description of how giant reed (*Arundo donax*) would be removed in infected River Reaches is discussed in the Habitat Evaluation Appendix (Appendix E, subAppendix 4)

As a summary, giant reed would be removed from the study area in the initial five years of project construction. Giant reed removal would occur systematically during construction from the upper portion of the study area and working downstream. Four common methods may be used:

1. cut and remove biomass with cut-stump application of herbicide
2. cut and remove biomass
3. cut and remove biomass and remove below ground rhizomes
4. aerial application of herbicides.

Method 3 would likely be used in Reach 7 during recontouring of the site for any of the alternatives. Method 4 would likely be used for large areas of dense reed. Methods 1 and 2 are most commonly used and would be the best choices for most of the study area. All methods require 5 years of follow-up herbicide treatment of Giant reed sprouts.

B. STEELHEAD/AQUATIC HABITAT

The beneficial effects of deconstruction of Matilija Dam are discussed in detail in Appendix C1, section VI.A.2(c). As a brief summary, deconstructing Matilija Dam is expected to result in significant beneficial effects to the aquatic ecosystem downstream of the dam as the natural sedimentation processes that lead to channel complexity/habitat diversity (that would result in increased aquatic productivity) are restored. Sediment-starved River Reaches downstream of Matilija Dam are expected to experience significant aggradations as sediment is re-supplied. The proposed sediment by-pass at the Robles Diversion structure is expected to allow high-flows to naturally move sediment downstream and not become trapped in the Robles Basin. The channel in River Reaches 5 and 3 that have experienced downcutting (incision) for the past 30 years and are expected to aggrade significantly following deconstruction. It is expected that Reaches 5 and 3, especially, might experienced an improvement in the steelhead spawning habitat quality as more coarse gravel becomes available.

The 100-ft. wide channel in the former Matilija Reservoir area (Reach 7) is expected to have hydraulic conditions favorable to steelhead upstream migration. The excavated channel will allow for a naturally meandering, low flow channel to develop. As such, once the dam is removed and the channel is excavated through the reservoir sediments, significant benefits to steelhead are expected as upstream migration to about 17 miles of high quality habitat upstream of Matilija Dam is restored.

VI. HABITAT & WILDLIFE MONITORING

A. HABITAT MONITORING

1. RIPARIAN HABITAT

All areas where Giant Reed has been eradicated will require at least 5 years of treatment of resprouting canes with herbicide. Since reinfestation of the Ventura River by giant reed may occur following completion of deconstruction activities, eradication areas will be monitored annually for the first 5 years. Monitoring will occur every other year after the first 5 years to determine if Giant Reed has been adequately removed. Areas of reinfestaion will be re-treated. Upland and tributary sources of Giant Reed may also be identified and eradicated from the watershed under other projects, funded seperately, as part of a County-wide program.

2. STEELHEAD/AQUATIC HABITAT

River Reaches downstream that have experienced downcutting will be monitored to determine if they experience the aggredation of sediment that is expected – especially Reaches 5 and 3. Sediment grain size in these Reaches will also be monitored to determine if spawning gravels are replenishing these River Reaches. Steelhead/aquatic habitat monitoring will also occur in conjunction with fish surveys as described in section VI.B.2 (e.g., . streamside vegetation, stream substrate, riffle: pool ratios, pool depths, barriers to fish passage, stream flows,tc…).

B. FISH & WILDLIFE MONITORING

1. WATER QUALITY & AQUATIC INVERTEBRATE MONITORING

Routine water quality monitoring will be conducted with fisheries surveys. Parameters such as turbidity, dissolved oxygen, and pH will be taken. (See discussion on Fisheries Monitoring below). In addition to water quality, freshwater benthic invertebrates will also be sampled as an indicator of water quality.

2. FISHERIES MONITORING

Below the deconstructed dam, fisheries monitoring surveys will occur in selected locations in the study area during late spring or summer fro the first five years after construction. Thereafter, fisheries surveys will occur ever other year for the next five years. Primary emphasis will be placed on detecting the presence of salmonids in the study area. Additionally, fisheries/aquatic habitat will be monitored during fish surveys. Habitat parameters such as streamside vegetation, stream substrate, riffle:pool ratios, pool depths, barriers to fish passage, stream flows, and stream velocities will be measured.

In the former reservoir area, fisheries surveys will be conducted every year for a period of ten years following constructions to ensure that the constructed channel provides for fish passage and that recovery of vegetation along the sideslopes is occurring as expected.

3. WILDLIFE MONITORING

(a). RIPARIAN BIRDS

Riparian bird surveys will be conducted in the summer and spring season in the former reservoir area for the first 5 years. Thereafter it will occur in spring and summer every other year to document that the area is recovering and beneficial impacts to riparian species are occurring.

In River Reaches below the deconstructed dam, surveys spring surveys will be conducted for the first 5 years following dam deconstruction, and then conducted every other year to document the beneficial impacts to riparian birds from the recommended plan.

(b). AMPHIBIANS

Protocol surveys for the California red-legged frog and the arroyo toads will be conducted yearly in the former reservoir area and in selected (suitable) locations in the downstream reaches, for the first 5 years following construction. Thereafter, surveys will occur every other year.

VII. SUCCESS (PERFORMANCE) CRITERIA, REPORTING & ADAPTIVE MANAGEMENT

A. SUCCESS (PERFORMANCE) CRITERIA

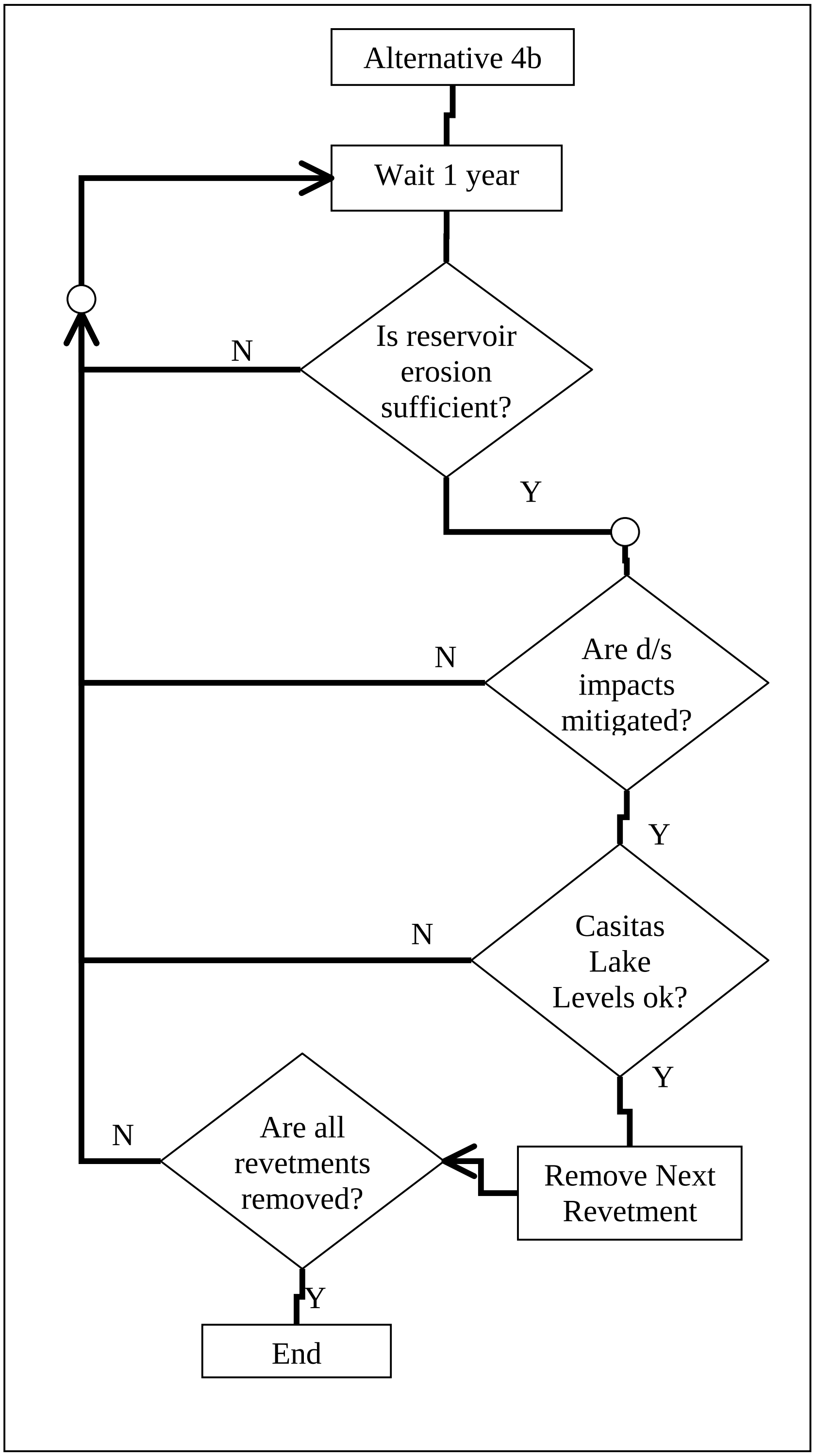
Success or failure of the restoration will be based on: 1) whether or not fish passage opportunity is restored through the former dam area (but not based on achieving a specific number of steelhead returning to the study area), 2) whether giant reed is effectively eliminated from the study area such that riparian habitat quality is improved/restored, and 3) whether natural sedimentation processes are approaching a state of equilibrium (i.e., whereby sediment entering the river and leaving the river to the ocean are in balance) such that the mosaic of channel forms characteristic of an undammed southern California river show signs of restoration.

Monitoring will occur as identified in Section 4, above; Monitoring Reports would be prepared at the end of the year by the Corps/Local Sponsor for the first 10 years after initial construction. The need to make adjustments to the constructed project will be based on the results of the Monitoring Reports. If the steelhead, riparian and natural processes components of the riparian ecosystem demonstrate signs of being restored, no modifications will be made.

After the first ten (10) ten years, the non-Federal Sponsor will prepare the Monitoring Reports as established by the Technical Committee (see discussion in the following section).

Hydraulic conditions and sedimentation will be assessed per the following:

1. Adequate flood capacity at each site of flood risk
2. Acceptable deposition behind Robles Diversion Dam and in the entrance to Robles Canal
3. Acceptable turbidity levels and/or duration in Ventura River and Estuary
4. Acceptable turbidity levels and/or duration in Robles Canal
5. Acceptable impacts in WQ at Lake Casitas.
6. Erosion of sediment as temporary structures are removed.



Notes: The d/s impacts are listed in the above paragraph. (Robles operations, Flood risk, Casitas water quality). If it is found that removal of revetment hampers the diversion of water, then the levels of Lake Casitas will be monitored to ensure that revetment removal does not occur during drought periods.

B. MONITORING REPORTS & ADAPTIVE MANAGEMENT

1. TECHNICAL COMMITTEE

The Corps and/or the non-Federal Sponsor will be responsible for collecting monitoring data and preparing annual Monitoring Reports. A Technical Committee consisting of, at least, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish & Game, will assist in collection of monitoring data, review monitoring data results, and providing recommendations of possible adaptive management measures.

The Technical Committee will recommend adaptive management measures to the existing project's design should any of the habitat components not demonstrate signs of restoration or if adverse impacts to fish and wildlife resources differ significantly from what was predicted in the DEIS/EIR.

2. EXECUTIVE COMMITTEE

Annual Monitoring Reports and any adaptive management measures recommended by the Technical Committee will be forwarded to an Executive Committee that will consist of, at least, a representative from the Ventura County Watershed protection District and the U.S. Army Corps of Engineers. The Executive Committee will decide whether to adopt adaptive management measures recommended by the Technical Committee

VIII. REFERENCES

Pastorok, R.A., A. MacDonald, J.R. Sampson, P. Wilber, D.J. Yozoo, and J.P. Titre. 1997. An ecological decision framework for environmental restoration projects. Ecol. Engin. 9:89-107.

Thom, R.M. and K.F. Wellman. 1996. Planning aquatic ecosystem restoration monitoring programs. Evaluation of Environmental Investments Research Program. IWR Report 96-R-23.

Yozzo, D., J. Titre, and J. Sexton. (eds.) 1996. Planning and evaluating restoration of aquatic habitats from an ecological perspective. IWR report 96-EL-4. WES, Prepared for Institute for Water Resources. USACE, Alexandria, Virg. and WES, Vicksburg, MS.

APPENDIX L.

NATIONAL HISTORIC PRESERVATION ACT COMPLIANCE

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
P.O BOX 532711
LOS ANGELES, CALIFORNIA 90053-2325

REPLY TO
ATTENTION OF:

July 6, 2004

Office of the Chief
Environmental Resources Branch

Dr. Knox Mellon
State Historic Preservation Officer
Office of Historic Preservation
P.O. Box 942896
Sacramento, California 94296-0001

Dear Dr. Mellon:

The Los Angeles District, Corps of Engineers (Corps), and the Ventura County Watershed Protection District (VCWPD) are preparing environmental and cultural resources documentation for the proposed Matilija Dam Ecosystem Restoration Project located near Ojai, in Ventura County (enclosure 1). The goals of the proposed project are to; 1) improve aquatic and terrestrial habitat along Matilija Creek and Ventura River; 2) restore fish passage; 3) restore natural processes to support beach sand replenishment; and, 4) enhance recreational opportunities.

The proposed undertaking (Alternative 4b) consists of several features and measures. The main feature would be the removal of Matilija Dam. It would be done in a manner that would allow sediment behind the dam to gradually migrate downstream. A more detailed project description is included as enclosure 2.

Based on the above description we have delineated the area of potential effects (APE), to include Matilija Dam, the basin behind the dam, all disposal areas, staging areas, new access roads, pipeline alignments, bridges and other structures to be demolished or modified (enclosure 3). Please provide us with your comments on our determination of the APE, so we can fully consider your comments prior to making our determination.

A records and literature search was conducted at the South Central Coastal Information Center at California State University, Fullerton (SCCIC). The overall study area for the records search included an area, one-mile on either side of the Ventura River and Matilija Creek, extending from Matilija Dam and basin, to the ocean. The records indicated that the project area behind Matilija Dam had not been previously surveyed for the presence of cultural resources. Portions of the Ventura River downstream of the dam have been surveyed, and several prehistoric and historic sites were located.

For project planning purposes, the Corps Archeology staff conducted a subsequent field survey of Matilija Dam, and basin (enclosure 4). Four-historic/prehistoric archeological sites were found. They include an historic road (COE#1), one historic/prehistoric archeological site (COE#2), Matilija Dam, built in 1947, and Matilija Hot Springs. The information in this survey was used to avoid impacts to the sites during preliminary design. It will not be possible to avoid impacts to Matilija Dam, since its removal is central to achieving the purpose of the project.

We also requested a Native American contact list from the Native American Heritage Commission (NAHC) and information on potential sacred sites. No sacred sites were reported by the NAHC within the larger study area. We will continue to consult with these Native American contacts throughout the compliance process.

During the next phase of project planning we intend to survey all previously unsurveyed portions of the APE. In consultation with your office we will also test, evaluate, and make determinations of NRHP eligibility for newly recorded sites, including COE#1, COE#2, Matilija Dam, and Matilija Hot Springs. We will also obtain trinomials from the SCCIC. If any NRHP resources are located within the APE which cannot be avoided, we anticipate developing and executing a memorandum of agreement pursuant to 36 CFR 800.6.

A draft Environmental Impact Statement is being prepared and will be widely distributed to the public, including contacts provided by the Native American Heritage Commission. Each Native American group and individual on the list was sent an initial letter requesting his or her comments at an early stage of planning. They were also invited to attend and participate in the public scoping meeting. We will continue to consult with them as project planning continues. The only comments received expressed a concern with the potential for buried resources beneath the sediment behind Matilija Dam, and interest in being given an opportunity to monitor construction.

Please review the enclosed information, and respond at your earliest convenience. Additional information on other aspects of the project can be viewed at matilijadam.org. If you have any further questions on this project please call Mr. Stephen Dibble, Senior Archeologist, at (213) 452-3849. He may also be reached by e-mail at ddibble@spl.usace.army.mil.

Sincerely,

Ruth Bajza Villalobos
Chief, Planning Division

Enclosures

CORRESPONDENCE

Public comments are provided in Appendix N.
Agency comments are provided in Appendix B.2 and Appendix L.

APPENDIX N.

PUBLIC REVIEW COMMENTS AND RESPONSES

Southern California Steelhead Coalition
5436 Westview Court
Westlake Village, CA 91362
(818) 865-2888

COALITION MEMBERS
American Whitewater Affiliation
California Trout
Center for Biological Diversity
Clean Up Rincon Effluent
Conception Coast Project
Conejo Valley Flyfishers
Ecology Center of Southern California
Endangered Habitats League
Environmental Defense Center
Friends of the Los Angeles River
Friends of the River
Friends of the Santa Clara River
Friends of the Ventura River
Heal the Bay
Keep the Sespe Wild Committee
Mailbu Resources Conservation District
National Audubon Society
(Buena Vista Chapter)
National Audubon Society
(Palomar Chapter)
Natural Resources Defense Council
Pacific Coast Federation of Fishermen's Associates
San Diego Trout
Santa Barbara SEA
Santa Monica Mountains Conservancy
Sierra Club
(Angeles Chapter)
Sierra Club
(San Diego Chapter)
Sierra Pacific Fly Fishers
Surfrider Foundation
Surfrider Foundation
(Ventura Chapter)
The Audubon Center
Trout Unlimited
Wilderness Fly Fishers

MANAGMENT COMMITTEE
Chairman: Jim Edmondson (CalTrout)
Vice Chairmen: Andrew Wetzler (NRDC)
Secretary: Kris Schmidt (Sierra Club)
At Large members:
Steve Netti (Trout Unlimited)
Leslie Mentz (Heal the Bay)
David Gottlieb – (Mailbu Resources Conservation District)
John Buse (Environmental Defense Center)

COMMENTS/CONCERNS ON DRAFT EIR/EIS FOR MATILIJA DAM REMOVAL ACOE PUBLIC MEETING January 31, 2002

1. <u>January 2002 Notice of Preparation of Draft EIR/EIS does not include as an objective natural sediment transport restoration</u>

a. Draft EIR/EIS should analyze more fully the benefits and impacts of restoring the natural sediment flow from the dam site to the ocean and the associated benefits and impacts of a restored natural sediment transport on beach nourishment.

The beach nourishment aspect potentially provides the most significant economic benefit of the project. The ACOE is the primary agency involved with shoreline management nationwide, and has a complex ongoing shoreline maintenance program in Ventura County. Beach erosion is a serious problem in Ventura County, which has the dubious distinction of having the highest percentage of hardened shoreline in the state of California. The obsolete Matilija Dam has impeded the littoral sediment supply for the past half century, the impacts of which are realized in beach erosion and shoreline recession in the Ventura sub-cell of the Santa Barbara littoral cell. Both the short-term benefits gained from using the impounded sediment for beach replenishment, and the long-term restoration of this critical sediment supply should be a primary focus of this project. The Draft EIR/EIS should consider beach nourishment as a primary objective of the project.

b. While fully analyzing the benefits and impacts of restoring the natural sediment regime in the Ventura River may entail more upfront costs in the ACOE Feasibility Study, the long term costs associated with this alternative (if chosen) would more than offset the additional study costs. Therefore, it is critical that the Draft EIR/EIS

c. provide all the information necessary to make an informed decision.

2. **<u>Sediment management alternatives and associated costs from the April 2000 Bureau of Reclamation Appraisal Report on Matilija Dam Removal:</u>**

1A upstream stabilization ***2 years*** ***$69.2 M***

Summary: the sediment will be moved to one side of the reservoir to create a new stabilization stream channel. Sediment will be stabilized using riprap and the area will be revegetated.

1B downstream transportation ***4-5 years*** ***$144.4 M***

Summary: the sediment will be excavated from behind reservoir and transportation trucked to a downstream storage site and/or beaches.

1BB slurry pipeline ***4 years*** ***$179.4 M***

Summary: the sediment will be excavated or dredged from behind reservoir and transported in slurry pipeline/conveyor belt to a downstream storage site and/or beaches.

2 phased natural transport ***25 years*** ***$21.6 M***

Summary: the dam will be "notched "to reduce its height in stages, transport and the sediment will be flushed by the river natural flows downstream.

3 combination of alternatives 1 & 2 ? years ***? cost***

Summary: further study may determine that some combination of alternatives 1 &2 will provide the most cost effective and environmentally preferred method for dam removal.

d. While the phased natural transport (i.e., incremental notching) may appear to be the longest in time of the alternatives, given the enormous costs of the other alternatives and the current economic situation in which we find ourselves, in reality the phased natural transport alternative may allow for the restoration of the Ventura River in the shortest amount of time.

3. **<u>Consideration of fish passage alternative is not feasible for restoration of southern steelhead.</u>**

Evidence from around the country (specifically Pacific Northwest) that fish ladders over 25 feet tall are not effective at passing fish. Given this, it is not an effective use of taxpayer money to analyze this alternative in the Draft EIR/EIS. The fish passage alternative was eliminated from the Bureau of Reclamation's Appraisal Report due to it's ineffectiveness as an alternative for fish passage, however the ACOE decided to include it in the Draft EIR/EIS.

4. **General concern that the Draft EIR/EIS will not stay on schedule, have cost overruns, etc.**

Want to ensure that the process occurs as efficiently and effectively as possible:

a) to ensure that restoration of the Ventura River occurs in a timely manner; and,
b) to alleviate additional costs to taxpayers.

Thank you for holding this public meeting and considering these comments as your important work progresses.

Sincerely,

SOUTHERN CALIFORNIA STEELHEAD COALITION

Jim Edmondson

Jim Edmondson, Chairman

March 7 2002
1917 N Dwight
Camarillo CA 93010 3852
805 482-5232

California Department of Fish and Game
P O Box 1797
Ojai CA 93024
Martin Potter

Subject: Matilija Dam Ecosystem Restoration, Ventura County

Dear Mr. Potter

I enthusiasticly support a reasonable and cost effective program that will help the natural environment and at the same time provide many benefits to society.

First some background information. Matilija Canyon is a product of geotechtonic forces, faulting and subsequent erosion. These natural geologic forces are on-going. There is some differential offset between the northerly and southerly canyon walls.

Ventura River's gradient at the ocean is very gentle. The stream gradient becomes increasingly steeper toward the dam site. The distance from the ocean to the dam measures ± 25,400 m / 25.4 km (83,400 ft / 15.8 mi). The stream gradient just downstream of Matilija Dam is s=0.044 or 4.4 %.

The dam is located at the "narrows" 300 m (1,000 ft) upstream of Matilija Hot Springs. Additional advantages of this site is the broad "flat" valley bottom upstream and generous precipitation that occurs in this region.

Construction of the dam was accomplished during 1947 and 1948. The height was 39 m (130 ft) with a spillway elevation of 343 m (1,125 ft) msl. The reservoir capacity was 8,634,500 cm (7,000 af). The maximum water surface measured 335 m (1,100 ft) wide by 1,650 m (5,400 ft) upstream of the dam.

Matilija Creek valley upstream of the dam measures 240 m (800 ft) wide and extends upstream this way for 10,200 m / 10.2 km (33,500 ft / 6.3 miles). This "flat" valley floor terminates at the junction of Old Man Canyon. The stream gradient just upstream of the dam is s = 0.006 / 0.6 %. Further upstream the gradient steepens. The average gradient from the dam to Old Man Canyon is s = 0.024 / 2.4 %. This 10.2 km of "flat" valley floor offers the greatest ecosystem restoration and must be preserved. Fantastic catches of Steelhead are recorded during the 1920's and early 1930's. After 1939 such catches are not recorded. This may be due to changes in ocean currents.

Geotechnical challanges and concrete quality problems contributed to the dam's short useful life. Due to deteriorating conditions of the dam, in 1965 the top 6 m (20 ft) of spillway and dam was removed to elevation 336.9 m (1,105 ft) msl. The width of this spillway removal measured 86.9 m (285 ft). In 1997 an additional widening of 30.5 m (100 ft) was accomplished. In 1998 an additional 3 m (10 ft) of vertical removal was accomplished resulting in the spill-way elevation to be at 333.8 m (1,095 ft) msl.

Today the impounded water measures 616,750 cm (500 af) which extends 120 m (400 ft) upstream of the dam. Accumulated silt at the upstream limits of the reservoir has produced a mud flat or wet-lands. 15 to 20 ducks, mostly Mallards, now claim this area as their domain.

The next storm will no doubt flush additional quantities of gravel, sand, silt and clay into the reservoir to completely replace the water.

Maximum advantages to subject ecosystem restoration project could be achieved by incorporating the following ideas:

Leave the existing concrete structure in place.

Cut a notch in the present spillway to accomodate a fish passage-way / low flow outlet. Suggest 0.5 m (1.5 ft) deep by 2 m (6 ft) wide.

Utilize materials from the nearby quarry. Place compacted fill against the dam's downstream face. Slope the fill surface at 10 horizontal to 1 vertical. The toe of this fill will not impact Matilija Hot Spring's facilities.

Place grouted rock over the entire fill. Within the grouted rock fashion a fish flume / channel by switchbacks and resting pools. This flume gradient to match the natural downstream gradient of s = 0.044 (4.4 %).

The private properties located within Matilija Creek valley be purchased in the name of the public. All structures to be removed.

Matilija Road North is maintained with public funds for public access. This right-of-way to be quit-claimed and motorized vehicles prevented from having access to the valley. Access to the valley to be by a hiking trail.

Future annual budgets include periodic inspections of these remediation efforts and timely repair.

ADVANTAGES

Natural stream gradients are preserved. All natural forces are utilized, i.e., precipitation, runoff, erosion, deposition and sediment transport. Material washed over the crest have a better chance of being safely carried to the ocean without filling down-stream channels. Inundation / flooding of properties by channel filling would be prevented.

The mud flat / wetlands area would enlarge to occupy the space that is now open water.

The existing concrete dam structure would act as a stable core for the earth embankment.

Should spawning fish not use the 1.6 km of mud flat / wetlands area, there is 8.6 km of valley floor remaining in its natural setting. This is a benefit ratio of 6.2 to 1.

This proposal would have minimal impact on Ojai Valley's air quality, which is in non-attainable status. The very short travel distances required of construction equipment will help maintain air quality in the area.

This project could be completed in 4 months.

Public ownership of all properties in Matilija Creek valley, along with trail access only, would assure maximum ecosystem restoration and preservation of the natural setting.

Thank you, Don Hauser, PE CARCE 20406

Don Hauser

January 23 2002
1917 N Dwight Av
Camarillo CA 93010-3852
805 482-5282

Ventura County Flood Control District
Jeff Pratt, Deputy Director
800 S Victoria Av
Ventura CA 93009
805 654-2040

Subject; Matilija Dam Ecosystem Restoration

Dear Mr. Pratt;

The Ventura County Flood Control District and U S Army Corps of Engineers will hold a public hearing to take comments on Jan. 31, 2002 from 7 pm to 9 pm at the Ventura County Government Cent. I would appreciate it if you would include this letter in the public hearing.

I would like to express my support for a reasonable and cost effective program that will provide maximum benefit(s) to nature and society.

BACKGROUND INFORMATION

Matilija Canyon was formed by a geologic fault and subsequent erosion. There is some differential offset between the northerly and southerly canyon walls. Natural geologic forces are on-going.

Copious precipitation occurs in this region due to orientation of mountains, direction of movement of moisture laden storms and proximity to the ocean. Runoff and stream flows reflect this phenomenon.

The Ventura River's gradient at the ocean is very gentle and becomes increasingly steeper to the dam site. The stream gradient just downstream of the dam measures 4.4 % (S = 0.044).

The dam is located at the "narrows" 300 m (1,000 ft upstream of Matilija Hot Springs.

Upstream of the dam site Matilija Creek valley floor measures + 240 m (800 ft) wide and extends 10,200 m / 10.2 km (33,500 ft / 6.3 miles). This "flat" valley floor terminates at the junction of Old Man Canyon. The stream gradient averages 2.4 % (S = 0.024) throughout this reach. It is suggested that this 10.2 km of "flat" valley floor may be suitable fish habitat.

Siting Matilija Dam took advantage of the narrow canyon, broac "flat" valley bottom upstream and generous precipitation.

Construction of the dam was accomplished during 1947 and 1948. The height was ± 39 m (130 ft) with a spillway elevation of 343 m (1125 ft) msl. The reservoir Capacity was 8,634,500 cm (7,000 af).

The maximum water surface measured 335 m (1,100 ft) wide by 1,650 m (5,400 ft) upstream of the dam.

Geotechnical challanges and concrete quality problems contributed to the dam's short useful life.

Due to deteriorating conditions in 1965 the top 6 m (20 ft) of the spillway and dam was removed to elevation 336.9 (1,105 ft) msl. 86.9 m (285 ft) of spillway removal was involved at this time. In 1977 an additional widening removal of 30.5 m (100 ft) was accomplished In 1998 an additional vertical removal of 3 m (10 ft) was accomplished. This resulted in the spillway elevation to be 333.8 m (1,095 ft) msl.

Today the impounded water measures + 616,750 cm (500 af) and extends 120 m (400 ft) upstream of the dam. accumulated silt at the upstream limits of the reservoir has produced a mud flat / wetlands. 15 to 20 ducks, mostly Mallards, now claim this area as their domain.

The next storm no doubt will flush additional quantities of gravel sand, silt and clay into the reservoir to completely replace the water.

RECOMMENDATION

Leave the existing concrete structure in place.

Cut a notch in the present spillway to accomodate a fish passageway / lowflow outlet. Suggest 0.5 m (1.5 ft) deep by 2 m (6 ft) wide.

Utilize materials from the nearby quarry. Place compacted fill against the dam's downstream face. Slope the surface at 10 horizontal to 1 vertical. The toe of this fill will not impact Matilija Hot Springs facilities.

Place grouted rock over the entire fill. Within the grouted rock fashion a fish flum / channel with switchbacks, including a series of resting pools. This flum gradient is to match the natural downstream gradient of 4.4 % (S = 0.044).

The private properties located within the Matilija Creek valley be purchased in the name of the public.

Matilija Road North is maintained with public funds for general access. This right-of-way should be quit claimed and motorized vehicles prevented from having access to Matilija Creek valley.

ADVANTAGES

The existing concrete dam would act as a stable core for the new earth embankment.

All natural forces are utilized, i.e., precipitation, runoff, erosion, deposition and sediment transport.

All natural stream gradients are preserved

The mud flat / wetlands area would expand downstream to the dam's upstream face. This would enlarge the ducks habitat.

Should spawing fish not use the mud flat / wetlands area, 1.6 km, there is 8.6 km of Matilija Creek valley floor remaining in its natural condition. This is a ratio of 6.2 to 1.

Eroded materials carried over the crest have a better chance of being carried to the ocean without filling downstream channels. This would prevent inundation / flooding of lower properties.

Ojai Valley air quality, which is in non-attainable status, would have a minimum impact by this proposal. This is due to the very short travel distances required of the construction equipment.

This project could be completed in 4 months

Public ownership of all properties in Matilija Creek valley and public access only by a trail would assure maximum preservation of the natural setting

Thank you

Don Hauser

Don Hauser P.E

Casitas Municipal Water District
1055 Ventura Avenue
P.O. Box 37
Oak View, CA 93022
(805) 649-2251
Fax (805) 649-3001

January 31, 2002

Ms. Pamela Lindsey
Ventura County Public Works Agency
Flood Control Department
800 S. Victoria Avenue
Ventura, CA 93009-1600

Subject. Comments on the Scope of the EIS/EIR
Matilija Dam Removal

Dear Ms. ,indsey;

The purpose of this letter is to provide comments for what information should be included in the EIS/EIR for the removal of the Matilija Dam. It is Casitas' belief that all these items should be thoroughly and properly evaluated to determine the actual impacts of this proposed project.

The following is a list those items that Casitas feels must be addressed as a part of the proposed EIS/EIR:

Silt behind the Dam. The first issue and probably the most important issue is to determine the effects of the removal of the silt from behind the Dam. The concern of Casitas, given that Casitas is installing a fish passage facility prior to the removal of the Dam, is that if the silt is allowed to be discharged into the Ventura River, this unusual quantity and quality will damage the habitat of the steelhead trout for all the years that it will be in river and make recovery impossible. The silt buildup in the river could damage any down stream spanning areas, damage the live stretch, and damage the estuary near the mouth of the river. The environmental studies should consider what happens if the silt is stops before being discharged into the ocean. Most, if not all, permits that Casitas has received from the Army Corps of Engineers, the California Department of Fish and Game, the Los Angeles Regional Water Quality Control Board and others have all required that the addition of silt should be prevented. Discharging the silt from behind Matilija Dam would add more silt to the River than all of the projects for which Casitas has been permitted or other agencies have been allowed by permitting agencies. Any alternatives that allow the silt to move down the river should investigate scenarios that would result from the deposit of that silt along the river and the quality of that silt. The environmental should look at the time before, several times during the project, and after, as well as predicting when the silt will move through the river to the ocean.

Additionally, should that silt be released down river it will make a first stop at the Robles diversion facility. It is likely to render the proposed fish passage facility useless. The environmental studies should then consider the effects it would have on Casitas and mitigate them both at the project and permit level. It is likely that the release of the Matilija Dam silt in the river will simply move the problem from the Matilija Dam to the Casitas Robles Diversion Facility. The environmental documentation should consider what is to be done and who is responsible for dealing with this problem of silt if it ends up at Robles. Currently, Casitas has had to remove silt approximately every three years. It is anticipated by Casitas that if the silt from Matilija Dam is released, the schedule for removal will have to be increased significantly in both amount and frequency.

A further concern is that if the silt is allowed to buildup in the river, those properties that have been developed in the floodplain could be inundated. This could cause a significant amount of litigation due to the Matilija Dam silt moving down the river. The environmental document should clearly indicate and the evaluate proposals for this situation as well as developing mitigations and/or dealing with the anticipated lawsuits if they occur.

2. Water Supply: The second issue in priority is a reduction in water supply, which the removal of Matilija Dam will cause. There are currently water rights for Matilija Dam. These water rights and the water itself were allocated by agreement to supply a number of customers along the Matilija Conduit in the Ojai area. Currently, Casitas is under contract with the Flood Control District to supply water to customers along the Matilija Conduit, which is a part of the Matilija Dam Project. This contract expires in 2009. The environmental impact studies should evaluate how the County Flood Control District is going to supply these customers along the Matilija Conduit if water is no longer available from Matilija Dam. This is more important should the dam be removed prior to 2009 as that will remove the supply that these customers are served. The Environmental Impact Report should also evaluate the cumulative effects of the reduction of this water supply as well as the impact on the water supply of the reduction called for by the anticipated additional releases of water for the steelhead in the river. Furthermore, when the Flood Control District receives Matilija Dam and the Matilija Conduit with its associated services back in 2009, the Flood Control District will not only have to supply the water for those customers, but will also have to provide a water that meets State Department of Health Service requirements for quality.

3 Water Quality. The third issue is water quality that might occur due to discharge of silt and the actual quality impacts from what is contained within

the silt. In the past, the Regional Water Quality Control Board has had concerns with the movement of sediment that contains buried vegetation as a water quality problem. It is a fact that a lot of vegetation is buried within the silt behind Matilija Dam as well as the possibility that there are other chemicals such as arsenic. Additionally, is likely that other contaminants are contained in that silt. The indications and the observation of Reclamation while drilling the silt for sampling was that they had seen rising gas which indicates that such buried vegetation exists. It is hard for Casitas to understand that a small discharge of this buried vegetation can be prohibited at Robles by such permitting agencies who then allow a tremendous amount of this material to be discharged with the removal of Matilija Dam. Such a concern is not alleviated by an alternative, which allows the silt to go downstream slowly, or even if the silt is secured in position behind the removed dam. This is because water flowing through the area after the removal of the Dam could allow chemicals to leach into the water and contaminate low flows of the river. Failure to remove the silt is likely to compel Casitas to increase the requirements for treatment of its water. The environmental impact report should address the increased requirements for treatment and how they will be paid for. There should be a valuation of the water quality before, during, and after the removal of the Dam to ensure that the water quality will not degrade and monitoring and mitigation methods should be developed which will resolve water quality issues that occur.

Steelhead Trout are the major purpose for the removal of the Matilija Dam and silt. Removal is to provide additional area for steelhead trout to migrate, spawn and grow. The largest impact to the success of such a project should be its effect upon the steelhead while the project is underway, or after it is completed. Several alternatives of the project could go on for many years and there should be a valuation of these interim effects upon the steelhead directly. The concern of Casitas is that the project not cause the steelhead trout irreparable harm by the failure to remove the silt properly as well as maintaining water quality.

Please include a discussion and investigation of all of these issues in the environmental documentation.

Very truly yours,

John J. Johnson
General Manager
JJJ:ep

MATILIJA - Written comments from Public mtg

Shea, Jason A SPL

From: William H SHALLENBERGER [billshall@juno.com]
Sent: Thursday, January 24, 2002 11:36 AM
To: jshea@spl.usace.army.mil
Subject: Matilija Dam

Thank you for returning my telephone call this morning. I would appreciate it if you could present the following comments at the meeting in Ventura on January 31, concerning the Matilija dam. I will not be able to attend at that time.

~~The Matilija dam was built for the purpose of flood control.~~ The accumulated silt above the dam has had two adverse effects. First, downstream areas have been deprived of silt. Second, the accumulation of silt has reduced the storage capacity of the dam for flood control purposes.

Removal of the dam would be beneficial in allowing the silt to move downstream but would not restore the ability ~~to control flooding.~~ for Storage.

An alternative to dam removal would be to dredge the accumulated silt from above the dam to the stream below. This would correct both of the adverse effects noted above.

I propose a study to determine the feasibility, including costs and benefits, of dredging versus dam removal.

The Aswan high dam in Egypt was similarly faulted by silt accumulation,
but the situation is being successfully corrected by dredging, as I have
proposed above for the Matilija dam.,

William H. Shallenberger, PE
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No limits

Non Native species will be studied

~~Add~~

habitat & Steelhead
Flooding
Conduit
W.Q.