

Final General Re-Evaluation & Environmental Report for Proposed Project Modifications

Guadalupe River Project Downtown San Jose, California



Volume 2B
February 2001
SCH#199902056
Filed with U.S. EPA April 2001



U.S. Army Corps of Engineers
Sacramento District

20010516 084

Santa Clara Valley Water District



REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE Feb 2001		3. REPORT TYPE AND DATES COVERED Final Report	
4. TITLE AND SUBTITLE Final General Re-Evaluation & Environmental Report for Proposed Project Modifications Guadalupe River Project, Downtown San Jose, California				5. FUNDING NUMBERS	
6. AUTHOR(S) U.S. Army Corps of Engineers, Sacramento District, Santa Clara Valley Water District Montgomery Watson/CH2M Hill, Jones and Stokes, Northwest Hydraulics Consultants, Inc.					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Corps U.S. Army Corps of Engineers Sacramento District 1325 J Street Sacramento, CA 95814-2922				8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Santa Clara Valley Water District 5750 Alameda Expressway San Jose, CA 95118				10. SPONSORING / MONITORING AGENCY REPORT NUMBER SCH# 1999025056	
11. SUPPLEMENTARY NOTES Available from the U.S. Army Corps of Engineers 1325 J Street Sacramento, CA 95814-2922					
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release, distribution unlimited				12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This report addresses proposed modifications to the federally authorized Guadalupe River Project in downtown San Jose, California. These modifications include flood protection, recreation and related mitigation measure primarily along 2.6 miles of the Guadalupe River and two related offsite mitigation areas. This report support decision making by the U.S. Army Corps of Engineers (Corps), Santa Clara Valley Water District (SCVWD), and other responsible agencies to implement proposed project modifications and ensure compliance with the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), and other pertinent laws and regulations.					
14. SUBJECT TERMS General Re-Evaluation Report, Environmental Impact Statement, Environmental Impact Report, Modification of G.R.P., and Downtown San Jose, California.				15. NUMBER OF PAGES 1,833.00	
				16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT		18. SECURITY CLASSIFICATION OF THIS PAGE		19. SECURITY CLASSIFICATION OF ABSTRACT	
				20. LIMITATION OF ABSTRACT	

Final

**Integrated General Re-Evaluation Report/
Environmental Impact Report-
Supplemental Environmental Impact Statement for**

**Proposed Modifications to the Guadalupe River
Project, Downtown San Jose, California**

**(Supplemental to the 1985 Final Environmental Impact
Statement for the Guadalupe River Flood Control and Adjacent
Streams Investigation, Santa Clara County, California)**

**Volume 2B
Appendix 3**

**Prepared by
U.S. Army Corps of Engineers, Sacramento District**

1325 J Street
Sacramento, California 95814

Santa Clara Valley Water District

5750 Almaden Expressway
San Jose, California 95118

February 2001

State Clearinghouse # 199902056

Contents – Volume 2B

Appendix 3: Mitigation and Monitoring Plan

**Appendix 3: Mitigation and
Monitoring Plan**

**Guadalupe River Project
Downtown San Jose, California**

MITIGATION AND MONITORING PLAN

Prepared by:

U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814-2922
Contact: Nina Bicknese

In Cooperation with:

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, California 95118
Contact: Terry Neudorf

February 2001

This document should be cited as:

U.S. Army Corps of Engineers. 2001. Guadalupe River project, downtown San Jose, California Mitigation and Monitoring Plan. February 2001. (JSA F023.) Sacramento, CA. Prepared for the U.S. Army Corps of Engineers, Sacramento District, Sacramento, CA.

Table of Contents

Chapter 1

Introduction	1
1.1 Introduction.....	1
1.2 Purpose and Scope of Mitigation and Monitoring Plan	3
1.3 Mitigation Planning Considerations.....	3
1.4 Limitation on Mitigation Program.....	3
1.5 Development of the MMP	4
1.6 Intent and Uses of This MMP	4
1.6.1 Corps.....	4
1.6.2 SCVWD	4
1.6.3 City of San Jose.....	4
1.6.4 SWRCB and RWQCB.....	4
1.6.5 USFWS and NMFS.....	5
1.6.6 CDFG	5
1.6.7 Guadalupe-Coyote Resource Conservation District, Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited, as Represented by the Natural Heritage Institute.....	5
1.6.8 Agency and Organization Commitments	5
1.7 Relationship to Other Pertinent Studies and Documents	5
1.7.1 General Re-evaluation Report/Environmental Impact Report/Supplemental Environmental Impact Statement (U.S. Army Corps of Engineers, 2000a).....	5
1.7.2 Habitat Evaluation Procedure (HEP) Analysis (U.S. Army Corps of Engineers, 2000b)	6
1.7.3 Biological Data Report/Biological Assessment (BDR/BA) for NMFS (U.S. Army Corps of Engineers, 2000c).....	7
1.7.4 BDR/BA for USFWS (U.S. Army Corps of Engineers, 2000d).....	7
1.7.5 Conditional Certification under CWA Section 401 (State Water Resources Control Board, 1992) (Appendix B-1)	7
1.7.6 Dispute Resolution Memorandum (DRM) (Guadalupe River Flood Protection Project Collaborative, 1998) (Appendix 2)	9
1.7.7 Collaborative Record Document (Guadalupe River Flood Protection Project Collaborative, 1998).....	9
1.7.8 Guadalupe River Project, Santa Clara County, California – Final Mitigation and Monitoring Plan (U.S. Army Corps of Engineers, 1992)	9
1.7.9 Fisheries and Aquatic Habitat Collaborative Effort Study Plan.....	10
1.7.10 Guadalupe Creek Restoration Project	10
1.8 Document Organization.....	10

Chapter 2

Description of the Guadalupe River Project Components and Implementation Phases.....	1
2.1 Introduction	1
2.2 Location and Description of the Project's Flood Protection and Recreation Components	1
2.2.1 Segment 1	2
2.2.3 Segments 3A and 3B	9
2.2.3.1 Segment 3A	11
2.2.3.2 Segment 3B	13
2.2.4 Segment 3C	16
2.2.4.1 Segment 3C Phase 1	16
2.2.4.2 Segment 3C Phase 2	16
2.2.4.3 Segment 3C Phase 3	17
2.3 Measures to Avoid and Minimize Adverse Project Effects during Construction	18
2.3.1 Vegetation Protection Plan.....	20
2.3.2 Stormwater Pollution Prevention Plan.....	20
2.3.3 Erosion and Sediment Control Plan	20
2.3.4 Toxic Materials Control and Spill Response Plan.....	21
2.3.5 Construction-Area Fish Management.	22
2.3.6 Construction Period Limits.....	23
2.3.7 Measures to Comply with Migratory Bird Treaty Act.....	23
2.3.8 Soil Management Plan	23
2.3.9 Hazardous and Toxic Materials Contingency Plan.....	24
2.3.10 Measures to Implement BAAQMD's Feasible Control Measures for PM10 Emissions from Soil Removal Activities	25
2.3.11 Measures to Address Traffic-Related Effects.....	25
2.3.12 Measures to Address Temporary Loss of Parking	25
2.3.13 Measures to Address Cultural Resources	25
2.4 Location and Description of the Compensatory Mitigation Components	26
2.4.1 Measures to Compensate for Unavoidable Adverse Project Effects.....	26
2.4.1.1 Plant Riparian Vegetation	26
2.4.1.2 Plant Shaded Riverine Aquatic Cover Vegetation.....	26
2.4.1.3 Protection of the Project's Compensatory Mitigation Components.....	31
2.4.1.4 Implement Water Temperature Measures	32
2.4.1.5 Replace Spawning Gravel	33
2.4.1.6 Implement Fish Passage Measures	33
2.4.1.7 Implement Fish Habitat Measures	34
2.5 Operation and Maintenance	35
2.5.1 Operation.....	35
2.5.2 Maintenance	35
2.6 Project Construction Schedule	36

Chapter 3	
Mitigation, Monitoring, and Adaptive Management Objectives.....	1
3.1 Introduction.....	1
3.2 Mitigation and Monitoring Objectives	1
3.2.1 Primary Mitigation Objectives	1
3.2.2 Primary Monitoring Objectives	2
3.3 Adaptive Management Components and Objectives	3
3.3.1 Monitoring Objectives.....	5
3.3.2 Reporting Objectives	5
3.4 Governance of Adaptive Management Program.....	6
3.4.1 Purpose.....	6
3.4.2 Membership	6
3.4.3 Representation.....	6
3.4.4 Adaptive Management Team's Responsibilities	6
3.4.5 Meetings	6
3.4.6 Decisions and Dispute Resolution.....	7
3.4.7 Legal Authority	7
 Chapter 4	
Mitigation Program	1
4.1 Introduction.....	1
4.2 Riparian Vegetation	14
4.2.1 Project Effects	14
4.2.2 Mitigation.....	14
4.2.3 Measurable Objectives and Adaptive Management.....	16
4.2.3.1 General Monitoring Framework: Permanent Riparian Vegetation Sampling Plots	16
4.2.3.2 Survival Indicator for Riparian Vegetation	17
4.2.3.3 Health and Vigor Indicator for Riparian Vegetation	18
4.2.3.4 Natural Recruitment Indicator for Riparian Vegetation	20
4.2.3.5 Vegetative Cover Indicator for Riparian Vegetation	20
4.2.3.6 Nonnative Species Relative Cover Indicator for Riparian Vegetation	22
4.2.3.7 Tree Height Indicator for Riparian Vegetation.....	23
4.2.3.8 Tree Basal Area Indicator for Riparian Vegetation	24
4.3 Shaded Riverine Aquatic Cover	25
4.3.1 Definition	25
4.3.2 Project Effects	26
4.3.3 Mitigation.....	26
4.3.3.1 Segments 1, 2, and 3.....	26
4.3.3.2 Woz Way to Park Avenue Bypass Reach.....	29
4.3.3.3 Reach A Mitigation Site.....	30
4.3.3.4 Guadalupe Creek Mitigation Site	32
4.3.4 Measurable Objectives and Adaptive Management.....	34
4.3.4.1 General Monitoring Framework: Permanent SRA Cover Sampling Plots	35
4.3.4.2 Survival Indicator for Riparian Vegetation Associated with SRA Cover	36
4.3.4.3 Health and Vigor Indicator for Riparian Vegetation Associated with SRA Cover	36

4.3.4.4 Natural Recruitment Indicator for Riparian Vegetation Associated with SRA Cover	38
4.3.4.5 Nonnative Species Relative Cover Indicator for Riparian Vegetation Associated with SRA Cover	38
4.3.4.6 Shaded Stream Surface Indicator for SRA Cover	39
4.3.4.7 Bank Stability Indicator for SRA Cover	40
4.3.4.8 Instream Cover Indicator for SRA Cover	41
4.3.4.9 Channel Bed Stability Indicator for SRA Cover	42
4.4 Water Temperature	43
4.4.1 Project Effects	44
4.4.2 Mitigation	44
4.4.3 Measurable Objectives and Adaptive Management	47
4.4.3.1 General Monitoring Framework: Water Temperature Data and Simulation	50
4.4.3.2 Monthly Thermal Suitability Indicator for Anadromous Fish Habitat ..	54
4.4.3.3 Short-Term Suitability Indicator for Anadromous Fish Habitat	56
4.5 Anadromous Fish Spawning Habitat	59
4.5.1 Project Effects	59
4.5.2 Mitigation	59
4.5.3 Measurable Objectives and Adaptive Management	59
4.5.3.1 Abundance Indicator for Spawning Gravel	60
4.5.3.2 Quality Indicator for Spawning Gravel	62
4.6 Anadromous Fish Passage and Rearing Habitat	63
4.6.1 Project Effects	63
4.6.2 Mitigation	63
4.6.3 Measurable Objectives and Adaptive Management	64
4.6.3.1 Depth and Velocity Indicator for Anadromous Fish Passage	64
4.6.3.2 Vertical Barrier Indicator for Anadromous Fish Passage	66
4.6.3.3 Rearing Habitat Diversity Indicator for Anadromous Fish	68
4.7 Anadromous Fish Occurrence	69
4.7.1 Project Effects	69
4.7.2 Mitigation	69
4.7.3 Measurable Objectives and Adaptive Management	70
4.7.3.1 Adult Migration and Spawning Indicator for Anadromous Fish	70
4.7.3.2 Juvenile Rearing Indicator for Steelhead	71
4.7.3.3 Juvenile Migration Indicator for Anadromous Fish	72
4.8 Mercury	73
4.8.1 Project Effects	74
4.8.2 Mitigation	76
4.8.3 Measurable Objectives and Adaptive Management	76
4.8.3.1 Assess Mercury Transport and Potential for Methylation in Segments 1, 2, and 3 and Reach A	76
4.8.3.2 Assess Mercury Transport and Potential for Methylation in the Guadalupe River Watershed	77
4.9 Special-Status Species Habitat – Alviso Slough	77

4.9.1 Western Snowy Plover	78
4.9.1.1 Monitoring of Hydrologic Conditions in Alviso Slough Area	78
4.9.2 California Clapper Rail and Salt Marsh Harvest Mouse	79
4.9.2.1 Monitoring of Dominant Plant Species and Habitat Types of Alviso Slough	80
4.9.2.2 Continuous Surface Water Level and Salinity	81
4.10 Responsibilities for MMP Implementation	82
4.11 Reporting	88
 Chapter 5	
References	5-1
5.1 Printed References	5-1
5.2 Personal Communications	5-4
 Appendix A. Members of Guadalupe River Flood Control Project Collaborative, Measurable Objectives and Adaptive Management Technical Team, and Habitat Evaluation Procedures Technical Team	
 Appendix B. Section 401 Conditional Water Quality Certification and Dispute Resolution Memorandum	
 Appendix C. Shaded Riverine Aquatic (SRA) Cover Impact Analysis and Onsite SRA Cover Mitigation Plan	
 Appendix D. Guadalupe River Project Offsite Shaded Riverine Aquatic (SRA) Cover Mitigation Plans (Reach A and Guadalupe Creek)	
 Appendix E. Spawning Habitat	
 Appendix F. Vegetation Protection Plan Guidelines	
 Appendix G. Overview of Erosion and Sediment Control Measures	

List of Tables

Table	Page
2-1 Summary of Project-Related Effects by Segment for the Guadalupe River Project	2-5
2-2 Amount of Armored Bank and Riverbed in Each Segment of the Project (Linear Feet).....	2-6
4-1 Indicators, Measurable Objectives, and Remedial Actions to Assure Mitigation Success for the Guadalupe River Project	4-2
4-2 Monitoring of Indicators for Ecological Functions and Habitat Values Required to Assess Mitigation Success for the Guadalupe River Project	4-7
4-3 Indicators, Measurable Objectives, and Remedial Actions Associated with Special-Status Species Habitat Monitoring Commitments for the Guadalupe River Project	4-12
4-4 Monitoring of Indicators Associated with Special-Status Species Habitat, at the Request of USFWS, for the Guadalupe River Project	4-13
4-5 Riparian Habitat Affected and Riparian Vegetation Planted as Mitigation in Each Segment (acres).....	4-14
4-6 SRA Cover Vegetation Affected and SRA Cover Vegetation Planted as Mitigation in Each Segment and Mitigation area (linear feet)	4-27
4-7 Temperature Requirements (°F) for Life Stages of Chinook Salmon and Steelhead during the Months Present in the Guadalupe River.....	4-49
4-8 Suitability Indices for Water Temperature Effects on All Life Stages of Steelhead and Chinook Salmon	4-55
4-9 Suitable Water Temperatures (°F) for Each Life Stage of Steelhead and Chinook Salmon	4-57
4-10 Reach-Specific Effects and Mitigation Measures for Spawning Habitat Affected by the Guadalupe River Project Gravel (in square feet).....	4-59
4-11 Numerical Rank of Particle Size for Steelhead and Chinook Salmon Spawning Habitat	4-62
4-12 Numerical Rank of Percentage Embeddedness for Steelhead and Chinook Salmon Spawning Habitat	4-63
4-13 Maximum Leaping Height and Horizontal Distance for Adult Steelhead and Chinook Salmon as Determined by the Angle of Exit from the Water and Pool Depth	4-67
4-14 Riparian Vegetation Mitigation and Responsible Parties, Guadalupe River Project	4-83
4-15 SRA Cover Mitigation and Responsible Parties, Guadalupe River Project	4-83
4-16 Spawning Habitat Mitigation and Responsible Parties, Guadalupe River Project	4-84

4-17	Fish Passage and Rearing Habitat Mitigation and Responsible Parties, Guadalupe River Project	4-84
4-18	Schedule of Monitoring Activities for Pre-Project and the 10 Years Following Implementation of Mitigation Actions, Guadalupe River Project	4-85

List of Figures

Figure	Page
1-1	Guadalupe River Project Vicinity Map..... 1-2
2-1	Guadalupe River Project – Flood Protection and Onsite Mitigation Components .. 2-3
2-2	Guadalupe River Project Segments 1 and 2 Cross Section..... 2-8
2-3	Existing and Proposed Recreation Components 2-9
2-4	General Cross Section of the Natural Channel in Segment 3A and 3B and the Preliminary Invert Stabilization Structure Design..... 2-12
2-5	Preliminary Low-Flow Channel Check Structure in Segment 3A and 3B..... 2-15
2-6	General Cross Section of the Riverbank and Channel Bed Armoring in Segment 3C Phase 2 and the Trapezoid/Boulder Low-Flow Channel Design..... 2-19
2-7	Guadalupe River Watershed Including Project Construction and Mitigation Areas 2-28
2-8	Offsite Mitigation Areas..... 2-29
2-9	Guadalupe River Project – Schedule for Flood Protection and Recreation Construction and Mitigation Installation 2-37
3-1	Flow Chart of the Adaptive Management Process for Meeting Mitigation Objectives..... 3-4
4-1	Simulated Average Maximum Temperatures in Segments 1 and 2 and Segment 3 4-45
4-2	Simulated Average Maximum Temperature in Reach A and Guadalupe Creek 4-46
4-3	Total Thermal Suitability Units for Juvenile Steelhead Rearing Calculated from Simulated Water Temperatures for the Dry/Median Year in all Stream Segments Affected by the Project 4-48
4-4	Simulation of Pre- and Post-Project Water Temperature under Post-Project Weather and Flow Conditions 4-51

MITIGATION AND MONITORING PLAN LIST OF FIGURES

Introduction

1.1 Introduction

The Guadalupe River Project with Refined Bypass System Alternative (the Project) is being implemented in phases along the Guadalupe River in downtown San Jose, Santa Clara County, California (Figure 1-1). Project modifications have been proposed to ensure compliance with the Federal Clean Water Act (CWA) and Endangered Species Act (ESA) (U.S. Army Corps of Engineers, 2000a). This mitigation and monitoring plan (MMP) is a component of the modifications to the Project. This MMP supersedes a previous mitigation plan prepared for the Authorized Project in 1992 (U.S. Army Corps of Engineers, 1992).

When all phases are completed, the Project will provide a 100-year level of flood protection to a portion of downtown San Jose and surrounding areas from the 100-year design floodflow (17,000 cubic feet per second [cfs]) while avoiding, minimizing, and mitigating adverse project effects on fish and wildlife habitat for threatened and endangered species. The Sacramento District of the U.S. Army Corps of Engineers (Corps) and the Santa Clara Valley Water District (SCVWD) are the lead Federal and non-Federal agencies and sponsors of the Project, respectively. The Corps and SCVWD are cooperating with the Guadalupe River Flood Protection Project Collaborative (the Collaborative) to develop modifications to the Project to ensure compliance with the CWA and the ESA and to develop an acceptable mitigation and monitoring plan. Membership of the Collaborative includes representatives of the Corps, SCVWD, project proponents, resource agencies, and private interest and environmental groups (Appendix A-1).

The Project is being modified in project reaches designated as Segments 3A and 3B (Chapter 2). These Project modifications include a proposed underground bypass and other onsite and offsite locations for implementation of the mitigation measures addressed in this MMP. The bypass will carry floodflows around the natural channel where its capacity is not adequate to accommodate the floodflows. The Project's compensatory mitigation components have been developed to replace lost habitat value identified in the Habitat Evaluation Procedures (HEP) analysis prepared for the Project (U.S. Army Corps of Engineers, 2000c) and to address direct adverse effects identified in the General Re-evaluation Report/Environmental Impact Report/Supplemental Environmental Impact Statement (GRR/EIR/SEIS) (U.S. Army Corps of Engineers, 2000b).

This plan will be amended and updated, as appropriate, on the basis of final regulatory approval (including biological opinions and certification and the findings of the hydraulic and geomorphic analyses) and thereafter through the adaptive management process (Chapter 3). Public input to the MMP will be provided during review of the environmental compliance documents for the Project.

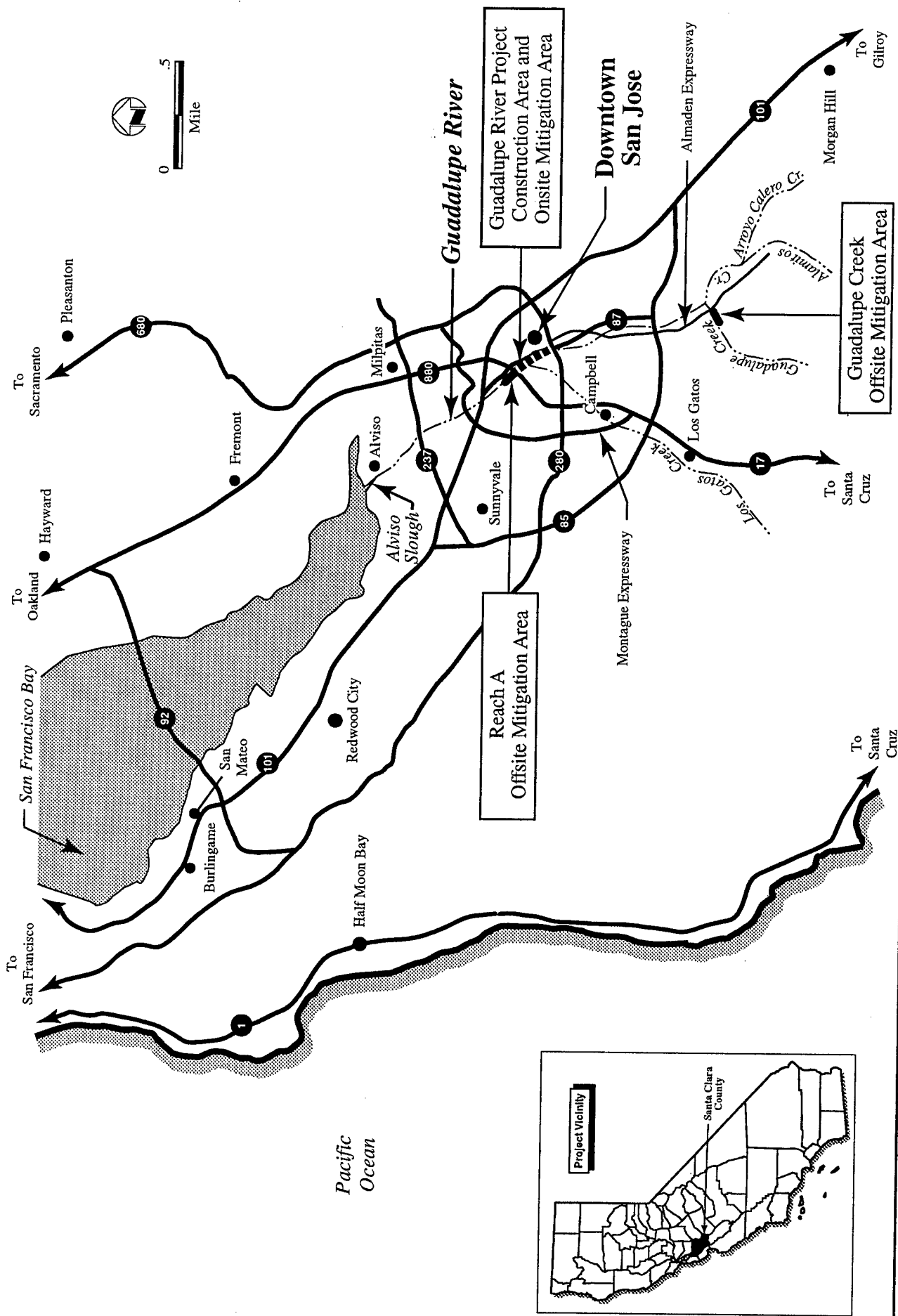


Figure 1-1. Guadalupe River Project Vicinity Map

1.2 Purpose and Scope of Mitigation and Monitoring Plan

This MMP identifies and describes project mitigation features that will ensure the protection or restoration of environmental resources present in the Project area. The California State Water Resources Control Board (SWRCB) and the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) will use the MMP to verify that mitigation for the Project will fulfill a conditional requirement for water quality certification under Section 401 of the CWA (Appendix B-1). Development of this MMP began in July 1998 after the execution of a Dispute Resolution Memorandum (DRM) to guide proposed project modifications (Guadalupe River Flood Protection Project Collaborative, 1998) (Appendix 2). Coordination among signatories of the DRM (including representatives of the Corps, SCVWD, project proponents, resource agencies, and private interest and environmental groups) led to proposed modifications that minimized adverse environmental effects and to commitments that would restore or compensate for unavoidable damages. For example, the bypass proposed for Segments 3A and 3B of the Project will avoid adverse environmental effects to much of the existing shaded riverine aquatic (SRA) cover in these reaches. Where avoidance was not possible, this MMP provides necessary actions and commitments to offset such adverse effects.

1.3 Mitigation Planning Considerations

Mitigation planning considerations guided specifications for the MMP to ensure that project-caused adverse effects on fish and wildlife resources have been avoided or minimized and that remaining, unavoidable effects have been compensated for. The National Environmental Policy Act (NEPA), Fish and Wildlife Coordination Act, and CWA require that the conservation of fish and wildlife resources be given equal consideration with other project purposes in the formulation and evaluation of alternative project plans. In accordance with this guidance, the Corps and SCVWD must first demonstrate that efforts have been made to avoid damages to significant fish and wildlife resources by not taking a certain action or part of an action. Unavoidable damages must then be minimized by limiting the degree or magnitude of the action and its implementation. Unavoidable damages to resources must be rectified by repairing, rehabilitating, or restoring the affected environment. Damages to resources that cannot be repaired, rehabilitated, or restored must be compensated for by replacing them or providing substitute resources or environments. Substitute resources, on the balance, need to be at least equal in value and significance to the resources lost.

1.4 Limitation on Mitigation Program

Nothing in this MMP requires, or should be interpreted as requiring, SCVWD to modify its current water supply operations or SCVWD or the Corps to undertake water augmentation actions, except that the Adaptive Management Team (AMT) may consider and implement such remedial actions pursuant to Section 3.3 (Chapter 3) and Chapter 4. The ongoing Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) will address the potential for changes to SCVWD's current water supply operations. The historic use of instream percolation ponds in Guadalupe Creek are not part of the current water supply operation.

1.5 Development of the MMP

A team of individuals from the Corps, SCVWD, regulatory agencies, and private interest groups developed the MMP and helped to prepare this document. The membership of that team, referred to as the Measurable Objectives and Adaptive Management Team, includes representatives from the Corps, SCVWD, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), and private interest and environmental groups (as represented by the Natural Heritage Institute) (Appendix A-2).

1.6 Intent and Uses of This MMP

This MMP has been prepared in response to Corps, SCVWD, and regulatory agencies requirements associated with mitigation of project-related adverse effects. These entities will use this document to ensure that:

- The mitigation will be adequate to ensure that the Project causes no significant adverse effects to environmental resources and beneficial uses
- The mitigation will fulfill the requirements stipulated in project permits and authorizing documents
- The MMP is in compliance with laws that govern adverse effects on environmental quality and with the legal instruments implementing those laws

In addition, the following entities will use the MMP to assist in the adaptive management process described in Chapter 3.

1.6.1 Corps

The Corps will use the MMP to identify specific mitigation measures, monitoring commitments, and reporting commitments; to describe how such features will be operated, managed, and funded over the life of the Project; and to verify that conditions of the DRM are adequately addressed (Appendix 2).

1.6.2 SCVWD

SCVWD will use the MMP in a manner similar to the Corps, as well as to comply with the California Environmental Quality Act (CEQA). SCVWD will provide a copy of annual MMP reports to the Corps as part of the periodic reporting required by the Project Operations and Maintenance Manual.

1.6.3 City of San Jose

The City of San Jose, including the Redevelopment Agency, Parks and Recreation Department, Public Works Department, and Environmental Services Department, will use the MMP to coordinate park plan implementation and other activities in the floodway.

1.6.4 SWRCB and RWQCB

SWRCB and RWQCB will use the MMP to verify that mitigation for the Project will fulfill a conditional requirement for water quality certification under Section 401 of the CWA

(Appendix B-1). The SWRCB will consider issuance of a modified Section 401 certification following review of this MMP and other pertinent documents.

1.6.5 USFWS and NMFS

USFWS and NMFS will use the MMP to determine if mitigation fulfills requirements stipulated in the ESA and the Fish and Wildlife Coordination Act, and to verify that conditions of the DRM are adequately addressed (Appendix 2).

1.6.6 CDFG

CDFG will use the MMP to determine if mitigation fulfills requirements in the Fish and Game Code and to verify that conditions of the DRM are adequately addressed (Appendix 2).

1.6.7 Guadalupe-Coyote Resource Conservation District, Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited, as Represented by the Natural Heritage Institute

These organizations will use the MMP to verify that conditions of the DRM are adequately addressed (Appendix 2).

1.6.8 Agency and Organization Commitments

The agencies and organizations that signed the DRM agree to fulfill mitigation and reporting commitments in this plan. Successors to the signatories of the DRM will also be bound by the mitigation and reporting commitments in this plan.

1.7 Relationship to Other Pertinent Studies and Documents

In addition to the MMP, several other applicable environmental documents have been or are being prepared for the Project. The following documents provide information related to adverse effects of the Project and mitigation and have been considered in this MMP.

1.7.1 General Re-evaluation Report/Environmental Impact Report/Supplemental Environmental Impact Statement (U.S. Army Corps of Engineers, 2000a)

A combined General Re-evaluation Report (GRR) and Environmental Impact Report/Supplemental Environmental Impact Statement (EIR/SEIS) is being prepared pursuant to Corps of Engineers regulations ER 1105-2-100 (Planning Guidance), ER 200-2-2 (Procedures for Implementing NEPA), EC-1165-2-203 (Technical and Policy Compliance Review), in accordance with CEQA and NEPA and with other regulations stipulated by the Corps' South Pacific Division in a 30 April 1999 memorandum: "Guidance for Postauthorization Decision Documents." The GRR will address the need, feasibility, and justification for the proposed modifications to the Authorized Project. These modifications were designed to meet objectives for improved flood management, environmental protection, water quality, recreation, and other concerns.

The EIR/SEIS will address changes to the Project's design and the associated mitigation package. Mitigation commitments made in the EIR/SEIS will be implemented by this MMP.

The MMP demonstrates that the mitigation prescribed in the EIR/SEIS is adequate to compensate for effects of the Project.

1.7.2 Habitat Evaluation Procedure (HEP) Analysis (U.S. Army Corps of Engineers, 2000b)

An HEP analysis was conducted for the Project. The HEP analysis was necessary to identify the loss of SRA cover vegetation quality caused by the Project (Chapter 4.4 for a description of SRA cover vegetation). The resource agencies, required the Corps and SCVWD develop a postproject mitigation package for SRA cover that would fully replace the quantity as well as the habitat quality of the SRA cover affected by the entire project. The Guadalupe River Project HEP technical team convened to conduct the HEP analysis included representatives from the Corps, SCVWD, CDFG, USFWS, NMFS, and private interest and environmental groups represented by NHI.

The Guadalupe River Project HEP evaluated anticipated project effects on aquatic and terrestrial species that use SRA cover vegetation and anticipated project effects on the habitat needs of these species. The HEP analysis captured all possible adverse affects on SRA cover from the final bypass alternative under consideration. To represent the suite of species that use SRA cover vegetation along the Guadalupe River as well as their habitat needs, two evaluation species and one cover type were selected by USFWS and approved by the Guadalupe River Project HEP technical team. Rainbow trout and belted kingfisher were selected as the evaluation species, and nonsalmonid pool habitat was selected as the cover type. The results of the HEP analysis indicate that full compensation of anticipated project effects on species represented by the evaluation species is achieved by a proposed mitigation package that includes onsite mitigation and offsite mitigation on Reach A and the Guadalupe River. However, full compensation of anticipated project effects on habitat values represented by the nonsalmonid pool habitat cover type is not achieved by this proposed mitigation package. USFWS agreed to use excess mitigation for the rainbow trout evaluation species created by the proposed mitigation package to compensate for the deficit in the nonsalmonid pool habitat cover type. Relative value compensation is an approach used by USFWS that allows habitat values among habitats and species to be traded off at differing rates, depending on resource management goals (U.S. Army Corps of Engineers, 2000b). With this approach, the HEP analysis indicates that the proposed mitigation package for the Project fully compensates for, or balances, the anticipated project effects on species represented by the rainbow trout and belted kingfisher evaluation species and on the nonsalmonid pool habitat cover type.

The results of the HEP analysis are reported in U.S. Army Corps of Engineers, 2000b.

The HEP analysis determined that 18,026 lf of SRA cover vegetation mitigation would be required to mitigate for the loss of SRA cover vegetation. USFWS has determined that all of Guadalupe Creek between Masson Dam and Almaden Expressway would need to be restored for any mitigation credits to be applied from the Guadalupe Creek Restoration Project. Therefore, 12,044 lf of SRA cover will be planted on Guadalupe Creek but 4,866 lf of SRA cover vegetation mitigation credits would be used by SCVWD to mitigate for other projects. Resource agencies responsible for implementation of ESA subsequently determined that 18,026 lf of SRA cover is adequate compensation for effects on steelhead habitat provided that the entire reach of Guadalupe Creek from Masson Dam to Almaden Expressway is restored.

The HEP mitigation package was used to determine the amount, quality, and value of the SRA cover compensation required to mitigate adverse environmental effects of the Project. These components are included in this MMP.

1.7.3 Biological Data Report/Biological Assessment (BDR/BA) for NMFS (U.S. Army Corps of Engineers, 2000c)

In accordance with Section 7 of the ESA, the BDR/BA prepared by the Corps for NMFS analyzes adverse effects of the Project on fish species listed or proposed under the ESA to determine if the Project may affect the species or their habitat. The species of concern are steelhead (*Oncorhynchus mykiss*) and chinook salmon (*O. tshawytscha*). Mitigation specified in the BDR/BA is included in this MMP. Reasonable and prudent measures and conservation recommendations specified in NMFS Biological Opinion have been included in the final MMP for the Guadalupe River Project.

1.7.4 BDR/BA for USFWS (U.S. Army Corps of Engineers, 2000d)

In accordance with Section 7 of the ESA, the BDR/BA prepared by the Corps for USFWS analyzes effects of the Project on species of concern under the ESA. These species include California red-legged frog (*Rana aurora draytonii*), western snowy plover (*Charadrius alexandrinus nivosus*), California clapper rail (*Rallus longirostris obsoletus*), and salt marsh harvest mouse (*Reithrodontomys raviventris*). Reasonable and prudent measures and conservation recommendations specified in USFWS BDR/BA is included in this MMP. Mitigation specified in the Final USFWS Biological Opinion will be included in the final MMP for the Project.

1.7.5 Conditional Certification under CWA Section 401 (State Water Resources Control Board, 1992) (Appendix B-1)

The Project is subject to the conditions of a certification under CWA Section 401 issued by the SWRCB in 1992, including the 1993 revisions and clarifications to the conditions of certification (Appendix B-1). The SWRCB expressed two primary concerns resulting from changes to the Project following issuance of the 1985 EIS: (1) the need to summarize impacts on riparian resources and specify protective measures and (2) the need to incorporate fishery mitigation measures into a Final MMP. The fishery mitigation measures are also required to fully mitigate any project-related thermal impacts on the armored and unarmored sections of the channel, including detailed vegetation planting and plant maintenance plans to reestablish the vegetative canopy. In addition, the SWRCB specified elements that must be contained in the Final MMP and indicated that the MMP must be approved by the RWQCB, CDFG, USFWS, and NMFS (Appendix B-1).

In June 1992, the MMP was submitted to CDFG, NMFS and USFWS; these agencies provided the comments contained in Appendix B-1. USFWS commented that the Final MMP should include: (1) a listing of proposed riparian mitigation areas and plans for planting these areas, including a species list; and (2) an additional description of the quantities and locations of vegetation provided as mitigation for loss of overhead cover. On July 9 and 10, 1992, the Corps provided responses to comments from CDFG and USFWS indicating commitments to modify the MMP in accordance with resource agency comments. A revised plan was submitted to USFWS for review in May 1993. On May 27, 1993, the Corps requested that the SWRCB review its proposed revisions to the MMP. On June 8, 1993,

USFWS requested that another revision of the MMP be provided by the end of 1993 that would encompass specific mitigation actions for impacts on SRA cover, anticipating that construction plans would be completed by then. On August 17, 1993, the SWRCB issued a revised conditional certification in which it stated that certification would be deferred until all changes to the MMP were completed and approved by the appropriate resource agencies. On October 8, 1993, the SWRCB reconsidered its determination (clarification of revised conditional certification), finding that the Corps' commitments must be implemented as a condition of certification and that further approval of the MMP by the resource agencies would therefore not be required. In a letter dated September 10, 1997, the SWRCB acknowledged the continuing need for "comprehensively outlining expected elements of the final mitigation plan, consistent with certification condition No. 2." Finally, in a letter dated September 8, 1998, the SWRCB indicated that it would reconsider certification after the final design and environmental documents were prepared.

The conditions of certification under Section 401 of the CWA are reiterated below along with the 1992 commitment by the Corps in response to resource agency review. In addition, the location of each element in the MMP is indicated.

- **Summary of Impacts on Wetland, Riparian, and Fish Habitat.** A summary of wetland, riparian, and fish habitat impacts of the project is presented in Chapters 2 and 4 and Appendices C and D. The summary includes a narrative and maps that bring together and update the information presented in previous environmental documents. For each reach of the river in which construction would take place, existing wetland, riparian, and fish habitat are described and the amount of habitat that would potentially be removed by construction is indicated.
- **Compensatory Riparian Mitigation Plan.** Detailed descriptions of and plans for compensatory mitigation sites are provided in Chapters 2 and 4 and in Appendices C and D. The plans include approximate locations, quantities, and species of mitigation plantings. Criteria used to evaluate whether mitigation has been successful in offsetting the loss of wetland and riparian functions and values are discussed under the measurable objectives summarized in Table 4-1. Chapter 4 also includes a discussion of the monitoring procedures summarized in Table 4-2; in Section 4.11, "Reporting," provisions for reporting to concerned agencies are described. Remedial actions will be implemented if monitoring indicates that the mitigation has not been fully successful, based on the measurable objectives. Chapter 2 of the MMP also describes the source and availability of irrigation water for mitigation plantings (Section 2.4.1) and provides information on how mitigation sites will be protected from urban effects in perpetuity (Section 2.4).
- **Vegetation Protection Plan.** The vegetation protection plan will be part of the best management practices required in the project construction plans and specifications. The selected construction contractor(s) will be responsible for implementing these plans under Corps oversight. General information for a vegetation protection plan is included as Appendix F. SRA cover is shown in Appendix C, including vegetation adversely affected and vegetation avoided by project construction.
- **Erosion Control Plan.** Erosion and sediment delivery to the Guadalupe River will be minimized during project construction; related efforts will include measures to minimize the potential for sediment to enter the river and interim soil stabilization

measures pending establishment of vegetative cover (Appendix G). As part of the Stormwater Pollution Prevention Plan (SWPPP) required for project construction, the erosion and sediment control plan will be prepared and incorporated into project construction plans and specifications. The selected contractor(s) will be responsible for implementing the erosion and sediment control plan under Corps oversight, as required by the National Pollutant Discharge Elimination System (NPDES) permitting process. General information for an erosion and sediment control plan is discussed in Chapter 2 (Sections 2.3.2 and 2.3.3).

- **Fishery Mitigation Plan.** Chapter 2 of the MMP includes constructed low-flow channel designs for armored river channel bed (channel bed) sections of the Project (Section 2.2.3). The constructed low-flow channel will provide for fish passage and fish resting areas. Operation standards for the secondary channel in Segment 2 are discussed in Section 2.2.2. The effects of the removal of the U.S. Geological Survey (USGS) gaging weir upstream from the St. John Street bridge is discussed in Chapter 2 (Section 2.2.3). Chapter 4 includes measurable objectives to ensure maintenance of fish passage, fish rearing habitat, and spawning gravels in perpetuity (summarized in Table 4-1). Measures to mitigate adverse project-related thermal effects are discussed in Chapter 4 (Section 4.4).

1.7.6 Dispute Resolution Memorandum (DRM) (Guadalupe River Flood Protection Project Collaborative, 1998) (Appendix 2)

The DRM specifies conditions that must be met in an environmental mitigation plan to ensure the Collaborative's continued support of the modified Project. Those conditions have been incorporated into this MMP.

1.7.7 Collaborative Record Document (Guadalupe River Flood Protection Project Collaborative, 1998)

The Record Document stresses the Collaborative's desire that measurable objectives and adaptive management criteria be clearly articulated in the MMP; this information is included in Chapter 4. The Record Document also identified 16 community benefit objectives for the Project, relating to public access, flood protection, aesthetic beauty, education, recreation, wildlife viewing, erosion protection, groundwater recharge, water quality, subsidence, land use, nonpoint source pollution, salinity management, fish and wildlife habitat, vegetation, and a public park. The community benefits identified in these areas are evaluated in the EIR/SEIS. If adverse effects on these community benefits are identified in the EIR/SEIS, mitigation measures will be developed and included in the final MMP. Appropriate mitigation measures have been included for any adverse effects on these community benefits in this report. If additional mitigation is deemed necessary as a result of comments received on the Draft Report, this will be addressed in the Final MMP and Final Report.

1.7.8 Guadalupe River Project, Santa Clara County, California – Final Mitigation and Monitoring Plan (U.S. Army Corps of Engineers, 1992)

This MMP supersedes the 1992 plan, which was written to implement environmental commitments of the Authorized Project. Because it was determined that the Authorized Project has adverse effects that could not be fully mitigated, that project was modified as

described in the GRR (U.S. Army Corps of Engineers, 2000a). Project effects and mitigation measures described in the 1992 plan are no longer accurate or current. The correct mitigation information for the Project is contained in this MMP.

1.7.9 Fisheries and Aquatic Habitat Collaborative Effort Study Plan

The Guadalupe River, Coyote Creek, and Stevens Creek provide habitat for a variety of aquatic resources, including both fall-run chinook salmon and steelhead. Many activities, including water management, urban encroachment, land use, agricultural use, reclamation, flood protection, and water supply operations by SCVWD, cause concern for the condition of the public trust resources and the quality and availability of instream habitat within the river and creeks. The implementation of these activities also raises concern about the economic and social impacts of efforts to significantly alter the existing flow regimes of the river and creeks. SCVWD has been named in a complaint filed before the SWRCB for violations of the Fish and Game Code, Water Code, and Public Trust Doctrine related to SCVWD's incremental contribution to the cumulative impacts on chinook salmon and steelhead and their habitat within the river and creeks. The complaint alleges harm to cold-water fisheries as a result of consumptive urban and agricultural water uses within Santa Clara County. To address this complaint, a Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) process has been initiated jointly by SCVWD and CDFG.

The FAHCE will identify factors limiting steelhead and chinook salmon populations in the Guadalupe River, Coyote Creek, and Stevens Creek watersheds. Both flow and nonflow measures will be considered by the FAHCE when addressing the complaint. Participants include SCVWD, CDFG, Guadalupe-Coyote Resource Conservation District, Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited (as represented by NHI), NMFS, USFWS, and the City. The FAHCE study is expected to be completed in 2001. Data on fish populations and the environment collected by the FAHCE study will be used, as appropriate, in the adaptive management of this MMP, as explained in Chapters 3 and 4.

1.7.10 Guadalupe Creek Restoration Project

The Guadalupe Creek Restoration Project site is bordered upstream by Masson Dam, downstream by the Almaden Expressway, to the north by residential development and the Los Capitancillos percolation pond system, and to the south by Coleman Road. SCVWD proposes to establish 12,044 lf of SRA cover vegetation and improve aquatic habitat at this site to offset environmental effects associated with future SCVWD projects. An EIR/EIS addressing the potential effects of the Guadalupe Creek Restoration Project is expected to be completed in fall 2000. The Guadalupe Creek Restoration Project is scheduled for implementation in 2001.

The Guadalupe Creek Restoration Project is highly suitable for providing mitigation for a variety of activities along the Guadalupe River watershed. The Project would use a portion of the Guadalupe Creek Restoration Project to mitigate effects on SRA cover vegetation and aquatic habitat. The Guadalupe Creek Restoration Project is independent of the Project, and it will be implemented even if the Project is not implemented.

1.8 Document Organization

This MMP is organized into the following chapters:

- Chapter 1, "Introduction," describes the purpose and scope of the MMP; pertinent background information; mitigation planning considerations; how the document is intended to be used by concerned agencies and persons; and links to other pertinent studies, reports, and plans.
- Chapter 2, "Description of the Guadalupe River Project Components and Implementation Phases," briefly summarizes the Project's goals and location. Project construction and mitigation components are discussed in detail, including a summary of the schedule for implementation.
- Chapter 3, "Mitigation, Monitoring, and Adaptive Management Objectives," discusses objectives associated with mitigation, monitoring, and adaptive management.
- Chapter 4, "Mitigation Program," describes adverse effects, mitigation, measurable objectives, monitoring, and adaptive management for each of the resources affected by the Project.
- Chapter 5, "References," provides information about each printed reference and personal communication cited in this MMP.
- Appendices.

Description of the Guadalupe River Project Components and Implementation Phases

2.1 Introduction

The completed Guadalupe River Project will provide flood protection for a portion of downtown San Jose and vicinity. The Guadalupe River Project will convey flows up to the authorized design flow of 17,000 cfs below the confluence of the Guadalupe River and Los Gatos Creek (U.S. Army Corps of Engineers, 1991b). To complete the Guadalupe River Project, modifications are required to:

- Protect species recently listed under the ESA
- Meet conditions for water quality certification under the CWA and
- Further enhance recreational opportunities

To minimize adverse effects on environmental resources in Segments 3A and 3B, the Project is being modified through the GRR process (U.S. Army Corps of Engineers, 2000a). The location, description, and implementation schedule for the Bypass System Alternative's flood protection, recreation, and compensatory mitigation components are discussed below.

2.2 Location and Description of the Project's Flood Protection and Recreation Components

Flood protection components of the Guadalupe River Project are being constructed along 2.6 miles of the Guadalupe River in downtown San Jose between Grant Avenue, just upstream from I-280, and I-880. The section of the river between Woz Way and Park Avenue, referred to as the Woz Way to Park Avenue bypass reach (Figure 2-1), will not include project flood protection construction but will include SRA cover vegetation infill plantings.

The proposed flood protection and recreation components include riverbank and riverbed armoring, trail/maintenance road and stairwell construction, bypass construction, bridge removal and replacement, and mitigation. Specific modifications to the Guadalupe River in each reach are described below. Key construction terms used in this chapter are briefly defined below.

- **Armoring** – the use of structural techniques to prevent riverbank and channel bed erosion. Structural techniques in this project include complete concrete-wall channelization of the river, use of gabions, and use of concrete cellular mattress (CCM). The type, quantity, and location of armoring is dependent on floodflows and hydraulic conditions.

- **Bypass** – a large underground culvert that is used to channel flood water around a section of river. The bypasses in Segments 3A and 3B would be box culverts that may range in dimension from 18.5 by 25.5 feet to 25.5 by 25.5 feet.
- **Concrete Cellular Mattress (CCM)** – Concrete blocks that are laid in an interlocking pattern and secured with cable. Typical CCM thickness is 6 inches. CCM is used to armor surfaces adjacent to various flood protection features and can be placed on slopes of varying steepness.
- **Concrete Masonry Unit (CMU)** – Precast concrete blocks.
- **Gabion** – A basket or cage filled with rocks, which is used in the construction of flood protection features. Gabions are custom-made in various sizes and shapes.
- **Gabion Terraces** – A set of gabion embankments with gabion infill placed between the embankments. Terrace faces will typically range from 2 to 4 feet high, and terrace tops will range from 3 to 6 feet wide.
- **Stone Terraces** – A set of raised, concrete-faced embankments with a level top. Gabion infill is placed between each embankment. Terrace faces will typically range from 2 to 4 feet high, and terrace tops will range from 3 to 6 feet wide.
- **Trail/Maintenance Road** – A dual-purpose project feature that serves as a trail but is also constructed with enough durability to support trucks and maintenance vehicles. Trail/maintenance roads will be 18-foot wide and will include a 12-foot-wide asphalt surface bordered on each side with 3-feet of reinforced turf. Trails that can accommodate small maintenance vehicles will be 12-foot wide and include an asphalt surface.
- **Riparian Mitigation** – Trees, shrubs, and woody vegetation planted in soils that are saturated for a substantial portion of the year as compensation for previous effects on riparian vegetation.
- **Shaded Riverine Aquatic (SRA) Cover Vegetation Mitigation** – Trees, shrubs, and woody vegetation planted in soil within 15 feet of the shoreline to shade aquatic habitat, as compensation for previous effects on SRA cover vegetation.

Described in Sections 2.3 and 2.4 mitigation components will be completed before or concurrent with construction work. A summary of effects of the Guadalupe River Project is included in Table 2-1.

2.2.1 Segment 1

Segment 1 is the farthest downstream reach and is located between I-880 and Hedding Street (Figure 2-1). Construction of the flood protection and recreation components in Segment 1 began in August 1992 and was completed in August 1994. Riparian mitigation for Segment 1 was established in 1994 in accordance with the 1992 MMP (U.S. Army Corps of Engineers, 1992).

Implementation of SRA cover mitigation and other mitigation elements in Segment 1 is ongoing and will be completed in 2001. Onsite riparian mitigation, SRA cover mitigation, and other Segment 1 mitigation components are described in Section 2.4, "Location and Description of the Compensatory Mitigation Components."

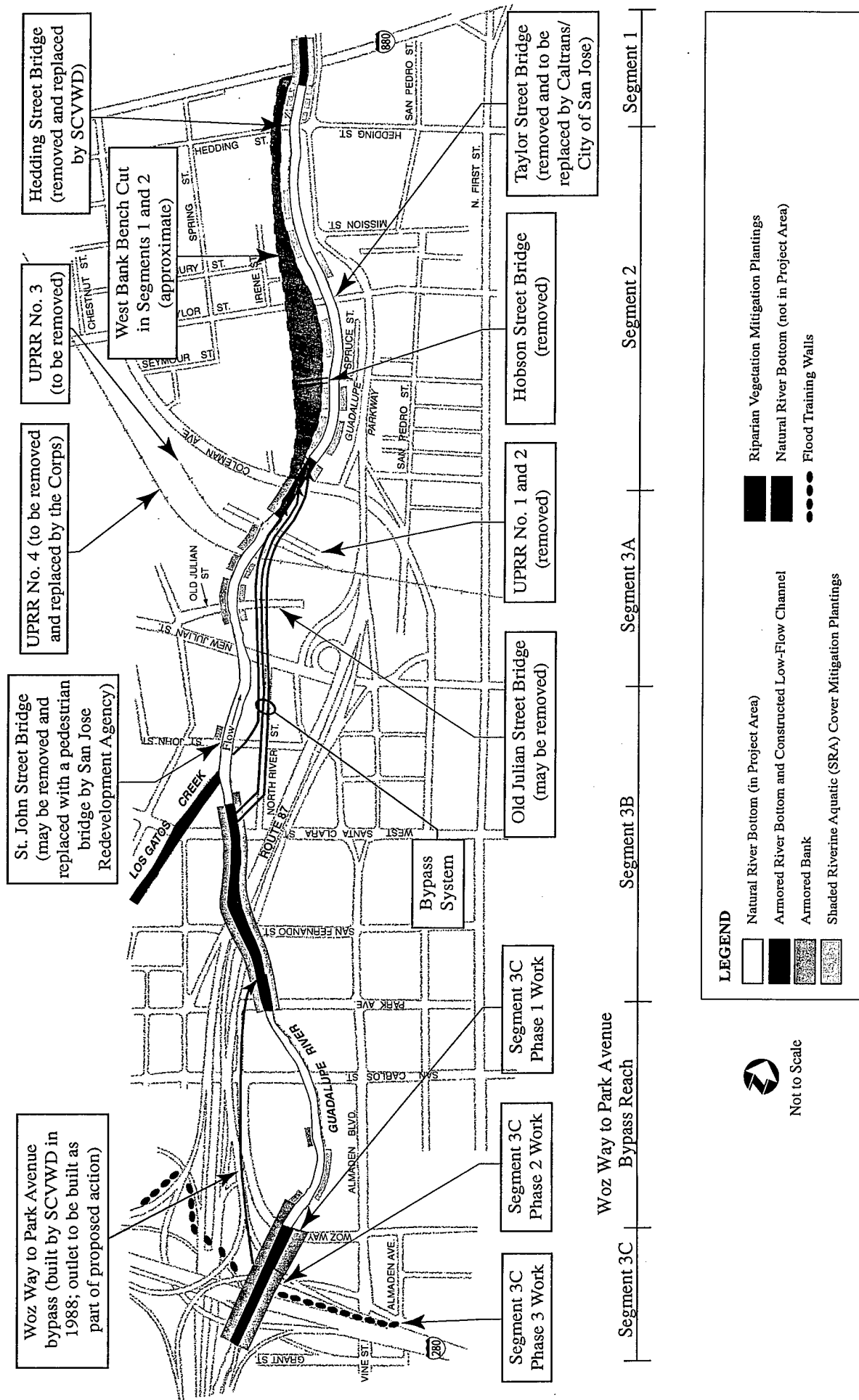


Figure 2-1. Guadalupe River Project - Flood Protection and Onsite Mitigation Components

TABLE 2-1 Summary of Project-Related Effects by Segment for the Guadalupe River Project

Project Segment	Terrestrial Resource Effects				Aquatic Resource Effects							
	Riparian Vegetation (ac) ^a		Wetlands (ac)		SRA Cover (lf)		Armored River Bottom (lf)		Increased Water Temperature		Spawning Habitat (sf)	
	Existing	Affected	Existing	Affected	Existing	Affected	Existing	Affected	Existing	Affected	Existing	Affected
Segment 1	2.82 ^b	1.31 ^b	0	0	2,402	1,510	0	448	N/A	Yes	1,000	0
Segment 2	12.21 ^c	5.13 ^c	0	0	6,252	2,060	0	305	N/A	Yes	3,390	20
Segment 3A	4.52 ^d	2.06 ^d	0	0	3,062	1,381	0	695	N/A	Yes	10,600	6,500
Segment 3B	5.96 ^d	3.35 ^d	0	0	3,839	2,408	0	1,861	N/A	Yes	9,700	4,700
Segment 3C	1.92 ^e	1.92 ^e	0	0	1,102	956	0	1,045	N/A	Yes	700	700 ^f
Totals	27.43	13.77	0	0	16,657	8,315	0	4,354	N/A	Yes	25,390	11,920

^a Preproject riparian canopy mapping assumed that native and nonnative trees and shrubs growing on or near the top of bank and connected to the riparian canopy were included in the original riparian habitat mapping effort performed for the 1992 mitigation and monitoring plan. The 1992 plan identified approximately 32 acres of riparian vegetation that included the Woz Way to Park Avenue Bypass Reach, which is no longer considered part of the Project.

^b Preproject conditions for the Segment 1 were mapped on Plates 1 and 2 of the 1992 mitigation and monitoring plan (east bank) and on an orthophoto contour mapping blue line (west bank) dated 1990. Postproject conditions were mapped on blue lines dated August 15, 1996. Postproject conditions were field verified on June 16, 1999.

^c Preproject conditions for the Segment 2 were mapped on blue lines dated October 27, 1990. Postproject conditions were mapped on blue lines dated August 15, 1996. Postproject conditions were field verified on June 16, 1999.

^d Preproject conditions for the Segments 3A and 3B were mapped on blue lines dated October 27, 1990. Postproject conditions where adverse effects occurred were mapped on the preproject blue line set. This acreage was subtracted from the preproject acreage to determine postproject acreage.

^e Preproject conditions for the Segment 3C were mapped on blue lines dated October 27, 1990 (downstream from I-280) and November 3, 1990 (upstream from I-280).

^f Affected spawning in the Segment 3C includes 500 sf lost as a result of the Auzerias Street Bridge removal, which occurred in the Woz Way to Park Avenue bypass reach.

N/A = not applicable.

Flood protection elements constructed in Segment 1 include 448 feet of gabion armoring on both the west and east banks. In addition, CCM armoring was placed at the downstream end of the reach and in the channel bed upstream from, under, and downstream from the I-880 Bridge (Figure 2-1, Table 2-2). Where armoring was installed on the channel bed, a weir/pool low-flow channel design developed by CDFG has been installed.

TABLE 2-2. Amount of Armored Bank and Riverbed in Each Segment of the Project (Linear Feet)

Project Segment	Armored West Bank	Armored East Bank	Armored Riverbed
Segment 1	448	448	448
Segment 2	305	305	305
Segment 3A	695	695	695
Segment 3B	1,861	2,081	1,861
Segment 3C	1,250	1,085	1,045
Total	4,559	4,614	4,354

To accommodate high-water flows, a floodplain terrace was created on the west bank of the river by constructing a bench cut (Figures 2-1 and 2-2). This floodplain terrace includes riparian mitigation sites. A network of recreational trails has been constructed to the west of the floodplain terrace. This floodplain terrace is approximately 30 acres. Five of these acres are located in Segment 1. The entire area floods temporarily during high-water flows. The floodplain terrace was created approximately 3 feet above the existing summer water level to keep flows less than 350 cfs from entering the floodplain terrace. A narrow channel was excavated in the floodplain terrace between I-880 and Coleman Avenue throughout Segments 1 and 2. This feature, referred to as a secondary channel, is discussed in further detail in Section 2.2.2, "Segment 2."

Recreational features (Figure 2-3) on the west bank of Segment 1 include a trail system, park benches, picnic tables, and trash receptacles. These recreation features are set back 40 to 180 feet from the riparian mitigation sites. In Segment 1, there is a network of recreation trails interspersed with trees and grassy knolls to form an urban park setting. Trails are 12 feet wide, and trail/maintenance roads are 18 feet wide. The west bank trail crosses under the I-880 and Hedding Street bridges and has trail access points upstream from I-880 Bridge and upstream and downstream from Hedding Street Bridge. The east bank trail/maintenance road crosses under I-880. The trail/maintenance road under I-880 Bridge will connect with the proposed east bank trail that will be constructed as part of the Caltrans Route 87 project currently under construction.

2.2.2 Segment 2

Segment 2 is located between Hedding Street and Coleman Avenue (Figures 2-1 and 2-2). Construction of the flood protection and recreation components in Segment 2 began in July 1994 and was completed in September 1996. Riparian mitigation for Segment 2 was completed in 1998 in accordance with the 1992 MMP (U.S. Army Corps of Engineers, 1992). Implementation of SRA cover mitigation and other mitigation elements is ongoing and will be completed in 2001. Onsite riparian mitigation, SRA cover mitigation, and other Segment

2 mitigation components are described in Section 2.4, "Location and Description of the Compensatory Mitigation Components."

Flood protection elements in Segment 2 include 305 feet of armoring on the east and west banks at the upstream end of the reach, just downstream from the Coleman Avenue Bridge. Armoring will include gabions on the west and east banks at the toe slope and CCM in the channel bed (Figure 2-1, Table 2-2). Where the channel bed was armored, a low-flow channel was constructed to provide fish passage, as described in Section 2.4.1. Both the eastern and western banks of Segment 2 were disturbed in 1994, when the Hobson Street Bridge was removed to provide hydraulic capacity for the Authorized Project, and again in 1996, when SCVWD removed and then replaced the Hedding Street Bridge (Figure 2-1). On the west bank, a sewer line was capped at Hobson Street and rerouted to Taylor Street. Removal of the Taylor Street Bridge in 1998 also caused disturbance to both the east and west banks; this bridge will be replaced in 2000. These bridge removals and replacements were documented in previous environmental reports (U.S. Army Corps of Engineers, 1985, 1991a).

To accommodate high-water flows, an floodplain terrace was created on the west bank of the river by constructing a bench cut approximately 3 feet above the existing summer water level (Figures 2-1 and 2-2). This floodplain terrace is approximately 30 acres in size. Twenty-five of these acres are located in Segment 2. The entire floodplain terrace floods temporarily during high-water flows. Existing riparian vegetation along a 30-foot-wide strip adjacent to the river was preserved to provide SRA cover in this reach. This resulted in a berm, immediately adjacent to the main river channel, that is 6 feet higher than the adjacent bench cut on the west bank. Several breaks or openings in the berm create low spots where floodflows spill into the floodplain terrace. These breaks in the berm also allow floodflows to drain back to the main river channel when flows recede. This floodplain terrace includes riparian mitigation sites. A network of recreational trails has been constructed to the west of the riparian mitigation.

Recreation features in Segment 2 (Figure 2-3) include a trail system on the west bank and a trail on the east bank. These recreation features are set back 120 to 250 feet from the riparian mitigation sites and habitat and along the river. The west bank network of trails is interspersed with trees and grassy knolls to form an urban park setting. The west bank trails merge to cross under the Taylor Street and Coleman Avenue bridges. Trail access points on the west bank are located upstream and downstream from the Taylor Street Bridge and downstream from the Coleman Avenue Bridge. The east bank trail is located just under and downstream from the Coleman Avenue Bridge. The proposed Caltrans/City of San Jose Route 87 east-bank trail would connect to the Segment 2 east bank trail.

A narrow secondary channel was excavated in the flood floodplain terrace on the west bank between I-880 and Coleman Avenue. The inlet for the secondary channel is located just downstream from Coleman Avenue in Segment 2, and the outlet is located approximately 300 ft upstream from I-880 in Segment 1. The bottom of the secondary channel's inlet is nearly 2 feet higher than the channel bed at the same location. The secondary channel has a bottom width of 5 feet and a top width of 13 feet; it is 4 feet deep and almost a mile (approximately 5,100 feet) long. Water flows into the secondary channel when flows in the main channel exceed 350 cfs.

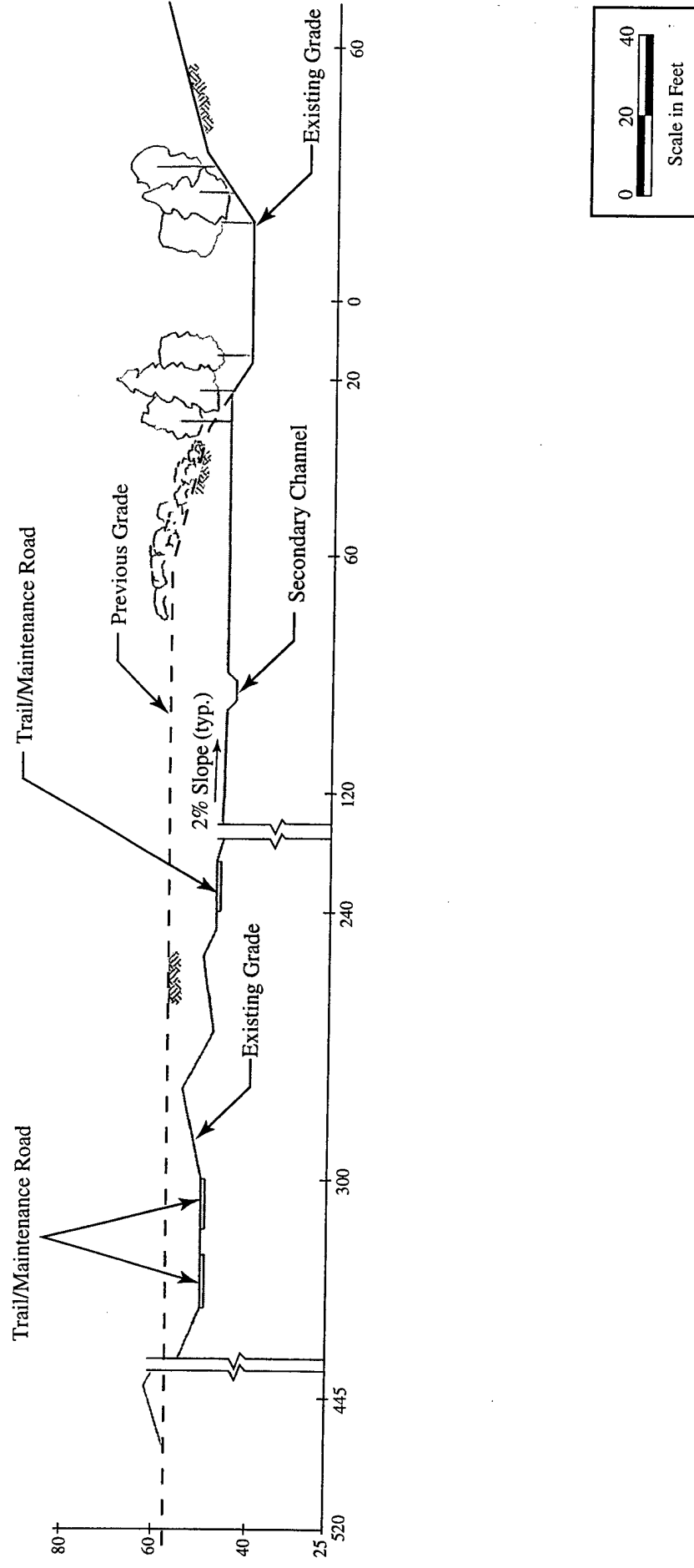
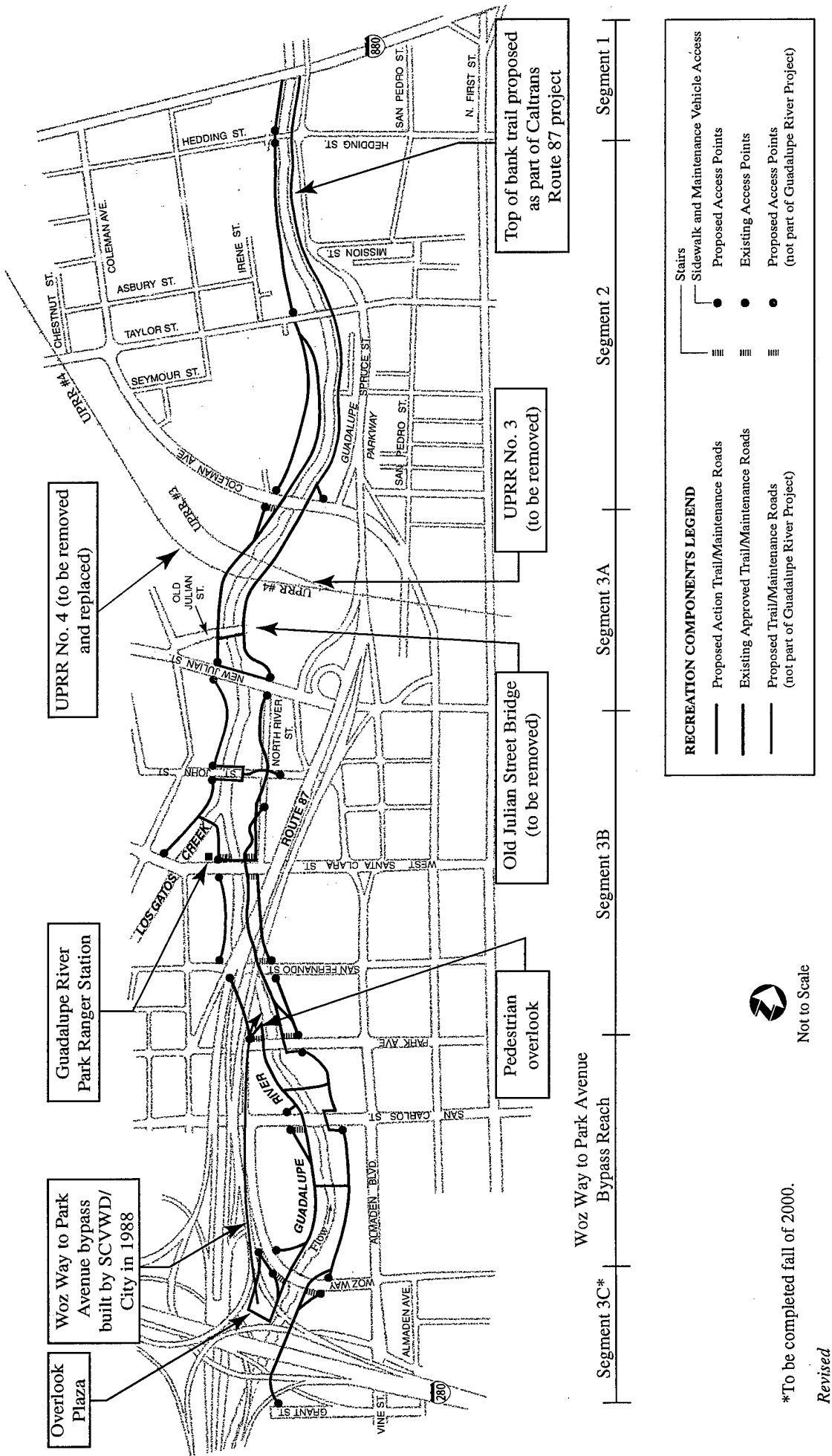


Figure 2-2. Guadalupe River Project Segments 1 and 2 Cross Section



*To be completed fall of 2000.

Revised

The secondary channel was designed to improve the quality of habitat in the riparian mitigation sites located away from the main river channel in Segments 1 and 2 (Section 2.4.1). It also minimizes ponding in the flood floodplain terrace because it directs water out of this area and back into the main river channel, which helps to minimize the potential for fish to become stranded in the flood floodplain terrace.

A rock weir was placed across the upstream end of the secondary channel. It is constructed of boulders ranging from 2 to 6 feet in diameter that interlock and provide a smooth transition to the CCM in the natural river channel downstream from Coleman Avenue (Santa Clara Valley Water District, 1997). A gap at the entrance of the secondary channel, perpendicular to the flow, allows water to enter the secondary channel. It is intended to retain sediment in the natural channel and has performed as expected. The rock weir was originally installed as a temporary structure until the Guadalupe River Project is completed, but the consideration to keep the weir as a permanent structure to protect the mitigation plantings will be evaluated after completion of the Project. For flows less than 2,000 cfs, approximately 20 percent of the flow is diverted to the secondary channel in the flood floodplain terrace, and the remaining 80 percent remains in the main river channel (Reiller, personal communication). At flows greater than 2,000 cfs, progressively more water is diverted into the secondary channel and flood floodplain terrace. By helping to concentrate flows of less than 1,000 cfs in the main river channel, the rock weir maintains sediment transport in the river, minimizes the deposition of sediment, and protects mitigation plantings in the flood floodplain terrace from routine storm events.

To confirm that the secondary channel is operating correctly and does not cause the stranding of steelhead or chinook salmon, the Corps and SCVWD must monitor flows at the rock weir. Specifically, the flow split at the weir structure must be maintained as described above; as flows decrease below 2,000 cfs, the secondary channel must maintain a connection sufficient to enable fish to move back into the main river channel.

Current maintenance practices include removal of vegetation and sediment in the secondary channel. This ensures that water does not pond in the floodplain terrace or within the secondary channel. Vegetation removal will be performed in accordance with the U.S. Army Corps of Engineers Interim Operation and Maintenance Manual (U.S. Army Corps of Engineers, 1997). The secondary channel presently collects stormwater from the adjacent streets to the west of the river.

2.2.3 Segments 3A and 3B

Segment 3A is between Coleman Avenue and New Julian Street, and Segment 3B is between New Julian Street and Park Avenue (Figure 2-1). The underground bypass system would consist of three box culverts, "A," "B," and "C," located on the eastern bank of the Guadalupe River. As designed, the box culverts would be of different lengths and have different inlet and outlet locations. The inlet for proposed box culvert A would be located downstream from the West Santa Clara Street Bridge, and the outlet would be located in the vicinity of the Coleman Avenue Bridge (Figure 2-1). Box culvert A would be approximately 5,000 feet long and have a cross section of 18.5 feet by 25.5 feet to 25.5 feet by 25.5 feet. The inlet for proposed box culvert B would be located downstream from the West Santa Clara Street Bridge, and the outlet would be located upstream from the Coleman Avenue Bridge (Figure 2-1). Box culvert B would be approximately 4,000 feet long and have a cross section of 18.5 feet by 25.5 feet to 25.5 feet by 25.5 feet. The inlet for proposed box culvert C would

be located downstream from the confluence of Los Gatos Creek and the Guadalupe River, and the outlet would be located upstream from the Coleman Avenue Bridge (Figure 2-1). Box culvert C would be approximately 2,500 feet long and have a cross section of 18 feet by 25.5 feet. The estimated amount of material that would be excavated to allow construction of box culverts A, B, and C would be 371,900 cubic yards.

The Bypass System Alternative could include alternative scenarios in which a bypass system consisting of two box culverts would be constructed. Under one option, culverts A and B would be constructed as described above. However, the inlet at Los Gatos Creek would connect with box culvert B. The width of box culvert B would be expanded to accommodate additional floodflows. Outlets would still be in the vicinity of Coleman Avenue. A second option would include construction of box culverts A and C only. The inlet to box culvert A would be approximately 120 feet wide and the inlet to box culvert C would be approximately 75 feet wide. Box culvert A would have a cross-section of approximately 30 feet by 30 feet and box culvert C would have a cross-section of approximately 24 feet by 24 feet.

Under either scenario, the proposed bypass would be constructed below portions of North River Street, St. John Street, and New Julian Street. Construction would require the temporary closure of one or more traffic lanes. The bypass would also cross under Union Pacific Railroad (UPRR) tracks.

As water rises during flood events in the Guadalupe River, flows would continue in the main river channel but would also begin to flow over a weir and into the box culverts at a minimum of 1,500 cfs. The total diversion from the main river channel during a 100-year flood event will be approximately 7,000 cfs at the bypass system entrance near West Santa Clara Street and 3,000 cfs at the bypass system entrance near St. John Street. Approximately 7,000 cfs will remain in the natural channel. There will be approximately 2 feet of freeboard in the box culverts during the peak storm event. One storm every 2 years may generate enough flow for river water to spill into the bypass. The bottom of the box culverts would be sloped to drain. As sediment and flood debris could settle on the bottom of the box culverts after large storm events, periodic maintenance of the box culverts would be required. The weir heights could be modified with the objective of preventing sediment inflow and maximizing floodflows into the culverts while providing 2 feet of freeboard. The minimum threshold for flows into the box culverts would still be 1,500 cfs. Public access to the interior of the bypass would be prohibited at all times; signs warning the public that trespassing is prohibited would be posted near the openings of the bypass system. No physical devices, such as screens, are planned to be installed at this time to prevent access. The Corps and SCVWD would continue to work with the City of San Jose to ensure that safety concerns are minimized to the maximum extent practicable.

As the weir heights are adjusted to prevent sediment from getting into the bypass, channel widening could be required on the west bank downstream from West Santa Clara Street. The top of the west bank would remain undisturbed, the existing retaining wall would be extended 20–50 feet, and the bank would be steepened to approximately 1 Vertical on 1 Horizontal–1 Vertical on 2 Horizontal beginning at the toe of the extended wall. If this widening became necessary it would occur within the proposed armoring zone limit of 340 feet downstream from West Santa Clara Street as described above.

Invert stabilization structures are small weirs that would be placed in the natural river channel in Segments 3A and 3B to stabilize the grade of the river, trap coarse sediment, and create in-channel bars and instream fish habitat. Between 9 and 15 invert stabilization structures (Figure 2-4) would be placed in the channel bed in the unarmored, natural channel sections between Santa Clara Street and Coleman Avenue (Figure 2-1). Between 9 and 20 invert stabilization structures would be placed in the channel bed in Segments 1 and 2 between Coleman Avenue and I-880, if needed. The footing of the invert stabilization structure would be constructed of concrete (Figure 2-4). The footing will extend into the channel bank approximately 3 feet and will be built to an elevation approximately 2 to 3 feet above the summer water elevation. Logs will be fastened to the top of the footings to create drops in grade between structures of 1 foot or less. The size and number of logs can be adjusted as necessary to change the depth of water behind the structures. The low-flow slot in the footing and logs of each structure would be approximately 3.5 to 4 feet wide to allow for passage of small watercraft. The low-flow slot would be shaped to concentrate flows into the natural low-flow channel of the river and encourage the development of plunge pools below the invert stabilization structures. A plunge pool is a pool formed as a result of water flowing through the low-flow slot in the invert stabilization structure and scouring out a pool just below the structure. The pools are expected to be from 1 to 3 feet deep. This concentration of low flows into the natural low-flow channel and the creation of plunge pools would benefit anadromous fish by facilitating passage and providing additional instream fish habitat.

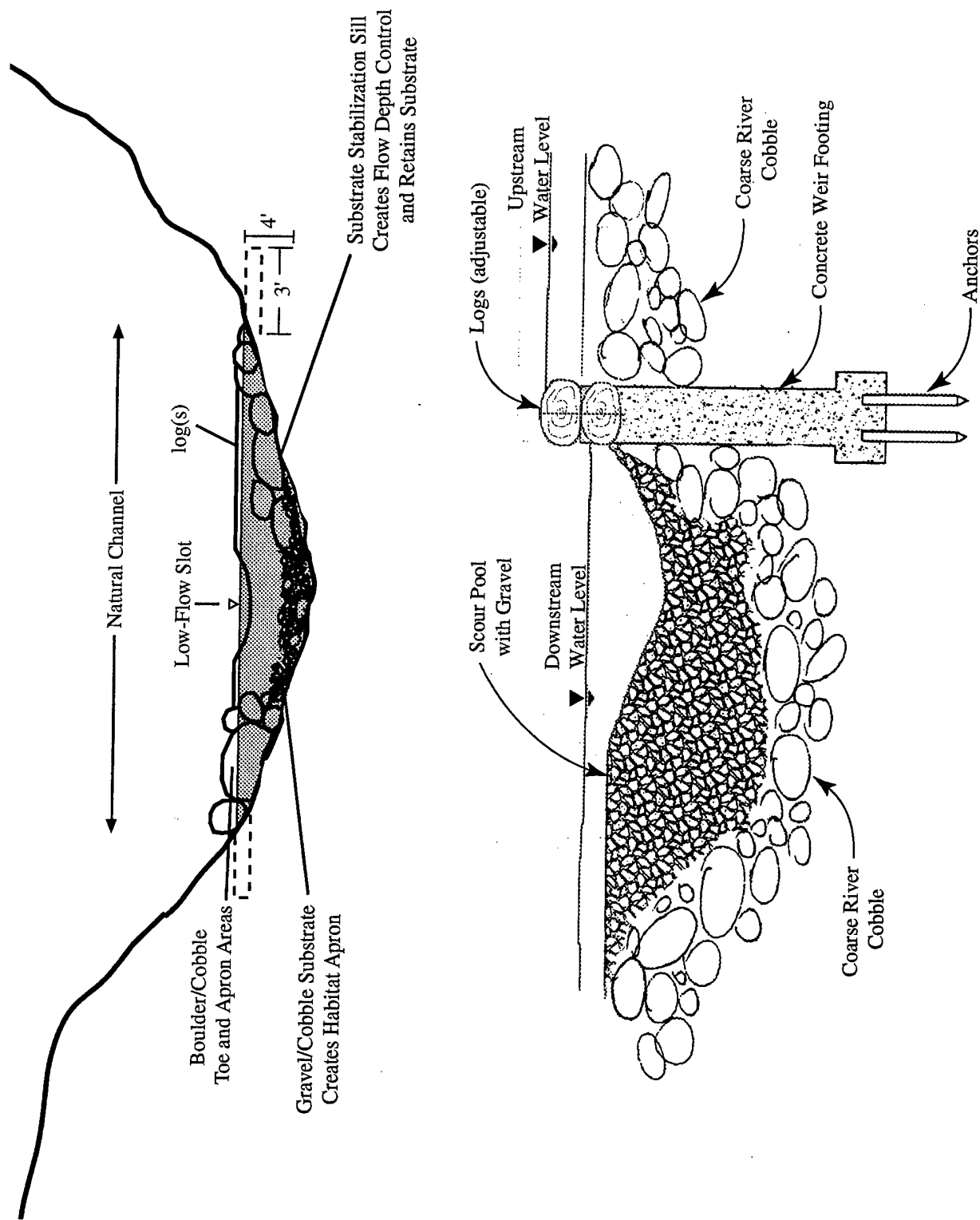
The invert stabilization structures will be built utilizing a four-wheel-drive front-end loader and backhoes. After water has been diverted from the construction area (Section 2.3), a trench approximately 3 to 4 feet deep by 2 feet wide will be excavated into the channel bed and formwork built for the 1-foot-wide concrete footings. Steel reinforcing will be placed within the formwork and concrete pumped through an overhead delivery system to avoid impacts on riparian vegetation. The concrete will be pumped from trucks at road crossings or unvegetated areas at the top of the bank. The formwork will be removed after the concrete has cured, and suitable channel bed material will be used to backfill the trench.

Construction of flood protection in Segments 3A and 3B is scheduled for 2002 through 2004. Mitigation elements will be completed before or concurrent with flood protection components. Mitigation sites in Segments 3A and 3B are described in Section 2.4, "Location and Description of the Compensatory Mitigation Components."

2.2.3.1 Segment 3A

In Segment 3A, there will be approximately 695 feet of east and west bank and channel bed armoring below and upstream from the Coleman Avenue Bridge at the downstream end of the Bypass System Alternative (Figure 2-1, Table 2-2). On the west bank, gabions will armor the toe of the slope, and stone terraces will armor the riverbank. A wheel-chair accessible ramp would be installed on the bank armoring to allow trail passage under the Coleman Avenue Bridge. On the east bank, gabions will armor the toe of the slope and a vertical concrete retaining wall will armor the riverbank. To prevent erosion, the channel bed would be armored with CCM below and upstream from the Coleman Avenue Bridge.

In the armored channel bed sections of Segment 3A upstream from Coleman Avenue (Figure 2-1), approximately 5 to 7 low-flow channel check structures will be constructed (Section 2.4.1, and Figure 2-5). This low-flow channel check structure design will use a



Not to Scale

Figure 2-4. General Cross Section of the Natural Channel in Segments 3A and 3B and the Preliminary Invert Stabilization Structure Design

concrete sill, logs, boulders, and gravel placed at grade and on top of the CCM-armored riverbed to concentrate flows in a low-flow channel. This design will maintain a minimum average water depth of 1.2 feet when the flow is 0-1 cfs. The depth meets Thompson's (1972) minimum water depth criteria of 0.6 foot (7.2 inches) for steelhead and 0.8 foot (9.6 inches) for chinook salmon. The low-flow channel check structures will increase depth at low flows, thereby maintaining cooler water temperatures and improving anadromous fish passage and habitat.

In Segment 3A (Figure 2-1), the UPRR No. 1 and 2 Bridges were removed in 1996 to meet the hydraulic capacity requirements of the Authorized Project. Old Julian Street Bridge will also be removed. UPRR Nos. 3 and 4 Bridges will be removed to realign the railroad main line, and it is assumed the UPRR No. 4 Bridge will be replaced. Because there is an exposed sewerline under the Old Julian Street Bridge, a new sewer line will be built on the downstream side of Old Julian Street Bridge under the river using a sewer siphon system. An exposed gas and sewer line, encased in a concrete box that is 4.5 feet wide by 3 feet high, crosses the river 150 feet upstream from UPRR No. 4. Because this line may act as a barrier to fish at low flows, it will also be relocated under the river using a sewer siphon system.

Recreational trails in Segment 3A include an 18-foot-wide trail/maintenance access road on the top of both the east and west banks from New Julian Street to Coleman Avenue (Figure 2-3). The 18-foot-wide trail/maintenance access road will include a 12-foot-wide asphalt surface bordered on each side with 3-feet of reinforced turf. The eastern top-of-bank trail will cross the New Julian Street Bridge at-grade. The top-of-bank trail continues downstream to above Coleman Avenue, where the trail will descend the armored bank to pass under the Coleman Avenue Bridge. On the western bank, there would be at-grade trail access downstream from New Julian Street and upstream from Coleman Avenue. Before Coleman Avenue, there would be a 300-foot-long wheelchair-accessible ramp sloped down the armored bank to pass under the Coleman Avenue Bridge. Both the east and west bank trails will cross the reconstructed railroad track UPRR No. 4 either as bridges or underground crossings. The final selection of railroad crossing method will be determined through coordination with UPRR.

There is no west bank trail between New Julian Street and St. John Street although a proposed nonproject trail shown in Figure 2-3 would provide connection. Until the nonproject trail is complete, west bank trail users traveling upstream from New Julian Street will have to cross the New Julian Street Bridge to the east bank trail system.

2.2.3.2 Segment 3B

Two areas in Segment 3B will be armored. This will result in a total of 1,861 feet of riverbank armoring on the west bank, 2,081 feet of riverbank armoring on the east bank, and 1,861 feet of channel bed armoring.

Approximately 1,861 feet of riverbank armoring on the west bank, and 1,861 feet of channel bed armoring will be constructed from 300 feet downstream from the West Santa Clara Bridge to under the Park Avenue Bridge (Figure 2-1, Table 2-2). Approximately 2,081 feet of riverbank armoring on the east bank will be constructed from 340 feet downstream from the West Santa Clara Street Bridge to under the Park Avenue Bridge (Figure 2-1). On the east bank, armoring will include gabions at the toe of the slope and stone terraces on the slope. On the west bank, armoring includes a vertical concrete retaining wall that will be 18 to 22 feet high beginning at the Woz Way Bypass and ending at West Santa Clara Street. The

channel bed, armored with CCM and concrete, will contain an artificial low-flow channel for fish passage. A new sewer line will be constructed under the armored channel bed downstream from West Santa Clara Street to upgrade the size of the sewer line to the existing Guadalupe River Park ranger station (Figure 2-3) and to ensure there is adequate capacity.

In the armored channel bed sections of Segment 3B upstream and downstream from West Santa Clara Street (Figure 2-1), approximately 5 to 7 low-flow channel check structures will be constructed (Section 2.4.1. and Figure 2-5). This low-flow channel check structure design will use a concrete sill, logs, boulders, and gravel placed at grade and on top of the CCM-armored channel bed to concentrate flows in a low-flow channel. This design will maintain a minimum average water depth of 1.2 feet when the flow is 0-1 cfs. The depth meets Thompson's (1972) minimum water depth criteria of 0.6 foot (7.2 inches) for steelhead and 0.8 foot (9.6 inches) for chinook salmon. The low-flow channel check structures will increase depth at low flows, thereby maintaining cooler water temperatures and improving anadromous fish passage and habitat.

One other area on the east bank in Segment 3B will be armored. Approximately 180 feet of the east bank under and upstream from the St. John Street Bridge will be armored with CCM (Figure 2-1, Table 2-2). This armoring is necessary to create the inlet to the bypass.

The outlet structure for the Woz Way to Park Avenue bypass will be in Segment 3B downstream from Park Avenue. The outlet structure will include a small pedestrian overlook. The outlet structure will be covered with a bulkhead retaining wall to prevent the utilization of the bypass until the Guadalupe River Project is operational.

An existing U.S. Geological Survey (USGS) gaging weir upstream from the St. John Street Bridge in Segment 3B is blocking fish passage and will be removed and replaced with an invert stabilization structure. A new USGS gaging house to measure flow will be installed at a location to be determined after consultation with the USGS. The gaging house will be placed on top of the east bank outside the SRA cover vegetation zone, and the gage would be in an armored portion of the river to allow for fish and boat passage.

Recreational trails proposed in Segment 3B include features on both the east and west banks (Figure 2-3). Trail/maintenance roads will be 18-foot wide and will include a 12-foot-wide asphalt surface bordered on each side with 3 feet of reinforced turf. Trails that can accommodate small maintenance vehicles will be 12-foot wide and include an asphalt surface. On the east bank, there will be two 18-foot-wide trails between Park Avenue and Santa Clara Street, including a river trail on top of the stone terraces, 6 feet above summer water level, and a top-of-bank trail on top of the bank. The river trail will connect with the existing Woz Way to Park Avenue Bypass Reach trail. The top-of-bank trail begins at the downstream sidewalk of Park Avenue. There will be a ramp sloped down the bank from the upper trail to the lower trail between Park Avenue and San Fernando Street, across from the Woz Way to Park Avenue Bypass outlet. There will be a ramp sloped up the bank that would merge the river trail with the top-of-bank trail after West Santa Clara Street.

Downstream from Santa Clara Street, the trail will be a top-of-bank trail to New Julian Street. The top-of-bank trail will have stairs down to the river trail at the following locations: downstream from Park Avenue, downstream from San Fernando Street, and upstream and downstream from West Santa Clara Street. The east bank river trail will pass under Park Avenue, San Fernando Street, and West Santa Clara Street.

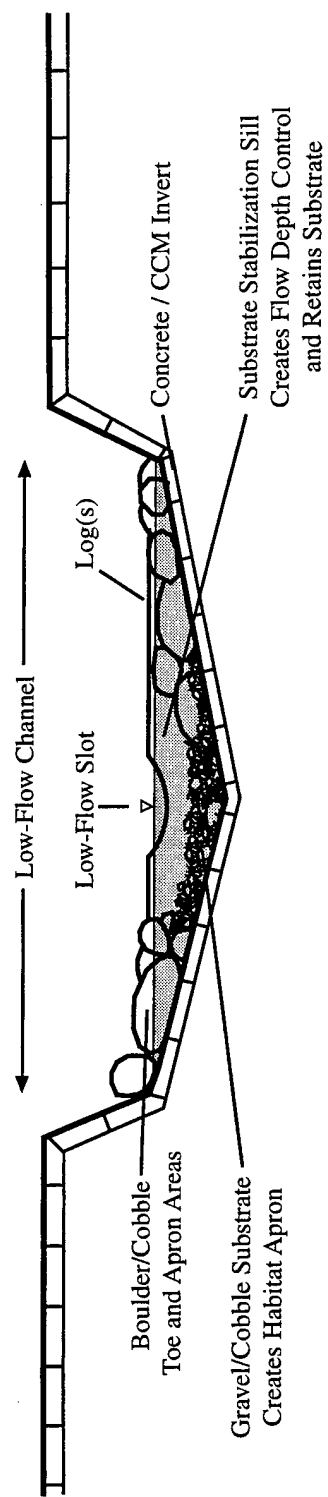


Figure 2-5. Preliminary Low-Flow Channel Check Structure in Segment 3A and 3B

On the west bank, the existing Woz Way to Park Avenue Bypass Reach trail will be extended under Park Avenue and terminate in a switch-back ramp that traverses the armored bank of the proposed pedestrian overlook. Stairs will be constructed downstream from Park Avenue from the top of the bank down to the river trail. A 12-foot-wide top-of-bank trail will continue downstream from Park Avenue to San Fernando Street, where it will connect at-grade. There will be no new west bank trails between San Fernando Street and New Julian Street, through a proposed nonproject trail shown in Figure 2-3 will provide a connection to the stairs downstream from West Santa Clara Street will be completed.

2.2.4 Segment 3C

Segment 3C is located at the upstream end of the Guadalupe River Project between Woz Way and Grant Avenue (Figure 2-1). Segment 3C is separated from Segments 3A and 3B by the Woz Way to Park Avenue bypass reach (Figure 2-1). Except for operation, the Woz Way to Park Avenue Bypass Reach is not part of the Project. In 1988, SCVWD completed the middle section of an underground box culvert bypass to carry floodflows around the Woz Way to Park Avenue Bypass Reach. By constructing this bypass, most of the construction effects on environmental resources located within the Woz Way to Park Avenue Bypass Reach were avoided. The remaining inlet section of the bypass will be constructed as part of Segment 3C, Phase 2 and will include a temporary bulkhead retaining wall over the inlet until the Guadalupe River Project is operational. The outlet will be constructed as part of Segment 3B. The inlet structure will be constructed in 2000-2001, the outlet structure will be constructed in 2002-2004, and the lower Guadalupe River Project is expected to be completed by 2003. A trail system, with a top-of-bank trail and a trail 6 feet above the summer water level, will be constructed on the west bank in Segment 3C, between Woz Way and I-280. A trail system will be constructed on the east bank in Segment 3C, between Woz Way and Grant Street.

Flood protection and recreation elements in Segment 3C will be constructed in three phases, described below.

2.2.4.1 Segment 3C Phase 1

Segment 3C Phase 1 work is on the east bank between Woz Way and the I-280/State Route 87 interchange (Figure 2-1). Approximately 355 feet of the east bank was armored with gabions and stone terraces from under the Woz Way Bridge to 50 feet downstream from the I-280 south/State Route 87 connector ramp (Table 2-2). A stairway was constructed on the east bank upstream from the Woz Way Bridge to allow access to the lower trail system. Segment 3C Phase 1 construction began in mid-September 1999 and ended in late 2000. Work within CDFG's jurisdictional waters was completed by November 1, 1999.

2.2.4.2 Segment 3C Phase 2

Segment 3C Phase 2 includes work on the east bank between the upper limit of Segment 3C Phase 1 and Grant Street, including the area of the Guadalupe River under I-280 (Figure 2-1). On the west bank, Segment 3C Phase 2 includes 1,250 feet of armoring from downstream from Woz Way to Grant Street. This armoring includes gabions at the toe of the slope and stone terraces on the bank from downstream from the inlet to the Woz Way to Park Avenue bypass to Woz Way. A concrete weir will be constructed at the inlet to control when flows enter the bypass. A bulkhead retaining wall will be placed over the inlet to the

bypass, which will block the passage of water into the bypass until the bypass is made operational. Upstream from the inlet, another retaining wall would be constructed.

The inlet structure for the existing Woz Way to Park Avenue bypass on the west bank will be constructed as part of Segment 3C Phase 2. A stairway and a handicap access ramp will be constructed on the west bank upstream from the Woz Way Bridge. A trail system with a top-of-bank trail and a trail 6 feet above the summer water level along the armored bank will be constructed on the west bank in Segment 3C between Woz Way and I-280. The trail will continue upstream to the proposed Overlook Plaza on the west bank between Woz Way and I-280. The Overlook Plaza is included as part of the Project. A trail/maintenance road system will be constructed on the east bank in Segment 3C between Woz Way and Grant Avenue. Stairs and a ramp would be constructed upstream from Woz Way and the trail would be at-grade downstream from Grant Street.

On the east bank, armoring will continue for approximately 730 feet from the upstream edge of previous work in Segment 3C Phase 1 to Grant Street. This armoring includes gabions at the toe of the slope and stone terraces on the riverbank. An 18-foot-wide trail will be integrated into the terraces along the armored bank.

The channel bed will be armored with CCM and concrete for 1,045 feet from upstream from the Woz Way Bridge to Grant Street (Figure 2-1, Table 2-2). The sections of channel bed that are proposed to be armored will contain a trapezoidal/boulder low-flow channel for fish passage (Section 2.4.1, "Maintain Fish Passage" and Figure 2-6). The low-flow channel has a trapezoidal shape; boulders are placed in the low-flow channel to increase water depth and provide hydraulic complexity (Figure 3.3-1). The trapezoid/boulder low-flow channel design would result in a minimum thalweg water depth of 1.0 foot when the flow is 4 cfs. Thalweg is the line of maximum depth in the channel (Leopold and Wolman, 1957). The boulders would be large enough, and possibly anchored, to ensure that they are not carried downstream by high flows.

Construction of Segment 3C Phase 2 is scheduled to begin in 2001 and end in 2002. For both construction years, work within the channel bed would generally not begin before May 1 and would be completed by October 15.

2.2.4.3 Segment 3C Phase 3

Flood-training walls would be constructed upstream from Woz Way to direct overbank floodflows from above the Project into the river channel (U.S. Army Corps of Engineers, 1991b). The flood-training walls will be located on both the east and west sides of the river (Figure 2-1). The walls will be constructed of concrete or concrete masonry units (CMUs). On the east bank, there will be 600 lf of wall from the river at the I-280 Bridge abutment east to Almaden Boulevard/Vine Street, 60 lf of wall across the median, and 200 lf of wall from Almaden Boulevard/Vine Street east to Almaden Avenue. The wall will vary in height from 0.5 foot to 3.5 feet.

On the west bank, there will be 120 lf of flood-training wall from the river to the edge of the Children's Discovery Museum parking lot, 440 lf of earthen berm across the south edge of the Children's Discovery Museum parking lot, 33 lf of wall tying into the lightrail bridge abutment, 180 lf of earthen berm under the Route 87 south/I-280 south connector, and 820 lf of wall along the west side of the Route 87 south/I-280 north connector. The berm height will vary from 0.5 foot to 3.5 feet. The wall height will vary from 0.5 foot to 4.5 feet.

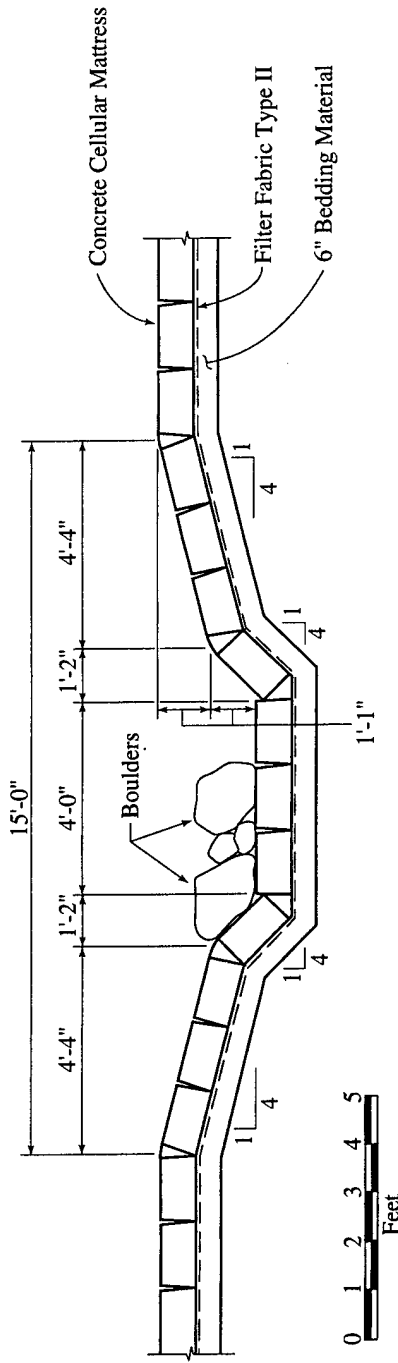
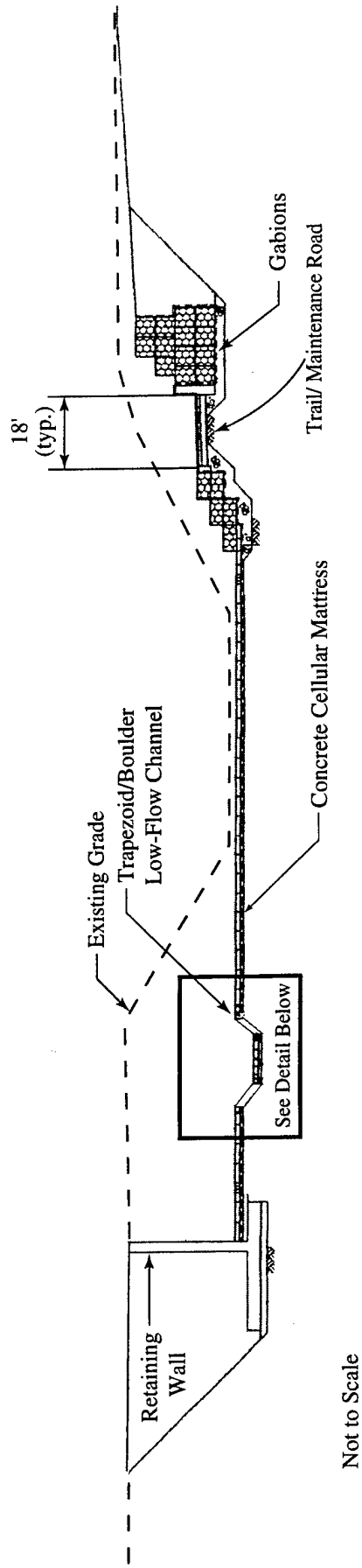
During a flood, the street crossings at Almaden Boulevard/Vine and at Almaden Avenue will be closed for approximately 24-48 hours in order to direct water into the river channel. A final design for street crossing closures has not been determined, but a stop-log structure, sand bags, or inflatable dams are being considered to make the flood wall functional. Construction of Segment 3C Phase 3 is scheduled for 2003 through 2004. The flood-training walls would not be completed and made functional until the lower Guadalupe River Project is completed. The flood-training walls will not induce flooding. When the Upper Guadalupe River Project is completed by SCVWD, street closure operations for the training walls would no longer be needed because the Upper Guadalupe River Project will prevent over bank flows that the training walls are designed to collect.

2.3 Measures to Avoid and Minimize Adverse Project Effects during Construction

Preventive measures will be implemented to avoid and minimize potential adverse effects on riparian vegetation, including SRA cover vegetation, and aquatic resources that could occur during Guadalupe River Project construction. These preventive measures include implementation of:

- A vegetation protection plan
- A Storm Water Pollution Prevention Plan (SWPPP)
- An erosion and sediment control plan
- A toxic materials control and spill response plan
- Fish management in the construction area
- Construction period limits
- Measures to comply with the Migratory Bird Treaty Act
- A soil management plan
- A hazardous and toxic materials contingency plan
- Bay Area Air Quality Management District (BAAQMD) feasible control measures for respirable particulate matter smaller than 10 microns (PM10) emissions
- Traffic management
- Parking management and
- Cultural resources management

The requirements associated with these preventive measures would be included in the construction contractor's plans and specifications. All the measures are in compliance with CDFG Streambed Alteration Agreement Notification No. III-403-91. The measures are discussed below.



Note:
Low-flow channel check structure not pictured.

Revised

Figure 2-6. General Cross Section of the Riverbank and Channel Bed Armoring in Segment 3C Phase 2 and Trapezoid/Boulder Low-Flow Channel Design

2.3.1 Vegetation Protection Plan

A vegetation protection plan will be prepared and implemented as part of the Best Management Practices (BMPs) included in the Guadalupe River Project's construction plans and specifications (Appendix F). The vegetation protection plan includes measures to protect vegetation during construction. Prior to project construction, plastic barricade fencing will be erected outside the drip-line of trees or similar measures taken along construction-area boundaries to protect vegetation to be avoided. If any protected trees are damaged during construction, they would be trimmed under the direction of a qualified arborist to minimize the risk of disease. Trees not approved for removal that are damaged during construction will also be replaced at the contractors cost with trees of the same species or another species listed on the mitigation plans and specifications in a riparian forest or SRA cover mitigation area (Appendix F). Replacement ratios will be determined in consultation with USFWS. The selected construction contractor(s) will be responsible for implementing the plan under Corps oversight. Planted trees will be monitored in accordance with the appropriate monitoring procedures in this MMP in coordination with the AMT.

2.3.2 Stormwater Pollution Prevention Plan

The Project is subject to stormwater quality regulations established under the National Pollutant Discharge Elimination System (NPDES), described in Section 402 of the Federal CWA. In California, the NPDES program requires that any construction activity disturbing 5 or more acres comply with the Statewide General Permit, as administered by the SWRCB. The General Permit requires elimination or minimization of nonstormwater discharges from construction sites and the development and implementation of an SWPPP for the site. The primary elements of an SWPPP are:

- Description of site characteristics, including runoff and streamflow characteristics and soil erosion hazard and construction procedures
- Guidelines for proper application of erosion and sediment control BMPs, including vegetative and structural practices, which will be delineated on a topographic map
- Description of measures to prevent toxic materials spills
- Description of construction site housekeeping practices and
- Monitoring and adaptive management

In addition to the primary elements, the SWPPP also specifies that the extent of soil and vegetation disturbance be minimized by control fencing or other means and that the extent of soil disturbed at any given time also be minimized. The SWPPP must be retained at the construction site. Implementation of the SWPPP would be monitored during Guadalupe River Project construction, and when construction is completed, the SWRCB will be notified that all State and local requirements have been met.

2.3.3 Erosion and Sediment Control Plan

As discussed above, the SWPPP includes measures to minimize erosion and sediment movement to the stream. Increased sediment input to the stream has the potential to adversely affect aquatic species and their habitat. An erosion and sediment control plan will

be prepared and implemented by the selected contractor(s) (Appendix G). The Corps will oversee implementation of the erosion and sediment control plan. Elements of the plan will require contractors to:

- Conduct all construction work in accordance with site-specific construction plans that minimize the potential for sediment input to the stream
- Identify with construction fencing the perimeter of all areas that require clearing, grading, revegetation, or recontouring, and minimize the areas to be cleared, graded, or recontoured
- Grade spoil sites to minimize surface erosion and apply erosion control measures as appropriate to prevent sediment from entering water courses or the stream channel to the extent feasible
- Mulch disturbed areas as appropriate and plant with appropriate species as soon as practicable after disturbance and
- Avoid equipment operation in flowing water by using temporary cofferdams or some other suitable diversion to divert channel flow around the channel and bank construction area

2.3.4 Toxic Materials Control and Spill Response Plan

As discussed above, the SWPPP includes measures to prevent toxic materials spills. Such spills have the potential to adversely affect aquatic species. A toxic materials control and spill response plan that regulates the use of hazardous materials, such as petroleum-based products (fuel and lubricants for equipment) and other potentially toxic materials associated with Guadalupe River Project construction, will be prepared and implemented by the selected contractor(s). The Corps will oversee implementation of the toxic materials control and spill response plan. Elements of the plan will assure that:

- Workers are trained to avoid and manage spills
- A spill prevention and countermeasure plan will be established and implemented before Guadalupe River Project construction begins; the plan will include strict onsite handling rules to keep construction and maintenance materials from entering the river
- All spills will be cleaned up immediately and appropriate agencies notified of any spills and cleanup procedures
- Staging and storage areas for equipment, materials, fuels, lubricants, solvents, and other possible contaminants will be located outside the top of the river's banks
- Vehicles will be removed from the top of the river's normal high-water area before refueling and lubricating
- Vehicles will be immediately removed from work areas if they are leaking
- Equipment will not be operated in flowing water

2.3.5 Construction-Area Fish Management.

A worker education program shall be undertaken on the importance of protecting chinook salmon and steelhead trout and their designated essential/critical habitat. Any activity that temporarily diverts flow from any segment of the river would require implementation of the following constraints:

- Before flow is diverted, culverts and siphons would be in place so that flow to river segments downstream from the construction site would not be interrupted
- Flow would be incrementally diverted from the affected river segment at the upstream boundary, with diversion progressively increasing over a 4-hour period in the following increments: 50 percent, 75 percent, 90 percent, 95 percent, and 100 percent. Incremental reduction in flow allows fish in the affected river segment to move downstream. Sufficient flow would be maintained through culverts, pumps, or siphons to allow consistent streamflow in the downstream segments
- All native aquatic vertebrates and larger channel invertebrates would be moved by a qualified fisheries biologist prior to dewatering
- Fish would be removed from pools remaining after flow is diverted from the river segment. A method to capture stranded fish would be developed cooperatively by NMFS, SCVWD, the Corps, and CDFG. Qualified fish biologists would transport captured fish immediately to a flowing river segment. Protocol for capture and release will be developed in cooperation with NMFS, CDFG and SCVWD. Fisheries biologists would contact NMFS immediately if any steelhead or chinook salmon are found dead or injured, except for spawned-out adult chinook salmon
- If migrating juvenile chinook salmon and steelhead are detected during June and if downstream passage, as determined by a fisheries biologist, may be impeded by construction activities, then a fish trap would be placed above the upstream barrier and operated by a fisheries biologist. Detection of migrating juvenile chinook salmon and steelhead during June would be based on the occurrence during any of the previous 14 days in the ongoing downstream migrant trapping (Appendix 3: Mitigation and Monitoring Plan). The trap at the construction site would be removed if juvenile chinook salmon and steelhead were not captured at the construction site or by the ongoing downstream migrant trapping during 14 consecutive days. All migrating steelhead and juvenile chinook salmon would be removed from the trap every 24 hours, or other appropriate time period, as determined by a qualified fish biologist, to maintain fish in good condition. Captured fish would be counted, measured, and transported immediately to a flowing river segment that allows downstream migration. Additional details of downstream migrant trapping will be coordinated with NMFS, including specific reporting requirements
- A likely possibility exists that adult chinook salmon may arrive at coffer dam sites before the end of construction on October 15. If necessary, upstream passage for chinook salmon would be provided through or around construction sites from September 1 through October 15. The need to provide passage would be based on the occurrence of more than 25 adult chinook salmon, flow conditions, and cooperative assessment of passage needs by NMFS, SCVWD, the Corps, and CDFG. Occurrence of adult chinook

salmon will be based on trapping at an appropriate downstream location, or other method developed cooperatively by NMFS, SCVWD, the Corps, and CDFG

2.3.6 Construction Period Limits

To reduce the likelihood of adverse effects on rearing juvenile steelhead and chinook salmon, as well as on adult fish migrating to upstream spawning areas, in-channel construction, including riverbank and channel bed construction, would be limited to the summer low-precipitation period (April 15-October 15), with the condition that construction requiring stream dewatering, stream crossings, or work in the channel bed may not commence before May 1. Work could commence on May 1 only if the stream-monitoring criteria were satisfied by that date. Stream monitoring criteria include monitoring to determine whether average daily water temperatures have exceeded 68 °F for at least 5 consecutive days and the absence of outmigrating salmonids. Absence of juvenile chinook salmon and steelhead during May would be based on observations during the previous 14 days in the ongoing downstream migrant trapping (Appendix 3: Mitigation and Monitoring Plan). Generally, conditions for steelhead and chinook salmon decline when water temperatures exceed 68 °F in spring. Should stream-monitoring criteria not be met, channel work and stream dewatering would not be allowed to commence until June 1. If necessary, upstream passage for chinook salmon would be provided through or around construction sites from September 1 through October 15. The need to provide passage would be based on adult chinook salmon occurrence, flow conditions, and cooperative assessment of passage needs by NMFS, SCVWD, the Corps, and CDFG. Construction outside the summer low-precipitation period would require previous approval from CDFG and NMFS.

2.3.7 Measures to Comply with Migratory Bird Treaty Act

The Bypass System Alternative will be constructed inside habitat used by migratory birds. Project construction activities will not pursue, hunt, attempt to take, kill, capture, collect, possess, or offer for sale any migratory bird, including feathers, parts, nests, or eggs. Migratory birds, eggs, and active nests will be avoided by removing potential nesting vegetation designated for removal inside the construction area boundaries prior to or after February 16 to July 31 migratory bird nesting season. Barricade fencing erected as part of the Vegetation Protection Plan will protect nesting vegetation located outside of the construction area boundaries. In addition, if construction is initiated during the February 16 to July 31 migratory bird nesting season, a qualified biologist will survey the construction area for eggs or young migratory birds just prior to construction. If eggs or migratory birds are found inside the construction area boundaries, the Corps and SCVWD will develop protective measures and inform CDFG of their actions.

2.3.8 Soil Management Plan

The soil management plan includes protocols for classifying the content of wastes in soil. These protocols are based on standard analytical tests used for the disposal of material at appropriately licensed disposal sites (CH2MHILL, 1994). The soil management plan also provides criteria for classification of material considered inert, based on California's standard Waste Extraction Test (WET) procedures, as well as procedures for disposal and reuse of these materials. Prior to disposal, confirmation sampling for all constituents of concern, including metals, hydrocarbons, and polynuclear aromatic hydrocarbons, will be

conducted and the soil classified pursuant to the criteria outlined in the approved soil management plan.

Prior to project implementation, the soil management plan will be updated to reflect final project design and to incorporate input from RWQCB regarding management of soils containing elevated mercury concentrations. The updated soil management plan will be submitted to RWQCB for approval prior to implementation.

The following additional restrictions on soil management would be included in the soil management plan submitted to RWQCB for their approval:

- Sediments with mercury concentrations that exceed hazardous waste criteria under Federal or State law must be disposed offsite in appropriately licensed disposal sites. The determination of hazardous properties shall comply with all applicable statutes and regulations pertaining to hazardous wastes.
- Excavated soils with mercury concentrations not exceeding hazardous waste criteria but greater than 1 mg/kg may not be reused onsite unless such soils are placed above the low flow channel or in adjacent areas where frequent exposure to overbank flow is not anticipated to occur; above the water surface elevation defined by the 3-year recurrence interval.
- Excavated surfaces above the 3-year recurrence interval elevation that contain mercury concentrations higher than hazardous waste levels will be overexcavated and replaced with soils meeting the above criteria for onsite reuse. Excavated surfaces below the 3-year recurrence interval elevation which contain mercury concentrations greater than 1 mg/kg will be overexcavated and replaced with clean imported soil.
- The limitations on onsite reuse of excavated soils and sediments would also apply to operation and maintenance activities throughout the life of the proposed project.

The 1 mg/kg requirement is based on regulatory guidance from RWQCB (California Regional Water Quality Control Board, 2000) which states that reducing bank sediment concentrations of mercury to 1 mg/kg or less will reduce water column concentration of total recoverable mercury. Water quality in the Project area presently exceeds Basin Plan numeric water quality objectives for mercury. Therefore, incorporation of the proposed soil reuse restrictions will result in improved water quality under postproject conditions.

2.3.9 Hazardous and Toxic Materials Contingency Plan

Disposal of materials from all hazardous, toxic, and radioactive waste (HTRW) sites, discovered within the Project limits of the Guadalupe River Project will require special consideration. The Corps, in coordination with SCVWD, will develop a contingency plan outlining a course of action in the event that previously unidentified HTRW sites are uncovered during construction. This contingency plan will outline the immediate course of action to follow in the event HTRWs are uncovered. SCVWD will be the lead agency in implementing the contingency plan.

2.3.10 Measures to Implement BAAQMD's Feasible Control Measures for PM10 Emissions from Soil Removal Activities

The following list of measures for controlling emissions of PM10 would be implemented during the construction phase of the Project. These measures are contained in the BAAQMD's Feasible Control Measures for PM10 Emissions from Soil Removal Activities (Bay Area Air Quality Management District, 1996).

- Water all active construction sites at least twice daily
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least 2 feet of freeboard
- Pave, apply water three times daily to, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets

2.3.11 Measures to Address Traffic-Related Effects

The contractor(s) shall submit a traffic control plan. Three lanes of West Santa Clara Street would remain open during the construction period. Two of the three open lanes would move in the direction of peak traffic flow. This measure would be implemented during the peak travel periods from 7:00 a.m. to 8:00 a.m. and from 5:00 p.m. to 6:00 p.m. and during large events at San Jose arena, as required by the City (City of San Jose, 1994).

Prior to the onset of construction, signs with the construction periods clearly displayed would be posted on New Julian Street and West Santa Clara Street, warning commuters of potential construction delays. During construction, signs would be posted at access points to West Santa Clara Street to notify drivers of alternative routes. This measure would help divert traffic around potentially congested areas on West Santa Clara Street.

2.3.12 Measures to Address Temporary Loss of Parking

A shuttle service would be implemented to mitigate the temporary loss of parking at the office park under construction at the intersection of 333 New Julian Way and Guadalupe Parkway. A parking lot or lots that could accommodate an additional 75 cars would be identified, and a continuous shuttle service between the parking lot(s) and the office park would be instituted during work hours.

2.3.13 Measures to Address Cultural Resources

An archeologist meeting the Secretary of the Interior's Standards for Professional Archeologists would monitor the Project during ground-disturbing activities. If a prehistoric archeological site should be discovered, the site would be evaluated for significance under NRHP criteria. A Native American monitor would also be present during the evaluation of the site's significance. If human remains of Native American origin should be discovered during project construction, procedures identified in the California State public health and

safety codes would be followed. These procedures include notifying the County Coroner and the Native American Heritage Commission. The Commission would appoint a "most likely descendant" to make recommendations for treatment of the remains. Work in the area would be stopped until the site is treated.

If prehistoric or historic archeological sites that appear eligible for the NRHP should be discovered, procedures stipulated under implementing regulations for the NHPA (36 CFR 800) would be followed. These procedures would include consulting with the California State Historic Preservation Officer to confirm eligibility of the site(s) for the National Register and development of a Memorandum of Agreement that specifies treatment for the site(s). Treatment could comprise data recovery, site avoidance, or, possibly, capping the site to avoid further impacts.

2.4 Location and Description of the Compensatory Mitigation Components

The Guadalupe River Project's compensatory mitigation components have been developed to replace lost habitat value identified in the Habitat Evaluation Procedures (HEP) analysis prepared for the Guadalupe River Project (U.S. Army Corps of Engineers, 2000b) and to address direct adverse effects (U.S. Army Corps of Engineers, 2000a). The Guadalupe River Project will affect 13.77 acres of riparian vegetation, 8,315 lf of SRA cover vegetation, and 24,850 square feet (sf) of spawning gravel, as well as fish passage, fish habitat diversity, and water temperature (Table 2-1). When efforts to develop a mitigation plan for Segments 3A and 3B began, actual effects were not known. Early work on the compensatory mitigation program for Segments 3A and 3B was therefore based on an analysis of all impacts of all possible bypass alternatives. Additional information is now available regarding the actual effects of the Project in Segments 3A and 3B and the results of the HEP analysis (Section 1.7.2, "Habitat Evaluation Procedure (HEP) Analysis (U.S. Army Corps of Engineers, 2000b)" and this MMP reflects this information. The following summary of compensatory measures is based on the updated analysis of effects from the bypass system alternative.

2.4.1 Measures to Compensate for Unavoidable Adverse Project Effects

2.4.1.1 Plant Riparian Vegetation

A total of 21.0 acres of riparian vegetation have been planted in Segments 1 and 2 (Table 4-5). In 1994 and 1999, a total of 4.0 acres of riparian vegetation were planted in the bench-cut area on the west side of the river in Segment 1. During the winter of 1998-1999, approximately 17.0 acres of riparian vegetation were planted in the bench-cut areas on the west side of the river in Segment 2. Planting densities were approximately 244 trees and 270 shrubs per acre. Species planted as part of riparian vegetation mitigation are locally native to the Guadalupe River.

The riparian vegetation plantings installed in 1999 are currently being drip irrigated with water from existing city water lines. The riparian vegetation plantings installed in 1994 are no longer being irrigated.

2.4.1.2 Plant Shaded Riverine Aquatic Cover Vegetation

SRA cover vegetation mitigation is considered to be native riparian vegetation planted within 15 feet of the base-flow water surface elevation. SRA cover vegetation mitigation will be planted both onsite and offsite (Table 4-6). Onsite SRA cover mitigation includes planting 2,944 lf in Segments 1, 2, and 3 and in the Woz Way to Park Avenue bypass reach. Offsite SRA cover vegetation mitigation includes planting 7,848 lf of riparian vegetation in Reach A and 12,044 lf in Guadalupe Creek. SRA cover vegetation mitigation plantings will be in natural bank or biotechnical bank stabilization areas and will be sufficiently dense to provide shade along at least 85 percent of the planted bank length by year 40 following planting. Species planted as part of SRA cover vegetation mitigation and all propagation material required to prepare the container plant material will be locally native to the Guadalupe River.

Potential water sources to irrigate SRA cover vegetation mitigation sites located onsite and at Reach A and Guadalupe Creek include existing and future city water lines. Other options for obtaining water are limited. Pumping from the Guadalupe River is not possible because SCVWD does not have water rights to remove water from the river. Use of reclaimed water is not recommended by SCVWD because it can be detrimental to the successful establishment of riparian plants.

Offsite compensatory mitigation areas include Reach A and Guadalupe Creek, a tributary to the Guadalupe River (Figure 2-7). Reach A is located immediately downstream from the Guadalupe River Project area between Airport Parkway and I-880 (Figure 2-8). The Guadalupe Creek mitigation site begins 660 feet downstream from Masson Dam and continues downstream to Almaden Expressway (Figure 2-8).

Onsite Mitigation. Onsite SRA cover vegetation mitigation includes planting 575 lf of riparian vegetation in Segment 1, 1,081 lf in Segment 2, 878 lf in Segment 3A, and 410 lf in the Woz Way to Park Avenue bypass reach (Appendix C). This represents maximum infill of available onsite areas. Onsite SRA cover vegetation mitigation will include planting areas disturbed during construction and filling existing gaps in the riparian canopy. In one area in Segment 1 existing bank rip-rap will be removed to create additional space for plantings. Plants will be installed in a random pattern approximately 5 to 6 feet on center. The planting density is approximately 50 plants per 100 lf. The plant material may include container plants and/or cuttings that will be installed in augured or hand-excavated holes.

Reach A Mitigation Area. Reach A Mitigation Area is immediately downstream from the Guadalupe River Project area, between Airport Parkway and I-880. Approximately 7,848 lf, approximately 2.7 acres, of riparian vegetation will be planted along the Guadalupe River in Reach A (Figure 2-8) to provide SRA cover vegetation along this reach of the river (Appendix D). Planting methods within Reach A were determined based on hydraulic modeling.

Based on the results of hydraulic modeling, there will be no mitigation plantings installed within 300 feet downstream from I-880 in order to maintain hydraulic capacity. A restricted planting area begins 300 feet downstream from I-880 and extends for approximately 1,670 feet on both sides of the river (Appendix D). Planting in the restricted area is limited to a single row of vegetation along both sides of the river. Approximately 3,346 lf of SRA cover vegetation mitigation will be planted in the restricted planting areas. Unrestricted SRA cover plantings will begin approximately 2,000 feet downstream from I-880 and extend to

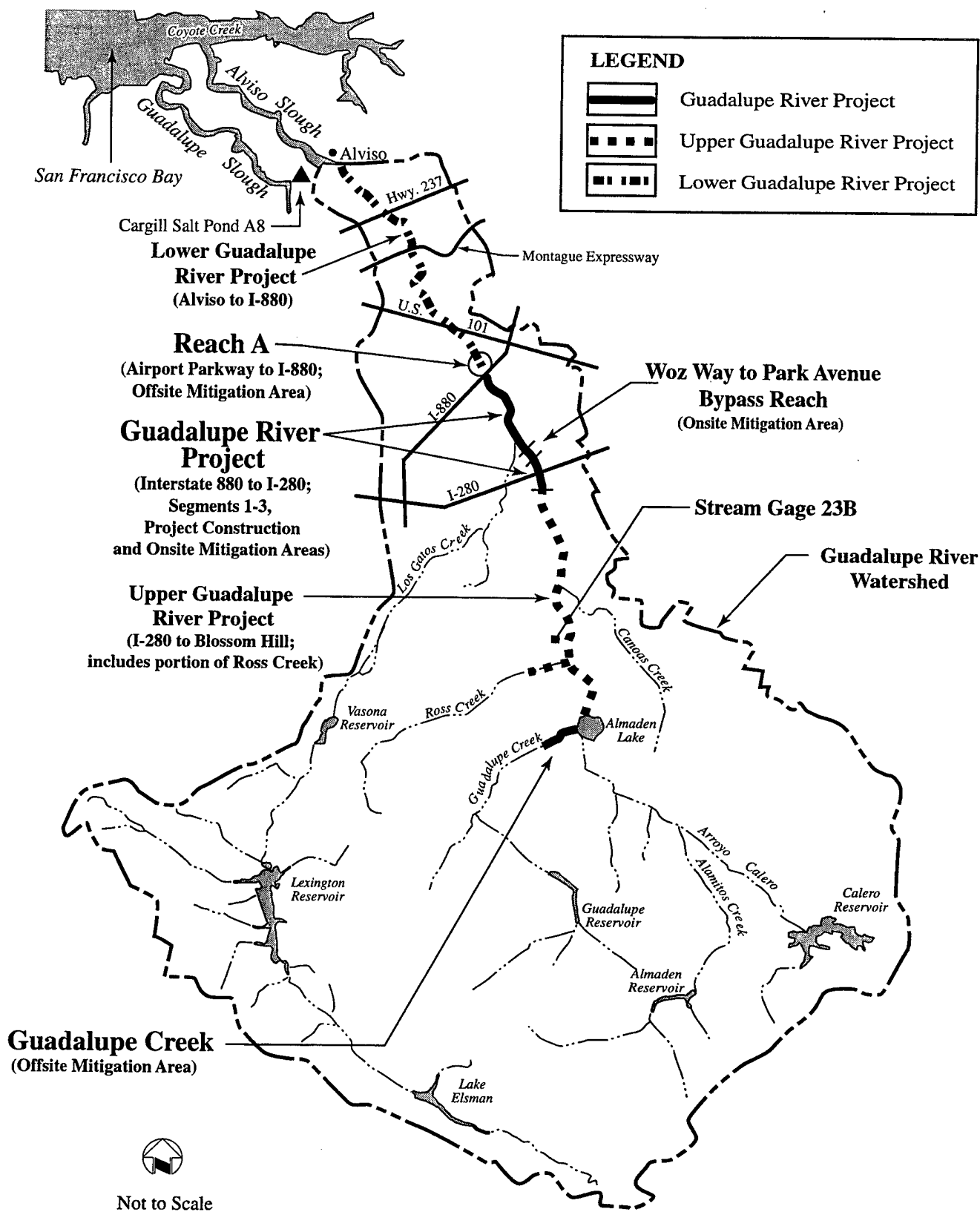
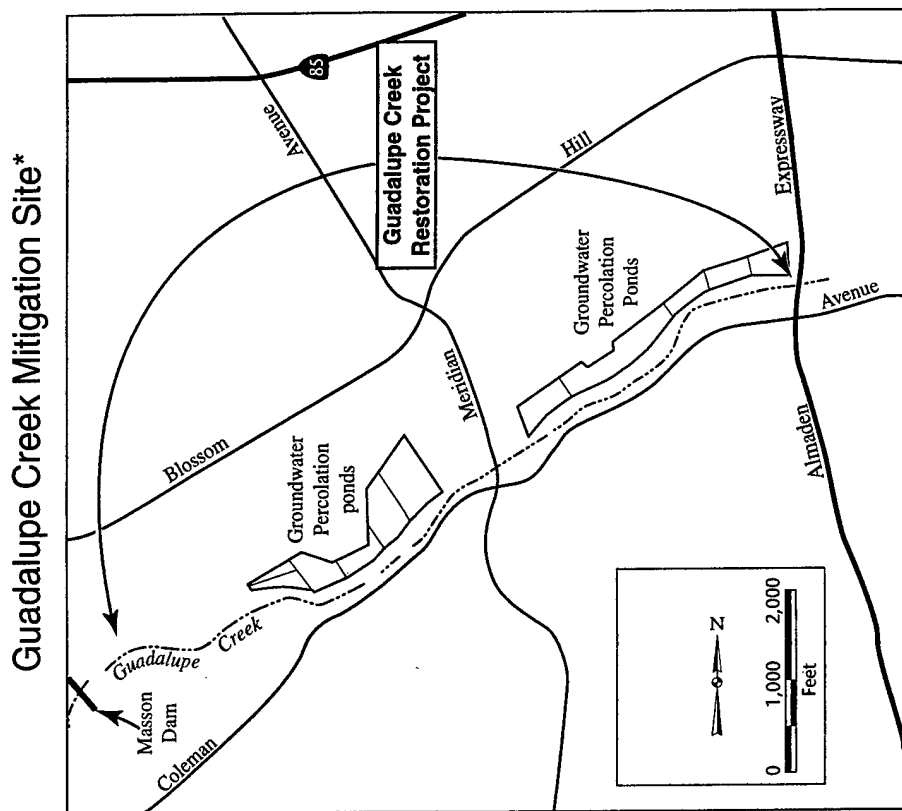
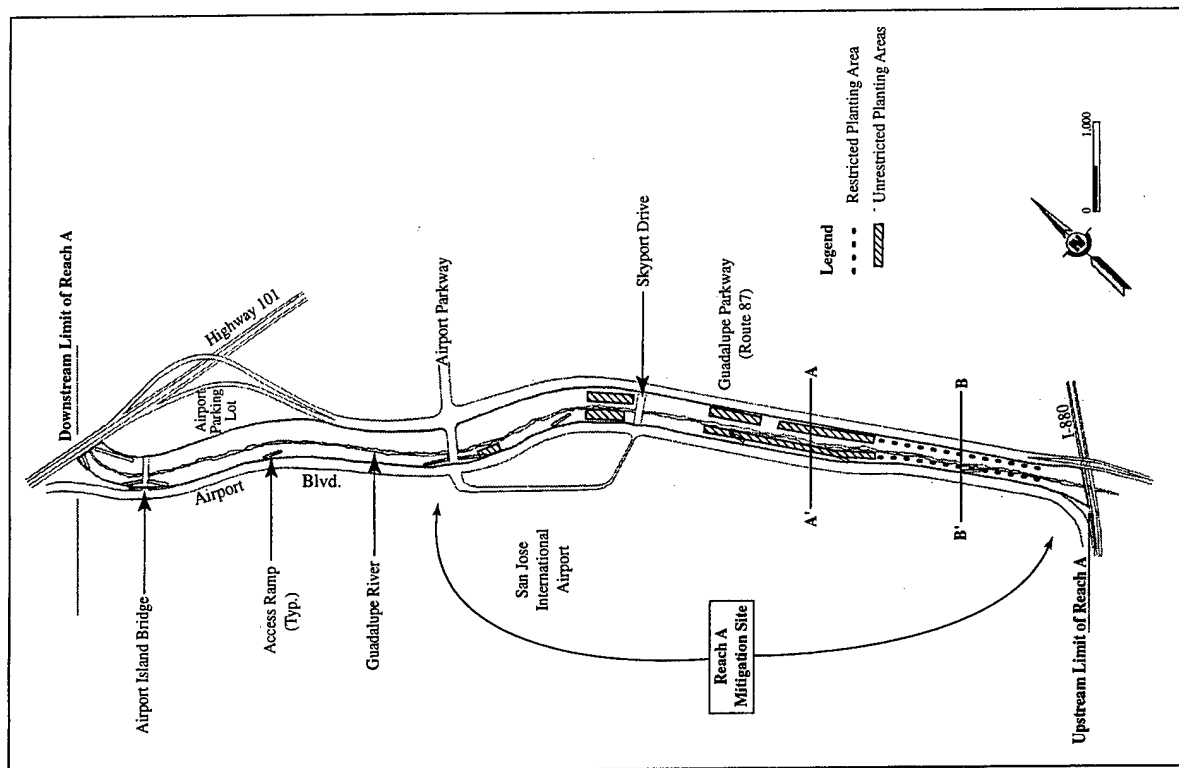


Figure 2-7. Guadalupe River Watershed Including Project Construction and Mitigation Areas

Reach A Mitigation Site



*This figure depicts the entire Guadalupe Creek Restoration Project area. A portion of this area will be used to mitigate for the Guadalupe River Project with Proposed Action.

Figure 2-8. Offsite Mitigation Areas

Airport Parkway. Unrestricted plantings will occur at three sites on the east bank and three sites on the west bank. Approximately 4,502 lf of SRA cover vegetation mitigation will occur in the unrestricted planting areas.

The Guadalupe River has been channelized and straightened in Reach A by past flood protection projects, but the levees contain enough soil to support riparian and SRA cover vegetation. Two planting surfaces have been identified in Reach A. The lower bank elevation is approximately 0 to 2 vertical feet above summer water level and the mid-bank elevation is approximately 2 or more vertical feet above summer water level. Plants suitable for the lower bank include arroyo willow, red willow, sandbar willow, yellow willow, Fremont's cottonwood, mule fat, western sycamore, and white alder. Plants suitable for the mid-bank include box elder, Fremont's cottonwood, mule fat, valley oak, and western sycamore. This plant palette will be used as a guideline only, with site-specific conditions dictating the actual plant species installed.

In response to concerns regarding feasibility and sustainability of planting in Reach A due to high average floodflow velocities and shear stresses, five pilot planting sites were installed during winter 1998-1999. Each pilot-planting site was approximately 300 by 15 feet, for a total of 1,543 lf of riparian vegetation. Two pilot planting sites were located in the restricted planting areas, and three pilot planting areas were located in the unrestricted planting areas. Riparian tree and shrub species in both the restricted and unrestricted planting areas were installed 5 to 6 feet apart with a planting density of approximately 80 plants per 100 lf. The Corps and NMFS, in coordination with the AMT, is reviewing mitigation in accordance with the MMP, will determine whether the pilot plantings in the restricted area will need to be thinned.

Future planting within the restricted planting area will include planting riparian vegetation on different types of soil, slopes, and slope surfaces along a total of approximately 3,346 lf of Reach A of which 600 lf has already been planted. Due to hydraulic constraints, planting will be limited to one plant every 5 to 6 feet along the bank. The location and elevation on the bank of each plant will vary within a 15-foot-wide planting zone to create a random, nonlinear planting row. The plant material may include container plants and/or cuttings that will be installed in augured or hand-excavated holes. Species planted in the restricted planting areas will be limited to those species that will be a single trunk tree at maturity. Examples of single trunk trees include Fremont's cottonwood, western sycamore, white alder, red willow, and yellow willow. Shrub or shrub-like species like arroyo willow, sandbar willow, box elder, and mule fat will not be planted.

Future planting within the unrestricted planting areas will include planting riparian vegetation on different types of soil, slopes, and slope surfaces along a total of approximately 4,502 lf of Reach A, of which 943 lf has already been planted. Plants will be installed in a random pattern approximately 5 to 6 feet on center. The average planting density will be approximately 50 plants per 100 lf. The plant material may include container plants and/or cuttings that will be installed in augured or hand-excavated holes. Species planted in the unrestricted planting areas will include both tree and shrub species.

Guadalupe Creek Mitigation Area. The proposed Guadalupe Creek mitigation area is located along Guadalupe Creek and bordered upstream by Masson Dam, downstream by the Almaden Expressway, on the north by residential development and the Los Capitancillos percolation pond system, and on the south by Coleman Road. The proposed site is located

in a large restoration project, the Guadalupe Creek Restoration Project (Section 1.7.10), which is owned and maintained by SCVWD. SRA cover vegetation mitigation is being planted along Guadalupe Creek in two phases (Figure 2-8). Phase 1, which was installed during the winter of 1998-1999, included planting 1,263 lf of riparian vegetation at the upstream end of the mitigation area to provide SRA cover vegetation. Phase 2, which is currently being designed, will be implemented in 2001 and will include planting an estimated 10,781 lf of riparian vegetation to provide SRA cover vegetation.

The Phase 1 planting sites, starting approximately 660 feet downstream from Masson Dam, ranged from low benches with availability of year-round soil moisture to higher benches where plant species preferring drier conditions, such as oaks, were planted. The Phase 2 planting sites will include a similar range of soil conditions.

Prior to Phase 2 planting, some sections of the channel banks will be regraded, and in some locations the channel may be realigned. After site grading activities have been completed, 15-foot-wide planting areas will be laid out. The plants closest to the channel will be located at or slightly above the bankfull channel elevation. Because the Guadalupe Creek mitigation area is currently being designed, the final planting surface elevations and descriptions are not yet known. Plants will be installed in a random pattern approximately 5 to 6 feet apart with approximately 80 plants per 100 lf. Plant material may consist of a mixture of container plants, cuttings, transplants, acorns, and seed that are present in the vicinity of the mitigation area. Plant protection cages may be used in some of the higher bank locations to protect against deer browse but will not be used in lower elevation planting areas due to the likelihood of high-velocity floodflows and prolonged inundation during winter storms.

The following design elements for Phase 2 are currently being considered:

- Planting native woody riparian vegetation parallel to the creek channel to replace overhead SRA cover lost in the downtown reach
- Using biotechnical techniques to stabilize severely eroded creek banks
- Constructing fish habitat features to replace instream SRA cover lost in the downtown reach and to increase cover and water depth

Ongoing maintenance, such as weed control and irrigation, would be required during the first 3 years postconstruction to assist in the establishment of the plantings. Additional low-level maintenance would most likely be required in perpetuity.

In Guadalupe Creek, SCVWD will no longer place gravel spreader dams in the creek between April and October to percolate water into the groundwater basin. In the past, four instream gravel spreader dams had been constructed on a seasonal basis in Guadalupe Creek. This will be permanently discontinued. The adjacent groundwater percolation ponds will remain in operation.

2.4.1.3 Protection of the Project's Compensatory Mitigation Components

The conditional water quality certification for the Guadalupe River Project issued by the SWRCB in 1992 requires "specifications of how compensatory mitigation sites will be guaranteed protection in perpetuity from potential recreational and other urban impacts" (Condition 2.b.vii) (Appendix E). After a 3-year establishment period monitored by the Corps, SCVWD will be responsible for the management and protection of all mitigation sites

in perpetuity after the initial 3-year plant establishment period administered by the Corps. No trails will be constructed in the mitigation areas, and recreational use will not be allowed in onsite and offsite riparian vegetation and SRA cover vegetation mitigation sites. However, because many of the onsite mitigation sites are located within the Guadalupe River Park, recreational activities, including nature viewing and walking/riding on trails, will take place in the vicinity of the mitigation sites. This is also the case with Guadalupe Creek, where informal recreation in the form of walking and jogging presently occurs regularly along a levee/maintenance road that runs adjacent to the creek. It is anticipated that such activities will not substantially affect the performance of the mitigation sites.

To protect mitigation sites from recreational and other urban impacts, several options are available. Each option will be considered for each mitigation site and the most appropriate method will be selected in coordination with the AMT. Signage can be effective in discouraging disturbance of mitigation sites. Small, discrete signs can be posted at regular intervals that identify mitigation sites and request that people not enter the site. In high-use areas, larger interpretative exhibits that provide more information about the mitigation sites and the importance of limiting access can be installed. Benches or other features can be constructed around the interpretative exhibits to attract people to these designated areas rather than the mitigation sites. Fencing can also be used. Post and cable or other suitable fencing material compatible with park design can be installed in high-use areas. Fences will be high enough, approximately 30 inches, that people will not trip over them. Taller fencing may be appropriate and can be identified as part of the adaptive management of the mitigation sites. Designated access routes or trails are also effective because most people will take the path of least resistance and use the trails rather than disturb the mitigation sites. In the Guadalupe River Project area, trails will be constructed as part of the Guadalupe River Park. At this time, no formal trails are planned for offsite mitigation locations on Reach A or Guadalupe Creek. These areas may be added to the City of San Jose's Master Trail Plan at some later date; if that occurs, the protection guidelines discussed herein will be followed as part of any trail planning. Barrier plantings are another option for protecting the mitigation sites. Dense plantings of native shrub species at the mitigation site/park boundary can discourage people from entering. Using native species that have thorns or spines, for example, California wild rose (*Rosa californica*) will be effective in discouraging entry into the mitigation sites. Care will be taken to avoid selection of species that may be invasive.

As part of monitoring and maintenance activities, environmental and maintenance personnel will be required to access the mitigation sites. If other needs for access become necessary, the AMT will be convened to assess the new access requirements.

2.4.1.4 Implement Water Temperature Measures

Riparian vegetation planted to provide SRA cover vegetation mitigation within Segments 1, 2, 3A, and 3B, and in Reach A and Guadalupe Creek will compensate for shade lost as a result of Guadalupe River Project construction. Increasing shade along the river is expected to cool water temperature. Riparian vegetation will grow and begin to provide shade before year 5 and will reach maturity and maximum shade density after year 40.

As described in Chapter 4, temporary shade could be installed or other measures implemented as remedial measures if water temperature measurements and modeling indicate that temperatures would harm steelhead and chinook salmon after Guadalupe

River Project construction and before vegetation planted as SRA cover vegetation mitigation begins to provide shade. Boxed trees could be placed along the low-flow channels, large fast-growing trees could be planted in SRA mitigation sites, and/or shade cloth could be installed in Segments 2, 3A, and 3B. Temporary shade would not be placed along the constructed low-flow channel sections that are covered by bridges. This is an interim remedial measure for moderation of short-term temperature effects. If temporary shade is required but is, for some reason, unable to reduce water temperatures as needed, other remedial actions will be taken as described in Chapter 4.

2.4.1.5 Replace Spawning Gravel

The Guadalupe River Project could affect up to 24,850 sf of spawning gravel (Table 4-10). If the Guadalupe River Project affects 24,850 sf of spawning gravel, up to 25,190 sf (465 cubic yards) of river-run gravel will be restocked in Segments 1 and 2 and Segments 3A and 3B (Table 4-10). River-run gravels will be placed at appropriate spawning habitat locations whenever gravel coverage drops below approximately 20,000 sf (80 percent of the preproject level; U.S. Army Corps of Engineers, 1992) and will bring total spawning gravel abundance up to at least 25,190 sf. Gravel embeddedness and depth will also be considered when surveying needs for gravel replacement (Section 4.5, "Anadromous Fish Spawning Habitat"). Restocking will take place between June 15 and August 31 to avoid potential adverse effects on salmonids that spawn in the river earlier in the year. In addition, gradient-control structures placed in the unarmored sections of the channel bed will promote gravel deposition.

2.4.1.6 Implement Fish Passage Measures

A constructed low-flow channel will be installed in all armored sections of the channel bed to provide fish passage through the Guadalupe River Project area. Three different low-flow channel concepts have been developed for the Guadalupe River Project:

- Weir/pool low-flow channel design
- Low-flow channel check structure design
- Trapezoid/boulder low-flow channel design

These concepts are discussed below according to the location at which they have been or will be installed in the Guadalupe River Project area.

In Segments 1 and 2, a weir/pool low-flow channel design developed by CDFG has been installed in the armored channel bed under I-880 and Coleman Avenue.

In each of the armored sections of Segments 3A and 3B upstream and downstream from West Santa Clara Street and upstream from Coleman Avenue (Figure 2-1), approximately 5 to 7 low-flow channel check structures will be constructed. This low-flow channel check structure design will use a concrete sill, logs, boulders, and gravel placed at grade and on top of the CCM-armored channel bed to concentrate flows in a low-flow channel (Figure 2-5). This design will maintain a minimum average low-flow water depth of 1.2 feet when the flow is zero to 1 cfs. The minimum depth was included in the design to reduce daily maximum water temperature and improve habitat conditions for juvenile steelhead. The depth meets Thompson's (1972) minimum water depth criteria of 0.6 foot (7.2 inches) for steelhead and 0.8 foot (9.6 inches) for chinook salmon. The low-flow channel check

structures will increase depth at low flows, thereby maintaining cooler water temperatures and improving anadromous fish habitat. The low-flow slot for the low-flow channel check structures has been designed with a 3.5 to 4-foot wide and curved opening to provide for easier boat passage.

In Segment 3C, a modified trapezoid/boulder low-flow channel is proposed to be constructed as part of the armoring that protects approximately 1,045 lf of channel bed. As the name implies, the low-flow channel has a modified trapezoidal shape. Boulders will be placed in the low-flow channel in a right side-left side alternating cluster pattern every 20 to 70 feet, depending on the longitudinal slope of the channel bed. The boulders will regulate water depth at low-flows for fish passage and provide fish refuge during high velocity flows. The boulders will weigh between 150 to 300 pounds each and will be placed in the low-flow channel using four-wheel-drive front-end loaders. Final placement and spacing of the boulders will depend on the size and sphericity of the individual boulders and on final field adjustment necessary to achieve desired low-flow water depths.

The approximate dimensions of the modified trapezoid/boulder low-flow channel include a top width of 15 feet, a bottom width of 4 feet, a depth of 2 feet 2 inches, 1H:1V (horizontal to vertical) side slopes up to 1 foot 1 inch depth, and 4H:1V side slopes above 1 foot 1 inch depth (Figure 2-6) (A-N West, Inc. et al, 2000). This design will generally provide 0.9 to 1.1 feet (10.8 inches to 13.2 inches) of thalweg depth at 4 cfs except in the vicinity of the boulder clusters where thalweg water depth will drop to 0.8 to 0.9 foot (9.6 inches to 10.8 inches) as the water flows around the clusters (A-N West, Inc. et al, 2000). Thalweg water depth will then rise back up to a depth 0.9 to 1.1 feet after clearing the clusters.

The modified trapezoid/boulder low-flow channel meets Thompson's (1972) minimum water depth criteria of 0.6 foot (7.2 inches) for steelhead and 0.8 foot (9.6 inches) for chinook salmon. The low-flow depth range of 0.8 to 1.1 feet during low-flow conditions of 4 cfs provides passage for adult steelhead and chinook salmon even when similar flow conditions in the Guadalupe River may impede fish passage in nonarmored, natural sections of the river channel.

In addition, existing physical barriers to fish passage through the Guadalupe River Project area and to the upstream mitigation site will be removed or modified. The USGS gaging weir upstream from the St. John Street Bridge will be removed and replaced. A new USGS gaging house to measure flow would be installed at a location to be determined after consultation with the USGS. The future gaging house would be placed in a location outside the SRA cover vegetation zone, and the gage would be in an armored portion of the river that will allow for fish and boat passage. An exposed gas and sewer line, encased in a concrete box that is 4.5 feet wide by 3 feet high, crosses the river under Old Julian Street Bridge. Because this line may act as a barrier to fish at low flows, it will be relocated. The Alamitos drop structure located downstream from Almaden Lake (Figure 2-7) was modified in 1999 by SCVWD as part of another project and will now allow fish passage to the upper tributaries of the Guadalupe River, including the mitigation site on Guadalupe Creek (Figure 2-7).

2.4.1.7 Implement Fish Habitat Measures

Several compensatory mitigation components will maintain and replace aquatic habitat used by fish. The geomorphic instream features proposed for Guadalupe Creek will improve bank stability, increase instream cover, and improve the suitability of spawning

and rearing habitat for aquatic species, including steelhead and chinook salmon. These geomorphic instream features include rock weirs and vanes, root wads, and deflector logs.

The low-flow channel check structure design would increase instream cover and provide improved spawning and rearing habitat through the creation of pools and riffles in the armored channel bed sections of Segments 3A and 3B. Channel bed stabilization structures proposed for the natural channel bed sections of Segments 3A and 3B will also improve spawning and rearing habitat by encouraging the development of plunge pools and gravel bar sequences in the river.

2.5 Operation and Maintenance

The Guadalupe River Project was designed with the assumption that the river downstream from I-880 could convey the authorized design flow of approximately 17,000 cfs. After the January and March 1995 storms, SCVWD completed an analysis that indicated that the lower Guadalupe River, below I-880, did not have the capacity to convey the authorized design flow of 17,000 cfs. From the town of Alviso to Trimble Road, there is approximately a 40 percent reduction in channel capacity. Sediment deposition and vegetation growth, which resulted from deferral of maintenance, were identified as the main causes of reduced channel capacity. The Lower Guadalupe River Flood Protection Project (Lower Guadalupe River Project) is planned to restore channel capacity in the lower Guadalupe River. The Lower Guadalupe River Project is scheduled for completion before or concurrent with the Guadalupe River Project. The Lower Guadalupe River Project would restore the capacity required to convey the Guadalupe River design flood; therefore, all Guadalupe River Project flood protection components would not be made operational until the Lower Guadalupe River Project is completed. Inlets and outlets for the bypasses in Segments 3A and 3B would remain closed with bulkhead retaining walls. The flood training walls in Segment 3C Phase 3, would not be completed until completion of the Lower Guadalupe River Project.

2.5.1 Operation

Once the Guadalupe River Project is operational, bypass culverts will remain in an open condition year-round. Flood training walls in Section 3C Phase 3 will be manually closed prior to river overbanking. Once closed, these training walls will channel flood waters into the Guadalupe River. After completion of the Upper Guadalupe River Project by SCWD, overflows would be prevented (up to the design flood of that project) and the training walls would no longer need to be operated.

2.5.2 Maintenance

SCVWD currently conducts limited channel maintenance activities on the Guadalupe River between I-280 and I-880, including the downtown reach and the Reach A mitigation site. When all designs, plans, and specifications for the Bypass System Alternative are finalized, the Corps and SCVWD would develop a Final Operation and Maintenance Manual (Final O&M Manual) for maintaining the Project elements. This Final O&M Manual would require SCVWD to preserve the as-built design of the Bypass System Alternative, and would likely include the on-going maintenance procedures currently used by SCVWD, as well as all MMP requirements (Appendix 3). This Final O&M Manual would replace the Interim Operation and Maintenance Manual presently used by SCVWD for the already completed

segments of the Guadalupe River Project (U.S. Army Corps of Engineers, 1997). SCVWD, as the local sponsor, has agreed to perform these Project operation and maintenance responsibilities for the life (100 years) of the Project. The Final O&M Manual would also provide for maintenance of the recreation elements of the Bypass System Alternative.

While the nature and extent of required maintenance would be determined in the Final O&M Manual, it is not expected that there would be any significant change from the maintenance activities currently conducted in the Project Area. Current procedures generally include removal of large woody debris blocking or impeding floodflow, removal of accumulated sediment, and bank stabilization. Sediment removal, if required, is performed from the top of bank or from existing access points to avoid impacts on bank vegetation, and performed in compliance with a Streambed Alteration Agreement with CDFG. Bank stabilization measures are implemented only when necessary to protect adjacent properties and public facilities. The O&M Manual is a legally binding agreement between the Corps and SCVWD. SCVWD will annually budget funds for the required maintenance and monitoring of the Guadalupe River Project and annual reporting.

SCVWD and the City of San Jose have drafted a separate Operation and Maintenance Agreement that will transfer the operation and maintenance responsibilities of the recreation features to the City of San Jose. This agreement, not yet executed, is in accordance with SCVWD/City of San Jose/Redevelopment Agency of San Jose "Three Party" Agreement, executed on March 30, 1992.

2.6 Project Construction Schedule

The schedule for the Guadalupe River Project is illustrated in Figure 2-9. Segments 3A and 3B would be constructed from 2002 through 2004, and Segment 3 Phase 3 would be constructed in 2003 through 2004.

The schedule for mitigation for the Guadalupe River Project is also illustrated on Figure 2-9. Riparian mitigation was installed prior to 1999. Installation of SRA cover vegetation mitigation, which began in 1999, will continue through 2004. Installation of anadromous fish habitat mitigation will continue through 2004 (U.S. Army Corps of Engineers, 1992).

Mitigation, Monitoring, and Adaptive Management Objectives

3.1 Introduction

Mitigation and monitoring objectives prescribe specific actions to be taken to avoid, minimize, restore, or compensate for adverse project effects. Primary mitigation and monitoring objectives for this MMP were developed to meet conditions of the conditional water quality certification and the Dispute Resolution Memorandum (DRM) and the requirements of regulatory agencies. Mitigation objectives reflect the specific resources to be addressed, identify specific amounts of compensation, and identify the compensation ratios required to replace or substitute for unavoidable losses. Monitoring objectives describe how such mitigation will be accounted for and set guidelines for the management, operation, and reporting of the mitigation over the life of the Project. Adaptive management is a component of the monitoring objectives that provides for the use of decision-making processes in the long-term implementation of the Project's mitigation.

3.2 Mitigation and Monitoring Objectives

3.2.1 Primary Mitigation Objectives

The goal of the mitigation is to fully mitigate project-related effects on beneficial uses, as required for water quality certification, and comply with other applicable laws requiring mitigation of environmental effects. Project mitigation objectives include the following:

- Replace the amount, quality, and value of riparian vegetation removed for Project construction (13.77 acres would be removed) by establishing 21.0 acres of riparian vegetation. This amount reflects the riparian vegetation mitigation that was committed to under the Authorized Project to compensate for the Project's effects (U.S. Army Corps of Engineers, 1992).
- Replace the amount, quality, and value of SRA cover that was removed for Project construction (8,315 lf would be removed) by establishing 22,892 lf of SRA cover in the Project area, Woz Way to Park Avenue Bypass Reach, Reach A, and Guadalupe Creek. The Corps and SCVWD committed to a mitigation replacement ratio of at least 1:1 for SRA cover under the Authorized Project (U.S. Army Corps of Engineers, 1992). An HEP analysis (U.S. Army Corps of Engineers, 2000b) determined that more than 1:1 replacement (a total of 18,026 lf) is required to supply equal habitat value as the existing SRA cover for the maintenance of anadromous fish species. A total of 18,026 lf will be directly credited to the Project and the remaining 4,866 lf on Guadalupe Creek will likely be used by SCVWD to compensate for other SCVWD projects or channel maintenance activities.

- Design the Project so that it will not cause elevated water temperature or other project effects that harm anadromous fish species or other beneficial uses during project construction and over the entire life of the Project (100 years), including during the transition period before replacement vegetation matures. "Harm" is defined as:
- "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. [50 CFR 17.3]"
- Design the Project to allow successful migration of anadromous fish through the Project area, including armored channel bed sections of the Project.
- Replace the amount, quality, and value of spawning gravels removed by project construction an estimated (24,850 square feet would be removed). River-run gravels will be placed at appropriate spawning habitat locations whenever gravel coverage drops below approximately 20,000 sf (80 percent of the preproject level; U.S. Army Corps of Engineers, 1992). The Corps and SCVWD have committed to maintaining preproject abundance of spawning gravels under the Authorized Project to compensate for the Project's effects on that resource (U.S. Army Corps of Engineers, 1992).
- Replace the same quantity and quality of anadromous fish habitat, including spawning and rearing habitat, as was present before project construction by implementing the above five mitigation objectives.

3.2.2 Primary Monitoring Objectives

- The goal of monitoring is to set guidelines and account for the management, operation, and reporting of mitigation values over the life of the Project. The primary monitoring objectives are the following:
- Implement a technically sound monitoring program for vegetation and other components of anadromous fish habitat that fulfills regulatory requirements and incorporates flexibility into the long-term monitoring plan
- Conduct a postconstruction survey to account for the actual effects of the Project and incorporate these postconstruction data into the monitoring plan
- Provide ongoing monitoring and accounting of all mitigation measures onsite and offsite throughout the life of the Project to assure that the actual benefits of mitigation measures comply with mitigation requirements
- Allow for adaptive management of the Project to help provide for success of the mitigation measures and to provide a mechanism for implementing corrective actions in the event of mitigation failure; such measures include annual meetings for the purpose of exchanging and evaluating information on the adaptive management program

- Provide annual reporting of the monitoring results starting with the first year of project construction

3.3 Adaptive Management Components and Objectives

Adaptive management is defined as a decision-making process to optimize the long-term implementation of flood protection measures on the Guadalupe River. The objective of adaptive management is to ensure that ecological functions and habitat values affected by the Project are reestablished. Key components of adaptive management are identifying indicators for ecological functions and habitat values, monitoring the indicators, setting measurable objectives (numerical and descriptive goals) for the indicators, and planning and implementing remedial actions. The adaptive management process provides a mechanism by which remedial actions can be implemented if a measurable objective is not achieved.

Figure 3-1 illustrates the adaptive management process, including selection of indicators and measurable objectives during the planning process, measurement of indicators as part of the monitoring phase, and assessment to determine achievement of mitigation objectives during the agency review phase. All three phases are ongoing until the mitigation objectives are achieved. An AMT convened by SCVWD will direct and implement the adaptive management process during project construction and for the life of the Project. The AMT will consist of representatives with technical expertise applicable to the MMP from SCVWD, the Corps (until the Project is turned over to SCVWD), the City of San Jose, SWRCB, RWQCB, USFWS, NMFS, CDFG, Guadalupe-Coyote Resource Conservation District, Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited. The AMT will amend the MMP, if necessary, on the basis of the monitoring results and through a consensus process subject to any necessary regulatory approvals. Fish population and environmental data collected by the FAHCE process will be used, as appropriate, by the AMT in the adaptive management of this MMP.

The following describes the adaptive management process illustrated in Figure 3-1 and defines specific terms used in that figure.

- An indicator provides information about the condition of ecological functions and habitat affected by mitigation actions. For example, survival or percent cover could be an indicator for riparian vegetation installed as mitigation
- Monitoring provides specific data or values for each indicator affected by mitigation actions
- Measurable objectives are numerical and descriptive goals for each indicator
- If a measurable objective is not achieved, the AMT will determine whether the measurable objective is likely to be met. This will be determined by the AMT's analysis of measured values. If the AMT decides that the measurable objective is not likely to be met, then the AMT will determine whether the indicator is appropriate and, if the indicator was

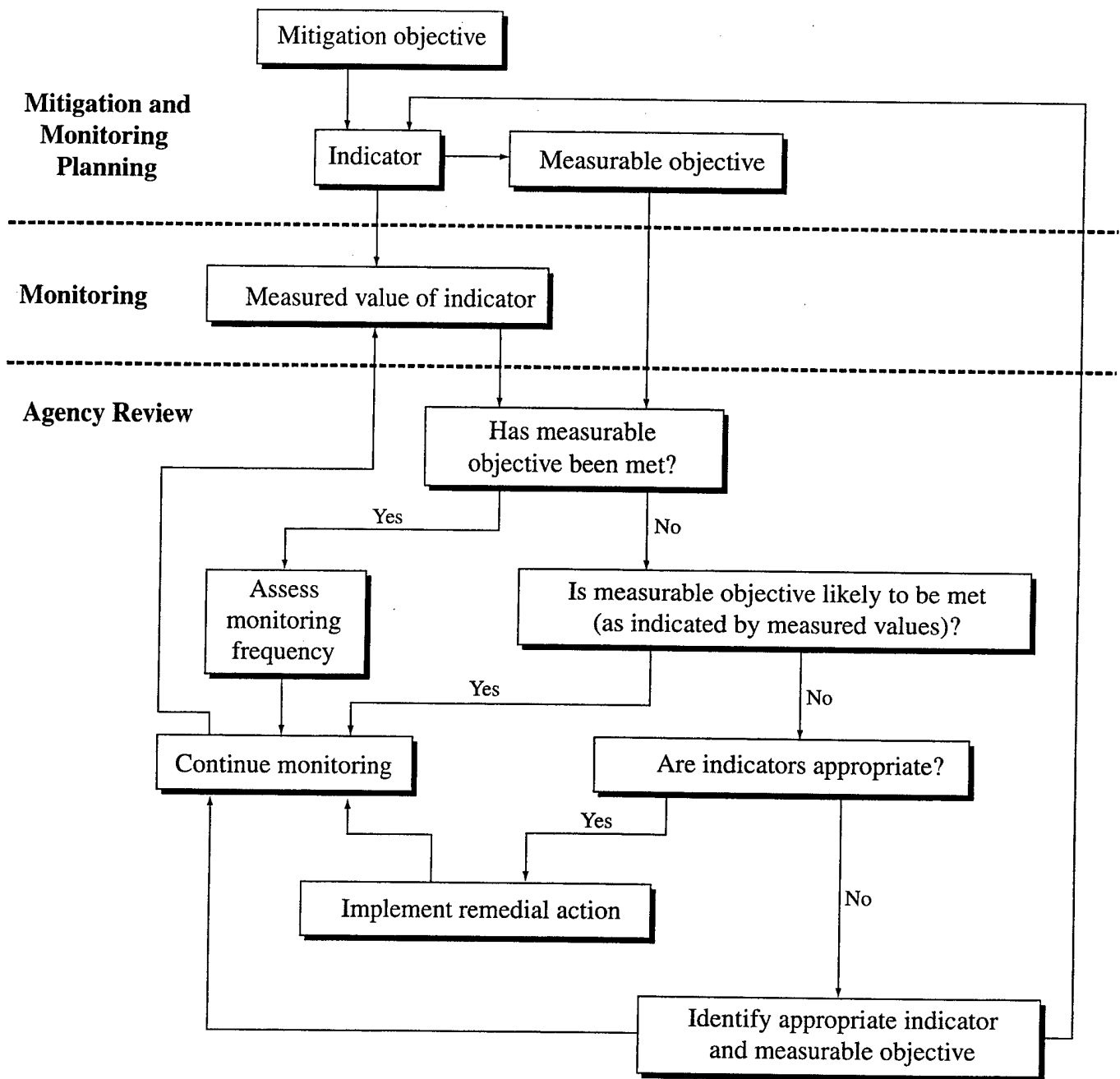


Figure 3-1. Flow Chart of the Adaptive Management Process for Meeting Mitigation Objectives

- determined to be inappropriate, identify another indicator and measurable objective. If the AMT determines that the indicator is the correct one to be using, the AMT will then identify a remedial action to be implemented to ensure mitigation success. Monitoring will then continue until the measurable objective is met.

The AMT will employ a consensus process in its deliberations and strive to resolve all differences. The guidelines for this consensus process will be developed prior to establishment of the AMT. Upon agreement via the consensus process, SCVWD will officially inform the Corps and recommend such additional measures be added to the Project Operation and Maintenance Manual. If differences cannot be resolved, the AMT will select a neutral facilitator from among its member agencies or from outside to assist in dispute resolution.

This MMP includes adaptive management as an integral component of the Project. Specific indicators and measurable objectives for each indicator are described in Chapter 4.

3.3.1 Monitoring Objectives

Monitoring of indicators is necessary to determine if the measurable objective is being met, and, if not, to implement remedial actions (Figure 3-1). For example, unforeseen circumstances may cause plant mortality within the first year after planting riparian vegetation. Monitoring and evaluation of riparian vegetation survival after year 1 may indicate that the 3-year measurable objective would not be met. To minimize delay in achieving the measurable objective, early replacement planting and other warranted remedial actions would be implemented.

Chapter 4 contains details on the monitoring program. Specific monitoring responsibilities of the Corps and SCVWD are listed in Tables 4-14 through 4-17. The proposed monitoring frequency is shown in Table 4-2. Specific monitoring methods for each measurable objective are described in Chapter 4.

3.3.2 Reporting Objectives

An annual report on the monitoring results will be prepared not later than March 31 of each year by the Corps (during construction and years 1-3) and SCVWD (years 4 to 100) and submitted to the City of San Jose, SWRCB, RWQCB, USFWS, NMFS, CDFG, and Natural Heritage Institute (representing Guadalupe-Coyote Resource Conservation District, Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited). The report will summarize monitoring data collected during the previous water-year (October 1 - September 30). The AMT will use the information in the report to assess progress toward the measurable objectives and identify remedial actions that will be implemented to rectify mitigation shortfalls. The AMT will prepare a separate report documenting the results of its assessment of the mitigation program and will include recommendations for the following year's mitigation and monitoring plan. The AMT will amend the MMP, if necessary, on the basis of the monitoring results and through a consensus process subject to any necessary regulatory approvals. Chapter 4 contains details on the reporting program.

An annual report on monitoring will continue for the life of the Project, subject to the AMT's continuing oversight, or until the AMT has determined that the measurable objectives have been attained.

3.4 Governance of Adaptive Management Program

3.4.1 Purpose

The AMT will assist SCVWD to implement the adaptive management program in this Mitigation and Monitoring Plan.

3.4.2 Membership

The AMT will include each signatory of the "Dispute Resolution Memorandum regarding Construction, Operation, and Maintenance of the Guadalupe River Flood Control Project" (Sept. 1988) who supports the final regulatory approval. The U.S. Army Corps of Engineers will participate for the period and to the extent specified elsewhere in the MMP. These original members may adopt criteria and procedures to add additional parties to the AMT. At a minimum, such criteria and procedures will require a finding that such party has committed to participate in the manner described herein, and that such participation will materially contribute to the effectiveness and success of implementation of the adaptive management program.

3.4.3 Representation

Each member will designate a representative who has the qualifications, authority, and availability to participate, necessary to assist the AMT in implementing the adaptive management program. Each representative will participate actively in the AMT's meetings and other work and may designate a proxy. Representatives will timely inform their senior managers of developments in the implementation of the adaptive management program.

3.4.4 Adaptive Management Team's Responsibilities

The AMT will review the annual Monitoring Report. It will evaluate progress towards achievement of the measurable objectives in the MMP and the need for modification in Project design, mitigation, operation or maintenance procedures in order to assure achievement of those objectives. It will make recommendations to SCVWD for such modifications, although it does not have the authority under this MMP to require that SCVWD adopt any such recommendations. It will take such other actions as its members believe are necessary for the effective and successful implementation of the adaptive management program.

3.4.5 Meetings

The AMT will meet at least annually. SCVWD will schedule meetings as needed to implement the adaptive management program. It will provide reasonable notice of each meeting. It will serve as chair of the AMT unless the members agree otherwise.

Representatives will participate in person in any meeting where decisions may be made, although telephone participation will be available when necessary.

Meetings will be open to public observers and participation to the extent required by applicable law.

3.4.6 Decisions and Dispute Resolution

The AMT's decisions, including those making recommendations that the Project design, mitigation, operation or maintenance procedures be modified, will be by consensus of the members participating in a noticed meeting.

In the event consensus is not reached on a proposed decision, the representatives will systematically propose and consider alternatives that may resolve the dispute. The AMT may engage a facilitator to assist in this effort. A special meeting consisting of the respective senior managers of the members will occur if the dispute is otherwise unresolved for a period of 60 days after initial consideration of the proposed decision. Although members will make best efforts to resolve in this cooperative manner any dispute related to the AMT's purpose, any member may seek to resolve such dispute in another forum. A dispute does not modify SCVWD's or the Corps' authority and duty to timely implement each mitigation or monitoring measure specified in the MMP Section 4.10.

3.4.7 Legal Authority

This governance document does not modify the authority, right, or duty of any member under applicable law.

Mitigation Program

4.1 Introduction

This chapter includes a discussion of Project effects, measures to mitigate those effects, related measurable objectives, and adaptive management. It also identifies specific responsibilities of the Corps and SCVWD for implementing the mitigation program and details the monitoring and reporting requirements for the mitigation program.

Project construction will affect riparian vegetation, SRA cover (see definition below), and anadromous fish habitat (U.S. Army Corps of Engineers, 1999b) (Table 4-1). A mitigation program associated with the Project will be implemented to provide habitat value equivalent to values lost as a result of construction of the Project.

Adaptive management has been included as an essential component of this MMP to facilitate achievement of mitigation objectives described in Chapter 3 and to provide for implementation of remedial actions if the mitigation objectives are not achieved. Adaptive management will ensure increased understanding of how the Guadalupe River ecosystem is functioning so that future management actions can be more effective. Key components of adaptive management are:

- Identifying indicators for ecological functions and habitat values
- Setting measurable objectives for the indicators
- Planning and implementing remedial actions
- Monitoring the indicators
- Evaluating the measurable objectives and reporting results and
- Establishing which parties are responsible for MMP implementation

Indicators provide information about the condition of ecological functions and habitat affected by mitigation actions. Indicators for the Guadalupe River Project's mitigation goals and objectives for riparian vegetation, SRA cover, and anadromous fish habitat include:

- Riparian vegetation – survival, health and vigor, natural recruitment, percent vegetative cover, relative cover of nonnative species, tree height, and tree basal area
- SRA cover – survival, health and vigor, natural recruitment, relative cover of nonnative species, shaded stream surface, bank stability, instream cover, and riverbed stability
- Water temperature – measured water temperature, heat transfer, stream channel geometry, simulated water temperature, monthly thermal suitability, and short-term thermal suitability

TABLE 4-1. Indicators, Measurable Objectives, and Remedial Actions to Assure Mitigation Success for the Guadalupe River Project

Potential Effect	Mitigation Measures	Indicators and Measurable Objectives ^a	Examples of Potential Remedial Actions
Loss of 13.77 acres of riparian vegetation	Plant 21.0 acres of riparian vegetation	<u>Survival</u>: 100 trees and 70 shrubs per acre; survival counts may be replaced by cover measurements if counts are impractical because of natural regeneration <u>Health and vigor</u>: average rating for foliage, wood and root crown for each plant in sample must exceed "fair" (score > 2) <u>Natural recruitment</u>: evidence of natural recruitment of native riparian tree and shrub species <u>Cover</u>: approximately 75 percent cover for native trees and 45 percent cover for native shrubs; variable percentages but total cover no less than 85 percent <u>Nonnative species</u>: cover by giant reed should be <5 percent; cover by other nonnative woody species should be <15 percent <u>Tree height</u>: 30-60 feet depending on the species <u>Tree basal area</u>: typical for a riparian forest at the site and increasing over time	Replant appropriate species at the mitigation site or alternative location Revise irrigation regime, treat diseases, amend soil, or deter pest damage Develop and implement actions to facilitate natural recruitment Initiate an irrigation regime, add soil amendments, plant additional appropriate species Physically and chemically remove noxious woody nonnative species and introduced species Initiate an irrigation regime, add soil amendments, plant additional appropriate species Initiate an irrigation regime, add soil amendments, plant additional appropriate species

TABLE 4-1. Indicators, Measurable Objectives, and Remedial Actions to Assure Mitigation Success for the Guadalupe River Project

Potential Effect	Mitigation Measures	Indicators and Measurable Objectives ^a	Examples of Potential Remedial Actions
Loss of 8,315 lf of shaded riverine aquatic (SRA) cover	Plant 22,836 lf with riparian vegetation; Onsite Contracts 1-3 = 2,534 lf; Woz Way to Park Ave. Bypass Reach = 410 lf; Reach A = 7,848 lf; and lower Guadalupe Creek = 12,044 lf ^b	<u>Survival</u>: 17 trees and 10 shrubs per 100 lf; survival counts may be replaced by cover measurements if counts are impractical because of natural regeneration <u>Health and vigor</u>: average rating for foliage, wood and root crown for each plant in sample must exceed "fair" (score > 2) <u>Natural recruitment</u>: evidence of natural recruitment of native riparian tree and shrub species <u>Nonnative species</u>: cover by giant reed should be <5 percent; cover by other nonnative woody species should be <15 percent <u>Shaded stream surface</u>: 45 percent of total stream surface area shaded at normal summer flow, at least 85 percent of bank with some shade <u>Bank stability</u>: stable ground cover along 75 percent of the affected stream length <u>Instream cover</u>: 10 percent of total stream area at depths greater than 15 cm at normal summer flow <u>Channel Bed Stability</u>: Maintain channel bed elevation within ± 0.5 feet of previous survey	Replant appropriate species at the mitigation site or alternative location Revise irrigation regime, treat diseases, amend soil, or deter pest damage Develop and implement actions to facilitate natural recruitment Physically and chemically remove noxious woody nonnative species and introduced species Initiate an irrigation regime, add soil amendments, plant additional appropriate species Plant additional riparian vegetation, or implement biotechnical bank stabilization Place boulders, woody material, or other structures in the channel Stabilize channel with permanent structural changes

TABLE 4-1. Indicators, Measurable Objectives, and Remedial Actions to Assure Mitigation Success for the Guadalupe River Project

Potential Effect	Mitigation Measures	Indicators and Measurable Objectives ^a	Examples of Potential Remedial Actions
Increase in water temperature	Plant riparian vegetation, construct low-flow channel	Monthly thermal suitability: monthly thermal suitability units for steelhead and chinook salmon equal to or greater than preproject levels Short-term thermal suitability: monthly median hourly water temperature must provide a suitability index for steelhead and chinook salmon life stages greater than 0.5 in at least 50 percent of the Project area	Plant additional riparian vegetation, modify channel to increase water depth, augment flow with cool water Plant additional riparian vegetation, increase water depth, provide temporary shade, augment flow with cool water
24,850 square feet of anadromous fish spawning habitat	Replace and maintain spawning habitat	Spawning gravel abundance: spawning gravel abundance greater than or equal to preproject levels	Add gravel to spawning areas, place boulders and weirs to retain gravel, place gravel upstream to supply the project area
4,433 feet of armored river channel, affecting fish passage and rearing habitat	Construct low-flow channel, invert stabilization features, and bank stabilization features	Spawning gravel quality: spawning gravel quality greater than or equal to preproject levels Depth and velocity: water depth >1 foot at flows >4 cfs; velocity <5 feet per second when flow is within the capacity of the low flow channel Vertical barriers: Vertical barriers must allow upstream migration of anadromous fish	Add gravel to spawning areas, reduce input of fine sediment, remove fine sediment Remove the cause of high velocity or shallow depth, such as sediment or debris removal; alter channel geometry Remove barriers, construct fish passage facilities
Effects on habitat conditions may reduce anadromous fish abundance	Replace and maintain habitat values for anadromous fish	Rearing habitat diversity: occurrence and length of rearing habitat within 10 percent of preproject values Adult Migration and Spawning: anadromous fish migration and spawning consistent with preproject levels and environmental conditions not affected by the Guadalupe River Project	Place boulders or other structures in the channel Add gravel to spawning areas, remove migration barriers

TABLE 4-1. Indicators, Measurable Objectives, and Remedial Actions to Assure Mitigation Success for the Guadalupe River Project

Potential Effect	Mitigation Measures	Indicators and Measurable Objectives ^a	Examples of Potential Remedial Actions
Potential for cumulative changes in the locations and rates of methyl mercury formation	SCVWD will participate with the RWQCB for the San Francisco Bay Region in assessing mercury transport in the Guadalupe River and the potential for methylation associated with proposed wetland and riparian mitigation	Juvenile rearing: steelhead rearing distribution and abundance consistent with preproject levels and environmental conditions not affected by the Guadalupe River Project Juvenile migration: anadromous fish outmigration timing and abundance consistent with preproject levels and environmental conditions not affected by the Guadalupe River Project Indicators for the assessment of mercury transport and the potential for methylation of mercury will include total suspended solids, total and bioavailable mercury, and methyl mercury concentrations in riverbed and suspended sediments. Specific measurable objectives will be developed by the RWQCB in coordination with SCVWD.	Plant additional riparian vegetation; place boulders, woody material, or other structures in the channel Plant additional riparian vegetation; place boulders, woody material, or other structures in the channel SCVWD will continue to participate with the RWQCB in assessing mercury transport in the Guadalupe River and the potential for methylation associated with proposed wetland and riparian mitigation.

^a

See text and Table 4-15 for time requirements relative to meeting the measurable objectives.

^b

Total SRA mitigation for the Guadalupe River Project with Bypass System Alternative is based on the HEP and equals 18,026 lf. Guadalupe Creek, between Masson Dam and Almaden Expressway, will be planted with SRA cover vegetation for an estimated 12,044 lf. A total of 7,217 lf of SRA cover vegetation mitigation on Guadalupe Creek will be used as mitigation for the Guadalupe River Project with Bypass System Alternative. Phase 2 plantings on Guadalupe Creek will need to provide an estimated 5,971 lf of SRA cover vegetation mitigation to be applied to the Guadalupe River Project with Bypass System Alternative. Excess SRA cover vegetation mitigation credits on Guadalupe Creek would be used by SCVWD to mitigate for other projects.

- Anadromous fish spawning habitat – spawning gravel abundance and spawning gravel quality
- Anadromous fish passage and rearing habitat – visual observation, depth and velocity, vertical barriers, and rearing habitat diversity
- Anadromous fish occurrence – adult migration and spawning, juvenile rearing, and juvenile migration
- Mercury transport and the potential for methylation of mercury – total suspended solids, total and bioavailable mercury, and methyl mercury concentrations in riverbed and suspended sediments

Measurable objectives are associated with each indicator (Table 4-1). These objectives are in the form of numerical and descriptive goals for each indicator that designate the threshold of acceptable change. If a measurable objective is not achieved, the AMT (Chapter 3) will determine possible causes and recommend remedial actions to assure mitigation success.

Monitoring methods are identified for each measurable objective (Table 4-2). Evaluation and reporting of the monitoring results will allow for an assessment of the success or failure of the Project mitigation (Guadalupe River Flood Protection Project Collaborative, 1998). Monitoring will continue for the life of the Guadalupe River Project, subject to the AMT's continuing oversight, or until the AMT has determined that the measurable objectives have been attained. The life of the Project is 100 years. The AMT will amend the MMP and adjust the monitoring schedules through a consensus process, subject to any necessary regulatory approvals, if the monitoring results indicate that it is necessary.

Additional monitoring commitments have been made, at the request of USFWS, to monitor special-status species habitat in the Alviso Slough area (Table 4-3). The cumulative effects of the Guadalupe River Project and the Upper Guadalupe River Project, prior to construction of the Lower Guadalupe River Project, would not affect the western snowy plover, California clapper rail, and salt marsh harvest mouse or habitat critical to their continued existence because hydrologic and hydraulic conditions in Alviso Slough would not change from those currently experienced by these species. However, USFWS has requested, as a stipulation for issuing the Biological Opinion, that the Corps and SCVWD:

- Monitor floodflows and surface-water levels in Alviso Slough and in evaporation pond A8D
- Monitor dominant plant species and habitat types in Alviso Slough
- Monitor salinity in Alviso Slough

This special-status species habitat monitoring program will begin in 2001 and continue through the remaining construction phases of the Guadalupe River Project (Table 4-4). Monitoring will end when the Lower Guadalupe River Project has been completed and the Guadalupe River Project becomes operational. After the Guadalupe River Project is operational, monitoring may continue as a component of the Lower Guadalupe Project. This monitoring program is discussed in more detail in Section 4.9, "Special-Status Species Habitat – Alviso Slough."

TABLE 4-2. Monitoring of Indicators for Ecological Functions and Habitat Values Required to Assess Mitigation Success for the Guadalupe River Project
Although specific periods are indicated for "Duration of Monitoring," the need for monitoring of each indicator will be reassessed by the AMT throughout the life of the Project.

Indicator	Monitoring Plan				
	Monitoring Activity	Location of Monitoring	Begin Monitoring	Frequency of Monitoring	Duration of Monitoring
Riparian Vegetation					
Survival	Counts of planted trees and shrubs with minimum health and vigor rating of fair	Permanent plots in Project area	August/September following planting	Annual	3 years from planting
Health and vigor	Visual assessment of foliage, wood, and root crown	Permanent plots in Project area and reference sites	August/September following planting	Annual	5 years from planting
Natural recruitment	Visual counts of naturally recruited native woody species	Permanent plots in Project area and reference sites	August/September in year 5 after planting	Once	5 years from planting
Cover	Percentage cover along a line intercept transect, aerial photographs	Permanent transects in Project area and reference sites	August/September in year 4 after planting	Annual for years 4 and 5, then every 6 th year	40 years from planting
Nonnative species	Percentage cover by nonnative species along a line intercept transect, aerial photographs	Project area	August/September following planting	Annual for first 5 years after planting, then every 6 th year	40 years from planting
Tree height	Stadia rod measurement of young trees, then measurement by clinometer	Permanent plots in Project area and reference sites	5 years after planting	Every 5 th year	40 years from planting
Tree basal area	Tree diameter measured at breast height	Permanent plots in Project area and reference sites	5 years after planting	Every 5 th year	40 years from planting

TABLE 4-2. Monitoring of Indicators for Ecological Functions and Habitat Values Required to Assess Mitigation Success for the Guadalupe River Project
Although specific periods are indicated for "Duration of Monitoring," the need for monitoring of each indicator will be reassessed by the AMT throughout the life of the Project.

Indicator	Monitoring Plan				
	Monitoring Activity	Location of Monitoring	Begin Monitoring	Frequency of Monitoring	Duration of Monitoring
Shaded Riverine Aquatic (SRA) Cover					
Survival	Counts of planted trees and shrubs	Project area, Guadalupe Creek, Reach A	August/September following planting	Annual	3 years from planting
Health and vigor	Visual assessment of foliage, wood, and root crown	Permanent plots in Project area, Guadalupe Creek, Reach A, and reference sites	August/September following planting	Annual	5 years from planting
Natural recruitment	Visual counts of naturally recruited native woody species	Permanent plots in Project area, Guadalupe Creek, Reach A, and reference sites	August/September in year 5 after planting	Once	5 years from planting
Nonnative species	Percentage cover by nonnative species along a line intercept transect, aerial photographs	Project area, Guadalupe Creek, and Reach A	August/September following planting	Annual for first 5 years after planting, then every 6 th year	40 years from planting
Shaded stream surface	Evaluation of aerial photographs; field verified	Adjacent to permanent plots in Project area, Guadalupe Creek, Reach A	August/September following planting	Every 3 rd year	40 years from planting
Bank stability	Field surveys; evaluation of aerial photographs	Project area, Guadalupe Creek, Reach A	Between April-October following planting	Annual for four years, then every 3 rd year	10 years from construction
Instream cover	Measured within 10-foot wide transect bands perpendicular to the stream channel	Project area, Guadalupe Creek, Reach A	Between April-October immediately after construction	Every 3 rd year	10 years from construction

TABLE 4-2. Monitoring of Indicators for Ecological Functions and Habitat Values Required to Assess Mitigation Success for the Guadalupe River Project
Although specific periods are indicated for "Duration of Monitoring," the need for monitoring of each indicator will be reassessed by the AMT throughout the life of the Project.

Monitoring Plan					
Indicator	Monitoring Activity	Location of Monitoring	Begin Monitoring	Frequency of Monitoring	Duration of Monitoring
Channel bed stability	Measure channel depth at permanent cross sections	Project area	Between April-July for preproject and immediately after construction	Annual	10 years from construction
Water Temperature					
	Monthly thermal suitability				
	Hourly water temperature simulation	Project area, Guadalupe Creek, Reach A	Preproject	Annual	40 years from construction
	Hourly water temperature	Project area, Guadalupe Creek, Reach A	Preproject	Hourly	40 years from construction
	Measure heat transfer	Project area, Guadalupe Creek, Reach A	Preproject	Pre- and postproject, then every 5th year for March, June, and September	40 years from construction
	Measure stream channel geometry	Project area, Guadalupe Creek, Reach A	Preproject	Pre- and postproject, then every 5th year for normal winter and summer flow conditions	40 years from construction
Short-term thermal suitability					
	Hourly water temperature simulation	Project area, Guadalupe Creek, Reach A	Preproject	Monthly	10 years from construction
	Hourly water temperature	Project area, Guadalupe Creek, Reach A	Preproject	Hourly	40 years from construction
	Measure heat transfer	Project area, Guadalupe Creek, Reach A	Preproject	Pre- and postproject, then every 5th year for March, June, and September	40 years from construction

TABLE 4-2. Monitoring of Indicators for Ecological Functions and Habitat Values Required to Assess Mitigation Success for the Guadalupe River Project
Although specific periods are indicated for "Duration of Monitoring," the need for monitoring of each indicator will be reassessed by the AMT throughout the life of the Project.

Indicator	Monitoring Plan					
	Monitoring Activity	Location of Monitoring	Begin Monitoring	Frequency of Monitoring	Duration of Monitoring	
Anadromous Fish Spawning Habitat						
	Spawning gravel abundance	Measure stream channel geometry	Project area, Guadalupe Creek, Reach A	Preproject	Pre- and postproject, then every 5th year for normal winter and summer flow conditions	40 years from construction
	Spawning gravel quality	Measure gravel patches	Project area, Guadalupe Creek, Reach A	Between March - October	Annual for 5 years, then every 5th year	10 years from construction
Anadromous Fish Passage and Rearing Habitat						
	Depth and velocity	Visual assessment of particle size and fine sediment occurrence	Project area, Guadalupe Creek, Reach A	Between March - October	Annual for 5 years, then every 5th year	10 years from construction
Vertical barrier						
		Visual assessment of critical stream reaches	Project area, Guadalupe Creek, Reach A	October; immediately after construction	Every 2 weeks and within 3 days of major storm events through March	Throughout the life of the Project
		Measure depth and velocity	Project area, Guadalupe Creek, Reach A	October	Annual: October and when needed	10 years from construction
		Visual assessment of critical stream reaches.	Project area, Guadalupe Creek, Reach A	October, immediately after construction	Every 2 weeks and within 3 days of major storm events through March	Throughout the life of the project
Rearing habitat diversity						
		Measure barrier: height, length, and staging pool depth.	Project area, Guadalupe Creek, Reach A	October	Annual: October and when needed	10 years from construction
		Enumerate and measure length of riffles, pools, runs, and backwater areas	Project area, Guadalupe Creek, Reach A	Between May - September for preproject	Annual during first 5 years following construction, then every 5th year	10 years from construction

TABLE 4-2. Monitoring of Indicators for Ecological Functions and Habitat Values Required to Assess Mitigation Success for the Guadalupe River Project
Although specific periods are indicated for "Duration of Monitoring," the need for monitoring of each indicator will be reassessed by the AMT throughout the life of the Project.

Indicator	Monitoring Plan				
	Monitoring Activity	Location of Monitoring	Begin Monitoring	Frequency of Monitoring	Duration of Monitoring
Anadromous Fish Occurrence					
Adult migration and spawning	Visual observation of adult fish and spawning activity	Project area, Guadalupe Creek, Reach A	October for preproject	Four times each year: October, November, February, and March	10 years from construction
Juvenile rearing	Method developed cooperatively by NMFS, SCVWD, the Corps, and CDFG	Project area, Guadalupe Creek, Reach A	September/ October for preproject	Three times each year: September/ October, March/ April, and June/ July	10 years from construction
Juvenile migration	Method developed cooperatively by NMFS, SCVWD, the Corps, and CDFG	Downstream from Interstate 101	March for preproject	Continuous from March to May, may be extended into June	10 years from construction
Mercury Transport and Potential for Methylation					
Segments 1, 2, and 3 and Reach A: methyl mercury concentrations in riverbed and suspended sediments	Specific monitoring activities will be developed by the RWQCB in coordination with the Corps and SCVWD.	In freshwater, wetland, and riparian environments in Segments 1, 2, and 3 and Reach A at sites approved by the RWQCB	2001	In accordance with RWQCB requirements	5 Years
Guadalupe River Watershed: Total suspended solids, total and bioavailable mercury, and methyl mercury concentrations in riverbed and suspended sediments	Specific monitoring activities will be developed by the RWQCB in coordination with SCVWD.	In freshwater, seasonal wetland, and riparian environments in the Guadalupe River Watershed at sites approved by the RWQCB	2001	In accordance with RWQCB requirements	One year

TABLE 4.3. Indicators, Measurable Objectives, and Remedial Actions Associated with Special-Status Species Habitat Monitoring Commitments for the Guadalupe River Project

Environmental Commitment	Indicators and Measurable Objectives	Examples of Potential Remedial Actions
Monitor floodflows and surface-water levels in Alviso Slough and in evaporation pond A8D	<u>Surface-water level</u> : average monthly depth and duration of flooding of the salt-evaporation pond A8 will not exceed that predicted by the HEC-RAS model of Alviso Slough using existing Guadalupe River streamflow data	Corps and SCVWD will coordinate with USFWS. Corps will reinitiate consultation with USFWS if changes in hydraulic conditions continue, affect listed species, and are determined to be a result of the Guadalupe River Project.
Monitor dominant plant species and habitat types in Alviso Slough	<u>Dominant plant species and habitat types</u> : rate of conversion of salt marsh to other habitat types as a result of the construction of the Guadalupe River Project must not exceed the average annual rate of conversion during the past 10 years (1989 to 1999)	Corps and SCVWD will coordinate with USFWS. Corps will reinitiate consultation with USFWS if adverse changes in salt-marsh habitat continue, special-status species are affected, and if adverse changes are determined to result from the Guadalupe River Project.
Monitor surface-water levels and salinity in Alviso Slough	<u>Surface-water level</u>: average monthly depth and duration of flooding of the marsh surface will not exceed that predicted by the HEC-RAS model of Alviso Slough using existing Guadalupe River streamflow data <u>Salinity</u>: average surface-water salinity in Alviso Slough will not be more than 20 percent less than the 1999-2000 baseline data	Corps and SCVWD will coordinate with USFWS. Corps will reinitiate consultation with USFWS if adverse changes in salt-marsh habitat continue, special-status species are affected, and if adverse changes are determined to result from the Guadalupe River Project.

TABLE 4-4. Monitoring of Indicators Associated with Special-Status Species Habitat, at the Request of USFWS, for the Guadalupe River Project

Indicator	Monitoring Plan			
	Monitoring Activity	Location of Monitoring	Begin Monitoring	Frequency of Monitoring
Special-Status Species Habitat Monitoring				
Surface-water level and flow	Continuously measure surface-water levels and flow	Alviso Slough, Guadalupe Slough	Preproject	Continuous
	Measure weir overtopping and pond flooding with peak-stage recorders	Levee weir between Alviso Slough and evaporation pond A8W, evaporation ponds A8W and A8D	Preproject	Each storm event
Dominant plant species and habitat types	Perform aerial photographic surveys and ground truthing surveys	Alviso Slough from the Alviso UPRR Bridge to the confluence with Coyote Creek	Preproject	Annually between June 15 and August 31
Salinity	Continuously measure surface water salinity	Alviso Slough, Guadalupe Slough	Preproject	Continuous
				Until Guadalupe River Project is operational

4.2 Riparian Vegetation

4.2.1 Project Effects

The Authorized Project would have affected a total of 15.3 acres of riparian vegetation (U.S. Army Corps of Engineers, 1992). The effects on riparian vegetation from the triple bypass alternative total 13.77 acres.

4.2.2 Mitigation

A total of 21.0 acres of riparian vegetation was planted as mitigation in the bench-cut areas on the west side of the river in Segments 1 and 2 (Figure 2-1, Table 4-5). In 1994 and 1999, approximately 4.0 acres of native riparian vegetation were planted in the bench-cut area on the western side of the river in Segment 1. In Segment 2, approximately 17.0 acres of riparian vegetation were planted as mitigation during winter of 1998-1999. Valley oaks, which were to be planted as acorns, were not planted in Segments 1B and 2 during 1998-1999 due to a shortage of acorns. Approximately 1,400 valley oaks will be planted as acorns during fall and winter of 1999-2000.

TABLE 4-5. Riparian Habitat Affected and Riparian Vegetation Planted as Mitigation in Each Segment (acres)
This table provides comparative information on the amount, location, and timing of effects on riparian habitat and riparian mitigation. Segment 2 experienced the greatest loss of riparian vegetation and also accounted for the largest amount of riparian mitigation plantings.

Project Segment	Riparian Effects by Construction Start Date						Total Impacts
	1992	1994	1998	1999	2001	2002	
Segment 1	1.31						1.31
Segment 2		5.13					5.13
Segment 3A						2.06	2.06
Segment 3B						3.35	3.35
Segment 3C Phase 1				0.34			0.34
Segment 3C Phase 2					1.58		1.58
Total	1.31	5.13		0.34	1.58	5.41	13.77

Project Segment	Riparian Mitigation by Planting Start Date					Total Mitigation
	1992	1994	1998	1999	2000	
Segment 1		1.7		2.3		4.0
Segment 2			17.0			17.0
Total		1.7	17.0	2.3		21.0

Species planted as part of riparian vegetation mitigation are native to the Guadalupe River watershed and are of local genetic origin. The plants were planted in natural, unarmored soil conditions. Tree species that have been planted include:

- Boxelder (*Acer negundo* var. *californicum*)
- California buckeye (*Aesculus californica*)
- Western sycamore (*Platanus racemosa*)
- Fremont cottonwood (*Populus fremontii* ssp. *fremontii*)
- Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*)
- Valley oak (*Quercus lobata*)
- Red willow (*Salix laevigata*)
- Shining willow (*Salix lucida* ssp. *lasiandra*)
- Arroyo willow (*Salix lasiolepis*)

Woody shrub and vine species that have been planted include:

- Coyote bush (*Baccharis pilularis*)
- Mule fat (*Baccharis salicifolia*)
- Virgin's bower (*Clematis ligusticifolia*)
- California rose (*Rosa californica*)
- California blackberry (*Rubus ursinus*)
- Narrow-leaved willow (*Salix exigua*)
- Blue elderberry (*Sambucus mexicana*)
- Snowberry (*Symphoricarpus albus* var. *laevigatus*)

With the exception of buckeye, which was planted as seed, all plant material was planted from container stock. Valley oaks were planted as acorns in fall/winter 1999. In addition to tree, shrub, and vine species, native herbaceous species were also planted. These species include marsh baccharis (*Baccharis douglasii*), aster (*Aster chilensis*), western goldenrod (*Euthamia occidentalis*), and creeping wild rye (*Leymus triticoides*).

Riparian vegetation mitigation planting densities vary by species and location, but overall densities of individual plants per acre range from 200 to more than 400 for trees and from 100 to more than 200 for shrubs. After it has been determined by the AMT that the Project effects have been fully mitigated, riparian vegetation acreage planted in excess of the mitigation requirements for this Project may be available for use by SCVWD to compensate for the effects of other projects and activities. The SRA vegetation mitigation plan to replace SRA quality lost includes 22,892 lf of replacement SRA of which 18,026 lf is required and approximately 4,866 lf on Guadalupe Creek are planned for use by SCVWD. SCVWD will work with the appropriate regulatory agencies to determine whether and how to apply the excess riparian vegetation credit.

Plants were installed in augured or hand-excavated holes in natural soil conditions (i.e., nonrevetted) on the bench-cut areas and the adjacent west bank levee. Each plant was

supplied with a slow release fertilizer tablet. Watering basins were formed around all planting sites and filled with a wood chip mulch. The plant material is irrigated by a drip irrigation system that is connected to the irrigation system associated with the adjacent parkway on the west side of the mitigation area. A revegetation maintenance contractor is currently under contract with the Corps to provide maintenance service for riparian plantings in Segments 1B and 2 for 3 years following plant installation. This maintenance period is expected to continue through the 2001 growing season. Riparian plantings in Segment 1A, which were planted in 1994, are currently being maintained and managed by SCVWD.

4.2.3 Measurable Objectives and Adaptive Management

Indicators for riparian vegetation include survival, health and vigor, natural recruitment, vegetative cover, cover by noxious nonnative and introduced species, tree height, and tree basal area. Monitoring of these indicators provides information for the AMT to assess whether Project construction and operation are providing adequate riparian habitat and whether mitigation measures have been successful.

Failure to meet measurable objectives for the indicators below will trigger evaluation of the cause of failure by the AMT and selection of appropriate remedial actions by the AMT. Remedial actions described in this MMP are only potential actions that could be recommended by the AMT, and the AMT may select alternative remedial actions. Because remedial actions may or may not be necessary and the remedial actions that may be selected by the AMT are not known at this time, the effects of all remedial actions have not been analyzed in the environmental compliance document for the Project (U.S. Army Corps of Engineers, 1999b). Subsequent environmental analysis of selected remedial actions, if necessary, will be performed at the direction of the AMT.

4.2.3.1 General Monitoring Framework: Permanent Riparian Vegetation Sampling Plots

Permanent riparian vegetation sampling plots will be established in the Project mitigation area and reference sites to evaluate the success of the mitigation measures.

Project Mitigation Area. Approximately 5 percent of the total riparian mitigation area will be sampled, with a total of 18 permanent sampling plots located within the riparian mitigation area. The percentage of area to be sampled and the number of sampling plots needed were based on the prior experience of qualified botanists on the Measurable Objectives and AMT that developed this MMP. The AMT may increase the number of plots based on evaluation of actual variability of the indicators among the initial 18 plots.

The riparian mitigation area is fragmented by recreational trails, roads, and Project boundaries. The number of sampling plots established within each fragment will be approximately proportional to the planted area in the fragment relative to the total planted mitigation area.

Parallel transects 50 feet apart and approximately perpendicular to the stream channel will be established throughout the riparian mitigation area. Along these transects, all available 50-foot sections in each fragment will be identified. The permanent sampling plots will be randomly selected from the available 50-foot sections within each fragment (Cochran, 1963).

Each selected 50-foot section will form one side of a 50-foot by 50-foot permanent sampling plot.

Each permanent sampling plot will be marked with a permanent concrete monument imprinted with the plot number. The monument locations will be indicated on a baseline aerial photograph of the riparian mitigation area (scale: 1 inch = 50 feet) and recorded using a global positioning system (GPS) with submeter accuracy. The GPS coordinates will be based on the North American Datum of 1983 (NAD83). The aerial photograph will be taken in August or September 1999, or as soon as is feasible, to record baseline conditions in the mitigation area.

The slope and aspect of each plot will be measured. Along with plot location, slope and aspect will be evaluated to determine which conditions have the greatest effect on the success of the mitigation. In addition to indicators monitored within the permanent sampling plots, the condition of riparian vegetation planted outside of the plots will be assessed qualitatively. The qualitative evaluation will reveal attributes of the mitigation area that are not represented by the sample plots. For example, clusters of mortality, stunting, and erosion will be observed and recorded.

[Note: In Segment 1, monitoring of 2 acres planted in 1994 is being conducted using the methods developed for the area at the time of planting.]

Reference Sites. Monitoring reference sites may allow change in vegetation parameters attributable to environmental variability, such as weather, fire, invasion of exotic species, insect damage, and disease, to be separated from failure or success of installed riparian vegetation. Applicable indicators may include health and vigor, natural recruitment, percent cover, tree height, and basal area. Measurable objectives for the mitigation sites are not derived from those at the reference sites, but environmental variability at the reference sites may indicate variability independent of Project and mitigation effects.

The AMT will review the selected reference site locations and determine the appropriateness of methods to be used to assess environmental variability. Locating reference sites near the Project area that represent the average condition of the mitigation area is virtually impossible. The reference sites will be chosen so that the response to systemwide environmental variation is reasonably expected to be reflected by changes in indicators at the reference site and in the Project area. Indicators will be monitored concurrently at the reference sites and in the mitigation area.

4.2.3.2 Survival Indicator for Riparian Vegetation

Survival will be represented by the number of live trees and shrubs per unit area. The survival of trees and shrubs planted as mitigation will be estimated following initial planting.

Herbaceous species planted as part of the mitigation effort are generally short lived and recruit annually; these species will therefore not be monitored for survival. Tree and shrub survival counts will include only those individuals planted as part of the mitigation program. Multistemmed specimens of species listed in the tree category that are less than 8 feet tall will be counted as shrubs.

Measurable Objective. A minimum of 100 planted trees and 70 planted shrubs per acre must survive each year for 3 years after planting in the mitigation area. A percentage of the initial planting density was not chosen for the survival objective because planting density will vary by location, with as many as 400 trees and 200 shrubs planted per acre in some locations. A variable planting density allows for the survival of individuals and species best suited for each location. Based upon evaluation of monitoring results for other indicators, the AMT may lower the measurable objective for trees and shrubs.

Monitoring Methods. Survival of individual trees and shrubs is defined as a minimum health and vigor rating of "fair" (Section 4.2.3.3, "Health and Vigor Indicator for Riparian Vegetation"). Survival will be estimated for all planted trees and shrubs in the 50-foot by 50-foot permanent sampling plots. Each tree and shrub planted within the sampling plots will be permanently marked and identified to species. Survival of each marked plant will be assessed every monitoring year. Sampling will occur in August or September of each of the first 3 years after planting. If natural recruitment occurs at a level that exceeds the density of planted trees and shrubs, the AMT may allow enumeration of total individuals of the target species in place of the survival of planted trees and shrubs (Jones & Stokes Associates, 1995). After 3 years, the survival indicator will be replaced by the vegetative cover indicator and other indicators for determining the success of riparian vegetation mitigation.

Remedial Actions. Failure to meet the measurable objective for the survival indicator during any of the 3 years after planting would trigger evaluation of the cause of plant mortality by the AMT. Appropriate species would be replanted; alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If feasible, replacement species will be chosen to maintain overall species diversity. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area is not part of the Project mitigation measures. If alternative mitigation areas are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Up to 1 year may be necessary to obtain suitable planting material for the alternative mitigation area or for replanting in the original area. Another 3-year monitoring period would begin at the time of replanting.

4.2.3.3 Health and Vigor Indicator for Riparian Vegetation

Health is defined as the absence of disease and vigor as the robustness of a plant. Health and vigor will be estimated in the field using a rating system based on the prior experience of qualified botanists on the Measurable Objectives and AMT that developed this MMP. A health and vigor rating will be determined for each planted tree and shrub in the permanent sampling plots. The ratings will be compiled by species to provide an overall species health and vigor rating for each permanent sampling plot. The data will be used to estimate trends in plant health; identify deficiencies in plant material and planting and maintenance practices; indicate the need for corrective measures; and identify individual plants that must be replaced.

Three categories of health and vigor will be evaluated: foliage, wood, and rootcrown. Several criteria will be used to evaluate the health and vigor of each of these categories:

- Foliage – symptoms of disease, size, color, wilting, defoliation, new growth, browsing by wildlife, and insect damage
- Wood – symptoms of disease, browsing by wildlife, insect damage, girdling, structural deformities, die-back, and sunburn and
- Rootcrown – symptoms of disease, girdling, insect damage, and die-back

Measurable Objective. The average rating for health and vigor must exceed 2 (“fair”) for the permanent sampling plot for each year for 5 years after planting. The health and vigor objective allows clear differentiation between dead and live trees and enables remedial action to be initiated prior to the death of a substantial portion of the vegetation in a sampling plot. A rating of fair is not uncommon under natural conditions and is a required condition for the survival objective identified in Section 4.2.3.2, “Survival Indicator for Riparian Vegetation.”

Monitoring Methods. Plant health and vigor will be assessed for planted trees and shrubs in each 50-foot by 50-foot permanent sampling plot. Each tree and shrub planted within the sampling plots will be permanently marked and identified to species. If natural recruitment occurs at a level that exceeds the density of planted trees and shrubs, health and vigor will no longer be directly scored for individual plants in the plot, but will be assessed qualitatively for the vegetation in the plot as a whole.

Using a modified Daubenmire cover class method (Daubenmire, 1968), health and vigor for each category (foliage, wood, and rootcrown) will be rated as follows:

- 5 Excellent – less than 5 percent of plant affected by cumulative symptoms of poor health, for example, disease, insect damage, mechanical damage, and poor structure
- 4 Very good – between 5 percent and 25 percent of plant affected by cumulative symptoms
- 3 Good – 25 percent to 50 percent of plant affected by symptoms
- 2 Fair – 50 percent to 75 percent of plant affected by cumulative symptom
- 1 Poor – greater than 75 percent of plant affected by cumulative symptom
- 0 Dead

The ratings for each category will be averaged for each sampled plant. For example, a particular plant may have the following ratings for the three assessment categories: foliage 2, wood 3, rootcrown 2. The overall rating for this plant would be $(2+3+2)/3=2.33$. The values for individual plants will then be averaged over the sample.

Plant health and vigor will be assessed annually in August or September for 5 years following planting.

Remedial Actions. Failure to meet the measurable objective for health and vigor in any year would trigger an evaluation of the cause of the poor health and vigor by the AMT. Remedial actions may include revision of the irrigation regime, treatment of disease, prevention of pest damage, addition of soil amendments, and replacement of dead plants. Replacement of

the plants with a rating of "dead" (0-0.99) or "poor" (1.0-1.99) would be required if the 3-year survival criterion of 100 trees and 70 shrubs per acre is not expected to be met. The number of trees and shrubs that would be replaced will be sufficient to achieve the required 100 trees and 70 shrubs per acre.

Appropriate species would be replanted; alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If feasible, replacement species will be chosen to maintain overall species diversity. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area is not part of the Project mitigation measures. If alternative mitigation areas are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Up to 1 year may be necessary to obtain suitable planting material for the alternative mitigation area or for replanting in the original area. Another 5-year monitoring period would begin at the time of replanting.

4.2.3.4 Natural Recruitment Indicator for Riparian Vegetation

Establishment of native trees and shrubs by natural reproduction indicates sustainability of the mitigation and progress toward a forest that can perpetuate itself with minimal intervention.

Measurable Objective. Natural recruitment of native woody species must be apparent in the mitigation area by year 5.

Monitoring Methods. Natural recruitment will be determined through visual assessment by a qualified botanist within each 50-foot by 50-foot permanent sampling plot (Bonham, 1989). Visual assessment will include recording an estimate of the approximate density of volunteer seedlings and vegetative sprouts in each plot; recording the species that have naturally colonized each plot; noting assumed or observed recruitment mechanisms, for example, seed dispersal or rhizomatous or sucker growth; and recording seed production observed on planted riparian vegetation. Observations of site-specific characteristics within each sampling plot that may influence natural recruitment will also be recorded; these site-specific characteristics could include dense seedling growth, soil texture, and soil moisture. The visual assessment will be conducted once in August or September of year 5. Whether the native riparian vegetation in the riparian mitigation area can be sustained will be inferred from the recruitment data obtained in year 5.

Remedial Actions. Failure to meet the measurable objective for natural recruitment 5 years after planting in the mitigation area would trigger an evaluation of the cause of poor recruitment and development of remedial actions to facilitate natural recruitment. Failure to meet the objective would also trigger monitoring for natural recruitment in all permanent sampling plots within the riparian mitigation area.

4.2.3.5 Vegetative Cover Indicator for Riparian Vegetation

The indicator for vegetative cover is the percentage of ground surface covered by a vertical projection of the native vegetation canopy.

Measurable Objective. Forty years after planting, native trees and shrubs must either provide 75 percent and 45 percent cover, respectively, or, if native shrub cover is at least 30 percent, native tree cover in excess of 75 percent can be substituted for shrub cover. A total combined cover for native trees and shrubs of at least 85 percent must be attained after year 40. The trend in the development of the tree and shrub cover over time will be analyzed in each monitoring report to determine whether achievement of the 40-year cover objective is feasible.

Monitoring Methods. Vegetative cover of trees and shrubs will be measured using the line intercept transect method (Bonham, 1989).

The riparian mitigation area is fragmented by recreational paths, roads, and Project boundaries. Parallel transects 50 feet apart and approximately perpendicular to the stream channel will be established throughout the riparian mitigation area, as described in Section 4.3.4.1, "General Monitoring Framework: Permanent Riparian Vegetation Sampling Plots." A total of 50 transects will be chosen as permanent sampling plots for vegetative cover in the mitigation area using a random sampling technique (Cochran, 1963). Of the 50 transects, the number of transects established within each fragment of the riparian mitigation area will be approximately proportional to the planted area in the fragment relative to the total planted mitigation area. Only transects at least 50 feet in length will be used. Transect length may exceed 100 feet, and the entire length of each transect will be used to sample vegetative cover.

A measuring tape will be stretched taut along the transect, and the length of the intersection of the vertical projection of the canopy of the native and nonnative tree and shrub layers will be recorded. The percent canopy cover will be determined for tree and shrub layers by dividing the length of the transect intercepted by a canopy of trees or shrubs by the total length of the transect. Data collected for all transects will be averaged to determine the canopy cover provided by native species for the entire mitigation area; in other words, the cover of either trees or shrubs equals 100 percent minus the percent of area not covered by trees or shrubs.

The vegetative cover indicator will be applicable after the measurable objective for survival is met in year 3 after planting. In years 4 and 5, the line intercept method will be used to measure vegetative cover once a year in August or September. If the AMT determines that aerial photographs provide a reliable estimate of tree and shrub cover, photographs will be used during year 10 and every sixth year thereafter to determine the total tree and shrub cover in the entire riparian vegetation mitigation area. If it is not feasible to determine tree and shrub cover from aerial photographs, the line intercept method will be used throughout the monitoring period.

The timing and method used for the aerial photography will produce photographs that will facilitate identification and measurement of riparian plant species. The photographs will be taken in August or September to coincide with the peak period for cover development for riparian vegetation. The photographs will be approximately rectified and printed at a scale of 1 inch = 50 feet (1:600) or better, which will permit accurate estimation of percent vegetative cover. The mapping of vegetative cover from the aerial photography will be verified in the field to ensure the accuracy of the mapping and to determine the percent canopy cover provided by native and nonnative trees and shrubs. For the maps produced

from the aerial photographs to be considered valid, the measurements made on the photographs must not be significantly different from the measurements made in the field ($\alpha=0.05$). In some cases, shrub cover may be obscured on the aerial photographs by tree canopy cover. If this happens, shrub cover will be estimated during the field verification. After mapping the tree and shrub canopy on the aerial photographs, the relative cover of trees and shrubs will be determined using a digital planimeter, computer-aided design (CAD) software, or other appropriate method.

The development of vegetative cover over time will be analyzed every monitoring year, and the likelihood of attainment of the 40-year cover criteria will be determined. Ten years after initial planting and in all subsequent monitoring years, a regression analysis (Draper and Smith, 1966) will be performed to predict the expected vegetative cover by year 40.

Remedial Actions. Failure to meet the cover objective after year 5 would trigger an evaluation of the potential to meet the 40-year objective by the AMT. A large number of factors would affect the development of cover and the potential to meet the measurable objective by year 40. Data collected at the reference sites and environmental data collected for the Guadalupe River basin as a whole will indicate environmental conditions such as droughts and low flows that may impede the development of cover. The trend toward meeting or failing to meet the measurable objective will be documented and interpreted in the annual monitoring reports that will be reviewed by the resource agencies.

If cover development and other data indicate that achievement of the 40-year objective is not feasible, remedial actions would be initiated, including beginning an irrigation regime, adding soil amendments, and replanting appropriate species. Alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If feasible, replacement species will be chosen to maintain overall species diversity. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area is not part of the Project mitigation measures. If alternative mitigation areas are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Up to 1 year may be necessary to obtain suitable planting material for replanting for the alternative mitigation area or for replanting in the original area. If replanting is necessary, monitoring of vegetative cover by the line intercept method would be reinitiated in years 4 and 5. If feasible, monitoring through evaluation of aerial photographs would then resume.

4.2.3.6 Nonnative Species Relative Cover Indicator for Riparian Vegetation

The vegetative cover of tree and shrub species at the mitigation area will be composed primarily of native species. The cover provided by giant reed (*Arundo donax*), a particularly noxious nonnative species, and other nonnative species will be assessed.

Measurable Objective. Relative to the total cover provided by trees and shrubs, the cover provided by giant reed will be less than 5 percent. The relative cover (Bonham, 1989) provided by nonnative woody riparian species – for example, black walnut, black locust, and tree-of-heaven – established after planting will be less than 15 percent. The combined relative cover of nonnative woody species will, therefore, be less than 20 percent.

Monitoring Methods. The relative vegetative cover of nonnative species will be estimated for the tree and shrub layers of each transect by the line intercept method described in Section 4.2.3.5, "Vegetative Cover Indicator for Riparian Vegetation." Relative cover of nonnative species is defined as the vertical projection of the canopy of nonnative species on the ground surface as a proportion of the vertical projection of the canopy of all tree and shrub species. In addition, any apparent concentrations of colonization in the mitigation area by nonnative woody species will be visually identified in the field by a qualified botanist (Bonham, 1989) and plotted on aerial photographs.

Visual estimates of cover in the mitigation area provided by nonnative species will be made annually during the first 5 years after the planting of trees and shrubs. The line intercept method will be used during years 4 and 5. Beginning in year 10 and every sixth year thereafter, aerial photographs will be used to estimate the cover provided by nonnative tree and shrub species. Field verification will be conducted throughout the monitoring period to confirm that aerial photograph signatures for nonnative species have been identified correctly and to ensure that nonnative shrub and vine cover is also identified. The cover provided by giant reed can be easily estimated from aerial photographs, but field verification will be necessary for most other species. After nonnative species have been identified from aerial photograph signatures or in the field and delineated on the aerial photographs, their relative cover will be determined with a digital planimeter, CAD software, or other appropriate method.

Remedial Actions. Failure to meet the objective for the nonnative species relative cover indicator in any year will trigger physical or chemical removal of noxious and other nonnative species. Removal of nonnative species would be integrated with existing vegetation management by SCVWD. Nonnative species removal is expected to be most intensive during the first few years after installation of riparian plants; the intensity of management activities should subsequently decrease because native trees and shrubs will become more resistant to invasion as their sizes increase.

4.2.3.7 Tree Height Indicator for Riparian Vegetation

Tree height is both a measure of the suitability of the mitigation area to support the planted and naturally recruited riparian species and a measure of the value of the trees as wildlife habitat.

Measurable Objective. Tree height in the mitigation area at 40 years after planting should range from 30 to 60 feet. A regression analysis of tree height data collected during and after the first 10 years following initial planting will indicate whether trees will reach the expected height by year 40.

Monitoring Methods. Tree height will be measured and the trees recorded by species in each 50-foot by 50-foot permanent sampling plot. The height of young trees will be measured with a stadia rod, and the height of older trees will be measured with a clinometer. Tree height will be measured at 5-year intervals. After several years of data have been collected, a regression analysis will be used to illustrate the trend in average tree height for each species and the expected height by year 40. At the time that tree height is measured, a photograph will be taken of the permanent plot from a fixed point and in a fixed direction relative to the

immovable concrete monument that marks the plot location. A photograph of each plot will be included in the report for the year the photograph is taken.

Remedial Actions. Tree height in a mature riparian forest is dependent on soil type, groundwater availability, and other environmental conditions, including weather and animal browsing. The trend in tree height and expected height by year 40 will be evaluated in the context of data collected at the reference sites and environmental data collected for the Guadalupe River basin as a whole so that the trend can be corrected for unusual environmental conditions, including droughts. The trend in tree height will be documented and interpreted in the annual monitoring reports that will be reviewed by the resource agencies.

If the trend in tree height determined by the regression analysis indicates insufficient growth to reach the measurable objective by year 40, the cause of the insufficient growth will be evaluated and remedial actions, possibly including irrigation, addition of soil amendments, and replanting, will be initiated. Appropriate species would be replanted; alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If feasible, replacement species will be chosen to maintain overall species diversity. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area is not part of the Project mitigation measures. If alternative mitigation areas are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Up to 1 year may be necessary to obtain suitable planting material for the alternative mitigation area or for replanting in the original area. Monitoring of tree height at 5-year intervals would be reinitiated if replanting is performed.

4.2.3.8 Tree Basal Area Indicator for Riparian Vegetation

Tree basal area is a measure of the suitability of the mitigation area to support planted and naturally recruited riparian tree species and a measure of the wildlife habitat value of the trees. The basal area is the total area of tree stems in each permanent sample plot expressed as a percentage of the total ground surface area.

Measurable Objective. The basal area of native riparian trees will increase over time in the riparian mitigation area; at 40 years, the basal area must be typical for a riparian forest along the Guadalupe River. The basal area in the reference sites will be one of the criteria that the AMT will use to evaluate basal area in the riparian mitigation area. After monitoring data have been collected for 15 years, the AMT will evaluate whether the basal area in the riparian mitigation area can be expected to reach the typical basal area of a mature riparian forest by year 40.

Monitoring Methods. Basal area is the total area of tree stems measured at standardized "breast height" or 4.5 feet (1.4 meter) from the ground surface. Basal area will be calculated by two methods: measurement of all trees in each permanent plot and the Bitterlich method.

Basal area will be summed for all trees in each permanent 50-foot by 50-foot sampling plot with a diameter of more than 2 inches. The diameter for each tree is converted to area using the formula πr^2 , where r is half the diameter (Mueller-Dombois and Ellenberg, 1974). The

area for all trees in the plot is expressed as a percentage of the plot area. Diameter will be measured with a diameter tape (Bonham, 1989), Biltmore stick (Bonham, 1989), or other acceptable method.

The Bitterlich method requires use of a glass prism or Cruz-all purchased from a foresters supply company (Hays et al., 1981). From the permanent concrete monument in each permanent sampling plot, all plants larger than a critical size will be counted. Critical size is a function of plant diameter and distance from the concrete monument. With the glass prism or Cruz-all held directly over the monument, the observer will turn 360°. Each plant viewed will be counted if it is sufficiently close to the observer or large enough to be wider than the critical size when viewed with the glass prism or Cruz-all.

The basal area of native riparian species will be measured at 5-year intervals, beginning in year 5 after planting. Fifteen years after planting, a regression analysis will be performed to illustrate the trend in basal area and the expected basal area by year 40.

Remedial Actions. The basal area for a mature riparian forest depends on soil conditions, water availability, and other environmental conditions, including weather and animal browsing. The trend in basal area and the expected basal area by year 40 will be evaluated in the context of data collected at the reference sites and environmental data collected for the Guadalupe River basin as a whole so that the trend can be corrected for unusual environmental conditions, including droughts. The trend in basal area will be documented and interpreted in the annual monitoring reports that will be reviewed by the resource agencies.

If the trend in basal area determined by the regression analysis indicates that there is insufficient growth to reach the measurable objective by year 40, the cause of the insufficient growth will be evaluated and remedial actions, possibly including irrigation, addition of soil amendments, and replanting, will be initiated. Appropriate species would be replanted; alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If feasible, replacement species will be chosen to maintain overall species diversity. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area is not part of the Project mitigation measures. If alternative mitigation areas are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Up to 1 year may be necessary to obtain suitable planting material for the alternative mitigation area or for replanting in the original area. Monitoring of basal area at 5-year intervals would be reinitiated if replanting is performed.

4.3 Shaded Riverine Aquatic Cover

4.3.1 Definition

SRA cover is the unique, nearshore aquatic cover occurring at the interface between a river and adjacent riparian habitat. Key features of this aquatic cover include:

- An adjacent bank composed of natural, often eroding, substrate that supports vegetation overhanging and protruding into the water and
- A stream channel with variable amounts of woody material and detritus and variable water velocity and depth

The area of SRA cover is defined by stream length and the width of SRA cover. The width of SRA cover is measured from the shoreline during summer of years of average precipitation and runoff to the average maximum distance perpendicular to the shoreline within which instream cover or overhead cover occurs. In relatively narrow rivers, including the Guadalupe River, instream cover and overhead cover extend across the entire stream, so that the width of SRA cover is equivalent to the stream width.

SRA cover vegetation associated with this Project encompasses the stream area and the riparian vegetation within 15 feet of the summer shoreline. Riparian vegetation within 15 feet of the summer shoreline, shaded stream surface, bank stability, instream cover, and riverbed stability are indicators that will be monitored as part of the SRA cover mitigation plan (Section 4.3.4, "Measurable Objectives and Adaptive Management").

4.3.2 Project Effects

Of the total 16,657 lf of SRA cover present in the Project area, approximately 8,315 lf of SRA cover has been or will be affected under the triple bypass alternative: 1,510 lf (0.52 acre) in Segment 1; 2,060 lf (0.71 acre) in Segment 2; and 4,745 lf (1.64 acres) in Segment 3 (Table 4-6) (Appendix C). To determine effects of the Project, 1990 was used as the base year.

4.3.3 Mitigation

The Habitat Evaluation Procedure (HEP) was used to determine mitigation needs for SRA cover (Jones & Stokes Associates, 1997a). River invert stabilization structures and geomorphic instream features, including rock weirs and vanes, root wads, and deflector logs, will be installed in Segments 3A and 3B, in Reach A, and in Guadalupe Creek. Riparian vegetation will be planted within 15 feet of the summer shoreline in Segments 1, 2, and 3; the Woz Way to Park Avenue Bypass Reach; Reach A; and Guadalupe Creek (Appendices C and D). These features will improve bank stability, provide overhead shade, increase instream cover, and improve habitat suitability for aquatic species, including the suitability of spawning and rearing habitat for fish.

A total of 22,892 lf (approximately 7.9 acres) of riparian vegetation will be planted in natural, unarmored riverbanks (Table 4-6). The riparian species planted will be native to the Guadalupe River watershed and may include willow, Fremont's cottonwood, boxelder, western sycamore, coast live oak, and valley oak. Plant propagule types of these species may include plants grown in containers, cuttings, transplants, acorns, and seeds. Site-specific planting information for each of the mitigation areas is provided below. Planting densities are expected to vary, depending on the conditions at each location.

4.3.3.1 Segments 1, 2, and 3

Approximately 575 lf (about 0.2 acres) of the SRA cover mitigation area will be planted along the Guadalupe River in Segment 1 (Appendix C). Approximately 1,081 lf (about 0.4 acres) of SRA cover mitigation area will be planted in Segment 2 (Appendix C).

TABLE 4-6. SRA Cover Vegetation Affected and SRA Cover Vegetation Planted as Mitigation in Each Segment and Mitigation area (linear feet)

Project Segment	SRA Cover Effects by Construction Start Date					Total Impacts
	1992	1994	1999	2001	2002	
Segment 1	1,510					1,510
Segment 2		2,060				2,060
Segment 3A					1,381	1,381
Segment 3B					2,408	2,408
Segment 3C Phase 1			183			183
Segment 3C Phase 2				773		773
Total Effects	1,510	2,060	183	773	3,789	8,315

Project Segment/ Mitigation Area	SRA Cover Mitigation by Planting Start Date							Total Mitigation
	1992	1994	1998	1999	2000	2001	2002	
Segment 1					119	456		575
Segment 2					163	918		1,081
Segment 3C								
Segment 3A							878	878
Segment 3B								
Woz Way to Park Avenue Bypass Reach			200 ^a		210 ^c			410
Reach A			1,543		6,108	197		7,848
Guadalupe Creek			1,263 ^b			10,781 ^{d,e}		12,044
Total Mitigation			3,006		6,600	12,352	878	22,836^f

^a Children's Discovery Museum site (length based on as-built conditions).

^b This total includes of 17 lf of Guadalupe Creek Phase 1 SRA cover vegetation mitigation for impacts of laddering Masson Dam.

^c Rubble removal site (100 lf) and Auzerais Point boulder site (110 lf).

^d This work is scheduled to be completed in 2001 by SCVWD, and is expected to be completed before construction of Segment 3C Phase 2 is completed in 2002.

^e Estimated length available on Guadalupe Creek that would support SRA cover vegetation mitigation plantings.

^f Total for mitigation for the Project is based on the 2000 HEP analysis and equals 18,026 lf. Guadalupe Creek, between Masson Dam and Almaden Expressway, will be planted with SRA cover vegetation. A total of 7,234 lf of SRA cover vegetation mitigation on Guadalupe Creek will be used as mitigation for the Guadalupe River Project with Bypass System Alternative. Phase 2 plantings on Guadalupe Creek will need to provide an estimated 5,971 lf of SRA cover vegetation mitigation to be applied to the Guadalupe River Project with Bypass System Alternative. Excess SRA cover vegetation mitigation credits on Guadalupe Creek would be used by SCVWD to mitigate for other projects. Based on the estimate of a total of 12,044 lf of SRA cover vegetation on Guadalupe Creek, approximately 4,810 lf will be available to be used by SCVWD to mitigate for other projects

Approximately 878 lf (about 0.3 acre) of riparian vegetation will be planted in Segment 3A (Appendix C).

The planting areas will be divided into lower, mid-bank and upper bank. Lower, mid-bank and upper bank designations relate to the elevation of the bank relative to the summer water level. The lower bank elevation is approximately 0-2 vertical feet above summer water level. The mid-bank elevation is approximately 2-6 vertical feet above summer water level. The upper bank elevation is approximately 6 vertical feet and greater above the summer water level. Plants suitable for planting in the lower bank include arroyo willow, red willow, sandbar willow, yellow willow, Fremont's cottonwood, mulefat, and white alder

Plants suitable for planting in the mid-bank include box elder, Fremont's cottonwood, mulefat, western sycamore, and California wild rose. Upper bank plant species include buckeye, coyote brush, elderberry, valley oak, and California wild rose. The plant palette should be used as a guideline only, with site-specific conditions dictating the actual plant species installed. For example, although Fremont's cottonwood is identified as a mid-bank species, it should be primarily planted in the lower portion of the mid-bank.

Mitigation infill planting sites in Segments 1 and 2 are proposed on a variety of substrates, including undisturbed natural bank, natural bank with signs of recent erosion, and biotechnical bank stabilization areas. Bank stabilization, in conjunction with mitigation planting, may be necessary at some of the infill planting sites that show signs of excessive erosion (e.g., vertical bank). For example, planting approaches may include installing willow wattles at the bank's toe.

Site preparation may include mechanical or manual removal of existing ruderal vegetation to a height of approximately 4-6 inches above the ground. This will leave some vegetative stubble that may have erosion control and bank stabilization benefits during high rainfall and flow events. Cut material should be disposed of offsite. Some concrete rubble may be present at the infill planting sites. This rubble may extend below grade to an unknown depth. If it is necessary to remove rubble during plant installation, disturbance of the bank should be minimized. Following plant installation, the revegetation contractor should replace the excavated rubble adjacent to or in the planting hole, where feasible. The infill planting site may be relocated if the rubble proves to be extensive and prohibits establishment of plants.

Plants in most infill planting sites, unless otherwise indicated, should be installed in 4 rows, approximately 5 feet apart, parallel to the channel within a 15-foot wide planting swath. The row closest to the river should be located at, or slightly above, the bankfull channel elevation. Plants should be installed 5- to 6-feet on center and offset between the rows to create a triangular pattern. Container plants should be installed in an augured or hand-excavated hole approximately 24- to 36-inches deep and 8-inches wide, or at least 1.5-times the depth and twice as wide as the container. One slow-release fertilizer tablet should be provided in each planting hole. The planting hole should be backfilled with native material. Plant protection cages are not recommended due to the likelihood of high velocity floodflows and prolonged inundation during winter storms. The contractor should consider installing woven erosion control mats around individual planting locations or the entire mitigation site to reduce erosion potential from soil disturbance by rainfall and floodflows.

Both container plants and cuttings will be planted. Cuttings may be used for willow species and Fremont's cottonwood. Although the optimal time to collect cuttings is during the winter when the wood is dormant, cuttings can be collected earlier but they may have a lower survival rate depending on seasonal conditions. Container plants should be obtained by the revegetation contractor from a native plant nursery that has collected propagules that are locally native to the Guadalupe River watershed.

Drip irrigation using water supplied through the riparian mitigation irrigation system should be used to irrigate the infill planting sites on the west bank in Segments 1 and 2 when practical with respect to access, constructability, and probability of damage due to high flow periods. Plantings on the east bank in Segments 1 and 2 may not have an irrigation system; however, some form of an irrigation system or watering schedule may be required at time of planting. The revegetation contractor should be aware that high flow periods are likely to inundate the infill planting sites and, therefore, any irrigation installed should be securely fastened to the bank or removed prior to the start of the rainy season. In Segment 3, the irrigation system will connect to existing city lines or tie into existing or future irrigation systems of adjacent park facilities.

4.3.3.2 Woz Way to Park Avenue Bypass Reach

Approximately 410 lf (about 0.15 acre) of riparian vegetation is being planted as onsite mitigation along the Guadalupe River at three locations in the Woz Way to Park Avenue Bypass Reach. These three locations include:

- The west bank near the Children's Discovery Museum (200 lf)
- The east bank near the rubble removal site (100 lf) and
- Auzerai Point lookout at the Auzerai Point boulder site (110 lf) (Figure 2-1)

The riparian vegetation near the Children's Discovery Museum, which totals 200 lf, was planted in 1998. Riparian vegetation will be planted at the two remaining locations in 2000.

The planting areas will be divided into lower, mid-bank, and upper banks. As discussed above, lower, mid-bank, and upper bank designations relate to the elevation of the bank relative to the summer water level. Plants suitable for planting in the lower bank include arroyo willow, red willow, sandbar willow, yellow willow, Fremont's cottonwood, mulefat, and white alder. Plants suitable for planting in the mid-bank include box elder, Fremont's cottonwood, mulefat, western sycamore, and California wild rose. Upper bank plant species include buckeye, coyote brush, elderberry, valley oak, and California wild rose. The plant palette should be used as a guideline only, with site-specific conditions dictating the actual plant species installed.

Mitigation infill planting sites in the Woz Way to Park Avenue Bypass Reach are proposed on a variety of substrates, including undisturbed natural bank, natural bank with signs of recent erosion, banks with existing rock revetment, and biotechnical bank stabilization areas. Bank stabilization, in conjunction with mitigation planting, may be necessary at some of the infill planting sites that show signs of excessive erosion (e.g., vertical bank) or that would likely erode if some form of bank stabilization did not occur. For example, at the Children's Discovery Museum revegetation area the bank was restored by placing fill against the vertical bank to restore the slope and create a planting area. Woven erosion

control mats and blanket were secured over the entire mitigation slope to reduce erosion potential from soil disturbance by rainfall and floodflows. Root wads were installed at the toe of the slope to stabilize the toe of the slope and to provide instream cover.

At the rubble removal planting area much of the proposed planting area is covered with rock revetment. This revetment included boulders as well as pieces of concrete rubble previously placed on the bank to reduce erosion. The Auzerai Point boulder site is currently covered by large boulders. At both of these revegetation sites, rock revetment will be removed prior to planting. Bank stabilization techniques similar to those used at the Children's Discovery Museum will be constructed at the remaining revegetation sites, however, the actual technique may vary depending on site-specific conditions. The planting areas will be constructed by SCVWD.

In addition to revetment removal and bank stabilization techniques, site preparation may also include mechanical or manual removal of existing ruderal vegetation to a height of approximately 4-6 inches above the ground, where applicable. This will leave some vegetative stubble that may have erosion control and bank stabilization benefits during high rainfall and flow events. Cut material should be disposed of offsite.

The planting areas will be divided into lower, mid-bank and upper banks, depending on site conditions at each planting area. As discussed above, lower, mid-bank and upper bank designations relate to the elevation of the bank relative to the summer water level. Plants suitable for planting in the lower bank include arroyo willow, red willow, sandbar willow, yellow willow, Fremont's cottonwood, mulefat, western sycamore and white alder. Plants suitable for planting in the mid-bank include box elder, Fremont's cottonwood, mulefat, western sycamore, and California wild rose. Upper bank plant species include buckeye, coyote brush, elderberry, valley oak, and California wild rose. The plant palette should be used as a guideline only, with site-specific conditions dictating the actual plant species installed.

Plants at the future planting areas will be installed in a random pattern approximately 5 to 6 on center. The planting density will be approximately 50 plants per 100 lf. Plant materials will be installed in augured or hand-excavated holes and might include container plants, cuttings, transplants, acorns, and seeds. The planting hole should be backfilled with native material. Plant protection cages are not recommended due to the likelihood of high velocity floodflows and prolonged inundation during winter storms.

Irrigation of the mitigation sites in the Woz Way to Park Avenue Bypass Reach will be automated. The irrigation system will connect to existing city lines or tie into existing or future irrigation lines for adjacent park facilities. The revegetation contractor should be aware that high flow periods are likely to inundate the infill planting sites and, therefore, any irrigation installed should be securely fastened to the bank or removed prior to the start of the rainy season.

4.3.3.3 Reach A Mitigation Site

Approximately 7,848 lf (about 2.7 acres) of riparian vegetation will be planted along the Guadalupe River in Reach A, from Airport Parkway upstream to I-880 (Appendix D). The mitigation for Reach A is occurring in two phases. Phase 1, which was installed during winter 1998-1999, included planting riparian vegetation on variable geomorphic surfaces in

five 300-foot-long by 15-foot-wide planting plots, for a total of 1,543 lf of riparian vegetation. The purpose of Phase 1 is to determine whether riparian vegetation will be sustainable in this section of the river given the high average floodflow velocities. Phase 2a will be implemented in 2000 and 2001. A total of 6,108 lf of riparian vegetation will be planted in 2000 and 197 lf will be planted in 2001.

The mitigation for Reach A comprises two distinct areas, the restricted and unrestricted planting areas. These areas were selected, and planting methods were determined, based on hydraulic modeling performed by the Corps and SCVWD. Based on the results of hydraulic modeling, no mitigation plantings would be installed within 300 feet downstream from I-880, to maintain hydraulic capacity. The restricted planting area begins 300 feet downstream from I-880 and extends for approximately 1,670 feet on both sides of the river. Riparian plants would be installed in the restricted planting area in a single row meandering in a 15-foot wide swath with plants spaced 5- to 6-feet on center in the row (average of 18 plants per 100 lf). Approximately 3,346 lf of SRA cover mitigation would occur in the restricted planting area. The restricted planting area would provide a continuous, uninterrupted area of vegetation along both sides of the river. The unrestricted planting areas begin approximately 2,000 feet downstream from I-880; planting would occur in areas adjacent to Airport Parkway. Riparian plants would be installed in the unrestricted planting area in 4 rows, parallel to the river, and spaced 5 feet apart within a 15-foot wide swath; plants would be spaced 5- to 6- feet on center in each row (average of 50 plants per 100 lf). Approximately 4,502 lf of SRA cover mitigation would be planted in the unrestricted areas.

Existing geomorphic conditions in Reach A have primarily been created by past flood protection projects which have channelized and straightened the reach, resulting in primarily lower and mid-bank planting surfaces. The planting surfaces contain enough soil to support riparian and SRA vegetation. The lower bank elevation is approximately 0 to 2 vertical feet above summer water level and the mid-bank elevation is approximately 2 vertical feet and greater above summer water level. Plants suitable for the lower bank include arroyo willow, red willow, sandbar willow, yellow willow, Fremont's cottonwood, mulefat, western sycamore, and white alder. Plants suitable for the mid-bank include box elder, Fremont's cottonwood, mulefat, and western sycamore. The plant palette should be used as a guideline only, with site-specific conditions dictating the actual plant species installed. For example, although Fremont's cottonwood is identified as a mid-bank species, it should be primarily planted in the lower portion of the mid-bank.

Site preparation in future planting areas may include mechanical and/or manual removal of existing ruderal vegetation to a height of approximately 4-6 inches above the ground. This will leave some vegetative stubble that may have erosion control and bank stabilization benefits during high rainfall and flow periods. Cut material should be disposed of offsite. Some concrete rubble is present in Reach A. This rubble may extend below grade to an unknown depth. If it is necessary to remove rubble during plant installation, disturbance of the bank should be minimized. Following plant installation, the revegetation contractor should replace the excavated rubble adjacent to or in the planting hole, where feasible. The infill planting site may be relocated if the rubble proves to be extensive and prohibits establishment of plants.

Future planting within the unrestricted planting areas would include planting riparian vegetation on different types of soil and using different degrees and types of slope surfaces

along approximately 3,559 lf of Reach A. Plants would be installed in a random pattern approximately 5 to 6 feet on center, with a planting density of approximately 50 plants per 100 lf. Plant materials would be installed in augured or hand-excavated holes and might include container plants and/or cuttings. Planting in the unrestricted planting areas would include both tree and shrub species. The planting hole should be backfilled with native material. Plant protection cages are not recommended due to the likelihood of high velocity flows and prolonged inundation during winter storms. The contractor should consider installing woven erosion control mats around individual planting locations or the entire site to reduce erosion potential from soil disturbance by rainfall and floodflows.

Future mitigation in the restricted planting area would include planting riparian vegetation on different types of soil and using different degrees and types of slope surfaces along approximately 2,746 lf of Reach A. Because of hydraulic constraints, planting would be limited to one plant every 5 to 6 feet along the bank. Plants would be distributed in a fragmented, nonlinear pattern within the 15-foot-wide planting zone. The plant material would be installed in augured or hand-excavated holes and might include container plants and/or cuttings. Planting holes should be backfilled with native material. Species planted in this area should be limited to those species that will be a single trunk tree at maturity. Examples of single trunk trees include Fremont's cottonwood, western sycamore, white alder, red willow, and yellow willow. Shrub or shrub-like species like arroyo willow, sandbar willow, box elder, and mulefat should not be planted. Plant protection cages and small stakes are not recommended due to the likelihood of high velocity flows and prolonged inundation during winter storms. The contractor should consider installing woven erosion control mats around individual planting locations or the entire site to reduce erosion potential.

Both container plants and cuttings will be planted in Reach A. Cuttings may be used for willow species and Fremont's cottonwood. Although the optimal time to collect cuttings is during the winter when the wood is dormant, cuttings can be collected earlier but they may have a lower survival rate depending on seasonal conditions. Container plants should be obtained by the revegetation contractor from a native plant nursery that has collected propagules that are locally native to the Guadalupe River watershed. An irrigation system will not be required at the time of installation as the plants will be installed during winter and will receive water from storms and high-flow periods. The revegetation contractor should thoroughly water the plants immediately following installation. As necessary, additional irrigations following installation and prior to winter could be provided by the revegetation contractor at the Corps discretion.

Instream geomorphic features, including rock weirs and vanes, root wads, and deflector logs, would also be installed in natural riverbed sections to replace affected SRA instream cover. These features would improve bank stability, increase instream cover, and provide improved habitat for the spawning and rearing of aquatic species, including steelhead and chinook salmon.

4.3.3.4 Guadalupe Creek Mitigation Site

The proposed Guadalupe Creek mitigation site is located along Guadalupe Creek and bordered upstream by Masson Dam, downstream by the Almaden Expressway, on the north by residential development and the Los Capitancillos percolation pond system, and

on the south by Coleman Road (Figure 3.4-2). The site is part of the Guadalupe Creek Restoration Project and is owned and maintained by SCVWD. As a separate and independent project, SCVWD proposes to restore SRA cover vegetation and improve aquatic habitat along the lower reach of Guadalupe Creek. SCVWD would use this mitigation for other projects only if all of the mitigation is not needed for the Guadalupe River Project. However, this project will be implemented independently from the Guadalupe River Project and will be implemented even if the Guadalupe River Project is not implemented. SCVWD is proceeding with concurrent environmental documentation for the Guadalupe Creek Restoration Project because it is independent of the Guadalupe River Project.

For the Project to receive the full HEP credits assumed in the HEP analysis (U.S. Army Corps of Engineers, 2000b), the entire 12,044 lf (about 4.2 acres) of riparian vegetation must be installed along Guadalupe Creek (Appendix D). The calculated thermal and cover benefits of planted vegetation to SRA cover value will accrue only after habitat functions are provided, including overhead and instream cover. At most, only about 7,178 lf of riparian vegetation will be directly counted as mitigation for the Project. The remaining 4,866 lf of riparian vegetation along Guadalupe Creek may be available to mitigate impacts for other anticipated SCVWD actions after a mitigation banking agreement and protocols have been developed between SCVWD, USFWS, and CDFG.

SRA cover mitigation is being planted along Guadalupe Creek in two phases. Phase 1, which was installed during the winter of 1998-1999, included planting 1,263 lf of riparian vegetation at the upstream end of the mitigation area. Phase 2 will be implemented in 2001 and will include planting an additional 10,781 lf of riparian vegetation (Table 4-6). In the mitigation plan for Guadalupe Creek, operation of SCVWD's four instream seasonal percolation recharge ponds will be permanently discontinued.

The Phase 1 planting sites in Guadalupe Creek ranged from low benches with probable availability of year-round soil moisture to higher benches where species preferring drier conditions, such as oaks, were planted. Much of the substrate is tightly consolidated cobble or gravel material. The plant material consisted of a mixture of plants in containers, cuttings, transplants, and seed. The plants represented species present in the vicinity of the mitigation area, including boxelder, buckeye, elderberry, valley oak, willow species, alder, mule fat, California wild rose, western sycamore, Fremont's cottonwood, and mugwort. Spacing varied from 5 to 8 feet (average of 42 plants per 100 lf). USFWS concurred that experimental planting techniques should be allowed as needed to achieve mitigation success. For example, western sycamore pole cuttings were planted because an appropriate seed source was unavailable. The experimental nature of the planting will be taken into consideration by the AMT when determining the success of the mitigation. The Phase 2 mitigation area on Guadalupe Creek, however, is not intended to be an experiment, but will apply techniques with the highest probability for success given the site conditions.

Phase 2 extends from Almaden Expressway upstream to the Phase 1 planting site and would include planting 10,781 lf of riparian vegetation along both sides of the creek. Phase 2 is scheduled for implementation in fall 2000. Design objectives for the mitigation plan include streamside vegetation planting, instream fish habitat construction, and biotechnical bank stabilization. Site preparation and grading activities may include bank grading to create low benches and reduction in the slope of vertical banks. Existing ruderal vegetation

and Himalaya blackberry may be removed. Planting surfaces are expected to consist of low benches with probable availability of year-round soil moisture, and higher benches where species preferring drier conditions will be planted.

Plants would be installed in a random pattern approximately 5 to 6 feet on center, with a planting density of approximately 50 plants per 100 lf. Plant materials would be installed in augured or hand-excavated holes and might include container plants and/or cuttings, transplants, acorns, and seeds. Plant material may consist of a mixture of container plants, cuttings, transplants, acorns, and seed that are present in the vicinity of the mitigation area. The species composition will be similar to that used for Phase 1 plantings sites. Each planting hole will be backfilled with native soil. Plant protection cages may be used in some of the higher bank locations to protect against deer browse, but will not be used in lower elevation planting areas due to the likelihood of high velocity floodflows and prolonged inundation during winter storms.

The following design elements for Phase 2 are currently being considered:

- Planting native woody riparian vegetation parallel to the creek channel
- Using biotechnical techniques to stabilize severely eroded creek banks
- Constructing instream fish habitat features to increase cover and water depth and
- Realigning channel segments in appropriate areas to recreate natural meanders, which might require the excavation and offsite removal of between 5,000 and 20,000 cubic yards of fill material

Ongoing maintenance, such as weed control and irrigation, would be required during the first 3 years postconstruction to assist in the establishment of the plantings. Additional low-level maintenance would most likely be required in perpetuity.

4.3.4 Measurable Objectives and Adaptive Management

Indicators for the vegetative component of SRA cover will include survival, health and vigor, natural recruitment, shaded stream surface, relative cover by noxious nonnative and introduced species, bank stability, instream cover, and riverbed stability. Monitoring of these indicators will provide information for the AMT to assess (1) whether mitigation measures have been successful and (2) whether Guadalupe River Project construction and operations maintain adequate fish spawning and rearing habitat and avoid harm to anadromous fish species.

Failure to meet measurable objectives for the indicators below will trigger evaluation of the cause of failure and selection of appropriate remedial actions by the AMT. Remedial actions described in this MMP are only potential actions that could be recommended by the AMT, and the AMT may select alternative remedial actions. Because remedial actions may or may not be necessary and the remedial actions that may be selected by the AMT are not known at this time, the effects of all remedial actions have not been analyzed in the environmental compliance document for the Project (U.S. Army Corps of Engineers, 1999b). Subsequent environmental analysis of selected remedial actions, if necessary, will be performed at the direction of the AMT.

4.3.4.1 General Monitoring Framework: Permanent SRA Cover Sampling Plots

Permanent riparian vegetation sampling plots will be established in the Project mitigation area and reference sites for SRA cover.

Project Mitigation Area. To partially mitigate for the loss of SRA cover, riparian vegetation will be planted in a zone within 15 feet of the summer shoreline. The 15-foot width will be permanently marked in the field at 200-foot intervals along the stream within the mitigation area. The markers will delineate the boundary between planted riparian vegetation attributable to riparian mitigation and planted riparian vegetation attributable to SRA cover mitigation. The location of each marker will be mapped on an aerial photograph to facilitate subsequent monitoring efforts.

Approximately 20 percent of the area of riparian vegetation planted to mitigate for SRA cover will be sampled, with a total of 23 permanent sampling plots located within the SRA cover mitigation area in the Project reaches, Reach A, and Guadalupe Creek. The percentage of area to be sampled and the number of sampling plots needed were based on the prior experience of qualified botanists on the MMP team. The sampling intensity takes into consideration the number of trees and shrubs planted within the 15-foot-wide riparian band and the discontinuous nature of the band, including offsite mitigation planting in Reach A and along Guadalupe Creek. The AMT may increase/decrease the number of plots based on future evaluation of actual variability of the indicators among the initial 23 plots.

The approximately 23,000 lf of riparian vegetation planted as SRA cover mitigation will be subdivided into 23 equal segments, each 1,000 feet long. The 1,000-foot segments may be continuous or may be composed of several small segments. One 15-foot by 200-foot permanent plot will be randomly located within each 1,000-foot segment of SRA mitigation area. Because the 1,000-foot segments may be discontinuous, a 200-foot plot will have a set origin, but may span a distance along the stream that exceeds 200 feet. The location of each permanent plot will be determined by selecting a number between 0 and 799 from a random number table. The random number will determine the distance of the closest edge of the plot to the origin of the 1,000-foot segment.

Markers on the permanent plots will indicate the plot number. The locations of the markers will be carefully mapped on an aerial photograph and the position of the markers will be recorded using a GPS with sub-meter accuracy in a coordinate system based on NAD83. The aerial photograph will be taken in August or September 1999 or as soon as is feasible to record baseline conditions in the mitigation area.

The slope and the aspect of each plot will be measured. Along with plot location, slope and aspect will be evaluated to determine which conditions have the greatest effect on the success of the mitigation. In addition to indicators monitored within the permanent sampling plots, the condition of riparian vegetation planted outside the plots will be assessed qualitatively. The qualitative evaluation will reveal aspects of the mitigation area that are not represented by the sample plots. For example, clusters of mortality, stunting, and erosion will be observed and recorded for the mitigation area, including all in-fill planting locations.

Reference Sites. In addition to monitoring indicators of ecosystem functions and habitat values in the mitigation area, these indicators will be monitored at reference sites. Reference

sites are discussed in Section 4.2.3.1, "General Monitoring Framework: Permanent Riparian Vegetation Sampling Plots."

4.3.4.2 Survival Indicator for Riparian Vegetation Associated with SRA Cover

Survival is represented by the number of live trees and shrubs per linear distance. The survival of planted trees and shrubs will be estimated following the initial planting. If natural recruitment occurs at a level that exceeds the density of planted trees and shrubs, the AMT may allow use of the shaded stream surface indicator instead of survival counts.

Measurable Objective. A minimum of 17 trees and 10 shrubs per 100 lf must survive each year for 3 years after planting in the mitigation area. The survival objective is not a percentage of the initial planting density because planting density will vary by location, with as many as 40 to 60 plants per 100 lf. Variable planting density allows mortality attributable to environmental conditions to select individuals and species best suited for each location. Based on evaluation of monitoring results for other indicators, the AMT may lower the measurable objective for trees and shrubs consistent with the carrying capacity of the mitigation areas for SRA cover.

Monitoring Methods. Survival will be estimated for all planted trees and shrubs in the 15-foot by 200-foot permanent sampling plots. Survival for individual trees and shrubs is defined as a minimum health and vigor rating of "fair" (Section 4.2.3.3, "Health and Vigor Indicator for Riparian Vegetation"). Each tree and shrub planted within the sampling plots will be permanently marked and identified to species. Survival of each marked plant will be assessed every monitoring year. Sampling will occur in August or September of each of the first three years after installation. If natural recruitment occurs at a level that exceeds the density of planted trees and shrubs, the AMT may allow use of the shaded stream surface indicator (Section 4.3.4.6, "Shaded Stream Surface Indicator for SRA Cover") instead of the survival indicator for determining the success of SRA cover mitigation.

Remedial Actions. Failure to meet the measurable objective for survival during any of the 3 years after planting would trigger evaluation of the cause of plant mortality by the AMT. Appropriate species would be replanted; alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If feasible, replacement species will be chosen to maintain overall species diversity. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area is not part of the Project mitigation measures. If alternative mitigation areas are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Up to 1 year may be necessary to obtain suitable planting material for the alternative mitigation area or for replanting in the original area. Another 3-year monitoring period would begin at the time of replanting in the permanent sampling plots.

4.3.4.3 Health and Vigor Indicator for Riparian Vegetation Associated with SRA Cover

Health is the absence of disease and vigor is the robustness of a plant. Health and vigor will be estimated in the field using a rating system based on the prior experience of qualified botanists on the MMP team (Section 4.2.3.3, "Health and Vigor Indicator for Riparian Vegetation"). A health and vigor rating will be determined for each planted tree and shrub

in the permanent sampling plots. The ratings will be compiled by species to provide an overall species health and vigor rating for each permanent sampling plot. The data will be used to estimate trends in plant health; identify deficiencies in plant material and planting and maintenance practices; indicate the need for corrective measures; and identify individual plants that need to be replaced.

Measurable Objective. The average rating for health and vigor must exceed 2 ("fair") for the permanent sampling plot for each year for 5 years after planting. The health and vigor objective allows clear differentiation between dead and live trees and enables remedial action to be initiated prior to the death of a substantial portion of the vegetation in a sampling plot. A rating of fair is not uncommon under natural conditions and is a required condition for the survival objective identified in Section 4.3.4.2, "Survival Indicator for Riparian Vegetation Associated with SRA Cover."

Monitoring Methods. Health and vigor of all the trees and shrubs installed in the 15-foot by 200-foot permanently marked plots will be assessed. Each tree and shrub planted within the sampling plots will be permanently marked and identified to species. The methods for assessing the health and vigor of riparian vegetation in the mitigation area for SRA cover are identical to those for riparian vegetation (Section 4.2.3.3, "Health and Vigor Indicator for Riparian Vegetation"). Surveys will be conducted annually in August or September for 5 years after planting. If natural recruitment occurs at a level that exceeds the density of planted trees and shrubs, health and vigor will no longer be directly scored for individual plants in the plot, but will be assessed qualitatively for the vegetation in the plot as a whole.

Remedial Actions. Failure to meet the measurable objective for health and vigor in any year would trigger an evaluation of the cause of the poor health and vigor by the AMT. Remedial actions may include revision of the irrigation regime, treatment of disease, prevention of pest damage, addition of soil amendments, and replacement of dead plants. Replacement of the plants with a rating of "dead" (0-0.99) or "poor" (1.0-1.99) would be required if the 3-year survival criterion of 17 trees and 10 shrubs per 100 lf are not expected to be met. The number of trees and shrubs that would be replaced will be sufficient to achieve the required density per 100 lf.

Appropriate species would be replanted; alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If feasible, replacement species will be chosen to maintain overall species diversity. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area is not part of the Project mitigation measures. If alternative mitigation areas are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Up to 1 year may be necessary to obtain suitable planting material for the alternative mitigation area or for replanting in the original area. Another 5-year monitoring period would begin at the time of replanting in the permanent sampling plots.

4.3.4.4 Natural Recruitment Indicator for Riparian Vegetation Associated with SRA Cover

Establishment of native trees and shrubs by natural reproduction indicates sustainability of the mitigation and progress toward a forest that can perpetuate itself with minimal intervention.

Measurable Objective. Natural recruitment of native woody species must be apparent on or adjacent to the mitigation area by year 5.

Monitoring Methods. Natural recruitment will be determined through visual assessment by a qualified botanist within each 15-foot by 200-foot permanent plot (Bonham, 1989). Visual assessment will include recording an estimate of the approximate density of volunteer seedlings and vegetative sprouts for each plot; recording the species that have naturally colonized each plot; noting assumed or observed recruitment mechanisms, such as seed dispersal and rhizomatous or sucker growth; and recording seed production observed on planted riparian vegetation. Observations of site-specific characteristics within each sampling plot that may influence natural recruitment, such as dense seedling growth, soil texture, and soil moisture, will also be recorded. The visual assessment will be conducted once in August or September of year 5. Whether the native riparian vegetation in the riparian mitigation area can be sustained will be inferred from the recruitment data obtained in year 5.

Remedial Actions. Failure to meet the measurable objective for natural recruitment 5 years after planting in the mitigation area would trigger an evaluation of the cause of poor recruitment and development of remedial actions to facilitate natural recruitment. Failure to meet the objective would also reinitiate monitoring for natural recruitment in all permanent plots within the SRA cover mitigation area.

4.3.4.5 Nonnative Species Relative Cover Indicator for Riparian Vegetation Associated with SRA Cover

The vegetative cover of tree and shrub species in the mitigation area will be composed primarily of native species. The cover provided by giant reed and other nonnative species will be assessed.

Measurable Objective. Relative to the total cover of trees and shrubs, cover provided by giant reed will be less than 5 percent. Relative cover (Bonham, 1989) provided by nonnative woody riparian species, such as black walnut, locust, and tree-of-heaven, established after planting will be less than 15 percent. The combined relative cover of nonnative woody species will, therefore, be less than 20 percent.

Monitoring Methods. Any apparent concentrations of colonization by nonnative woody species will be visually identified in the mitigation area and plotted on aerial photographs. Nonnative cover will be visually estimated in the field by a qualified botanist (Bonham, 1989, pages 126-127).

Visual estimates of relative cover by nonnative species in the mitigation area will be made annually during the first five years after the planting of trees and shrubs. Beginning in year 10 and every sixth year thereafter, aerial photographs will be used to estimate the cover of nonnative tree and shrub species. Field verification will be conducted throughout the monitoring period to confirm that aerial photograph signatures for nonnative species have

been identified correctly and to ensure that nonnative shrub and vine cover is also identified. The cover provided by giant reed can be easily estimated from aerial photographs, but field verification will be necessary for most other species. After nonnative species have been identified from aerial photograph signatures or in the field and delineated on the aerial photographs, their relative cover will be determined with a digital planimeter, CAD software, or other appropriate method.

Remedial Actions. Failure to meet the objective for the nonnative species relative cover indicator for riparian vegetation associated with SRA cover in any year will trigger physical or chemical removal of noxious and other nonnative species. Removal of nonnative species would be integrated with existing vegetation management by SCVWD. Nonnative species removal is expected to be most intensive during the first few years after the planting of riparian plants; the intensity of management activities should subsequently decrease because native vegetation will become more resistant to invasion as tree and shrub size increases.

Because established nonnative trees and shrubs that were present in the SRA mitigation area prior to mitigation planting may provide shade during the early part of the mitigation period, immediate removal of these trees and shrubs may not be desirable. However, they could be removed once the planted native trees and shrubs are providing a significant amount of shade. The AMT will determine when they should be removed.

4.3.4.6 Shaded Stream Surface Indicator for SRA Cover

The shaded stream surface indicator for SRA cover is the percentage of the total stream surface area shaded during midday. The shaded stream surface is a measure of the extent of overhead cover (Raleigh et al., 1984). Where feasible, SRA cover will be maximized over pools. Overhead cover provides habitat for fish and other aquatic organisms and minimizes potential increases in water temperature.

Measurable Objective. By year 40, trees and shrubs must shade at least 41 percent, 64 percent, 45 percent, 58 percent, and 45 percent of the total stream surface in Segment 1, Segment 2, Segment 3, Guadalupe Creek, and Reach A, respectively. The total stream surface area is calculated for normal summer flow conditions during the hours from 10 a.m. to 2 p.m. At least 85 percent of the streambank must be shaded. The shaded area objective is consistent with the expected growth of riparian vegetation by year 40 and the overhead cover needs of steelhead (Jones & Stokes Associates, 1997b, U.S. Army Corps of Engineers, 1999c, Raleigh et al., 1984). The percentage of total stream surface area shaded must increase toward the measurable objective by year 9, and the measurable objective must be achieved by year 40.

Monitoring Methods. The percentage of shaded and unshaded stream surface will be estimated for the stream bordering the 23 permanent sampling plots located in the SRA cover mitigation areas. Rectified true color aerial photographs taken in August or September will be used to calculate the percentage of shaded stream surface. The photographs must be of sufficient quality to allow estimation of shade between 10 a.m. and 2 p.m. A planimeter, a computer scan and digital overlay, or another appropriate method may be used to calculate the percentage of shaded stream surface. Results will be documented in a GIS/CADD format.

The total stream area along the length of each 200-foot permanent plot will be based on stream width confirmed with field measurements. The aerial photographs will be examined at a scale of 1 inch=50 feet (1:600) or better. The accuracy of the estimated percentage of stream surface that is shaded will be verified in the field during August or September of each year that aerial photographs are taken. The measurements made on the photographs must not statistically differ from the measurements made in the field ($\alpha=0.05$).

Monitoring will take place at 3-year intervals beginning when the trees and shrubs are planted. In year 6 and at every monitoring increment thereafter, a regression estimate will be made of the predicted percentage of shaded stream surface for year 40 (for example, Draper and Smith, 1966).

Remedial Actions. If evaluation of the monitoring data in year 9 indicates that the percentage of shaded stream surface is not reasonably increasing toward the 40-year measurable objective, the cause of low shade would be evaluated by the AMT. The AMT would also address shade effects in excess of the measurable objective, primarily in relation to shaded riffles and the potential effects on steelhead and salmon feeding.

Failure to meet the measurable objective for the shaded stream surface indicator for SRA cover would trigger remedial actions. These actions could include irrigation, adding soil amendments, replanting or reducing the slope of steep banks to permit the planting of additional riparian vegetation and bank stabilization. Appropriate species would be replanted; alternative riparian species may be selected for replanting if the evaluation indicates that the initial species selection was not suitable for the location. If the evaluation indicates that the location will not support riparian vegetation, the AMT will select an alternative mitigation area. An alternative mitigation area and reducing the slope of steep banks are not part of the Project mitigation measures. If alternative mitigation areas or bank construction are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented.

4.3.4.7 Bank Stability Indicator for SRA Cover

Bank stability in natural channel segments of Segments 1, 2, and 3 and in the Guadalupe Creek and Reach A mitigation areas is indicated by stable ground cover along the streambank. Stable ground cover includes rooted trees, shrubs, and herbaceous plants and naturally occurring rocky substrates.

Measurable Objective. Stable ground cover must be present along at least 75 percent of the streambank in the natural channel segments of Segments 1, 2, and 3 and in the Guadalupe Creek and Reach A mitigation areas. Stable ground cover along at least 75 percent of the streambank will control erosion and help maintain habitat for steelhead (Raleigh, et al., 1984).

Monitoring Methods. Field surveys will be performed to record the stability of the streambank in natural channel segments of the Segments 1, 2, and 3 and in the Guadalupe Creek and Reach A mitigation areas. The presence of stable ground cover, including rooted vegetation and rocky substrates, will be determined by a qualified biologist, and the potential for bank erosion will be assessed. Any areas of bank that are eroding substantially

or that have the potential to erode substantially within 1 year of the survey will be identified and the length of eroding bank recorded.

The field surveys will be conducted between April and October for the first 4 years after trees and shrubs are planted. During the initial survey, locations with both stable and eroding banks will be photographed to provide a reference standard for future field surveys. Beginning after year 3 and every third year thereafter, bank stability will be determined using the aerial photographs acquired for determining shaded stream surface area (Section 4.3.4.6, "Shaded Stream Surface Indicator for SRA Cover"). Field surveys will be conducted every third year in the areas planted with riparian vegetation to confirm bank stability and erosion indicated by the aerial photographs.

Remedial Actions. Failure to meet the bank stability objective at any time would require evaluation of the cause of instability and implementation of actions to increase bank stability where necessary. Remedial actions may include channel reconfiguration, biotechnical bank stabilization methods, and additional planting of woody and herbaceous riparian vegetation. Channel reconfiguration and biotechnical bank stabilization are not part of the Project mitigation measures. If channel or bank construction is selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented.

4.3.4.8 Instream Cover Indicator for SRA Cover

Instream cover is an important component of SRA cover and fish habitat. Steelhead abundance is correlated with the amount of instream cover (Raleigh, 1984). Instream cover includes undercut banks with an undercut width greater than 10 centimeters (cm); roots, logs, and debris piles greater than 1,000 cm² in surface area; and boulders and rocks greater than 20 cm in diameter (Jones & Stokes Associates, 1997a, Fris and DeHaven, 1993).

Measurable Objective. Consistent with cover present under the preproject conditions and cover needs of steelhead (Jones & Stokes Associates, 1997a, Raleigh et al., 1984), cover within the mitigated reaches must exceed 10 percent of the total stream area at depths greater than 15 cm. The 10 percent instream cover criterion must be met within 10 years of Project implementation.

Monitoring Methods. Instream cover will be measured within 10-foot-wide transect bands perpendicular to and spanning the entire stream width. Stream width is measured from the summer shoreline during average summer flow conditions. One hundred permanent transect bands will be randomly established throughout the Project and mitigation areas. Transect bands will be selected in a stratified random manner (Cochran, 1963) to ensure that pool, riffle, and run habitats with both natural and armored riverbed are proportionately represented.

The proportion of a transect band containing instream cover is multiplied by 100 to calculate the percentage of instream cover. It is not necessary for cover to extend over the entire 10-foot width of the transect band; any cover intercepted by the 10-foot-wide transect band is measured as if intercepted by a line transect. (Fris and DeHaven, 1993). For example, in a 20-foot wide stream, a 4-foot-long piece of wood that is 1 foot in diameter and is perpendicular to the stream flow and intercepted by the transect band would be counted as

20 percent cover (4 feet÷20 feet). If the piece of wood were parallel to the stream flow, it would be counted as 5 percent cover (1 foot÷20 feet).

The first instream cover survey will be conducted between April and October immediately after Project construction. Subsequent surveys will be conducted at 3-year intervals. In year 6 and at every monitoring increment thereafter, a regression estimate (Draper and Smith, 1966) will be made of the predicted percentage of instream cover for year 10. The AMT will evaluate the frequency of ongoing surveys after year 10.

Remedial Actions. If evaluation of the monitoring data in years 6 and 9 indicates that the percentage of instream cover will not meet the 10-year measurable objective, the cause of low instream cover would be evaluated by the AMT. Remedial actions to provide instream cover could include placing boulders or woody material in the channel and planting riparian vegetation. Placement of boulders or woody material in the stream channel is not part of the Project mitigation measures. If actions requiring in-channel construction are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented.

4.3.4.9 Channel Bed Stability Indicator for SRA Cover

Channel bed stability affects the maintenance of SRA cover vegetation, instream cover, substrate composition, and other components of aquatic species habitat. Down cutting of the riverbed is indicated by a reduction in bottom elevation over time. Down cutting can cause bank instability and lowering of ground water levels, resulting in mortality of SRA cover vegetation. Down cutting may also cause loss of instream cover. Conversely, deposition of material raises the channel bed elevation, potentially causing bank erosion and bank overflow. Bank erosion potentially results in a direct loss of SRA cover vegetation.

The indicator for channel bed stability is bottom elevation at selected cross sections in natural channel areas potentially affected by Project components, including downstream from where the stream channel has been modified by armoring, construction of a low-flow channel, construction of invert stabilization control structures, and construction of the weir structure in Segment 2. Stability monitoring may also be required in Reach A and Guadalupe Creek if mitigation plans for these areas will involve work in the channel bed.

Measurable Objective. The measurable objective for stability is an average stream bottom elevation change over the channel width (between the existing top of bank limits) of less than 0.5 foot relative to the initial survey. Localized erosion or deposition occurs in mobile boundary channels, sometimes across the channel width. Net reach averaged deposition or incision, averaging out the bottom elevation change over the channel section, is more indicative of change in riverbed elevation. Any change in the elevation of the channel bed would be evaluated over time at each location, accounting for annual variability and effects unrelated to Project actions.

Monitoring Methods. Up to 14 cross sections will be established in Segments 2 and 3, based on the judgment of a qualified geomorphologist. In Segment 2, a first cross section will be established approximately 200 feet downstream from the Coleman Avenue Bridge and up to 4 additional cross sections will be established at approximately 250-foot intervals downstream from the first cross section. Downstream from Segment 3C, a first cross section

will be established approximately 200 feet downstream from Woz Way and up to 2 additional cross sections will be established at approximately 200-foot intervals downstream from the first cross section. In Segment 3B, a first cross section will be established approximately 200 feet downstream from the West Santa Clara Street Bridge and up to two additional cross sections will be established at approximately 200-foot intervals downstream from the first cross section. Also in Segment 3B, a first cross section will be established approximately 200 feet downstream from the St. John Street Bridge and up to two additional cross sections will be established at approximately 200-foot intervals downstream from the first cross section.

The permanent cross sections will extend perpendicular to the water flow across the width of the normal high-flow channel. Permanent monuments will be placed at each end of the cross section and their elevation recorded. The elevation of the channel bed will be measured at 2-foot intervals across the entire cross section. The accuracy of the measurements will be within ± 0.2 feet. The bottom elevation will be surveyed once each year between April and October and included in the annual monitoring report reviewed by the AMT. The AMT will evaluate the frequency of ongoing surveys after year 10.

Remedial Actions. Failure to meet the measurable objective for the channel bed stability indicator for SRA cover would require evaluation of the existing condition by the AMT and, if necessary, implementation of immediate measures to stabilize the channel. Remedial actions could include additional invert stabilization structures and permanent structural changes to the channel. If actions requiring in-channel construction are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented. Major construction activities associated with structural modification of the channel would be limited to June through September.

4.4 Water Temperature

Suitable water temperatures are critical to the survival of steelhead and chinook salmon. Prior to construction of the Project, water temperature in the Guadalupe River from March through October often exceeded optimal water temperatures for most life stages of steelhead and chinook salmon (Figure 4-1). As optimal water temperature is exceeded, chinook salmon and steelhead can experience increased stress, resulting in greater susceptibility to disease, reduced assimilation efficiency, and increased mortality.

Water temperature is controlled by numerous factors, including flow levels, weather, stream channel geometry, and heat transfer. Flow levels and weather are not affected by the Project.

However, stream channel geometry and heat transfer are affected. Stream channel geometry, including stream width and depth, affects the time it takes water to travel through a given river segment and the surface area exposed to solar radiation. In this document, the term heat transfer refers to the amount of solar radiation encountering the stream surface. Shading of a stream reduces heat transfer by blocking solar radiation. Sources of shading include riparian vegetation, topography, and bridges or other structures.

The difference in measured pre- and postproject water temperature do not clearly represent Project effects because flow levels and weather vary from year to year. A water temperature

simulation model was used to more clearly determine the effects of the Project on water temperature. This simulation allows removal of the confounding effects of variable weather and flow levels, thereby permitting a clear representation of the effects of Project changes to stream geometry and heat transfer. Simulated water temperature will be a component of the indicators used to ensure that Project construction and operation provide water temperature conditions that will continue to support steelhead and chinook salmon.

4.4.1 Project Effects

Stream channel geometry and shading will be affected by the Project. Riparian vegetation will be removed (Section 4.3, "Shaded Riverine Aquatic Cover"), reducing shade and increasing solar radiation at the stream surface. Construction of the low-flow channel and other Project elements will alter channel geometry, potentially affecting stream volume and surface area.

Potential pre- and postproject effects on water temperature were simulated using the JSATEMP model (Jones & Stokes Associates, 1997b); the model reflected potential changes in channel geometry and shade that would result from the Project. Postproject shade and channel geometry used in the temperature simulation reflect conditions immediately after Project construction. The JSATEMP model simulates hourly water temperature for 39 river segments of the Guadalupe River and Alamitos Creek, Arroyo Calero, and Guadalupe Creek (Jones & Stokes Associates, 1997b).

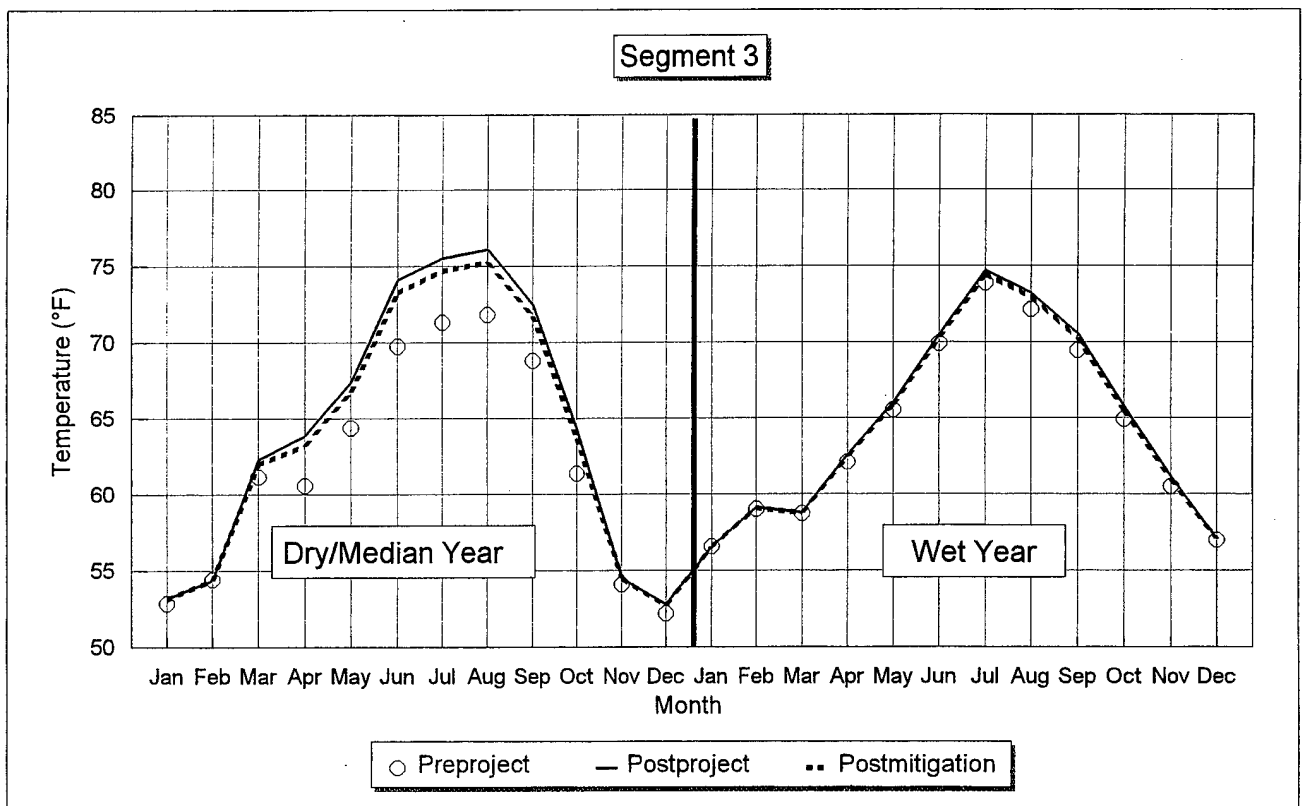
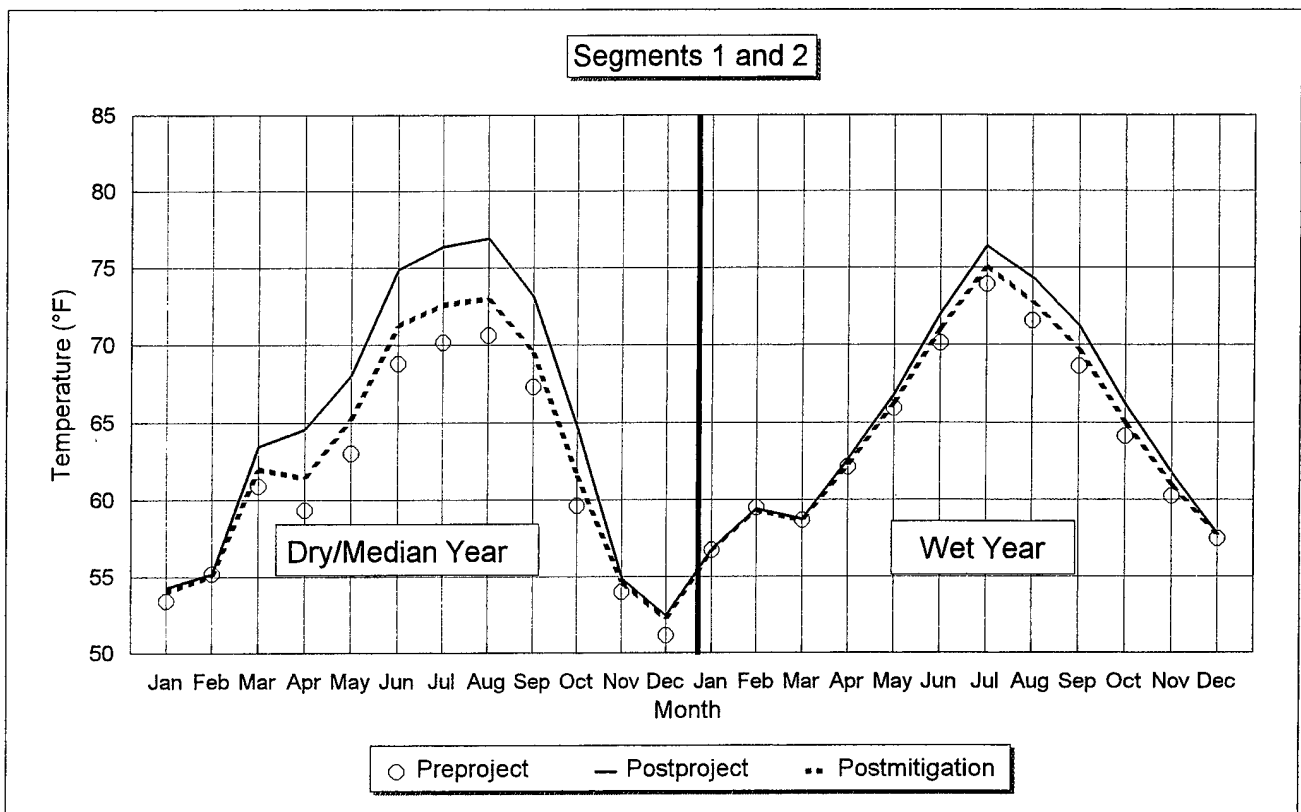
To analyze temperature effects, water temperatures were simulated for two types of years, a dry/median year and a wet year. These two year types were chosen to account of the range of conditions that may occur in the Guadalupe River. Flows from 1995 were used to simulate the wet year. Relatively low flow values for November through April were used to simulate the dry/median year. For May through September, median flow values were used for the dry/median year because of a flow of 0 cfs would have been required to represent dry years.

Based on the water temperature needs of steelhead and chinook salmon (Table 4-7), the increase in water temperature simulated for postproject conditions could cause additional stress on, and thus adversely affect, steelhead and chinook salmon.

4.4.2 Mitigation

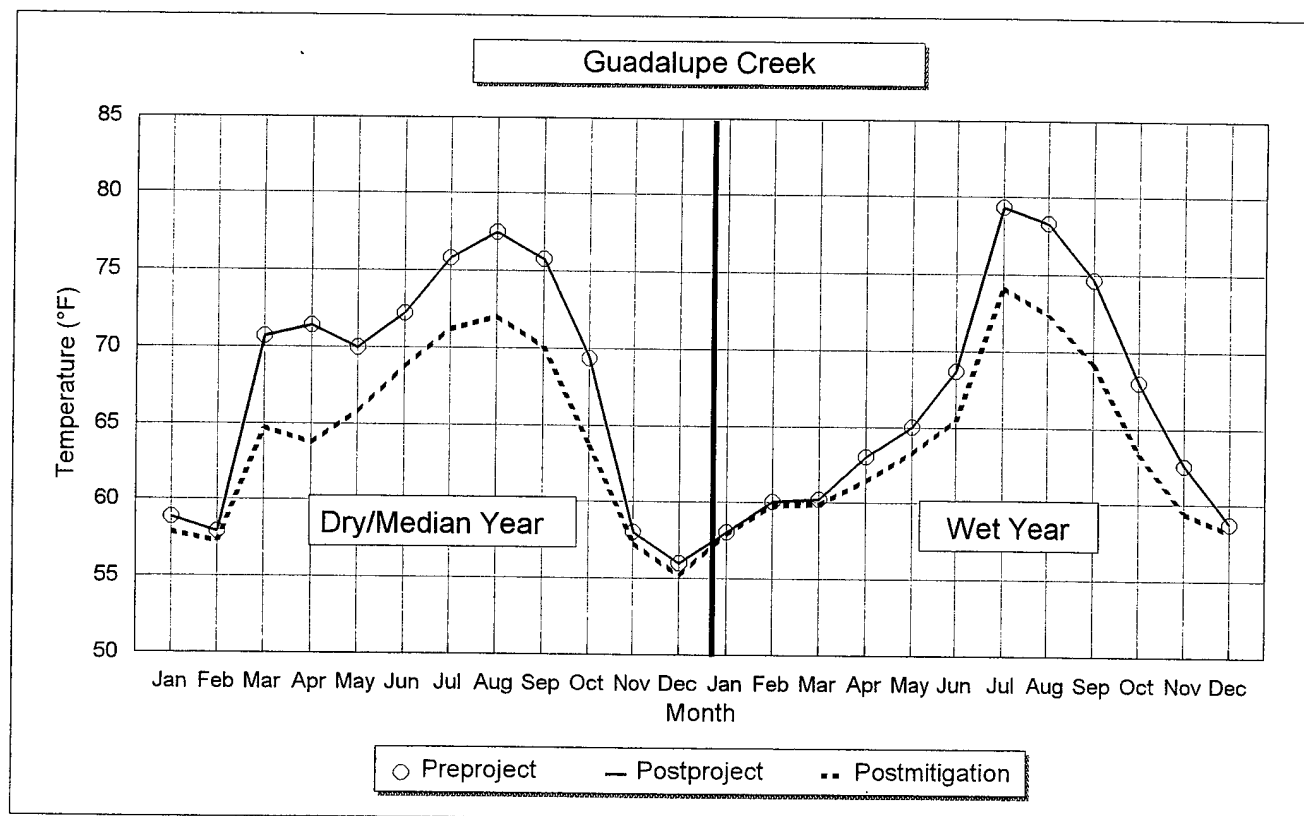
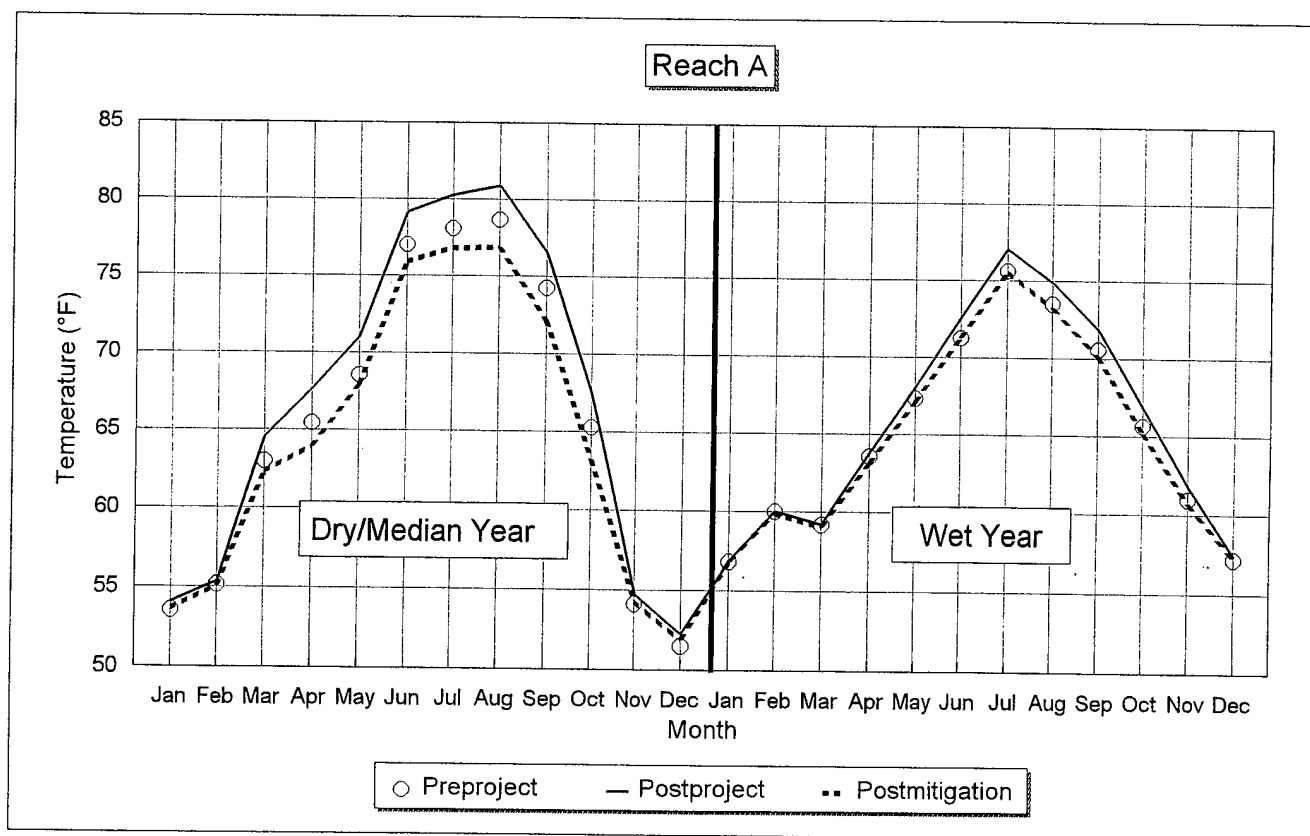
Riparian vegetation planted as mitigation in association with SRA cover will reestablish shade lost because of Project construction. As discussed previously (Section 4.3.3, "Mitigation," under Section 4.3, "Shaded Riverine Aquatic Cover"), a total of 22,892 lf of riparian vegetation will be planted along natural unarmored banks, including riparian vegetation planted in the Project area, Reach A, and Guadalupe Creek (Table 4-6). The riparian vegetation will begin to provide shade before year 5 and reach maturity and maximum shade density after 40 years.

Post mitigation water temperature was simulated to take into account shade provided by the planted riparian vegetation at year 40. Analysis of post mitigation conditions showed that the shade provided by growth of riparian vegetation cooled water temperature in the Guadalupe River and in Guadalupe Creek compared to temperature simulated for the Project immediately after construction (Figures 4-1 and 4-2). Water temperature in



Preproject = 1990 conditions; Postproject = year 0 after construction; Postmitigation = year 40 after construction

Figure 4-1. Simulated Average Maximum Temperatures in Segments 1 and 2 and Segment 3



Preproject = 1990 conditions; Postproject = year 0 after construction; Postmitigation = year 40 after construction

Figure 4-2. Simulated Average Maximum Temperatures in Reach A and Guadalupe Creek

Segments 1, 2, and 3 would, however, remain higher than temperature under preproject conditions (Figure 4-1). Water temperature in the Reach A and Guadalupe Creek mitigation areas would be cooler than under preproject conditions (Figure 4-2).

The effects of water temperature changes on steelhead and chinook salmon throughout the Project area were determined by calculating monthly thermal suitability units for each JSATEMP model segment (Section 4.4.3.2, "Monthly Thermal Suitability Indicator for Anadromous Fish Habitat"). Thermal suitability units were summed for all JSATEMP model segments affected by the Project, including mitigation areas. Thermal suitability units are the product of stream area times a suitability index for a steelhead or chinook salmon life stage. A suitability index is assigned to simulated hourly water temperature based on optimal, sub-optimal, and lethal effects on each species and life stage (Table 4-7). A suitability index (SI) is a unitless number bounded by 0 and 1 (Fris and DeHaven, 1993, U.S. Fish and Wildlife Service, 1982). For water temperature, 0 indicates that the life stage would not survive and 1 indicates optimal temperature conditions.

Calculation of thermal suitability units is not the same as calculations made for the HEP (U.S. Army Corps of Engineers, 2000c). Thermal suitability units isolate the thermal effect and sum the effect for the entire Project, including the effects of SRA cover mitigation in Reach A and Guadalupe Creek.

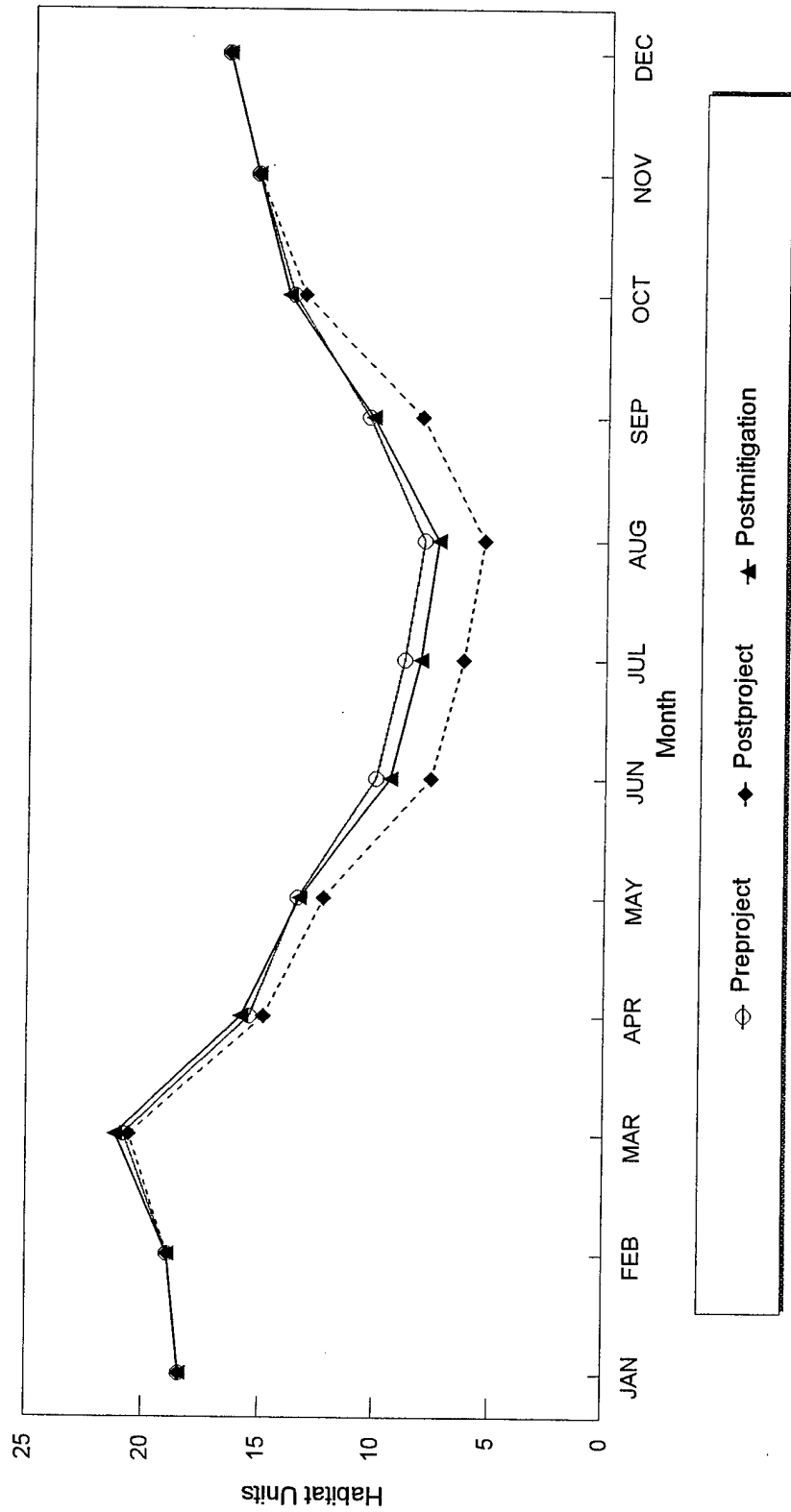
Suitability indices were assigned to the simulated hourly preproject water temperatures, simulated postproject water temperatures immediately following construction, and simulated postmitigation water temperatures after 40-years of riparian vegetation growth. For each of the simulated time periods, total thermal suitability units equaled the sum of thermal suitability units for the JSATEMP model segments affected by the Project, including temperature model segments in Segments 1, 2, and 3 and model segments encompassing the mitigation areas in Reach A and Guadalupe Creek.

Based on water temperature simulation and the calculated thermal suitability units for the Project, mitigation is expected to provide water temperature conditions that will continue to support steelhead and chinook salmon. For simulated postmitigation water temperature, the total thermal suitability units for steelhead and chinook salmon life stages are roughly equivalent to the total thermal suitability units for simulated preproject water temperature (U.S. Army Corps of Engineers, 2000c). For example, total thermal suitability units are shown in Figure 4-3 for juvenile steelhead, a life stage that potentially occurs year round in the Project area. The total thermal suitability units were calculated by month for preproject, postproject, and postmitigation simulated water temperature.

4.4.3 Measurable Objectives and Adaptive Management

Evaluation of simulated temperatures will provide information for the AMT to assess whether Project construction and operation are resulting in water temperature conditions that continue to support steelhead and chinook salmon. Evaluation of temperature effects requires simulated water temperature data for pre- and postproject conditions.

Use of simulated pre- and postproject water temperature enables clearer evaluation of Project effects than would the use of measured water temperature. Variable stream flow, weather, stream channel geometry, and heat transfer will cause substantial differences



Preproject = 1990 conditions; Postproject = year 0 after construction; Postmitigation = year 40 after construction

Figure 4-3. Total Thermal Suitability Units for Juvenile Steelhead Rearing Calculated from Simulated Water Temperatures for the Dry/Median Year in All Stream Segments Affected by the Project

TABLE 4-7. Temperature Requirements (°F) for Life Stages of Chinook Salmon and Steelhead during the Months Present in the Guadalupe River

This table indicates optimal, suboptimal and unacceptable temperatures for various life stages of chinook salmon and steelhead.

Life Stage	Chinook Salmon	Steelhead
Prespawning Adults	August-December	November-April
Optimal	46.4 - 53.6	44.0 - 57.0
Suboptimal	53.6 - 75.2	57.0 - 65.0
Unacceptable	>75.2	>65.0
Egg Incubation	October-March	January-May
Optimal	41.0 - 57.2	44.6 - 53.6
Suboptimal	57.2 - 60.8	53.6 - 60.8
Lethal	>60.8	>60.8
Juvenile Rearing	January-June	All Months
Optimal	53.6 - 64.4	53.6 - 64.4
Suboptimal	64.4 - 75.2	64.4 - 77.0
Lethal	>75.2	>77.0
Juvenile Outmigration	February-June	January-July
Optimal	53.6 - 64.4	44.6 - 59.9
Suboptimal	64.4 - 75.2	59.9 - 66.2
Unacceptable	>75.2	>66.2

Sources: Raleigh et al. 1984, 1986, Rich 1987, Shapovalov and Taft 1954, Moyle 1976.

between measured pre- and postproject water temperature. Flow levels and weather, including humidity, wind, and solar radiation, are not affected by the Project. Therefore, Project effects will be difficult to identify because differences in measured water temperature for pre- and postproject conditions may be attributable to variability unrelated to Project components.

Simulated water temperature is used to more clearly identify the effects of the Project on water temperature. Simulated water temperature allows removal of the confounding effects of variable weather and flow levels under future conditions, thereby permitting a clear representation of the effects of Project changes to stream geometry and heat transfer. For each year of weather and flow conditions, pre- and postproject water temperature will be simulated using measured pre- and postproject heat transfer and stream channel geometry. Measured water temperature will be used to calibrate and confirm the accuracy and precision of simulated temperature.

In addition, a calibrated water temperature model is a valuable tool that will enable the AMT to identify the most appropriate remedial actions relative to implementation cost and level of benefit to steelhead and chinook salmon. Based on recommendations of the AMT, possible remedial actions may include increased shade, stream depth, or flow. The potential change in water temperature can be simulated, demonstrating the magnitude of effects from the proposed remedial actions. Use of simulated water temperature provides the best

approach to ensuring that Project construction and maintenance provide water temperature conditions that will continue to support steelhead and chinook salmon.

Failure to meet measurable objectives for the indicators below will trigger evaluation of the cause of failure by the AMT and selection of appropriate remedial actions by the AMT. Remedial actions described in this MMP are only potential actions that could be recommended by the AMT, and the AMT may select alternative remedial actions. Because remedial actions may or may not be necessary and the remedial actions that the AMT may select are not known at this time, the effects of all remedial actions have not been analyzed in the environmental compliance document for the Project (U.S. Army Corps of Engineers, 2000c). Subsequent environmental analysis of selected remedial actions, if necessary, will be performed at the direction of the AMT.

4.4.3.1 General Monitoring Framework: Water Temperature Data and Simulation

To determine the effects of mitigation on water temperature, hourly pre- and postproject water temperature will be simulated for postproject flow and weather conditions and pre- and postproject heat transfer and stream channel geometry conditions (Figure 4-4). The difference between the simulated pre- and postproject water temperature will reflect water temperature change attributable to the Project effects on stream channel geometry and heat transfer.

The model used to simulate pre- and postproject water temperature for postproject weather and flow conditions will be determined by the AMT. The selected model must simulate hourly water temperature and have the accuracy and precision needed to determine water temperature differences attributable to Project changes in heat transfer and stream channel geometry conditions. The model used to simulate pre- and postproject water temperature must be able to incorporate the following variables:

- Flow from the upstream river segment
- Flow out of the modeled river segment
- Local outflow
- Local inflow
- Initial water temperature from the upstream river segment
- Temperature of local inflow
- Heat transfer
- Average depth of the modeled river segment and
- Volume of water in the modeled river segment

Equations incorporating heat transfer, stream depth, and stream width could be integrated by river segment to simulate pre- and postproject water temperature (Hetrick et al., 1998). However, an accurate and precise simulation of water temperature through time at variable

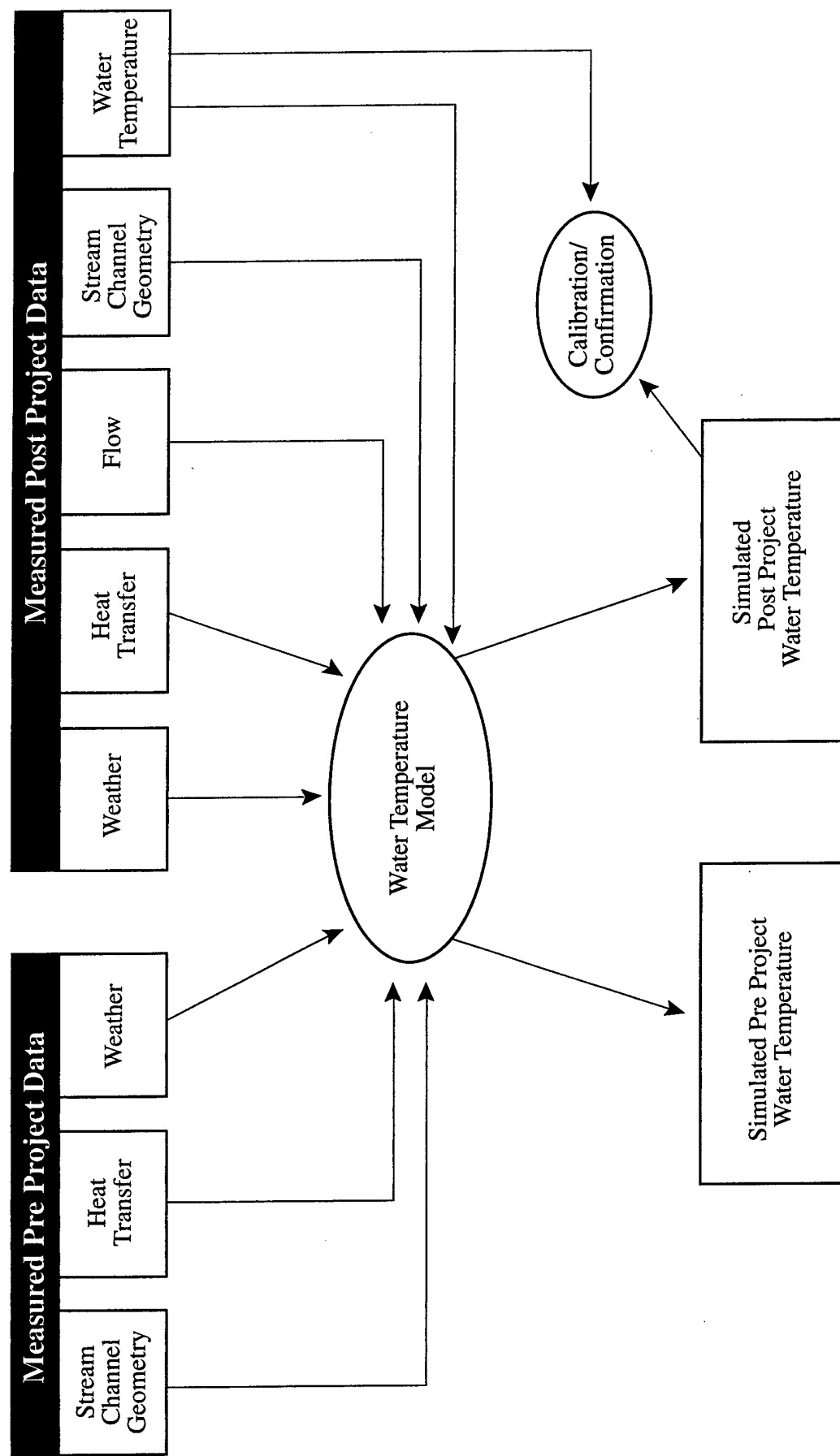


Figure 4-4. Simulation of Pre and Post Project Water Temperature under Post Project Weather and Flow Conditions

flows and multiple locations requires many equations that are appropriately combined into a water temperature model. The JSATEMP stream temperature model, developed and calibrated for the Guadalupe River system, was used to simulate water temperature and to assess Project effects (Jones & Stokes Associates, 1997b). JSATEMP could also be used to simulate water temperature in evaluating mitigation success.

Weather, flow, water temperature, heat transfer, and stream channel geometry are required input variables for a water temperature model (Figure 4-4); the data for these variables must reflect actual conditions. Hourly weather data, including humidity and solar radiation, will be obtained from the California Irrigation Management Information System (CIMIS) station at the San Jose International Airport. Flow data will be obtained from the U.S. Geological Survey (USGS)-operated gage (11169000) on the Guadalupe River and from SCVWD-operated stream gages located on the Guadalupe River (SF20 and SF23b), Alamitos Creek (SF16 and SF70), Arroyo Callero (SF13), Guadalupe Creek (SF17 and SF43), Ross Creek (SF51), Canoas Creek (SF73), and Los Gatos Creek (SF50). Additional SCVWD-operated gages may be required to adequately account for the effects of local inflows from storm drains, groundwater, and tributaries and local outflows from evapotranspiration, water diversions, and streambottom percolation.

Measured Water Temperature Monitoring. Measured water temperature data will be entered into the model for upstream segments to initiate the temperature simulation. Measured water temperature will also be used to calibrate and confirm model precision and accuracy. Water temperatures simulated for weather, flow, channel geometry, and heat transfer conditions during a given period will be compared to water temperatures measured for that period. The comparison will be included in the annual report to the AMT. Precision and accuracy must be sufficient to enable assessment of Project effects on water temperature and potential effects of water temperature differences on steelhead and chinook salmon. If the AMT determines that precision and accuracy of the simulated water temperature is inadequate, the most likely cause will be identified and the model recalibrated and confirmed within a 3 month period. Any additional monitoring needs will be identified and incorporated in the ongoing responsibilities of SCVWD with Corps oversight.

Hourly water temperature will be recorded year-round at a minimum of eight locations, including:

- Downstream from Masson Dam on Guadalupe Creek
- Upstream from Almaden Expressway on Guadalupe Creek
- Near Grant Street on the Guadalupe River
- Downstream and upstream from the confluence with Los Gatos Creek on the Guadalupe River
- On Los Gatos Creek near the confluence with the Guadalupe River
- Near Coleman Avenue on the Guadalupe River
- Near I-880 on the Guadalupe River and
- Near Airport Parkway on the Guadalupe River

Hourly water temperature will be recorded continuously, although measurement may be discontinued at some locations during high flow conditions to minimize loss of equipment and already-recorded temperature data. Beginning in 1996, hourly water temperature has been collected for variable periods at most of these locations. Hourly water temperature will be collected at all locations beginning in 2000. Temperature monitoring may be extended through the life of the Project if determined necessary by the AMT.

Heat Transfer. In this document heat transfer is defined as the amount of solar radiation encountering the stream surface. Shade is a primary factor affecting heat transfer. Project components alter the amount of shade through effects on riparian vegetation, topography, and bridges or other structures.

Solar and reflected radiation encountering the stream surface will be measured at randomly selected stream cross sections. Measurements will be taken with a pyranometer or other suitable instrument at the stream center and half the distance to the left and right banks. One cross section will be selected for each 100 feet of stream length, for a total of approximately 300 cross sections within the Project area, including Guadalupe Creek and Reach A. After initial evaluation, the number of cross sections may be increased or reduced to provide an estimate of radiation with a precision of approximately 5 percent (Cochran, 1963). For each cross section, radiation will be measured at approximately 2-hour intervals between sunrise and sunset during sunny days in March, June, and September. The radiation measured for each cross section, when compared to full-sun measurements, will indicate the effect of shade provided by deciduous riparian vegetation and the effect of sun angle relative to stream orientation and season.

Digital daylight integrators, pyranometer, or other suitable devices will be used to measure radiation (Ward and Meehan, 1984 in Hetrick et al., 1998). The rate of heat transfer per minute (langley/minute) will be calculated. A shade ratio would be calculated by dividing heat transfer (langley/minute) for the cross section by the solar radiation value (langley/minute) recorded for the same time at the CIMIS station located at the San Jose International Airport. Shade ratios will be used to convert hourly solar radiation values collected continuously at the CIMIS station to hourly heat transfer values for each cross section. If necessary, other continuous solar radiation data may be substituted for the CIMIS data.

Heat transfer will be measured for preproject conditions, immediately after Project construction, and every fifth year thereafter. The AMT will determine the need for heat transfer measurements after year 10. For reaches with previously completed Project components (Segments 1 and 2), preproject heat transfer will be estimated based on preproject shade estimates (Jones & Stokes Associates, 1997b).

Stream Channel Geometry. Stream channel geometry affects the time of travel through a given river segment and the stream volume potentially receiving solar radiation. Stream channel measurements include width and depth. For each of the cross sections described in the preceding section (Section 4.4.3.1.1, "Heat Transfer"), stream width and depth will be recorded. Depth will be measured at 2-foot intervals and averaged for each cross section.

Stream channel geometry will be measured in all transects for normal summer flow conditions (< 10 cfs) and again for normal winter flow conditions (10-30 cfs). Channel

geometry will be measured for preproject conditions, immediately after Project construction, and every fifth year thereafter. The AMT will determine the need for geometry measurements after year 10. For reaches with previously completed Project components, preproject geometry will be estimated based on available information.

4.4.3.2 Monthly Thermal Suitability Indicator for Anadromous Fish Habitat

Monthly thermal suitability units will be used as an indicator for water temperature effects on steelhead and chinook salmon life stages. Thermal suitability units are the product of stream surface area times a suitability index. A suitability index is assigned to hourly water temperature based on optimal, sub-optimal, and lethal effects of temperature on each species and life stage (Table 4-7). Thermal suitability units provide a common unit of currency that enables accounting for improved water temperature conditions in some river segments and degraded water temperature conditions in other segments. Shade provided by growth of riparian vegetation in SRA cover mitigation areas is expected to improve water temperature conditions. Removal of riparian vegetation and change in-channel geometry may degrade water temperature conditions.

Calculation of thermal suitability units is not the same as calculations made for the HEP (Jones & Stokes Associates, 1997a). Thermal suitability units isolate the thermal effect and sum the effect for the entire Project, including the effects of SRA cover mitigation in Reach A and Guadalupe Creek.

Measurable Objective. The measurable objective for the monthly thermal suitability indicator for anadromous fish habitat requires that total monthly thermal suitability units for steelhead and chinook salmon life stages under postproject conditions equal or exceed preproject thermal suitability units within 40 years of Project construction. The difference between preproject thermal suitability units and postproject thermal suitability units must indicate a decreasing trend by year 10.

Monitoring Methods. Monthly thermal suitability units are the product of stream surface area and the monthly average suitability index. Stream surface area is calculated from stream width and river segment length data (Section 4.4.3.1, "General Monitoring Framework: Water Temperature Data and Simulation").

Suitability indices are assigned to hourly water temperature based on the potential temperature effects on each species and life stage. Hourly pre- and postproject water temperature will be simulated (Section 4.4.3.1, "General Monitoring Framework: Water Temperature Data and Simulation"). A suitability index (SI) is a unitless number bounded by 0 and 1 (Fris and DeHaven, 1993, U.S. Fish and Wildlife Service, 1982). For water temperature, 0 indicates that the life stage would not survive and 1 indicates optimal temperature conditions. The SI values that would be assigned to each water temperature are shown in Table 4-8 for each species and life stage. For example, a water temperature of 70 °F would be assigned an SI value of about 0.5 for juvenile steelhead, juvenile chinook salmon, and smolt chinook salmon; an SI value of 0.26 for adult chinook salmon; and an SI value of 0.00 for chinook salmon eggs and steelhead smolt, adults, and eggs.

The monthly average suitability index is the average of all SI values assigned for a species and life stage to each hourly water temperature for a month. The total monthly suitability units for the Project are the sum of the monthly thermal suitability units for all river

TABLE 4-8. Suitability Indices for Water Temperature Effects on All Life Stages of Steelhead and Chinook Salmon

Water Temperature (°F)	Suitability Indices							
	Steelhead				Chinook Salmon			
	Juvenile	Smolt	Adult	Eggs	Juvenile	Smolt	Adult	Eggs
53	1	1	1	1	1	1	1	1
54	1	1	1	0.88	1	1	0.96	1
55	1	1	1	0.75	1	1	0.91	1
56	1	1	1	0.63	1	1	0.87	1
57	1	1	1	0.5	1	1	0.83	1
58	1	1	0.88	0.38	1	1	0.78	0.75
59	1	1	0.75	0.25	1	1	0.74	0.5
60	1	1	0.63	0.13	1	1	0.7	0.25
61	1	0.86	0.5	0	1	1	0.65	0
62	1	0.69	0.38	0	1	1	0.61	0
63	1	0.52	0.25	0	1	1	0.57	0
64	1	0.36	0.13	0	1	1	0.52	0
65	0.92	0.19	0	0	0.92	0.92	0.48	0
66	0.85	0.02	0	0	0.83	0.83	0.43	0
67	0.77	0	0	0	0.75	0.75	0.39	0
68	0.69	0	0	0	0.67	0.67	0.35	0
69	0.62	0	0	0	0.58	0.58	0.3	0
70	0.54	0	0	0	0.5	0.5	0.26	0
71	0.46	0	0	0	0.42	0.42	0.22	0
72	0.38	0	0	0	0.33	0.33	0.17	0
73	0.31	0	0	0	0.25	0.25	0.13	0
74	0.23	0	0	0	0.17	0.17	0.09	0
75	0.15	0	0	0	0.08	0.08	0.04	0
76	0.08	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0	0

Based on Raleigh et al. 1984, 1986, Rich 1987

segments. For all life stages of steelhead and chinook salmon, total monthly suitability units will be calculated for pre- and postproject water temperature conditions during every year following Project construction. The assessment of the measurable objective for the monthly thermal suitability indicator will be included in the annual report to the AMT. In year 10, the difference between pre- and postproject thermal suitability units will be graphically evaluated to determine whether conditions are trending toward the measurable objective.

Remedial Actions. Failure to meet the measurable objective for the monthly thermal suitability indicator for anadromous fish habitat would trigger the adaptive management process defined in Chapter 3 and require the AMT to identify appropriate remedial actions. Remedial actions could include additional planting of riparian vegetation associated with SRA cover both in and outside the Project area. Remedial actions could also include increased water depth through modified bank slope and channel structure, and, following assessment of benefits and adverse effects, flow augmentation with cool water. Planting additional SRA cover mitigation sites, changes in bank and stream channel structure, and flow augmentation are not part of the Project mitigation measures. If actions outside of existing mitigation sites, in-channel construction, and flow augmentation are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented.

4.4.3.3 Short-Term Suitability Indicator for Anadromous Fish Habitat

The monthly thermal suitability units discussed above (Section 4.4.3.2, "Monthly Thermal Suitability Indicator for Anadromous Fish Habitat") enables accounting for improved and degraded water temperature conditions for the Project as SRA cover and riparian vegetation grow and provide shade. An additional indicator, however, is required to enable NMFS and the AMT to assess the need for remedial actions in the short term, prior to growth of SRA cover and riparian vegetation. The short-term indicator for water temperature for each life stage of steelhead and chinook salmon is the surface area of stream that provides suitable water temperatures.

Measurable Objective. The short-term measurable objective requires that the stream surface area with suitable temperatures under postproject conditions be equal to or greater than 50 percent of the stream surface area that would have provided suitable water temperatures under preproject conditions for current stream flow and meteorology. The measurable objective would apply to all stream areas affected by the Project: Segments 1-3, the Woz Way to Park Avenue Bypass Reach, the Guadalupe Creek offsite mitigation site, and the Reach A offsite mitigation site.

The suitable water temperatures are listed by month in Table 4-9. Suitable temperatures are those that provide SI values greater than or equal to 0.5 for each life stage of steelhead and chinook salmon (Table 4-8). Under existing conditions, hourly water temperature in the Guadalupe River may vary by more than 5 °F to 10 °F daily and by even more throughout the month (Jones & Stokes Associates, 1997b). Given the magnitude of daily and monthly water temperature variability, monthly median hourly water temperatures that provide SI values equal to 0.5 are assumed to be the minimum threshold required to support affected life stages.

TABLE 4-9. Suitable Water Temperatures (°F) for Each Life Stage of Steelhead and Chinook Salmon

Suitable water temperatures are monthly median hourly water temperatures that provide SI values >0.5 for each life stage of steelhead and chinook salmon.

Month	Steelhead				Chinook Salmon			
	Juvenile	Smolt	Adult	Eggs	Juvenile	Smolt	Adult	Eggs
Jan	70	63	61	57	70	—	—	59
Feb	70	63	61	57	70	70	—	59
Mar	70	63	61	57	70	70	—	59
Apr	70	63	61	57	70	70	—	—
May	70	63	—	57	70	70	—	—
Jun	70	63	—	—	70	70	—	—
Jul	70	—	—	—	—	—	—	—
Aug	70	—	—	—	—	—	64	—
Sep	70	—	—	—	—	—	64	—
Oct	70	—	—	—	—	—	64	59
Nov	70	—	61	—	—	—	64	59
Dec	70	—	61	—	—	—	64	59

Note: — = indicates the life stage would not be present in the Guadalupe River

For example, the suitable temperature in July is 70 °F for juvenile steelhead, the only species and life stage present (Table 4-9). If the stream surface area with median water temperatures less than or equal to 70 °F totals 10,000 square feet for preproject conditions, then the stream surface area with median water temperatures less than or equal to 70 °F must total at least 5,000 square feet for postproject conditions to meet the short-term measurable objective for the short-term suitability indicator for anadromous fish habitat.

The analysis would be performed for all life stages of steelhead and chinook salmon present in a given month. Although preproject conditions may not be suitable for one life stage, less sensitive life stages may have been supported. For example, preproject water temperatures in April may not have supported adult migration and egg incubation for steelhead, but may have supported juvenile and smolt life stages of steelhead and chinook salmon. Postproject conditions, therefore, must also support juvenile and smolt life stages. Potential presence of a life stage is based on general life history data and observations in the Guadalupe River.

Water temperature information for all stream segments and information on juvenile and adult salmonid occurrence (Section 4.7, "Anadromous Fish Occurrence") will be provided to the AMT. The measurable objective for the short-term suitability indicator must be met every month for at least the first 10 years following Project construction. The assessment of the measurable objective for the short-term suitability indicator will be included in a monthly letter report and in the annual report to the AMT. If the measurable objective for the monthly thermal suitability indicator is met by year 10 (Section 4.4.3.2, "Monthly

Thermal Suitability Indicator for Anadromous Fish Habitat”), the AMT will determine whether use of the short-term indicator should continue.

Monitoring Methods. Measured water temperatures will be used to calibrate and confirm water temperature model precision and accuracy. Hourly preproject and postproject water temperature will be simulated for each month following Project construction (Section 4.4.3.1, “General Monitoring Framework: Water Temperature Data and Simulation”). Simulated preproject temperatures will be dependent on the postproject flow and meteorology conditions, and, therefore will not be the same as the temperatures presented in the EIR/SEIS. The monthly median hourly water temperature will be calculated for simulated preproject and postproject conditions in each segment of the water temperature model. The median is the midpoint of all hourly water temperatures for a given month: 50 percent of the time water temperatures are cooler and 50 percent of the time they are warmer. The area of each water temperature model segment for each month will be calculated from the average width of the stream and total length of the model segment.

Remedial Actions. If the monthly letter report to the AMT indicates that the measurable objective for the short-term suitability indicator for anadromous fish habitat was not met, the AMT will determine the appropriate remedial action. Potential remedial actions that may be considered by the AMT include increasing the density of plantings of SRA cover vegetation in the Project area with large, fast-growing tree stock; increasing the water depth by adjusting the invert stabilization structures and low-flow channel check-structures in Segments in 3A and 3B; flow augmentation with cool water; and planting additional offsite mitigation areas. These remedial actions are not part of the Project mitigation measures. If the AMT selects any of these remedial actions, environmental analysis, documentation, review, and required permits will need to be obtained at the direction of the AMT before the actions are implemented. With respect to flow augmentation, the feasibility of this remedial action would be constrained by water management operations described in Chapter 1 (Section 1.4, “Limitation on Mitigation Program”).

A temporary shade remedial action would be implemented if required by NMFS to meet the conditions in NMFS Biological Opinion for effects on steelhead. Temporary shade may be implemented in the armored low-flow channel sections of Segments 2, 3A, and 3B, excluding locations where the armored low-flow channel is covered by bridges. Temporary shade will not be installed in Segment 3C because much of it is covered by bridges. The preferred option for providing temporary shade is to place boxed trees adjacent to the armored low-flow channel. These trees would be removed in the fall and replaced in the spring. Another option would include suspension of shade cloth across the armored low-flow channel sections in Segments 2, 3A, and 3B. Installation and operation of temporary shade will be monitored to verify the temperature benefits of the shade measure(s) used.

If monitored water temperature (Section 4.4.3.1, “Water Temperature Monitoring”) and anadromous fish occurrence (Section 4.7, “Anadromous Fish Occurrence”) indicate that the short-term suitability indicator has not ensured water temperature conditions that will continue to support steelhead and chinook salmon, the AMT may require implementation of alternative measurable objectives or indicators as a remedial action. An alternative measurable objective may include having to provide a stream surface area with suitable water temperatures that is greater than 60 or 70 percent of the stream surface area that

would have provided suitable water temperatures under preproject conditions. Alternatives to using median water temperatures for evaluating suitability may include using the monthly average of daily maximum water temperatures, duration of temperatures above specific thresholds, or maximum daily temperature fluctuation.

4.5 Anadromous Fish Spawning Habitat

4.5.1 Project Effects

The 1992 Mitigation and Monitoring Plan (U.S. Army Corps of Engineers, 1992) identified approximately 25,400 square feet of spawning gravel in the Project area (Appendix E). Gravel survey data from that document indicate potential effects on spawning gravel on a reach-by-reach basis for a worst-case scenario (Table 4-10). The affected spawning gravel would be less than 24,850 square feet, depending on construction activities and losses to increased scour subsequent to construction of project elements (U.S. Army Corps of Engineers, 1992). Gravel losses could range from 400 to 1,000 square feet in Segment 1, 600 to 3,400 square feet in Segment 2, and 12,500 to 20,600 square feet in Segment 3.

4.5.2 Mitigation

Up to 25,190 square feet of spawning gravel will be placed in both the natural and armored riverbed sections of Segments 3A and 3B after construction (Table 4-10). Spawning gravels will also be placed in Segments 1 and 2. Any gravel placed as mitigation must be a minimum of 1 foot deep. Depth refers to the thickness of the gravel layer, not water depth. Installation of spawning gravel will be monitored to verify the benefits of the action. The proposed invert stabilization features that will be placed in the natural channel and in the armored invert sections of the low-flow channel in Segments 3A and 3B are expected to encourage gravel deposition that may lead to the formation of potential spawning habitat.

4.5.3 Measurable Objectives and Adaptive Management

Chinook salmon and steelhead have specific substrate requirements for successful spawning. In general, both species require silt-free gravel substrates in riffle-run areas (Raleigh et al., 1984). Indicators for spawning gravel will include gravel abundance and quality. Monitoring of these indicators will provide information for the AMT to assess whether Project construction and operation provide adequate spawning habitat and whether mitigation measures have been successful.

Failure to meet measurable objectives for the indicators below will trigger evaluation of the cause of failure by the AMT and selection of appropriate remedial actions by the AMT. Remedial actions described in this MMP are only potential actions that could be recommended by the AMT, and the AMT may select alternative remedial actions. Because remedial actions may or may not be necessary and the remedial actions that the AMT may select are not known at this time, the effects of all remedial actions have not been analyzed in the environmental compliance document for the Project (U.S. Army Corps of Engineers, 1999b). Subsequent environmental analysis of selected remedial actions, if necessary, will be performed at the direction of the AMT.

TABLE 4-10. Reach-Specific Direct and Indirect Effects and Mitigation Measures for Spawning Habitat Affected by the Guadalupe River Project; Gravel (in square feet)

Project Segment	Reach Specific Effects By Construction Start Date						Total Effects
	1992	1994	1998	1999	2000	2002	
Segment 1	1,000						1,000
Segment 2		3,390					3,390
Segment 3A						10,060	10,060
Segment 3B						9,700	9,700
Segment 3C				700			700
Total Effects	1,000	3,390		700		19,760	24,850

Project Segment	Reach Specific Mitigation By Implementation Start Date							Total Mitigation
	1992	1994	1998	1999	2000	2001	2002	
Segment 1					1,000			1,000
Segment 2					3,335			3,335
Segment 3A							10,617	10,617
Segment 3B							10,238	10,238
Segment 3C								
Total Mitigation					4,335		20,855	25,190

Spawning habitat (gravel) effects and mitigation are based on the Guadalupe River Project Final Mitigation and Monitoring Plan (U.S. Army Corps of Engineers, 1992).

4.5.3.1 Abundance Indicator for Spawning Gravel

The indicator for spawning gravel abundance is the area of rounded river gravel in patches at least 3 feet in diameter and 0.5 feet deep (depth refers to thickness of the gravel layer). The approximate 0.5-foot gravel depth was used as a minimum for the indicator because chinook salmon redds in the Guadalupe River have been observed in gravel less than 1 foot deep.

Measurable Objective. If the Guadalupe River Project affects 24,850 sf of spawning gravel, up to 25,190 sf (465 cubic yards) of river-run gravel will be restocked in Segments 1 and 2 and Segments 3A and 3B (Table 4-8). River-run gravels will be placed at appropriate spawning habitat locations whenever gravel coverage drops below approximately 20,000 sf (80 percent of the preproject level; U.S. Army Corps of Engineers, 1992) and will bring total spawning gravel abundance up to at least 25,190 sf. The approximate area of spawning gravel in Segments 1, 2, and 3 have been estimated for preproject conditions (U.S. Army Corps of Engineers, 1992; Appendix E). The approximate area of spawning gravel will be measured for preproject conditions in the Guadalupe Creek and Reach A mitigation reaches.

In addition, spawning gravel must occur at an elevation that will be inundated by the stream during the spawning period. When gravel elevation information is available, cumulative postproject abundance at a given elevation must be at least 75 percent of the

preproject abundance at the same elevation. Calculation of cumulative abundance begins with the lowest elevation relative to the stream channel bed.

Monitoring Methods. Potential spawning habitat through the entire Project area will be surveyed, including spawning habitat in the Reach A and Guadalupe Creek mitigation areas. Areas where gravel is removed as part of regular Project maintenance will not be included in the survey total. Only patches of gravel with an area exceeding 10 square feet will be included in the survey, unless spawning is documented in smaller patches. For example, patches 3 feet in diameter or 2 feet by 5 feet would be included. Gravel patches included in the calculation of area must be at least 6 inches thick and must not be armored with cobbles or rocks greater than 6 inches in any dimension. Gravel size will range from 0.25 to 4.0 inches in diameter and average 2.0 inches in diameter (Raleigh et al., 1984,1986). Armoring and gravel size will be visually estimated.

The potential spawning habitat will be recorded on a map or aerial photograph or in a geographical database. The area of gravel will be recorded for each foot of elevation relative to the lowest point on a transect across the channel. For example, if the water in the channel is 2 feet deep, the area of gravel covered by at least 1 foot of water would be estimated first. The area of gravel covered by less than one foot of water would be estimated next. The area of gravel in the stream channel currently uncovered by water would be measured for one foot intervals above the stream surface.

Surveys will be completed for preproject conditions in the Guadalupe Creek and Reach A mitigation reaches and annually throughout the Project area for 5 years after Project construction. After year 5, surveys would be conducted every fifth year if the AMT determines they are needed. Surveys will occur between March and October under normal summer low-flow conditions.

Remedial Actions. Failure to meet the measurable objective for the abundance indicator for spawning gravel in any year would trigger replacement of spawning gravel. Remedial actions could include addition of gravel to appropriate spawning areas in the Project reaches. Placement of boulders, construction of weirs, or other changes in channel geometry may be implemented to retain spawning gravel in the Project reaches. Gravel that is lost on an ongoing basis as a result of the Project may also be replaced by creating gravel sources at upstream locations outside the Project area. Change in bank and stream channel structure and placement of gravel at upstream locations outside of the Project area are not part of the Project mitigation measures. If in-channel construction and gravel placement outside of the Project area are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented.

The AMT will consult with a qualified fish biologist and geomorphologist to identify appropriate remedial actions. The areas where gravel is placed, in both engineered and natural channels, will maximize the potential value as spawning habitat for chinook salmon and steelhead. Any gravel placed as a remedial action must be a minimum of 1 foot deep. Depth refers to the thickness of the gravel layer, not water depth.

4.5.3.2 Quality Indicator for Spawning Gravel

The indicator for spawning gravel quality is substrate score. Substrate score is determined by visual evaluation of the substrate particles, the material surrounding the substrate particles, and embeddedness. Embeddedness is the extent to which the substrate particles are covered by fine sediment.

Measurable Objective. Spawning gravel quality must equal or exceed preproject conditions. That is, the substrate score for postproject conditions must equal or exceed the substrate score for preproject conditions. Given that construction has been completed in Segments 1 and 2 and has begun in Segment 3, spawning gravel quality must not deteriorate from the initial postproject surveys.

Monitoring Methods. Potential spawning habitat throughout the Project area will be surveyed, including spawning habitat in the Reach A and Guadalupe Creek mitigation areas. Gravel samples will be excavated from at least 50 randomly selected gravel patches. If initial surveys indicate that 50 samples are infeasible, the number of samples needed will be reviewed and adjusted by the AMT. A 6-inch-diameter sample will be excavated with a shovel to a depth of at least 6 inches and evaluated visually by a qualified fish biologist for substrate characteristics.

The visual evaluation will include assigning a substrate score (Grouse et al., 1981). The substrate score is the sum of four ranks, which are assigned based on the substrate characteristics shown in Tables 4-11 and 4-12. The first rank is assigned based on the size of the predominant particle (Table 4-11). The predominant particle is the particle size that constitutes the greatest proportion of total gravel volume. The second rank is assigned based on the size of the second most predominant particle. The third rank is assigned to the material surrounding the predominant substrate particles. Finally, the fourth rank indicates embeddedness (Table 4-12). Embeddedness is the extent to which the predominant particles are covered by fine sediment. To improve consistency between surveys, the ranks will be photographically documented during the initial survey, and the photographs will be used in subsequent surveys.

TABLE 4-11. Numerical Rank of Particle Size for Steelhead and Chinook Salmon Spawning Habitat

Particle Characteristic	Rank
organic cover over 50 percent of the bottom surface	1
<2 mm	2
2-5 mm	3
5-25 mm	4
25-100 mm	5

Modified from Grouse et al., 1981.

TABLE 4-12. Numerical Rank of Percentage Embeddedness for Steelhead and Chinook Salmon Spawning Habitat

Percentage Embeddedness	Rank
100 percent embedded	1
75 percent embedded	2
50 percent embedded	3
25 percent embedded	4
Unembedded	5

Modified from Grouse et al., 1981.

The gravel surveys will be completed for preproject conditions in the Guadalupe Creek and Reach A mitigation reaches and annually throughout the Project area for 5 years after Project construction. After year 5, surveys would be conducted every fifth year if the AMT determines they are needed. The surveys will occur along with the gravel abundance surveys between March and October under normal summer low-flow conditions (Section 4.5.3.1, "Abundance Indicator for Spawning Gravel").

Remedial Actions. Failure to meet the measurable objective for the quality indicator for spawning habitat in any year could trigger the same actions as indicated for gravel abundance (Section 4.5.3.1, "Abundance Indicator for Spawning Gravel"). In addition, actions may be taken to reduce input of fine sediment and to remove fine sediment from spawning habitat. The AMT will consult with a qualified fish biologist and geomorphologist to identify appropriate remedial actions.

4.6 Anadromous Fish Passage and Rearing Habitat

4.6.1 Project Effects

The worst-case scenario for the bypass alternative will result in 4,433 lf of riverbed armoring and other channel modifications. Riverbed armoring can block upstream passage of anadromous fish by reducing water depth at low flows and increasing velocity at high flows. The flood floodplain terrace between Coleman Avenue and Interstate 880 could lower water levels within the natural river channel and hamper anadromous fish passage by reducing water depth. Low-flow riverbed stabilization structures, including weirs, may create vertical barriers to fish passage. In addition, bank armoring, riverbed armoring, and invert stabilization may modify or eliminate pools, riffles, and runs. Changes in pool, riffle, and run structure and occurrence in a river system may adversely affect the availability and quality of anadromous fish rearing habitat as well as water temperature, cover, and food availability (U.S. Army Corps of Engineers, 1999b, Raleigh et al., 1994).

4.6.2 Mitigation

Several features are included in the Project design to avoid adverse effects on fish passage and minimize changes in fish rearing habitat. In Segments 1, 2, and 3C, a low-flow channel

similar to the trapezoid/boulder design will be constructed in the armored riverbed sections (Figure 2-6). Notched weirs are components of the low-flow channel constructed in Segments 1 and 2. In Segment 1, the low-flow channel is located upstream, under, and downstream from the I-880 Bridge. In Segment 2, the low-flow channel is located under and downstream from Coleman Avenue. Also in Segment 2, a weir structure was constructed at the upstream end of the secondary channel to ensure that sufficient flows remain in the river channel for migratory salmonids. The weir was designed to ensure that instream flows up to a minimum of 10 cfs remain in the natural channel (U.S. Corps of Engineers, 1992).

Diversion to the secondary channel begins at approximately 10-15 cfs. For flows less than 1,000 cfs, the flow split is approximately 20 percent to the secondary channel and floodplain terrace with 80 percent remaining in the natural channel (Reiller, 1999). Over 1,000 cfs, the flow split progressively increases into the secondary channel and floodplain terrace.

In Segment 3C, the low-flow channel will be located downstream from Grant Avenue to downstream from I-280. In Segments 3A and 3B, weirs may be constructed on top of the armored riverbed to create a low-flow channel and enhance fish-rearing habitat (Figures 2-5). The weirs will increase instream cover and provide improved spawning and rearing habitat. Pools and riffles will also be created. In Segments 3A and 3B and Reach A, the riverbed may also be stabilized in natural channel areas to minimize or eliminate further localized down cutting of the river and subsequent bank loss and encourage creation of a low-flow channel.

In Guadalupe Creek, geomorphic instream features, including rock weirs and vanes, root wads, deflector logs, and biotechnical bank stabilization measures, will be installed within the natural channel. All of these features will provide "back eddies" and cover for anadromous fish. Structures installed along the bank will encourage establishment of streamside vegetation and development of pools, riffles, and deeper runs.

4.6.3 Measurable Objectives and Adaptive Management

Indicators for anadromous fish passage and rearing habitat include depth and velocity, vertical barriers, and diversity of rearing habitat. Monitoring of these indicators will provide information for the AMT to assess whether Project construction and operations provide adequate fish passage and habitat conditions and whether mitigation measures have been successful.

4.6.3.1 Depth and Velocity Indicator for Anadromous Fish Passage

The purpose of the depth and velocity indicator is to ensure that movement of juvenile and adult chinook salmon and steelhead is not impaired by Project changes to channel geometry. Depth and velocity conditions will be monitored at all Project locations, including Reach A and Guadalupe Creek, where the stream channel has been modified by armoring, construction of a trapezoid/boulder low-flow channel or other low-flow channel, and construction of low-flow channel check structures or invert stabilization structures, and in the natural channel downstream from the weir structure in Segment 2.

Measurable Objective. Water depth and velocity where the stream channel has been modified by armoring must allow adequate upstream migration of adult steelhead and chinook salmon when flow is greater than or equal to 4 cfs. To provide for fish passage, water depth within all the different constructed low-flow channels will exceed 1 foot at

flows greater than or equal to 4 cfs. When flow is within the capacity of the low-flow channel, velocity will be less than 5 feet per second throughout the Project area during the October-March adult migration period (U.S. Army Corps of Engineers, 1992). Depth and velocity criteria will be met for at least a continuous portion of 10 percent or 4 feet of the total stream width, whichever is greater. A depth of less than 1 foot may not adversely affect migration and could be allowable within isolated segments that are less than 6 feet long. Also, velocity equal to or greater than 5 feet per second may not adversely affect migration and could be allowable within isolated segments that are less than 6 feet long. Exceptions to the measurable objective must be supported by visual confirmation that fish passage is not impaired at the potential blockage.

The depth criterion approximates those of Thompson (1972), who suggested that steelhead and chinook salmon require water depths of 0.6 and 0.8 feet, respectively, for passage. Although the velocity criterion is less than the 8.0 feet per second maximum recommended by Thompson (1972), a conservative approach is warranted because other factors, such as channel roughness and width, determine overall velocity effects on fish passage.

In addition, the flow split at the weir structure in Segment 2 must be maintained as designed. Instream flows will remain in the natural channel up to a minimum of 300 cfs. Diversion to the secondary channel will begin at approximately 300 cfs. For flows less than 1,000 cfs, the flow split will be approximately 20 percent to the secondary channel and flood floodplain terrace and 80 percent to the natural channel. At flows of more than 1,000 cfs, the flow split will progressively increase into the secondary channel and flood floodplain terrace. As flows recede, the secondary channel must maintain a connection sufficient to enable fish to move back into the main river channel.

Monitoring Methods. All Project locations will be visually surveyed, including Reach A and Guadalupe Creek. Visual surveys will be conducted by qualified fish biologists to identify potential critical stream reaches that may delay or prevent passage of migrating steelhead and chinook salmon. Critical stream reaches are areas of channel constriction that could increase water velocity under high-flow conditions and shallow riffles caused by Project features. Channel width may be constricted by culverts, boulder-filled areas, or armored invert features. Visual assessment is necessary because the location of critical stream reaches may change if stream bottom topography changes over time. Visual surveys of the low-flow channel, including the area downstream from the weir structure in Segment 2 and in the secondary channel, will be conducted every 2 weeks and within 3 days of every major storm event from October through March.

Depth and velocity conditions will be measured for critical stream reaches at all Project locations, including Reach A and Guadalupe Creek, where the stream channel has been modified by armoring, construction of a low-flow channel, construction of invert stabilization control structures, and the natural channel downstream from the weir structure in Segment 2. For critical riffles, depth will be measured along a cross section perpendicular to the stream flow and across the shallowest portion of the riffle. For constricted areas, velocity will be measured along a cross section perpendicular to the stream flow and across the area of highest velocity. The total width of the stream will be included in the cross section, and water depth and velocity will be measured at intervals of 2 feet or less. Depth and velocity data will be collected by using a measuring tape, depth/stadia rod, and flow meter.

Depth and velocity measurements will be conducted during the first week of October to assess passage conditions for adult steelhead and chinook salmon. Additional depth and velocity surveys will be conducted based on changes in passage conditions noted during the visual surveys. The surveys will be conducted for the life of the Project.

Remedial Actions. Failure to meet the measurable objective for the depth and velocity indicator during October through March for anadromous fish passage will trigger removal of the cause of high velocity or shallow depth within 3 working days. For remedial actions requiring major construction, the AMT will determine the cause of blockage, the responsible party, and the appropriate action. The timing of major construction activities associated with structural additions to the low-flow channel would be limited to June through September. Activities from October through May, including removal of sediment, would be limited to the minimum activity needed to allow for immediate fish passage.

Remedial actions may include measures to increase depth and reduce velocity, such as removal of sediment and other debris, structural additions to the low-flow channel, removal of structures, or flow augmentation (subject to water management operations constraints stated in Chapter 1, Section 1.4, "Limitation on Mitigation Program"). Structural additions to the low-flow channel could include addition of boulders, directional flow weirs, or flow-concentrating structures. Structural additions to the channel, removal of existing structures not including in the Project, and flow augmentation are not part of the Project mitigation measures. If in-channel construction, removal of structures, and flow augmentation are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the AMT before the actions are implemented.

4.6.3.2 Vertical Barrier Indicator for Anadromous Fish Passage

The purpose of the vertical barrier indicator is to ensure that movement of adult chinook salmon and steelhead is not impaired by Project-related effects. Vertical barriers may occur at constructed and natural features. Constructed barriers may include weirs, invert stabilization control structures, road fords, and stream gages. Natural barriers are formed by the action of the river, but Project components may create conditions that cause barrier formation. Natural barriers may include debris dams and vertical drops in channel elevation caused by down-cutting of the riverbed. Potential vertical barriers will be measured at all Project locations, including Reach A and Guadalupe Creek, where the stream channel has been modified by armoring, low-flow channel construction, and invert stabilization control structures.

Measurable Objective. Vertical barriers must allow for adequate upstream migration of adult steelhead and chinook salmon when flow is greater than or equal to 4 cfs in October through March. Where a potential vertical barrier is identified, fish passage is considered blocked when the ratio of staging pool depth to barrier height is less than 1.25 or the height and length dimensions exceed the leaping abilities for steelhead or chinook salmon (Stuart, 1962, U.S. Forest Service, 1977). At any vertical barrier greater than 0.5 feet, the minimum staging pool depth is 2 feet.

The maximum jumping height is 11.2 feet for steelhead and 7.9 feet for chinook salmon. Jumping ability is greatly affected by the jumping angle required for barrier clearance

(Powers and Orsborn, 1985, Reiser and Peacock, 1985). The Project criteria for maximum leaping height and distance for adult steelhead and chinook salmon are shown in Table 4-13. The leaping height and horizontal distance are a function of the angle of exit from the water and pool depth.

Monitoring Methods. The Project area, including the previous site of the USGS gaging weir upstream from the St. John Street Bridge, Reach A, and Guadalupe Creek, will be visually surveyed by qualified fish biologists to identify potential vertical barriers that could delay or prevent passage of migrating steelhead or chinook salmon. Visual assessment is necessary every 2 weeks from October through March because the location of barriers may change if stream bottom topography changes over time.

Vertical barrier elements will be measured at all Project locations, including Reach A and Guadalupe Creek, where the stream channel has been modified by armoring, construction of a low-flow channel, and construction of invert stabilization control structures. When

TABLE 4-13. Maximum Leaping Height and Horizontal Distance for Adult Steelhead and Chinook Salmon as Determined by the Angle of Exit from the Water and Pool Depth

Angle of Exit from Water	Minimum Pool Depth (ft)	Height of Leap (ft)	Distance of Leap (ft)
Steelhead			
40°	6.8	4.5	21.0
60°	12.0	8.0	18.4
80°	15.9	10.6	7.3
Chinook Salmon			
40°	4.5	3.0	15.2
60°	8.7	5.8	13.1
80°	11.4	7.6	5.4

Source: Powers and Orsborn, 1985, Reiser and Peacock, 1985.

potential barriers are identified, barrier height, length, and staging pool depth will be measured. Data will be collected using a measuring tape and depth/stadia rod.

Visual surveys of potential barriers will be conducted along with the visual surveys for depth and velocity (Section 4.6.3.1, "Depth and Velocity Indicator for Anadromous Fish Passage"). Barrier measurements will be made during the first week of October to assess passage conditions for adult steelhead and chinook salmon. Additional barrier measurements will be made based on changes in passage conditions noted during the visual surveys. The surveys will be conducted for the life of the Project.

Remedial Actions. Failure to meet the measurable objective for the vertical barrier indicator during October through March for anadromous fish passage will trigger removal of the cause of blockage within 3 working days. For remedial actions requiring major construction, the AMT will determine the cause of blockage, the responsible party, and the appropriate action. If construction actions that are not part of the Project mitigation measures are selected by the AMT to remediate Project effects, required environmental analysis, documents, and reviews and any required permits will be obtained at the direction of the

AMT before the actions are implemented. The timing of major construction activities associated with structural additions to the low-flow channel would be limited to June through September. Activities performed between October and May, including removal of barriers, would be limited to the minimum activity needed to allow for immediate fish passage.

4.6.3.3 Rearing Habitat Diversity Indicator for Anadromous Fish

The indicator is diversity of rearing habitat in the Project area, including Reach A and Guadalupe Creek. Diversity is reflected in the occurrence and size of riffles, pools, runs, and backwater areas. Several components of rearing habitat diversity will be monitored during the monitoring for other indicators, including depth and velocity (Section 4.6.3.1, "Depth and Velocity Indicator for Anadromous Fish Passage"), spawning habitat (Section 4.5, "Anadromous Fish Spawning Habitat"), shaded stream surface, instream cover, and bank stability (Section 4.3, "Shaded Riverine Aquatic Cover").

Measurable Objective. The occurrence and average length of habitat types will be at least within 10 percent of preproject conditions, or better than preproject conditions, which is defined as being generally within 10 percent of preproject values for any habitat type. The diversity of habitat types can be compared for multiple years through visual comparison of frequency histograms or chi-square analysis of pre- and postproject conditions (for example, Zar, 1974). Preproject conditions will be used for Segment 3 and, if available, for Segments 1 and 2. If adequate monitoring data are not available for preconstruction conditions, the AMT will determine the appropriate estimator for preproject conditions.

Monitoring Methods. Rearing habitat surveys will measure the abundance and length of four general habitat types: riffles, pools, runs, and backwater areas. Fisheries biologists will walk a hip chain in or along the stream for the entire Project area, including Reach A and Guadalupe Creek. The length, number, and location of all riffles, pools, runs, and backwater areas will be recorded on maps or aerial photographs or entered into a geographic database. Habitat quality relative to the needs of steelhead and chinook salmon will be noted, based on the judgment of a fish biologist.

Rearing habitat surveys will be conducted annually during summer low-flow conditions from May through September. Surveys will be conducted before Project construction begins, except in Segments 1 and 2, and during the first 5 years after Project construction. After year 5, surveys would be conducted every fifth year, possibly for the life of the Project, if the AMT determines they are needed.

Remedial Actions. Failure to meet the measurable objective for the rearing habitat diversity indicator for anadromous fish would trigger the adaptive management process defined in Chapter 3. The AMT will assess the need for implementing remedial actions to reestablish preproject levels of habitat diversity, assist in the design of the actions, and evaluate the results. Remedial actions to alter habitat diversity could include placing boulders, woody material, or other structures in the channel.

4.7 Anadromous Fish Occurrence

4.7.1 Project Effects

There are no direct estimates of Project effects on anadromous fish occurrence; effects on habitat conditions that affect occurrence have been discussed in the preceding sections. A total of 8,315 lf of SRA cover vegetation will be affected under a worst-case scenario (Table 4-6). The removal and modification of SRA cover vegetation will affect stream channel geometry, instream cover, and water temperature conditions.

An analysis of potential thermal effects from removal of riparian vegetation and changes in stream channel geometry indicated likely increases in water temperature by several degrees over existing conditions (Figure 4-1). The increase in water temperature under postproject conditions could result in increased stress for chinook salmon and steelhead.

A total of 4,390 square feet of spawning gravel will be affected in Segments 1 and 2 and 20,460 square feet in Segment 3 (Table 4-10). Loss or degradation of spawning gravel could affect spawning success of anadromous fish and could also affect food production in the stream.

Finally, the Project could result in 4,433 lf of riverbed armoring and other channel modifications. In-channel Project actions can block upstream passage of anadromous fish by reducing water depth at low flows, increasing velocity at high flows, and creating vertical barriers. Changes to channel geometry and SRA cover may also modify or eliminate pools, riffles, and runs, adversely affecting the availability and quality of anadromous fish rearing habitat.

4.7.2 Mitigation

Mitigation is focused on replacing and maintaining habitat values. SRA cover mitigation includes installation of stream invert stabilization structures and geomorphic instream features, including rock weirs and vanes, root wads, and deflector logs. A total of 22,892 lf of riparian vegetation will be planted in natural unarmored bank conditions as SRA cover mitigation (Table 4-6). Mitigation actions will improve bank stability, provide overhead shade, increase instream cover, and improve habitat suitability for aquatic species, including spawning and rearing habitat for fish. Shade provided by riparian vegetation is expected to cool water temperature in the Guadalupe River and Guadalupe Creek (Figures 4-1 and 4-2). After maturation of mitigation plantings (about 40 years) and implementation of other measures, water temperature conditions for chinook salmon and steelhead are expected to be equivalent to preproject conditions.

Spawning gravel will be placed in both the natural and armored riverbed sections of the Guadalupe River. Installation of stabilization features will be placed in the natural channel and in the armored invert sections. Spawning gravel abundance and quality will be maintained at preproject levels. Several in-channel features are included in the Project design to avoid adverse effects on fish passage and minimize changes in fish rearing habitat. A low-flow channel similar to the trapezoid/boulder design will be constructed in the armored riverbed sections. In Segments 3A and 3B, invert stabilization features may be constructed on top of the armored riverbed to create a low-flow channel and enhance fish

rearing habitat (Figure 2-3). The low-flow channel design and invert stabilization structures will increase instream cover and provide improved spawning and rearing habitat. Pools and riffles will also be created. The stream invert and bank may also be stabilized in natural areas to minimize or eliminate further down cutting of the river and the subsequent bank loss. All the features described above provide "back eddies" and cover, which are important habitat features for chinook salmon and steelhead.

4.7.3 Measurable Objectives and Adaptive Management

Indicators for anadromous fish occurrence will include adult migration and spawning, juvenile rearing, and juvenile migration. Monitoring of these indicators will provide information for the AMT to assess whether Project construction and operations, including mitigation actions, provide adequate conditions to support steelhead and chinook salmon.

Documentation of salmonids in the Guadalupe River prior to the Project comes largely from the reported occurrence of adult chinook salmon and steelhead, including observed spawning activity. Most reports are from within and downstream from the Project reach, although adult salmonids have been reported upstream from the Project at the base of the Blossom Hill drop structure. Annual run size for adult chinook salmon and steelhead likely varies widely. Juvenile chinook salmon and steelhead have been captured in the river as recently as 1996 to 1999. It is anticipated that monitoring will result in more consistent documentation of steelhead and chinook salmon occurrence. Although absolute abundance would vary, adult and juvenile chinook salmon and steelhead are expected to be present in the river most years, except for years when environmental conditions not related to the Project may inhibit occurrence of one or more age cohorts.

Based on results of monitoring anadromous fish occurrence, the AMT may require implementation of alternative indicators and measurable objectives that could include tagging of juvenile and adult salmonids (Chapter 3, "Mitigation, Monitoring, and Adaptive Management Objectives" and Figure 3-1). Recapture of tagged fish would provide additional information on habitat use and population abundance and distribution. The methods would need to be approved by NMFS and be consistent with the conditions for take in NMFS Biological Opinion for the Guadalupe River Project.

4.7.3.1 Adult Migration and Spawning Indicator for Anadromous Fish

The indicator for adult migration and spawning is the occurrence of adult steelhead and chinook salmon and the presence of spawning activity in the Project area. Adult steelhead are expected to occur in the Project area from November through April (Table 4-7). Spawning could occur from January through March. Adult chinook salmon occur in the Project area from September through January, with peak occurrence in October through December. Spawning occurs from October through January, with peak spawning in November and December.

Measurable Objective. The Guadalupe River must continue to support migration and spawning of adult steelhead and chinook salmon at a level that is consistent with preproject conditions and environmental conditions not affected by the Guadalupe River Project.

Occurrence of adult steelhead and chinook salmon in the Project area, including a concentration of these fish downstream from potential barriers, provides information on the

adequacy of fish passage and aid in the identification of potential critical stream reaches. The adult and spawning occurrence data will support the physical data collected for previous indicators (Section 4.6.3.1, "Depth and Velocity Indicator for Anadromous Fish Passage" and Section 4.6.3.2, "Vertical Barrier Indicator for Anadromous Fish Passage").

Monitoring Methods. Experienced fish biologists will search the Guadalupe River throughout the Project area for likely steelhead and chinook salmon spawning habitat and the presence of redds. Visual observation of migrating or spawning adult steelhead and chinook salmon, carcasses of chinook salmon (because chinook salmon die after spawning), and redds will be recorded. Numbers will be estimated visually and distribution and abundance data will be recorded on maps or aerial photographs or entered into a geographical database.

Surveys will be conducted a minimum of 4 times each year prior to Project construction and for the first 10 years after Project construction. The AMT will determine the need for surveys after year 10. Specifically, steelhead surveys will occur in February and in March of each year, and chinook salmon surveys will occur in late October and late November. These survey times target the expected peak periods of spawning activity for both steelhead and chinook salmon.

Remedial Actions. Failure to meet the measurable objective for the adult migration and spawning indicator for anadromous fish would trigger the adaptive management process defined in Chapter 3. The AMT will determine the cause of failing to meet the measurable objective, including potential Project effects, natural variation in salmonid occurrence in response to weather and ocean conditions, and effects of activities unrelated to the Project. If appropriate, the AMT may assist in the design and implementation of the actions necessary to address Project effects on adult chinook salmon and steelhead migration and spawning. Remedial actions may include placement of additional spawning gravel and removal of migration barriers.

Based on results of monitoring anadromous fish occurrence, the AMT may require implementation of alternative indicators and measurable objectives that could include trapping adult salmonids. The method would need to be consistent with the conditions for take in NMFS Biological Opinion for the Guadalupe River Project. Assuming that a noninvasive method can be implemented, trapping adult salmonids could improve the precision of spawning habitat use estimates and, in combination with outmigrant monitoring (Section 4.7.3.3 "Juvenile Migration Indicator for Anadromous Fish"), provide additional information on the survival of the resulting year class.

4.7.3.2 Juvenile Rearing Indicator for Steelhead

The indicator for juvenile rearing is the occurrence of juvenile steelhead in the Project area. Juvenile steelhead are expected to occur in the Project area year round (Table 4-7).

Measurable Objective. The Guadalupe River must continue to support juvenile rearing at a level that is consistent with preproject conditions and environmental conditions not affected by the Guadalupe River Project.

Occurrence of juvenile steelhead rearing in the Project area provides information on the adequacy of spawning and rearing habitat for the species. Occurrence data will support the physical data collected for previous indicators (Section 4.6.3.3, "Rearing Habitat Diversity

Indicator for Anadromous Fish"; Section 4.3, "Shaded Riverine Aquatic Cover"; Section 4.4, "Water Temperature"; and Section 4.5, "Anadromous Fish Spawning Habitat").

Monitoring Methods. Presence-absence surveys for rearing steelhead will be conducted throughout the Project area, Guadalupe Creek, and Reach A. Juvenile steelhead will be sampled by a methodology developed cooperatively by NMFS, SCVWD, the Corps, and CDFG and consistent with the conditions for take in NMFS Biological Opinion for the Guadalupe River Project. The number and size of all species captured or observed will be recorded.

At least 17 survey locations will be established: 4 in Guadalupe Creek, 9 in the Project reach, and 4 on Reach A. The 9 survey locations in the Project reach will include 4 in the area where the low-flow channel will be constructed, 4 in undisturbed areas, and 1 in the secondary channel in the flood floodplain terrace between Coleman Avenue and Interstate 880. All locations will be selected by experienced field biologists in coordination with the AMT. Each survey location will not exceed 150 feet in length and, if feasible, will encompass a run-riffle-pool complex. Surveys will be conducted a minimum of three times each year, once each in September or October, March or April, and June or July. The AMT will determine the need for surveys after year 10.

Remedial Actions. Failure to meet the measurable objective for the juvenile rearing indicator for anadromous fish would trigger the adaptive management process defined in Chapter 3. The AMT will determine the cause of failing to meet the measurable objective, including potential Project effects, natural variation in salmonid occurrence in response to weather and ocean conditions, and effects of activities unrelated to the Project. If appropriate, the AMT may assist in the design and implementation of the actions necessary to address Project effects on juvenile steelhead rearing. Remedial actions may involve improvements to spawning and improvements to rearing habitat, including planting riparian vegetation adjacent to the stream channel to cool water temperatures and the addition of boulders, woody material, and other structural changes to the channel to increase habitat diversity.

4.7.3.3 Juvenile Migration Indicator for Anadromous Fish

The indicator for juvenile migration is the capturing of migrant juvenile steelhead and chinook salmon downstream from the Project area. Juvenile steelhead are expected to migrate through the Project area from January through July (Table 4-7). Based on information for other streams, juvenile steelhead are expected to outmigrate as streamflow declines and water temperature increases. Outmigrant juvenile chinook salmon would be expected from February through June with peak migration likely to take place in February immediately after the juveniles emerge from their nests.

Measurable Objective. The Guadalupe River must continue to support juvenile steelhead and chinook salmon at levels consistent with preproject conditions and environmental conditions not affected by the Guadalupe River Project.

Occurrence of outmigrant juvenile steelhead and chinook salmon downstream from the Project area provides information on the adequacy of spawning and rearing habitat for both species. The occurrence data will support the physical data collected for previous indicators (Section 4.6.3.3, "Rearing Habitat Diversity Indicator for Anadromous Fish"; Section 4.3,

"Shaded Riverine Aquatic Cover"; Section 4.4, "Water Temperature"; and Section 4.5, "Anadromous Fish Spawning Habitat")

Monitoring Methods. Juvenile outmigration surveys will be conducted downstream from the Highway 101 crossing; these surveys will provide data to supplement the data from previous outmigrant surveys by SCVWD. A methodology developed cooperatively by NMFS, SCVWD, the Corps, and CDFG, and consistent with the conditions for take in NMFS Biological Opinion for the Guadalupe River Project will be used to capture downstream migrants. A method will be implemented that enables capture of juvenile fish over the broadest range of flows feasible and provides safe conditions for biologists operating the sampling gear. All fish will be counted, classified to species, its fork length and weight will be measured, and immediately released downstream from the net.

The sampling gear will be operated continuously from March through May. If juvenile steelhead or chinook salmon are captured in the last week of May, sampling will continue for 2 weeks in June. Surveys may be discontinued during high-flow conditions to minimize loss of equipment. Fish will be removed from the sampling gear, processed, and released once each day, or other appropriate time period, as determined by a fish biologist, needed to keep fish in good condition. If warranted to avoid undue stress to captured fish, the fish will be removed more frequently. The AMT will determine the need for surveys after year 10.

Remedial Actions. Failure to meet the measurable objective for the juvenile migration indicator for anadromous fish would trigger the adaptive management process defined in Chapter 3. The AMT will determine the cause of failing to meet the measurable objective, including potential Project effects, natural variation in salmonid occurrence in response to weather and ocean conditions, and effects of activities unrelated to the Project. If appropriate, the AMT may assist in the design and implementation of the actions necessary to address Project effects on juvenile chinook salmon and steelhead migration. Remedial actions may involve improvements to spawning and rearing success, including planting riparian vegetation adjacent to the stream channel to cool water temperatures and the addition of boulders, woody material, and other structural changes to the channel to increase habitat diversity.

4.8 Mercury

The Guadalupe River and its tributaries and South San Francisco Bay are classified as impaired with regard to mercury contamination under Section 303(d) of the CWA. Under the authority of Section 303(d) of the CWA, the Regional Water Quality Control Board (RWQCB) and SWRCB list water bodies as impaired when not in compliance with designated water-quality objectives and standards. Section 303(d) also requires preparation of a Total Maximum Daily Load (TMDL) program for waters identified by the State as impaired. A TMDL is a quantitative assessment of a problem that affects water quality. The TMDL program calls for a 90 percent reduction in the transport of mercury to the San Francisco Bay from the Guadalupe River system. Mercury is primarily associated with sediments in the Guadalupe River watershed. The RWQCB determined that if sediment mercury load could be reduced to pregold rush era levels, there would be a high probability that water quality standards for mercury would be achieved. Controlling sediment-bound

mercury is crucial for compliance with the reduction in mercury levels recommended in the TMDL program.

4.8.1 Project Effects

The Guadalupe River Project and other proposed flood protection projects in the Guadalupe River watershed would not change the amount or rate of sediments entering the Guadalupe River from sources such as surface runoff and storm drains. The sediments that are of most concern for mercury contamination are those that were transported and deposited along the banks of the Guadalupe River during the period when mercury-bearing ore was mined in the upper watershed. The volume of these mercury-bearing sediments entering the Guadalupe River from the source areas of the watershed upstream from the confluence of Guadalupe Creek and Alamitos Creek would not be affected by the proposed flood protection projects.

Operation of flood protection projects on the Guadalupe River would change areas of scour and erosion in response to the specific magnitude and duration of a given flood event. Some of the sediments affected by changes in scour and deposition patterns may contain unacceptable levels of mercury. Mercury-bearing sediments could be transported in either the suspended wash load or the bottom load. However, net erosion caused by peak flow conveyance in the Guadalupe River system is expected to be reduced by implementing the proposed flood protection improvements, including invert stabilization structures, bypasses, riverbed and bank armoring, and vegetative cover management. The Guadalupe River Project with Bypass System Alternative would implement an erosion and sediment control plan and soil management plan that would avoid and minimize the potential for increased transport and loading of mercury to the San Francisco Bay. The erosion control measures contained in the erosion and sediment control along with channel armoring and riparian vegetation planting could substantially manage project-related erosion, thereby minimizing project effects. Furthermore, the soil management plan would establish threshold criteria whereby mercury-laden soils would be removed from the channel. Together these measures could significantly contribute to the overall reduction in the available mercury that is mobile in the Project reach. In particular, the implementation of a soil management plan (Section 3.4.3, "Environmental Commitments") could result in significant exports of mercury from project reaches to licensed disposal facilities.

The Upper and Lower Guadalupe River Projects and the Guadalupe Creek Restoration Project include erosion and sediment control plans and soil management plans that are similar to those described for the Guadalupe River Project with Bypass System Alternative. Implementing erosion and sediment control plans and soil management plans for the flood protection projects on the Guadalupe River would reduce the impacts of potential discharges of sediment-bound mercury during construction activities to a less-than-significant level.

Preliminary sedimentation studies conducted for the Upper Guadalupe River Project and Guadalupe River Project indicate that over 92 percent of the bottom load will be deposited in the reach between Trimble Road and Montague Expressway. SCVWD will periodically remove bottom load sediment that accumulates in the channel between Trimble Road and Montague Expressway for flood protection maintenance purposes. Removal of sediment that contains excessive levels of mercury is considered beneficial to the overall goal of the

RWQCB mercury TMDL program of reducing mercury contamination in the watershed. Therefore, the effects of construction- and operations-related transport and loading of mercury to the San Francisco Bay are considered less than significant.

Sediment could accumulate behind habitat improvement and structural components, including riparian vegetation plantings and low-flow channel check and invert stabilization structures. Methyl mercury could form in these accumulated sediments, a process that is known as methylation. The process of methylation is determined by environmental conditions, such as pH, dissolved organic carbon, temperature, sulfate, and light. Many of these physical and chemical constituents are also affected by biological factors, such as growth, decay, and other metabolic processes. Since most methylation is affected by biological factors, it is likely that methylation processes change seasonally. Because of the potential for formation of methyl mercury, projects in the Guadalupe River watershed that contribute to sediment disturbance and transport processes could cause cumulative changes in the locations and rates of methyl mercury formation. However, the rate and location of the potential changes are unknown. This impact would be considered potentially significant.

The greatest concern with regard to the accumulation of mercury-laden sediments in the watershed is the potential for sediment-bound mercury to transform to dissolved and methylated forms that can be readily absorbed by aquatic organisms. The methylation process is dependent on environmental conditions, such as pH, dissolved organic carbon, temperature, sulfates, and light. Biological processes, such as growth, decay, and other metabolic processes affect many of these physical and chemical factors. Since most methylation is affected by biological processes, it is likely that the rate and quantity of methyl mercury formation changes seasonally.

There is no evidence to suggest that operation of the Guadalupe River Project with Bypass System Alternative would increase aquatic organism exposure to methyl mercury. To the contrary, the proposed project would discourage the development of instream conditions such as wetlands or other anoxic, high sulfate, low pH, and high organic matter aquatic environments that would be conducive to enhanced methylation. In addition, by creating a better defined low flow channel, the Project would create more concentrated and less stagnant flows, thereby resulting in reduced anoxic conditions. Therefore, increased methyl mercury formation is considered a less-than-significant adverse affect. However, SCVWD and the Corps would monitor postproject changes in methylation rates in Segments 1, 2, and 3 and Reach A to minimize the potential for increased methylation and to provide valuable data for the TMDL effort on the Guadalupe River (Section 4.8.2, "Mitigation,").

Because projects in the Guadalupe River watershed may slightly alter the ongoing pattern of erosion and sediment deposition (Section 6.2.3.2, "Cumulative Impacts on River Geomorphology – Operational Impacts"), these projects also have the potential to cause a change in the future distribution of methyl mercury. However, almost no information exists on the existing transport of bound mercury, the existing locations of mercury deposition, or the existing rate of methyl mercury formation in the Guadalupe River system (Section 4.3.2, "Toxic Constituents"). What is known is that the flood protection projects on the Guadalupe River and the Guadalupe Creek Restoration Project are expected to result in the following:

- the Projects would not change the amount or rate of sediments entering the Guadalupe River from sources such as surface runoff and storm drains
- net erosion caused by peak flow conveyance in the Guadalupe River system is expected to be reduced by implementing the projects, and
- the overall rate of erosion and sediment deposition, on a watershed scale, is not expected to change with the implementation of the projects and may be reduced.

Even with the benefits of the projects outlined above, mercury and the potential for methylation in the Guadalupe River watershed is an ongoing regional issue of concern. Leaching of mine tailings and overland flow of mercury-rich soils have resulted in the downstream accumulation of mercury in the Guadalupe River watershed. As a result of this past mining activity, tributaries of the Guadalupe River, including Guadalupe Creek and Alamitos Creek, as well as the Guadalupe River itself, have been contaminated with mercury. This regional issue constitutes an ongoing significant cumulative impact.

4.8.2 Mitigation

To avoid and minimize impacts from disturbance and transport of methyl mercury two monitoring programs would be implemented:

- Corps and SCVWD, in conjunction with RWQCB and other resource regulatory agencies, would develop and implement a program to monitor postproject changes in methylation rates in Segments 1, 2, and 3 and Reach A
- SCVWD, to avoid and minimize cumulative impacts, would participate with the RWQCB for the San Francisco Bay Region in assessing mercury transport in the Guadalupe River watershed and the potential for methylation associated with proposed riparian vegetation mitigation.

4.8.3 Measurable Objectives and Adaptive Management

Indicators for the assessment of mercury transport and the potential for methylation of mercury will include total suspended solids, total and bioavailable mercury, and methyl mercury concentrations in channel bed and suspended sediments. Monitoring of these indicators will provide information for SCVWD and RWQCB to develop BMPs with the objective of minimizing methylation and the overall transport of mercury-laden sediments to the San Francisco Bay. Implementation of this monitoring would assist in RWQCB's efforts to minimize and manage the adverse affects of mercury in Guadalupe River sediments.

4.8.3.1 Assess Mercury Transport and Potential for Methylation in Segments 1, 2, and 3 and Reach A

Measurable Objectives. No specific measurable objectives have been identified for the indicators listed above. The purpose of the proposed monitoring program is to assist in the development of measurable objectives and develop BMPs with the objective of minimizing methylation and the overall transport of mercury-laden sediments to the San Francisco Bay.

Monitoring Methods. SCVWD will monitor methyl mercury concentrations in riverbed and suspended sediments in Segments 1, 2, and 3 and Reach A. Monitoring of methyl mercury

formation will be conducted in freshwater, wetland, and riparian environments at sites approved by the RWQCB. Baseline monitoring would be conducted prior to project construction. Additional monitoring would be conducted in accordance with RWQCB requirements for a period of 5 years. Specific monitoring methods will be developed in coordination with the RWQCB, and a monitoring report will be provided to the RWQCB.

A comparison of baseline and postconstruction data would show whether preconstruction levels of methyl mercury in the Project reach have elevated above baseline conditions.

Remedial Actions. If monitoring showed elevated methyl mercury concentrations, efforts would be conducted to determine conditions responsible for this increase. SCVWD would then consult with the RWQCB and other agencies to identify and implement additional measures to reduce controllable factors responsible for the observed elevation in methyl mercury.

4.8.3.2 Assess Mercury Transport and Potential for Methylation in the Guadalupe River Watershed

Measurable Objectives. No specific measurable objectives have been identified for the indicators listed above. The purpose of the proposed monitoring program is to assist in the development of measurable objectives and develop BMPs with the objective of minimizing methylation and the overall transport of mercury-laden sediments to the San Francisco Bay.

Monitoring Methods. SCVWD will continuously monitor flow. In addition, SCVWD will monitor total suspended solids, total and bioavailable mercury, and methyl mercury concentrations in riverbed and suspended sediments of the Guadalupe River. Monitoring of methyl mercury formation will be conducted in freshwater, seasonal wetland, and riparian environments at sites approved by the RWQCB. This monitoring will be conducted in accordance with RWQCB requirements for of 1 year. Specific monitoring methods will be developed in coordination with the RWQCB, and a monitoring report will be provided to the RWQCB.

Remedial Actions. After the monitoring report has been provided to the RWQCB, SCVWD will continue to participate with the RWQCB in assessing mercury transport in the Guadalupe River and the potential for methylation associated with proposed wetland and riparian mitigation.

4.9 Special-Status Species Habitat – Alviso Slough

The Guadalupe River Project, prior to construction of the Lower Guadalupe River Project, will not change the existing hydrologic and hydraulic conditions of Alviso Slough or the adjacent salt evaporation ponds. Construction of the Guadalupe River Project will not change the floodflow, frequency, duration, or magnitude from existing conditions because the channel capacities will remain the same. The cumulative effects of the Guadalupe River Project and the Upper Guadalupe River Project, prior to construction of the Lower Guadalupe River Project would not affect the western snowy plover, California clapper rail, and salt marsh harvest mouse or habitat critical to their continued existence because hydrologic and hydraulic conditions in Alviso Slough would not change from those

currently experienced by these species. However, USFWS has requested, as a stipulation for issuing the Biological Opinion, that the Corps and SCVWD:

- Monitor floodflows and surface-water levels in Alviso Slough and in evaporation pond A8D
- Monitor dominant plant species and habitat types in Alviso Slough
- Monitor salinity in Alviso Slough

4.9.1 Western Snowy Plover

No change in flood frequency or adverse impacts on western snowy plover habitat are expected to result from construction of the Guadalupe River Project prior to completion of the Lower Guadalupe River Project. USFWS has requested that the Corps and SCVWD monitor floodflows and surface-water levels in Alviso Slough and in evaporation pond A8D. Monitoring will verify whether the flood frequency or inundation period within pond A8D remains unchanged as a result of the construction of the Guadalupe River Project prior to completion of the Lower Guadalupe River Project. The Corps and SCVWD will ensure that a short-term habitat-monitoring program will begin in 2001 and continue through the remaining construction phases of the Guadalupe River Project. The purpose of the short-term monitoring will be to identify any changes in flooding frequency and duration in the salt evaporation ponds. Proposed short-term monitoring methods are outlined below; final short-term monitoring methods for the salt-evaporation ponds will be developed in coordination with USFWS. Monitoring reports will be submitted to USFWS. Short-term monitoring will end when the Lower Guadalupe River Project has been completed and the Guadalupe River Project becomes operational. After the Guadalupe River Project is operational, water-level monitoring may continue as a component of the Lower Guadalupe River Project MMP. This monitoring will depend on the results of consultation with USFWS on the Lower Guadalupe River Project. As described below, the short-term monitoring program for the western snowy plover will focus on flooding and surface-water level in Alviso Slough and in evaporation ponds.

4.9.1.1 Monitoring of Hydrologic Conditions in Alviso Slough Area

Streamflow in Alviso Slough can directly affect the depth and duration of flooding of the salt evaporation ponds. Changes in the depth and duration of flooding can affect the availability of the salt evaporation ponds for foraging and nesting by the snowy plover. Flooding of the salt evaporation ponds from other sources, however, such as Guadalupe Slough, is not related to the operation of the Guadalupe River Project.

Measurable Objectives. The average monthly depth and duration of flooding of salt evaporation pond A8 will not exceed that predicted by the HEC-RAS model of Alviso Slough using existing Guadalupe River streamflow data.

Monitoring Methods. Continuous surface-water level data will be collected in Alviso Slough at two locations: the Gold Street Bridge and midway between the Gold Street Bridge and the confluence of Alviso Slough with Coyote Creek. Continuous surface-water level data will also be collected in Guadalupe Slough adjacent to evaporation pond A8D; these data are critical to assisting in isolating the impacts of construction and operation of the Guadalupe

River Project. In addition, flow rates will be measured continuously at the Gold Street Bridge and Guadalupe Slough locations. The continuous recorders will include a vented pressure sensor and will collect data once every 10 minutes. A peak-stage recorder, which records the peak of the flood, will be placed at the crest of the weir on the levee between Alviso Slough and evaporation pond A8W. This site is the historical location of levee overtopping. Peak-stage recorders will also be placed in evaporation ponds A8W and A8D to track the depth of flooding. The Corps and SCVWD have committed to coordinate with Cargill regarding these measures.

The locations of each continuous recorder and peak-stage recorder will be surveyed and referenced to a stable benchmark and to each other. The continuous recorders and peak-stage recorders will be located using an existing horizontal datum and will be programmed to record water-surface elevation in feet relative to the National Geodetic Vertical Datum of 1929. Data will be downloaded from the continuous recorders once every 60 days. Data will be downloaded from the peak-stage recorders after each storm. The elevations of the continuous recorders and peak-stage recorders will be checked at the close of each year's data period relative to the benchmark and to each other. The entire length of the levee between evaporation ponds A8W and A8D will be surveyed to verify low spots. It is assumed that water depth and a description of operations in salt evaporation ponds A5 through A8 will be provided twice a year by Cargill to identify the operational baseline.

The depth and duration of flooding of the salt evaporation ponds will be determined by field observations, the analysis of the continuous water-level and flow data, and the analysis of the peak-stage data.

Remedial Actions. If the median monthly depth and duration of flooding of salt evaporation pond A8 plus or minus one standard deviation exceed those predicted by the HEC-RAS model of Alviso Slough, the Corps and SCVWD will coordinate with USFWS to determine the cause of the change in depth and duration of flooding and whether additional steps are required to minimize impacts on western snowy plover. The Corps will reinitiate consultation with USFWS if changes in hydraulic conditions continue, if they affect listed species, and if they are determined to be a result of the Guadalupe River Project with Bypass System Alternative.

4.9.2 California Clapper Rail and Salt Marsh Harvest Mouse

No change in flood frequency or adverse impacts on California clapper rail habitat or salt marsh harvest mouse habitat are expected to result from construction of the Guadalupe River Project prior to completion of the Lower Guadalupe River Project. USFWS has requested that the Corps and SCVWD monitor clapper-rail and salt marsh harvest mouse habitat in the Alviso Slough area to determine whether the habitat in the salt-marsh changes after construction of the Guadalupe River Project prior to completion of the Lower Guadalupe River Project. Available information indicates that the dominant plant associations in the tidal marsh habitat along Alviso Slough vary with the type of water year (dry or wet). Habitat in and adjacent to Alviso Slough has been monitored for more than 10 years (H. T. Harvey, 1999b). This existing data will provide a baseline for identifying habitat changes. The Corps and SCVWD will ensure that a short-term habitat-monitoring program will begin in 2001 and continue through the remaining construction phases of the Guadalupe River Project. The purpose of the short-term monitoring program will be to add

to the baseline data and identify any changes in salt-marsh habitat as a result of the construction of the Guadalupe River Project. Proposed short-term monitoring methods are outlined below. Final short-term monitoring methods for the Alviso Slough area will be developed in coordination with USFWS. Monitoring reports will be submitted to USFWS. Short-term monitoring will end after the Lower Guadalupe River Project is complete and the Guadalupe River Project is operational. Completion of the Lower Guadalupe River Project is scheduled for 2002. After the Guadalupe River Project is operational, monitoring of clapper rail and salt marsh harvest mouse habitat in the Alviso Slough area may continue as a component of the Lower Guadalupe Project MMP. This monitoring will depend on the results of consultation with USFWS on the Lower Guadalupe River Project.

The proposed short-term clapper rail and salt marsh harvest mouse monitoring program will focus on the following key habitat indicators:

- Dominant plant species and habitat types in Alviso Slough
- Surface-water levels and salinity in Alviso Slough

4.9.2.1 Monitoring of Dominant Plant Species and Habitat Types of Alviso Slough

Changes in the dominant plant species and marsh habitat types within Alviso Slough can directly affect habitat for the California clapper rail and salt-marsh harvest mouse. A significant loss of salt marsh habitat can negatively affect the clapper rail and salt-marsh harvest mouse.

Measurable Objective. The rate of conversion of salt marsh to other habitat types as a result of the construction of the Guadalupe River Project must not exceed the average annual rate of conversion during the past 10 years (1989 to 1999).

Monitoring Methods. CIR aerial photographs will be taken annually of Alviso Slough from the Alviso Union Pacific Railroad (UPRR) Bridge to the confluence with Coyote Creek. Photographs will be taken from an altitude of approximately 8,500 feet (1.6 miles) using a 6-inch (15.2-centimeter) camera lens. The flight will be scheduled between June 15 and July 31 during negative tidal elevation and 30- to 45-degree solar altitude.

Photographs will be orthorectified to remove any distortion of the scale across the image caused by various factors, including curvature of the earth's surface, topographic changes, and tilt of the camera lens. The use of orthorectified photographs adds greater accuracy to the estimation of polygon areas on the vegetation map.

Field surveys and analysis of vegetation in Alviso Slough will follow a protocol that begins with mapping plant associations (comprising either a single dominant individual plant or two dominant plants) onto clear acetate overlays placed directly over the digital images of the orthorectified CIR photos. For Alviso Slough, these associations will be subsequently assigned to one of three marsh types, salt marsh, brackish marsh, or freshwater marsh, according to the relative salinity tolerance of these species, following established protocol.

Topographic features, marsh boundaries, and tentative vegetation associations, based on color signatures, will be mapped in the office prior to field visits. Ground truthing of the preliminary mapping will then be conducted in the same year the aerial photographs were

taken during site visits in the late summer. To minimize disturbance to sensitive habitats, marsh vegetation may be observed primarily from levee roadways, railroad beds, unimproved salt-evaporation pond levees, or Pacific Gas and Electric walkways. Vegetation associations may be verified by walking the marshes in areas that are not clearly visible from adjacent levees and upland areas.

Any species that occurred as a dominant, co-dominant, or sub-dominant species will be mapped. For the purposes of this study, a dominant species has approximately 51 to 100 percent coverage, a co-dominant species has 50 percent coverage, and a sub-dominant species has 15 to 49 percent coverage. Each species will be assigned to a vegetation association comprising one dominant, a dominant and sub-dominant, or two or more co-dominant species.

Plant-species associations will then be summarized into dominant-species categories. For example, alkali bulrush peppergrass association is an alkali-bulrush dominant-species category. These dominant-species categories will then be assigned to one of four habitat types: salt marsh, brackish marsh, freshwater marsh, or upland. The field vegetation maps (acetate overlays) will be scanned and electronically digitized. Plant-association acreages and color-coded figures will be generated in a GIS. Area comparisons between dominant-species categories and habitat types between study years will be made. Areas of significant change will be determined and presented as a habitat-change map.

Remedial Actions. If a change in habitat conditions in the Alviso Slough salt marsh is noted, the Corps and SCVWD will coordinate with USFWS to determine the cause of the habitat changes and whether additional steps are required to minimize impacts on the California clapper rail. The Corps will reinitiate consultation with USFWS if changes in salt marsh habitat continue, if the changes affect listed species, and if the changes are determined to be a result of the Guadalupe River Project with Bypass System Alternative.

4.9.2.2 Continuous Surface Water Level and Salinity

Streamflow in Alviso Slough directly affects the depth and duration of flooding of the marsh surface and the salinity of the surface water. These changes can affect the plant species distribution along the marshes of Alviso Slough.

Measurable Objectives. The average monthly depth and duration of flooding of the marsh surface will not exceed that predicted by the HEC-RAS model of Alviso Slough using existing Guadalupe River streamflow data. Average surface-water salinity in Alviso Slough will not be more than 20 percent less than the 1999-2000 baseline data.

Monitoring Methods. Continuous surface-water level and salinity data will be collected in Alviso Slough at two locations: the Gold Street Bridge and midway between the Gold Street Bridge and the confluence of Alviso Slough and Coyote Creek. Continuous surface-water level and salinity data will also be collected in Guadalupe Slough adjacent to evaporation pond A8D. Flow rates will be measured continuously at the Gold Street Bridge and Guadalupe Slough locations. The continuous recorders will include a vented pressure sensor and will collect data once every 10 minutes.

The location of each continuous recorder will be surveyed and referenced to a stable benchmark and to each other. The continuous recorders will be located using an existing

horizontal datum and will be programmed to record water-surface elevation in feet relative to the National Geodetic Vertical Datum of 1929. Data will be downloaded from the continuous recorders once every 60 days. The elevations of the continuous recorders will be checked at the close of each year's data period relative to the benchmark and to each other.

The depth and duration of flooding over the marsh surface will be determined from the continuous water-level and flow data. Continuous salinity data will be summarized and compared to the Guadalupe River flow rates at the Gold Street Bridge.

Remedial Actions. If the median monthly depth and duration of flooding of the salt marshes plus or minus one standard deviation exceed those predicted by the HEC-RAS model of Alviso Slough, the Corps and SCVWD will coordinate with USFWS to determine the cause of the change in depth and duration of flooding and whether additional steps are required to minimize impacts on the California clapper rail. The Corps will reinitiate consultation with USFWS if changes in hydraulic conditions continue, if the changes affect listed species, and if the changes are determined to be a result of the Guadalupe River Project with Bypass System Alternative.

4.10 Responsibilities for MMP Implementation

The Corps and SCVWD will be responsible for providing mitigation program design, implementation, maintenance, and monitoring. The responsibilities of each party will vary, depending on the mitigation area and the time when each party will assume responsibility. The responsibilities of each party are identified in Tables 4-14 through 4-17. The proposed monitoring frequency is shown in Table 4-18.

The Corps will be responsible for the design, implementation (including growing or collecting site-specific plant propagules), and short-term maintenance and monitoring (during construction and years 1-3 postconstruction) of all mitigation areas, except the Guadalupe Creek mitigation area. SCVWD has responsibility for the design, implementation (including growing or collecting site-specific plant propagules), maintenance, and monitoring of the Guadalupe Creek mitigation area; the Corps will review and approve any federally funded portions and specify their maintenance requirements. SCVWD will be responsible for monitoring for mercury transport and the potential for methylation in accordance with the monitoring plan described in Table 4-2. The Corps will be responsible for monitoring of indicators associated with special-status species habitat in the Alviso Slough and Guadalupe Slough areas in accordance with the monitoring plan described in Table 4-4. Additionally, the Corps is responsible for annual reporting of the short-term monitoring results to the AMT for all mitigation areas. There is a possibility that the Corps will undertake maintenance and monitoring for years 1-5 postconstruction; if so, this will be documented in a revised MMP. After the end of short-term maintenance and monitoring, the Corps will turn over all mitigation areas to SCVWD for long-term maintenance and monitoring and annual reporting (years 4-100). Monitoring will continue for the life of the Project, subject to the AMT's continuing oversight, or until the AMT has determined that the measurable objectives have been attained. The Corps (years 1-3) and SCVWD (years 4-100) will be responsible for planning for the potential implementation of remedial actions so that their implementation is not delayed once the AMT determines that

TABLE 4-14. Riparian Vegetation Mitigation and Responsible Parties, Guadalupe River Project

Project Segment or Mitigation Site	Total Mitigation (acres)	Responsible Party		
		Design and Implementation of Mitigation	Short-Term Maintenance and Monitoring (years 1-3)	Long-Term Maintenance and Monitoring (years 4-100)
Segment 1	4.0	Corps	Corps	SCVWD
Segment 2	17.0	Corps	Corps	SCVWD
Segment 3A	0	N/A	N/A	N/A
Segment 3B				
Segment 3C	0	N/A	N/A	N/A
Woz Way to Park Avenue Bypass Reach	0	N/A	N/A	N/A
Reach A	0	N/A	N/A	N/A
Guadalupe Creek	0	N/A	N/A	N/A
Totals	21.0	N/A	N/A	N/A

Note: N/A = not applicable.

TABLE 4-15. SRA Cover Mitigation and Responsible Parties, Guadalupe River Project

Project Segment or Mitigation Site	Total Mitigation (lf)	Responsible Party		
		Design and Implementation	Short-Term Maintenance and Monitoring (during construction and years 1-3)	Long-Term Maintenance and Monitoring (years 4-100)
Segment 1	575	Corps	Corps	SCVWD
Segment 2	1,081	Corps	Corps	SCVWD
Segment 3A	878	Corps	Corps	SCVWD
Segment 3B	0	Corps	Corps	SCVWD
Segment 3C	0	N/A	N/A	N/A
Woz Way to Park Avenue Bypass Reach	410 ^a	Corps ^c SCVWD ^d	Corps	SCVWD
Reach A	7,848	Corps	Corps	SCVWD
Guadalupe Creek	12,044 ^b	SCVWD	SCVWD	SCVWD
Totals	22,836 ^b	N/A	N/A	N/A

^a Includes Children's Discovery Museum site (200 lf), rubble removal site (100 lf), and Auzerais Point boulder removal site (110 lf).^b Total mitigation is determined based on the HEP analysis: at most, approximately 60 percent of the mitigation available in Guadalupe Creek will be needed for compensation (7,178 lf). The remaining 40 percent would be available to mitigate impacts for other anticipated SCVWD actions (4,866 lf) after a mitigation agreement and protocols have been developed.^c Includes responsibility for the Auzerais Point boulder and rubble removal sites.^d Includes responsibility for the Children's Discovery Museum site.

N/A = not applicable.

TABLE 4-16. Spawning Habitat Mitigation and Responsible Parties, Guadalupe River Project

Project Segment or Mitigation Site	Total Mitigation (sf)	Design and Implementation	Responsible Party	
			Short-Term Maintenance and Monitoring (during construction and years 1-3)	Long-Term Maintenance and Monitoring (years 4-100)
Segment 1	1,000	Corps	Corps	SCVWD
Segment 2	3,335	Corps	Corps	SCVWD
Segment 3A	10,617	Corps	Corps	SCVWD
Segment 3B	10,238	Corps	Corps	SCVWD
Segment 3C	0	Corps	Corps	SCVWD
Woz Way to Park Avenue Bypass Reach	N/A	N/A	N/A	N/A
Reach A	N/A	N/A	N/A	N/A
Guadalupe Creek	N/A	N/A	N/A	N/A
Totals	25,190	N/A	N/A	N/A

Note: N/A = not applicable.

Spawning habitat mitigation is based on gravel measurements from the Guadalupe River Project Final Mitigation and Monitoring Plan (U.S. Army Corps of Engineers, 1992).

TABLE 4-17. Fish Passage and Rearing Habitat Mitigation and Responsible Parties, Guadalupe River Project

Fish passage and rearing habitat mitigation is linear feet of low-flow channel constructed in armored channel bed sections of the Project area.

Project Segment or Mitigation Area	Total Mitigation (lf)	Design and Implementation	Responsible Party	
			Short-Term Maintenance and Monitoring (during construction and years 1-3)	Long-Term Maintenance and Monitoring (years 4-100)
Segment 1	448	Corps	Corps	SCVWD
Segment 2	305	Corps	Corps	SCVWD
Segment 3A	695	Corps	Corps	SCVWD
Segment 3B	1,940	Corps	Corps	SCVWD
Segment 3C	1,045	Corps	Corps	SCVWD
Woz Way to Park Avenue Bypass Reach	N/A	N/A	N/A	N/A
Reach A	N/A	N/A	N/A	N/A
Guadalupe Creek	N/A	N/A	N/A	N/A
Totals	4,433	N/A	N/A	N/A

Note: N/A = not applicable

TABLE 4-18. Schedule of Monitoring Activities for Preproject and the 10 Years Following Implementation of Mitigation Actions, Guadalupe River Project
Numbers shown in the "Month of Monitoring" columns indicate repetition of monitoring activity during the shaded period. An "M" under "Year of Monitoring" columns indicates that the measurable objective must be met in that year.

Indicator	Month of Monitoring												Year of Monitoring													
	J	F	M	A	M	J	J	A	S	O	N	D	Preproject ^a			O ^b	1	2	3	4	5	6	7	8	9	10
													3	RA	GC											
Riparian Vegetation																										
Survival									1							M	M	M								
Health and vigor									1							M	M	M	M	M						
Natural recruitment									1											M						
Cover									1																	
Nonnative species cover									1							M	M	M	M	M						M
Tree height									1																	M
Tree basal area									1																	M
SRA Cover																										
Survival									1							M	M	M								
Health and vigor									1							M	M	M	M	M						
Natural recruitment									1											M						
Nonnative species cover									1							M	M	M	M	M						M
Shaded stream surface									1																	
Bank stability								1								M	M	M	M							M
Instream cover								1																		M
Channel bottom stability								1								M	M	M	M	M	M	M	M	M	M	M

TABLE 4-18. Schedule of Monitoring Activities for Preproject and the 10 Years Following Implementation of Mitigation Actions, Guadalupe River Project

Numbers shown in the "Month of Monitoring" columns indicate repetition of monitoring activity during the shaded period. An "M" under "Year of Monitoring" columns indicates that the measurable objective must be met in that year. (Continued)

Indicator	Month of Monitoring												Year of Monitoring													
	J	F	M	A	M	J	J	A	S	O	N	D	Preproject ^a			1	2	3	4	5	6	7	8	9	10	
													3	RA	C											G
Water Temperature ^c																										
Measured water temperature ^d																										
Heat transfer			1			1			1																	
Stream channel geometry																										
Simulated water temperature	1	1	1	1	1	1	1	1	1	1	1	1														
Monthly thermal suitability																										
Short-term suitability	1	1	1	1	1	1	1	1	1	1	1	1					M	M	M	M	M	M	M	M	M	
Anadromous Fish Spawning Habitat																										
Spawning gravel abundance																	M	M	M	M					M	
Spawning gravel quality																	M	M	M	M					M	
Anadromous Fish Passage and Rearing Habitat																										
Depth and velocity	2	2	2									2	2	2			M	M	M	M	M	M	M	M	M	
Vertical barrier	2	2	2									2	2	2			M	M	M	M	M	M	M	M	M	
Rearing habitat diversity																	M	M	M	M					M	
Anadromous Fish Occurrence																										
Adult Migration and Spawning		2	2										2	2			M	M	M	M	M	M	M	M	M	
Juvenile rearing																	M	M	M	M	M	M	M	M	M	
Juvenile migration																	M	M	M	M	M	M	M	M	M	
Mercury Transport and Potential for Methylation in Segments 1, 2, and 3 and Reach A ^{g, h}																										
Methylmercury concentrations in riverbed and suspended sediments																										

TABLE 4-18. Schedule of Monitoring Activities for Preproject and the 10 Years Following Implementation of Mitigation Actions, Guadalupe River Project

Indicator	Month of Monitoring												Year of Monitoring												
	J	F	M	A	M	J	J	A	S	O	N	D	Preproject ^a			O ^b									
												3	RA	C	G	1	2	3	4	5	6	7	8	9	10

Mercury Transport and Potential for Methylation in the Guadalupe River Watershed ^{g,h}

[illegible]

^a Monitoring activities are to be conducted prior to Project construction. The codes are defined as follows: 3=Segment 3, RA= Reach A, and GC=Guadalupe Creek. For mercury transport and potential for methylation in the Guadalupe River Watershed, preproject monitoring will also occur in other locations in the watershed. For special-status species habitat (at Alviso Slough), preproject monitoring will also occur downstream of the Project.

b. Monitoring activities are to be conducted immediately after Project construction.

^c Measured water temperature is used for JSATEMP model calibration and confirmation. Heat transfer and stream channel geometry are used in simulation of the water

measured water temperature is used for short-term model calibration and validation; heat transfer and stream channel geometry are used for long-term model validation. Simulated water temperature is used to calculate the monthly thermal suitability and short-term suitability indicators. Simulated water temperature is used to calculate the monthly thermal suitability and short-term suitability indicators.

^d Hourly water temperature will be recorded continuously, although measurement may be discontinued at some locations between October 1 and March 31 to minimize loss of equipment and already-recorded temperature data, during high flow conditions (see hatched pattern).

^e Surveys in June will depend on occurrence in May.

Monitoring will occur downstream of the Highway 101 crossing.

⁹ Specific measurable objectives will be identified for these indicators by SCWWD in coordination with the RWQCB. Monitoring will occur downstream of the highway crossing.

^h Monitoring is shown as quarterly; actual monitoring frequency will be in accordance with RWQCB requirements.

- Measurable objective must be met monthly.

j Measurable objective must be met annually.

an action is necessary. This planning effort will be completed prior to the start of construction in Segments 3A and 3B.

4.11 Reporting

An annual report on the monitoring program, which will include a compilation and evaluation of the preceding water-year's monitoring data, will be completed by March 31. Annual reports will be prepared by the Corps during construction and years 1-3 postconstruction and by SCVWD during years 4 through the life of the Project. Annual reports on monitoring will continue for the life of the Project, subject to the AMT's continuing oversight, or until the AMT has determined that the measurable objectives have been attained. The reports will be submitted to the City of San Jose, SWRCB, RWQCB, USFWS, NMFS, CDFG, the Natural Heritage Institute representing the Guadalupe-Coyote Resource Conservation District, the Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited. This reporting mechanism complies with the Collaborative Decision Record Memorandum (DRM) requirement that SCVWD report annually on the monitoring results (DRM Section V.1.C). SCVWD will provide a copy of annual MMP reports to the Corps as part of the periodic reporting required by the Project Operations and Maintenance Manual.

An AMT convened by SCVWD will direct and implement the adaptive management process during Project construction and for the life of the Project. The AMT will consist of representatives with technical expertise applicable to the MMP from SCVWD, the Corps (until SCVWD assumes responsibility for the Project), the City of San Jose, SWRCB, RWQCB, USFWS, NMFS, CDFG, the Guadalupe-Coyote Resource Conservation District, the Pacific Coast Federation of Fishermen's Associations, and Trout Unlimited. The AMT will use the information in the annual monitoring report as well as other available information to assess progress toward the measurable objectives, to identify additional monitoring needs, and to identify remedial actions that will be implemented to rectify mitigation shortfalls. The AMT will amend the MMP, if necessary, on the basis of the monitoring results and through a consensus process subject to any necessary regulatory approvals. Proposed MMP changes will be submitted to the Corps' District Engineer for review 30 days prior to adoption; proposed changes may be considered approved if there is no objection; one copy of the revised MMP will be provided to SCVWD Engineer following adoption. The AMT will prepare a separate report documenting the results of its assessment of the mitigation program and will include recommendations on the following year's mitigation and monitoring program.

Annually, and particularly in year 10, a comprehensive review of the success or failure of terrestrial and aquatic mitigation measures for the Guadalupe River Project will be conducted. At that time, written consensus by the participants will confirm one of the following conclusions for each indicator:

- A. The measurable objective for the indicator has been met, and the frequency and extent of continued monitoring activities will be assessed.
- B. The measurable objective for the indicator may or may not have been met, and a future reevaluation date will be negotiated.

- C. The measurable objective for the indicator has not been or will not be met within the intended time frame, and remedial actions will be required. Appropriate remedial actions, monitoring frequency, and the time frame for success will be negotiated.

References

5.1 Printed References

- A-N West, Inc., AGS, Inc., Allied Engineering Company, Hargreaves Associates, Jones & Stokes, MTH Engineers, Inc., Northwest Hydraulic Consultants, Inc. 2000. Guadalupe River Project Construction Contract 3C, Phase 2: low flow channel design report. May 10. Prepared for U.S. Army Corps of Engineers, Sacramento District. Richmond, CA.
- Bonham, C. D. 1989. Measurements for terrestrial vegetation. John Wiley & Sons, Inc. New York, NY.
- CH2M HILL. 1994. Soil management plan: Guadalupe River flood control project construction reach 3. San Jose, CA. Prepared for the Santa Clara Valley Water District, San Jose, CA.
- City of San Jose. 1994. San Jose 2020 general plan. Department of Planning, Building and Code Enforcement. San Jose, CA.
- Cochran, W. G. 1963. Sampling techniques. John Wiley & Sons, Inc. New York, NY.
- Daubenmire. 1968. Plant communities. Harper and Row, New York, NY.
- Draper, N. R., and H. Smith. 1966. Applied Regression Analysis. John Wiley & Sons, Inc. New York, NY.
- Fris, M. B., and R. W. DeHaven. 1993. A community-based habitat suitability index model for shaded riverine aquatic cover, selected reaches of the Sacramento River system. Draft. U.S. Fish and Wildlife Service. Sacramento, CA.
- Grouse, M. R., C. A. Callahan, K. W. Malueg, and S. E. Dominguez. 1981. Effects of fine sediments on growth of juvenile coho salmon in laboratory streams. Transactions of the American Fisheries Society 110:281-286.
- Guadalupe River Flood Protection Project Collaborative. 1998. Final record document (including Dispute Resolution Memorandum [Chapter 9]). October. Prepared by CONCUR, Inc., Berkeley, CA.
- Hays, R. L., C. Summers, and W. Seitz. 1981. Estimating wildlife habitat variables. FWS/OBS-81/47, September 1981. Biological Services Program, U.S. Fish and Wildlife Service, Washington, DC.
- Hetrick, N. J., M. A. Brusven, W. R. Meehan, and T. C. Bjornn. 1998. Changes in solar input, water temperature, periphyton accumulation, and allochthonous input and storage after canopy removal along two small salmon streams in southeast Alaska. Transactions of the American Fisheries Society 127 (6): 859-875.
- Jones & Stokes Associates, Inc. 1995. Vegetation cover sampling protocol for Lower Coyote Creek, reaches 1B, 2A, 2B, Santa Clara County, California. February 14. (JSA 97-301.)

- Sacramento, CA. Prepared for Santa Clara Valley Water District, Project Development Branch. San Jose, CA.
- _____. 1997a. HEP analysis of aquatic resources for Downtown Guadalupe River flood control project. Final. February 21. (JSA 95-116.) Sacramento, CA. Prepared for U.S. Army Corps of Engineers, Sacramento District, Sacramento, CA.
- _____. 1997b. Simulation of temperature impacts and associated mitigation measures for the Downtown Guadalupe River flood control project, San Jose, California. Preliminary Draft. Sacramento, CA. Prepared for U.S. Army Corps of Engineers, Sacramento District, Sacramento, CA.
- Leopold, L. B. and M. G. Wolman. 1957. River channel patterns: braided, meandering and straight. U.S. Geological Survey professional paper 282-B. Washington, DC.
- Moyle, P. B. 1976. Inland fishes of California. University of California Press. Berkeley, CA.
- Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley & Sons, Inc., New York, NY.
- Powers, P. D., and J. F. Orsborn. 1985. Analysis of barriers to upstream fish migration: An investigation of the physical and biological conditions affecting fish passage success at culverts and waterfalls. U.S. Department of Energy, Bonneville Power Administration, Project 82-14 Final Report (contract DE-A179-82BP36523). Portland, OR.
- Raleigh, R. F., T. Hickman, R. C. Solomon, and P. C. Nelson. 1984. Habitat suitability information: rainbow trout. U.S. Fish and Wildlife Service, Division of Biological Services (FWS/OBS-82d/10.60). Washington, DC.
- Raleigh, R. F., W. T. Miller, and P. C. Nelson. 1986. Habitat suitability index models and instream flow suitability curves: chinook salmon. (Biological Report 82[10.122].) U.S. Fish and Wildlife Service. Washington, DC.
- Reiser, D. W., and R. T. Peacock. 1985. A technique for assessing upstream fish passage problems at small-scale hydropower developments. Pages 423-432 in F.W. Olson, R.G. White, and R.H. Hamre, editors. Symposium on small hydropower and fisheries. American Fisheries Society. Bethesda, MD.
- Rich, A. A. 1987. Water temperature which optimizes growth and survival of the anadromous fishery resources of the lower American River. A.A. Rich and Associates. San Rafael, CA. Prepared for McDonough, Holland, and Allan, Sacramento, CA.
- Santa Clara Valley Water District. 1997. Downtown Guadalupe River project. Preconstruction notification for Nationwide Permit Nos. 13 and 33; bank stabilization, temporary access, and dewatering. Revised September 1997. San Jose, CA.
- Shapovalov, L., and A. C. Taft. 1954. The life histories of the steelhead rainbow trout (*Salmo gairdneri gairdneri*) and silver salmon (*Oncorhynchus kisutch*) with special reference to Waddell Creek, California, and recommendations regarding their management. (Fish Bulletin No. 98.) California Department of Fish and Game. Sacramento, CA.
- State Water Resources Control Board. 1992. Condition certification under Clean Water Act (CWA) Section 401: U.S. Army Corps of Engineers (Corps), Guadalupe River Flood Control Project. February 14. Sacramento, CA.

- Stuart, T. A. 1962. The leaping behavior of salmon and trout at falls and obstructions. Department of Agriculture and Fisheries for Scotland, Freshwater and Salmon Fisheries Research Report 28, Edinburgh.
- Thompson, K. 1972. Determining stream flows for fish life. Pages 31-50 in Pacific Northwest River Basins Commission Instream Flow Requirement Workshop, March 15-16, 1972.
- U.S. Army Corps of Engineers. 1985. Final Guadalupe River interim feasibility report and environmental impact statement - Guadalupe River and adjacent streams investigation. July. San Francisco District. San Francisco, CA.
- _____. 1991a. Environmental assessment/initial study, Guadalupe River, California. January 1991. Sacramento, CA.
- _____. 1991b. Guadalupe River, California, General Design Memorandum. Final. December 1991, as revised July 1993. Sacramento, CA.
- _____. 1992. Guadalupe River project Santa Clara County, California: Final mitigation and monitoring plan. June 22. Sacramento, CA.
- _____. 1997. Interim-operation and maintenance manual for the Guadalupe River Project, Contracts 1 & 2 (I-880 to Coleman Avenue), I-880 to Highway 101, Highway 101 to SPRR Bridge and Woz Way to Park Avenue, Santa Clara, California. January. Sacramento, CA.
- _____. 2000a. General reevaluation report/environmental impact report/supplemental environmental impact statement. Sacramento, California. Prepared by CH2M HILL and Jones & Stokes, Sacramento, CA.
- _____. 2000b. Habitat evaluation procedure (HEP) analysis. Final. Sacramento, California. Prepared by Jones & Stokes, Sacramento, CA.
- _____. 2000c. Biological data report/biological assessment for National Marine Fisheries Service. Santa Rosa, California. Prepared by Jones & Stokes, Sacramento, CA.
- _____. 2000d. Biological data report/biological assessment for U.S. Fish and Wildlife Service. Sacramento, California. Prepared by Jones & Stokes, Sacramento, CA.
- U.S. Fish and Wildlife Service. 1982. Habitat suitability index models: Appendix A. Guidelines for riverine and lacustrine applications of fish HSI models with the habitat evaluation procedures. (FWS/OBS-82/10.A, September 1982). Washington, DC.
- U.S. Forest Service. 1977. Fish migration and fish passage. A practical guide to solving fish passage problems. Report prepared by W.A. Evans in collaboration with F.B. Johnston, USDA Forest Service, Region 5.
- Ward, J. F., and W. R. Meehan. 1984. Inexpensive digital daylight integrator. *Progressive Fish Culturist* 46: 62-66.
- Zar, J. H. 1974. *Biostatistical Analysis*. Prentice-Hall, Inc. Englewood Cliffs, NJ.

5.2 Personal Communications

Reiller, K. Engineer. Santa Clara Valley Water District, Operations and Maintenance Group, San Jose, California. August 24, 1999 – telephone communication regarding the operation of the weir structure at the upstream end of the secondary channel in Contract 2.

APPENDIX A

**Members of Guadalupe River Flood Control
Project Collaborative, Measurable Objectives
and Adaptive Management Technical Team, and
Habitat Evaluation Procedures Technical Team**

APPENDIX A-1

Guadalupe River Flood Control Project Collaborative

Signatories of the Dispute Resolution Memorandum

Agency	Name
California Department of Fish and Game	Carl Wilcox
California Regional Water Quality Control Board	Richard Whitsel
California State Water Resources Control Board	Oscar Balaguer
City of San Jose	Darrell Dearborn, Ralph Qualls
City of San Jose Redevelopment Agency	Ken Talbot
National Marine Fisheries Service	James Bybee
Natural Heritage Institute	Richard Roos-Collins, Mark Wolfe
Santa Clara Valley Water District	Kay Whitlock, Stan Williams, Jim Ferguson
U.S. Fish and Wildlife Service	Mike Aceituno
U.S. Army Corps of Engineers	Lewis Whitney, Mike Nolan, and Mark Charlton (supplement)

APPENDIX A-2

Measurable Objectives Development Team*

Agency	Name
California Department of Fish and Game	Carl Wilcox
California Regional Water Quality Control Board	Richard Whitsel
National Marine Fisheries Service	Mark Helvey
Natural Heritage Institute	Stacy Li
Santa Clara Valley Water District	Terry Neudorf
U.S. Fish and Wildlife Service	Steve Schoenberg
U.S. Army Corps of Engineers	Nina Bicknese

* Key Participants since 1998

APPENDIX A-3

Habitat Evaluation Procedures Team*

Agency	Name
California Department of Fish and Game	Margaret Roper, Carl Wilcox
California State Water Resources Control Board	Oscar Balaguer
National Marine Fisheries Service	Chris Mobley, Ian Gilroy, Mark Helvey
Natural Heritage Institute	Stacy Li
Santa Clara Valley Water District	Terry Neudorf
U.S. Fish and Wildlife Service	Steve Schoenberg
U.S. Army Corps of Engineers	Matt Davis, Mike Welsh, Nina Bicknese

* Participants since 1996

APPENDIX B

Section 401 Conditional Water Quality Certification and Dispute Resolution Memorandum

APPENDIX B-1

Section 401 Conditional Water Quality Certification and Letters

Contents of Appendix B-1

Letter	Description
1	Conditional Certification under Clean Water Act (CWA) Section 401 from the State Water Resources Control Board to the U.S. Army Corps of Engineers, February 14, 1992.
2	Guadalupe River Flood Control Project Mitigation Plan Planning Aid Letter from the U.S. Fish and Wildlife Service to the U.S. Army Corps of Engineers, June 1, 1992.
3	Comments on the Guadalupe River Mitigation and Monitoring Plan from the U.S. Fish and Wildlife Service to the U.S. Army Corps of Engineers, June 19, 1992.
4	Comments on the Guadalupe River Mitigation and Monitoring Plan from the U.S. National Marine Fisheries Service to the U.S. Army Corps of Engineers, June 29, 1992.
5	Comments on the Guadalupe River Mitigation and Monitoring Plan from the California Regional Water Quality Control Board, San Francisco Region, to the U.S. Army Corps of Engineers, July 7, 1992.
6	Comments on the Guadalupe River Mitigation and Monitoring Plan from the California Department of Fish and Game to the U.S. Army Corps of Engineers, July 8, 1992.
7	Responses to the U.S. Fish and Wildlife Service's June 19, 1992 Comments on the Guadalupe River Mitigation and Monitoring Plan from the U.S. Army Corps of Engineers, July 10, 1992
8	Responses to the California Department of Fish and Game's July 8, 1992 Comments on the Guadalupe River Mitigation and Monitoring Plan from the U.S. Army Corps of Engineers, July 9 and 13, 1992.
9	Review of the U.S. Army Corps of Engineers' Responses to the California Department of Fish and Game's July 8, 1992 Comments on the Guadalupe River Mitigation and Monitoring Plan from the California Department of Fish and Game, July 15, 1992.
10	Letter from the U.S. Corps of Engineers to the State Water Resources Control Board Regarding Approval of the Guadalupe River Mitigation and Monitoring Plan by Regulatory Agencies, July 17, 1992.

- 11 Letter from the U.S. Corps of Engineers to the State Water Resources Control Board Accompanying the May 1993 Mitigation and Monitoring Plan, May 27, 1993.
- 12 Comments on the U.S. Corps of Engineers' May 1993 Guadalupe River Mitigation and Monitoring Plan from the U.S. Fish and Wildlife Service, June 8, 1993.
- 13 Revised Conditional Certification under CWA Section 401 from the State Water Resources Control Board to the U.S. Army Corps of Engineers, August 17, 1993.
- 14 Clarification of Conditional Certification Under CWA Section 401 from the State Water Resources Control Board to the U.S. Army Corps of Engineers, October 8, 1993.
- 15 Letter from the State Water Resources Control Board to the U.S. Army Corps of Engineers Regarding Development of a Final Guadalupe River Mitigation and Monitoring Plan, September 8, 1997.
- 16 Letter from the State Water Resources Control Board to the U.S. Army Corps of Engineers Regarding Certification of the Guadalupe River Project under CWA Section 401 upon Completion of Final Design and Environmental Documents, September 10, 1998.

STATE WATER RESOURCES CONTROL BOARD

7. BONDERSON BUILDING
STREET
OX 100
SACRAMENTO, CA 95812-0100

(916) 657-1025

FAX (916) 657-2388



FEB 14 1992

Mr. David Ruark
Civil Projects, Section C
Sacramento District
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922

Dear Mr. Ruark:

CONDITIONAL CERTIFICATION UNDER CLEAN WATER ACT (CWA) SECTION 401: U.S. ARMY
CORPS OF ENGINEERS (CORPS), GUADALUPE RIVER FLOOD CONTROL PROJECT

This letter responds to your application for CWA Section 401 Water Quality Certification in connection with the subject project. The Guadalupe River Flood Control Project within the City of San Jose will modify the channel of the Guadalupe River and remove 15.4 acres of adjacent riparian vegetation. To compensate for the lost riparian habitat, the Corps proposes to create 22.45 acres of riparian woodland at a mitigation site in the project area adjacent to the Guadalupe River. The project will be coordinated with the construction of an urban river park along the Guadalupe River within the project reach.

The California Regional Water Quality Control Board, San Francisco Bay Region (San Francisco Bay Regional Water Board) reviewed the project and, based on available environmental documentation, recommended water quality certification to the State Water Resources Control Board (State Water Board). Subsequently, the State Water Board was asked to review the proposed certification. In assessing the project, State Water Board staff reviewed the Corps' July 1985 Final Guadalupe River Interim Feasibility Report and Environmental Impact Statement (FEIS); September 1990 Environmental Assessment; January 1991 Finding of No Significant Impact and Negative Declaration; and the City of San Jose's June 1989 Guadalupe River Park Final Environmental Impact Report. We also discussed the project with staffs of the Corps, the U.S. Fish and Wildlife Service (USFWS), the U.S. National Marine Fisheries Service (USNMFS), the San Francisco Bay Regional Water Board, the Department of Fish and Game (DFG), the Santa Clara Valley Water District (SCVWD), and the San Jose Redevelopment Agency, and with other environmental professionals working in the Guadalupe drainage. We met with agency staffs several times and participated in a fish habitat survey of the project area.

Mr. David Ruark

-2-

FEB 14 1992

During our review, we identified concerns relating to the proposed mitigation for impacts to riparian habitat and to impacts to anadromous fish. These concerns are briefly discussed below as background for the associated certification conditions (enclosed).

In connection with the first concern, after the 1985 FEIS a number of design changes occurred in the project. Each of the subsequent environmental documents focused narrowly on the issues within the scope of that document. Some draft documents elicited controversies, the resolution of which was not explicitly detailed within the final documents. As a result, it is difficult to gain a clear understanding of all project impacts and to assess the adequacy of the proposed mitigation. The fullest statement of proposed mitigation is presented in Attachment D, "List of Environmental Commitments", to the 1991 Finding of No Significant Impact and Negative Declaration. This list includes measures to compensate for lost riparian habitat but contains insufficient detail to allow a finding that lost beneficial uses will be fully replaced. To address this concern we have required development of a Final Mitigation and Monitoring Plan, which will summarize impacts to riparian resources and specify protective measures.

Our second concern relates to anadromous fish spawning habitat within the project area. Anadromous fish migration and spawning are listed in the San Francisco Regional Water Board's Water Quality Control Plan (Basin Plan) as potential beneficial uses for the Guadalupe River. None of the project reports discuss spawning within the project reach; however, data reviewed by State Water Board staff indicate that DFG employees observed numerous spawning depressions within the project area in August 1987. In November 1991, the Corps surveyed the project site, assisted by other concerned agencies, and observed potential fish spawning habitat which will be impacted by the project. In response, the Corps developed fishery mitigation measures which have been incorporated into the above-referenced Final Mitigation and Monitoring Plan.

I hereby certify the proposed project, subject to the enclosed conditions.

We would like to express our appreciation for the high level of professionalism displayed by the Corps' Environmental Resources Section staff and for the excellent cooperation we received from the Corps' project team in reviewing this project. If you require further assistance, please telephone Jesse M. Diaz, Chief of the Division of Water Quality, at (916) 657-0756. The staff person working on this issue is Oscar Balaguer, and he can be reached at (916) 657-1025.

Sincerely,

Original Signed By:

Walt Pettit
Executive Director

Enclosure

Mr. David Ruark

-3-

cc: (all with enclosure)

Mr. Steven R. Ritchie
Executive Officer
California Regional Water Quality Control Board,
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612

Lieutenant Colonel Stanley G. Phernambucq
San Francisco Bay District
U.S. Army Corps of Engineers
211 Main Street
San Francisco, CA 94105-1905

Mr. Phil Oshida, Chief (W-7-2)
Wetlands and Dredge Material Section
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, CA 94105

Mr. Michael Thabault
U.S. National Marine Fisheries Service
Federal Building, Room 325
777 Sonoma Avenue
Santa Rosa, CA 95404

Mr. Mike Fris
Field Supervisor
U.S. Fish and Wildlife Service
Sacramento Enhancement Field Office
2800 Cottage Way
Sacramento, CA 95825

Mr. Rich DiHaven
U.S. Fish and Wildlife Service
Sacramento Enhancement Field Office
Corps of Engineers Permit Unit, Room E 1803
2800 Cottage Way
Sacramento, CA 95825

Mr. Mark Klemencic
Flood Control Design
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Mr. Bernie Goldner
Environmental Specialist
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Mr. David Ruark

-4-

Mr. Carl Wilcox
California Department of Fish and Game
Yountville Office
P.O. Box 47
Yountville, CA 94599

Mr. Dean Marstein
California Department of Fish and Game
Marine Research Branch Office
2201 Garden Highway
Monterey, CA 93940

Ms. Libby Lucas
174 Yerba Santa
Los Altos, CA 94022

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

CONDITIONS OF CERTIFICATION UNDER CLEAN WATER ACT SECTION 401
FOR

U.S. ARMY CORPS OF ENGINEERS (CORPS)
GUADELUPE RIVER FLOOD CONTROL PROJECT,
SAN JOSE, CALIFORNIA

1. Ownership of the mitigation sites shall not be transferred to another public entity until the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) concur that the sites have met the goals of the Compensatory Mitigation Program.
2. Prior to the initiation of construction and after final design plans for the project have been drawn, a Final Mitigation and Monitoring Plan (Final Plan) shall be approved by the California Regional Water Quality Control Board, San Francisco Bay Region, CDFG, USFWS, and the U.S. National Marine Fisheries Service (USNMFS). Prior to construction, a copy of the Final Plan and documentation of approval by the above agencies shall be transmitted to the State Water Resources Control Board (State Water Board). The Final Plan shall contain the following elements, shall be fully implemented, and shall include provisions for reporting and inspections to assure implementation as specified:

a. Summary of Impacts to Wetland, Riparian, and Fish Habitat

The Summary of Impacts element will present an overview of all wetland, riparian, and fish habitat impacts of the project as finally designed, and will include narrative and maps to collate and update the information presented in previous environmental documents. For each reach of the river in which construction takes place, the Summary of Impacts element will describe existing wetland, riparian, and fish habitat; how much of the habitat will be removed by construction; how much will remain; and how much will be created.

b. Compensatory Riparian Mitigation Plan

The Compensatory Riparian Mitigation Plan will include:

- i. A detailed description and plans of compensatory mitigation sites;
- ii. A detailed planting plan;
- iii. Criteria to determine whether the compensatory mitigation has been fully successful in offsetting lost wetland and riparian functions and values;
- iv. A monitoring plan and provisions for reporting to concerned agencies;
- v. Contingency measures to be implemented should monitoring indicate that the mitigation is not fully successful as determined by the criteria established pursuant to Condition No. 2.b.iii above;
- vi. Documentation that sufficient reclaimed or other irrigation water for the establishment and maintenance of vegetation has been secured, while ensuring the adequacy of the instream flows required by Condition No. 2.e.ii below;
- vii. Specifications of how compensatory mitigation sites will be guaranteed protection in perpetuity from potential recreational and other urban impacts. The program will include provision for periodic inspections of the mitigation sites by concerned agencies.

c. Vegetation Protection Plan

The Vegetation Protection Plan will provide a detailed description of how impacts to existing vegetation will be minimized during construction, including a map of vegetation to be retained.

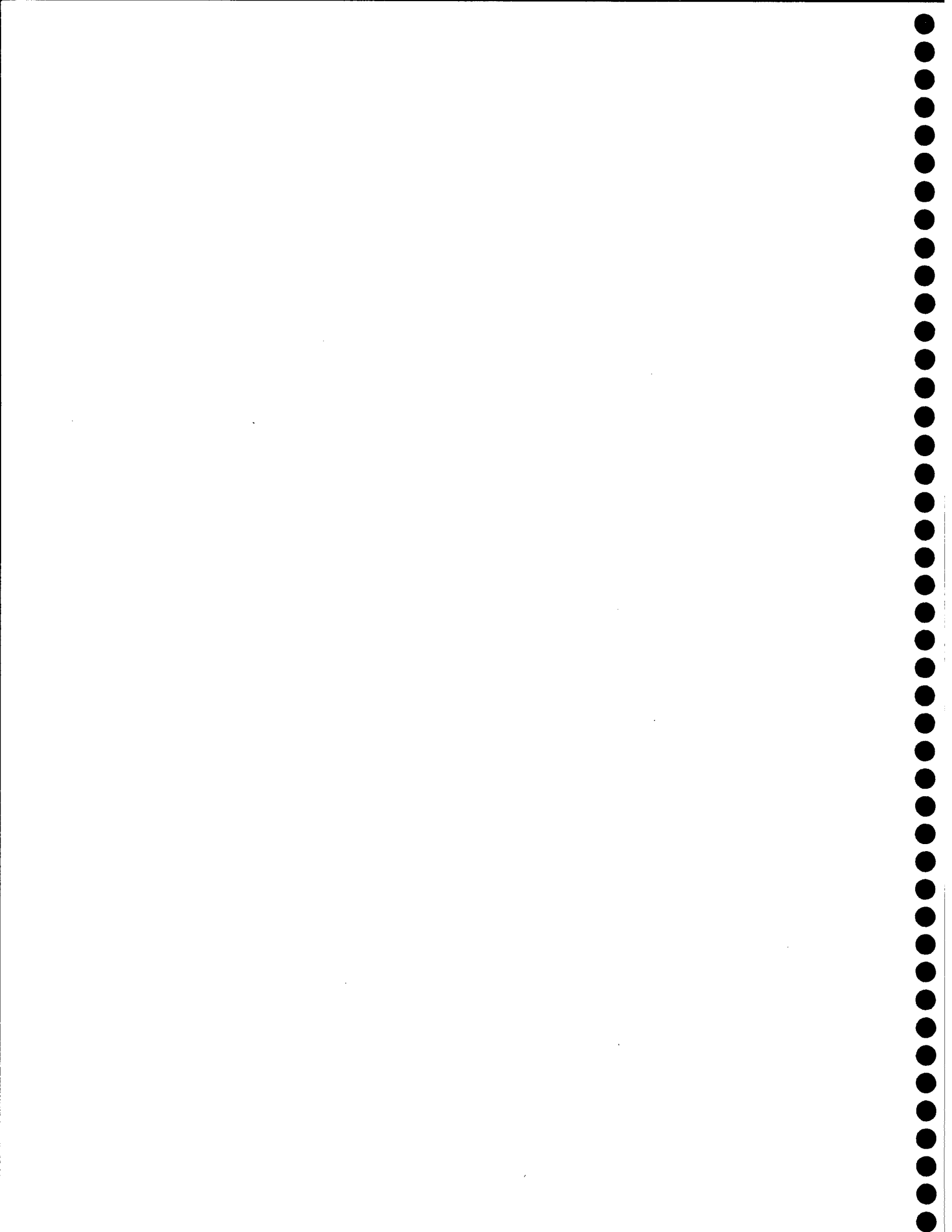
d. Erosion Control Plan

The Erosion Control Plan will detail how erosion and sediment delivery to the Guadalupe River will be minimized during construction, including prevention of wet weather runoff and interim soil stabilization until vegetative cover is established.

e. Fishery Mitigation Plan

The Fishery Mitigation Plan will detail:

- i. Design of a low flow channel, where the streambed will be armored, to include fish resting areas;
- ii. Design and operation standards for the secondary channel to avoid impacts to anadromous fish, including measures to ensure that adequate depth and velocity of water in the main channel are maintained;
- iii. Measures to ensure maintenance in perpetuity of spawning gravel for anadromous fish in the project reach, unless USFWS, USNMF, and CDFG recommend, and the State Water Board approves, cessation of the gravel maintenance program;
- iv. Measures to prevent gravel loss and fish barriers resulting from removal of the U.S. Geologic Survey gaging weir upstream of the St. John Street bridge;
- v. Measures to fully mitigate any project-related thermal impacts to the armored and unarmored sections of the channel, including a detailed planting and plant maintenance plan to reestablish the vegetative canopy.





United States Department of the Interior



FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

June 1, 1992

Colonel Laurence R. Sadoff
District Engineer
U.S. Army Corps of Engineers,
Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: CE-SAC Guadalupe River Flood Control Project Mitigation Plan

Dear Colonel Sadoff:

This Planning Aid Letter (PAL), provided pursuant to our FY-1992 Scope of Work, provides recommendations to the Corps of Engineers for the Final Mitigation and Monitoring Plan of the Guadalupe River Flood Control Project. The Plan is required by the State Water Resources Control Board for their Section 401 certification of the project pursuant to the Clean Water Act.

This PAL has been coordinated with your staff and staff of other involved agencies, including the State Water Resources Control Board, the Regional Water Quality Control Board, California Department of Fish and Game, and the National Marine Fisheries Service (Appendix D). Some coordination is continuing with these other involved agencies. Should any of these agencies provide additional formal comments, we will give them full consideration, and any revisions to this PAL based on their responses, or based on any additional information that may come to our attention, will be provided to you by subsequent letter.

BACKGROUND INFORMATION

In March 1992, the Department of the Army approved cost-sharing and the General Design Memorandum for a project which would provide flood control measures for portions of the lower Guadalupe River in the city of San Jose, California. The objective of the project is to provide protection from a 1 in 100-year flooding event on a 2.5-mile-long section of the river between Interstate Highway 280 and the community of Alviso. The lower Guadalupe River is contained entirely within urban and industrial sections of the city of San Jose, and provides one of the very few riparian vegetation corridors through the metropolitan areas immediately south of San Francisco Bay. These corridors provide essential habitat for many species of terrestrial and

aquatic wildlife; improper modification of such can not only destroy the important native flora, but also affect the survival of a myriad of animal species.

The need for this PAL arose partially because of events that were observed in the lower Guadalupe River after the Service's Coordination Act Report and the Final Environmental Impact Statement were completed. In November of 1986 and 1987, chinook salmon were observed in the project reaches (Ulmer 1988). Spawning redds were documented by both the California Department of Fish and Game (Ulmer 1988) and by the Habitat Restoration Group (HRG 1991). The chinook salmon, like other Pacific salmon species, lives most of its life in ocean waters and returns to freshwater streams to spawn. Salmon hatchlings are then reared in the streams for 6 to 10 months before migrating downstream to the ocean.

Partially as a result of this new information, the State Water Resources Control Board, in their review of the project, included a requirement for a Final Mitigation and Monitoring Plan as a condition for Section 401 certification under the Clean Water Act (Appendix C). Prior to the initiation of construction, the Plan shall be approved by the California Regional Water Quality Control Board, the U.S. Fish and Wildlife Service, California Department of Fish and Game, and the National Marine Fisheries Service. Components of the Plan include a Compensatory Riparian Mitigation Plan and a Fishery Mitigation Plan.

Under the FY-1992 Scope of Work, the Fish and Wildlife Service has been requested to provide: (a) success criteria for evaluating riparian mitigation; (b) goals for the gravel maintenance program and cessation of the program; and (c) additional assistance in developing other parts of the Mitigation and Monitoring Plan. This PAL provides our input for elements (a) and (b) in Appendices A and B. Appendix A includes elements of a monitoring plan and conditions for success of riparian mitigation. Appendix B includes the recommendations and goals for the Fishery Mitigation Plan. Both appendices include additional recommendations which aid in development of other parts of the Mitigation Plan. For example, the criteria for success of the riparian plan must include aspects of the monitoring plan, because success criteria dictate what types of monitoring are necessary.

The remainder of this PAL provides a brief discussion of several aspects of the riparian vegetation mitigation recommendations. Also included for your assistance in the planning process are: (a) comments and recommendations on several aspects of the Compensatory Mitigation Plan which were made by the Fish and Wildlife Service, Regional Water Quality Control Board and California Department of Fish and Game at a March 30, 1992 meeting with Corps of Engineers' staff; and (b) comments from National Marine Fisheries Service which were delivered at the meeting by Fish and Wildlife Service staff.

RIPARIAN MITIGATION SUCCESS CRITERIA

The criteria for success for the Compensatory Riparian Mitigation Plan is enclosed as Appendix A. This appendix is based on the 1991 H.T. Harvey and Associates Report, Route 85 - Los Gatos Creek Mitigation Project, Final Site Performance Monitoring Plan (H.T. Harvey and Associates, Alviso, California, prepared for Orsee Design Associates and the Santa Clara County Traffic Authority). We believe that the enclosed vegetation monitoring plan is particularly applicable to the Guadalupe River mitigation sites. The plan might be considered more stringent than typical Corps monitoring plans; however, we find such a plan is appropriate for several reasons, which are discussed below.

The Guadalupe River mitigation site lies between the main channel and a proposed secondary channel; the secondary channel will not receive water during low-flow periods, which occur through most months of the year. The site would initially be irrigated with water. Once this water source is discontinued, it is uncertain whether the vegetation would be adequately watered by the stream channel.

At present streamflow regimes, water would not be available in the secondary channel at low-flow conditions. More water cannot be diverted into the secondary channel because of potential conflicts with migrating salmon, which may not be able to navigate the primary channel at decreased flows. Thus, without higher streamflow releases, it may be necessary to provide extended irrigation of the replanting sites. Even then, the success of the riparian replanting would be difficult to ensure.

The enclosed riparian vegetation monitoring/mitigation plan would help provide assurance that the replanted areas would compensate for habitat values lost at impacted sites. We support the inclusion of such a plan into the Riparian Vegetation Mitigation Plan conditionally required for Clean Water Act Section 401 certification. Furthermore, the Fish and Wildlife Service recommends that a letter of credit or a bond be posted, of a dollar amount which would provide for additional lands on the Guadalupe River to be secured and replanted in case mitigation measures that were implemented fail to provide the projected habitat values. The letter of credit would not be used if desired habitat values were provided by the original mitigation measures.

We realize that the monitoring plan is beyond that which the Corps would normally fund. Although negotiations may be appropriate to determine which agencies would provide funding for various aspects of the project, we anticipate that funding beyond the first 3 years of the monitoring program would be the sole responsibility of the local sponsors.

ADDITIONAL COMMENTS AND RECOMMENDATIONS

At the March 30, 1992 meeting between Corps staff and representatives of the Fish and Wildlife Service, California Department of Fish and Game, Regional

Water Quality Control Board and National Marine Fisheries Service, recommendations and comments were made regarding implementation of the project. Several recommendations which were discussed are listed below. These recommendations, which are in accordance with required elements of the Mitigation and Monitoring Plan, are included to help facilitate the expedient approval of the Plan by the various agencies involved.

Riparian Mitigation Lands Identification. As part of the riparian mitigation, the December 1991 General Design Memorandum states that 2.4 acres of additional mitigation lands shall be replanted in the newly created gabions, concrete terraces, and disturbed areas along the river from Interstate Highway 280 to Coleman Avenue. In addition, at our December 13, 1991 meeting with Corps staff, it was agreed that additional trees would be planted to provide shade to the river. To our knowledge, these areas have not been defined. A listing of proposed mitigation sites will be needed to evaluate the Final Mitigation Plan.

The aforementioned mitigation areas should be planted in a manner which, to the maximum extent possible, provides shading to the river, overhead cover and insect drop. Plans for planting these areas, including species lists, should be provided in the Final Mitigation and Monitoring Plan.

Maintenance of Riparian Vegetation. To maximize instream habitat values within project reaches, riparian vegetation on the banks and elsewhere should not be maintained (i.e., sprayed, mowed or pruned) unless it entails an immediate threat to the integrity of the Flood Control Project. Instream vegetation and branches which have fallen into the stream bed should be removed only when they compromise flood control aspects of the project.

Location of Gravel Retention Structures. The gravel retention structures which will be placed in the river shall be placed in shaded areas where riparian cover is maximized. The designs for all instream structures (gravel retention structures, low-flow channels, etc) should be forwarded to Michael Thabault at the National Marine Fisheries Service, Santa Rosa, at the earliest date possible to allow sufficient time for evaluation and comment.

Vegetation Protection Plan. The Conditions for Certification (Appendix C) state that the Vegetation Protection Plan section will provide "a detailed description of how impacts to existing vegetation will be minimized during construction". Large riparian trees that must be removed during construction should be relocated, if possible, in the 20.05-acre mitigation site. If this alternative is found not to be feasible, information should be provided which explains why the measure was not included in the vegetation protection plan.

Thank you and your staff for the opportunity to provide assistance in this final stage of planning. If you have any questions pertaining to this PAL, please call Michael Fris of my staff at (916) 978-4613.

Sincerely,

James R. Carson
for Wayne S. White
Field Supervisor

cc: (w/Appendices)
ARD, FWE, FWS, Portland, OR
State Water Resources Control Board, Sacramento, CA (Attn: Oscar Balaguer)
Regional Water Quality Control Board, Oakland, CA (Attn: Dale Bowyer)
CDFG, Region 3, Yountville, CA (Attn: Carl Wilcox)
CDFG, Los Gatos, CA (Attn: Patricia Anderson)
NMFS, Santa Rosa, CA (Attn: Mike Thabault)
SCVWD, San Jose, CA (Attn: Bernard Goldner)
San Jose Redevelopment, San Jose, CA (Attn: Ken Talbot)

REFERENCES

- Habitat Restoration Group. 1991. Fisheries report prepared for the Upper Guadalupe River Flood Control Project Feasibility Study. Stanley and Associates, Inc. Scots Valley, California.
- H. T. Harvey and Associates. 1991. Los Gatos Creek Mitigation Project, Final Site Performance Monitoring Plan. Prepared for Orsee Design Associates and the Santa Clara County Traffic Authority. H.T. Harvey and Associates. Alviso, California.
- Ulmer, L. 1988. Anadromous fish species utilization of Guadalupe River and Coyote and Penitencia Creeks, Santa Clara County (1986-1987). California Fish and Game Report. Yountville, California.

June 19, 1992 Fish and Wildlife Service
Comments on the Guadalupe River
Mitigation and Monitoring Plan that was
Hand-Delivered to the
Fish and Wildlife Service
on June 17, 1992

- p38. 2a. 2nd sentence. Provide information as to where and how many trees will be planted, and what percent of the lost overhead cover will be replaced by the replantings.
- p38. 2b. Last sentence. Groundwater tables indicate that it is likely in most areas, but not a certainty. As per the monitoring criteria, irrigation may be determined necessary after year 3.
- p44. There is no point in cumulative survival criteria when the success criteria are lower every year. Leave survival (cumulative) at 70 percent for all years.
- p50. (1) Last sentence. The 175 plants per acre should include only native riparian trees and shrubs. The criteria should also fall within specified species composition ranges.
- p51.b) Criteria should include "survivorship of plantings".
- p57.d. Project Failure Contingency Plan. Please provide verbiage showing that one or both of the project sponsors will assume responsibility for implementing remedial measures, if necessary.
- p68. Section (1)(a) 2nd paragraph. The 465 cubic yards of gravel may not be enough, if 25,190 square feet are lost. Please leave open the possibility that more than 465 cubic yards may be necessary for restocking.
- p69. Bottom paragraph. Please provide assurance that gravels will be stocked in areas with tree cover.
- p70. The secondary channel should include a fish screen at the downstream end to prevent entrapment of upstream migrating fish. Furthermore, we defer concurrence of all fish passage structure designs (weirs, channel stabilizer structures) to the National Marine Fisheries Service (NMFS). If NMFS provides concurrence on the Corps' designs, we shall concur.
- p81. Section f. 1st sentence. Further description of thermal impact mitigation is necessary. How many trees will be planted, what is their location, and how much of the lost shade cover will be replaced by the trees?
- p90. The budget included in the report should be itemized and projected past year 3.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

June 19, 1992

Mr. Walter Yep
Chief, Planning Division
U.S. Army Corps of Engineers
Sacramento District
1325 J St.
Sacramento, CA 95814-2922

Subject: CESAC-Guadalupe River Project Mitigation Plan

Dear Mr. Yep:

We have reviewed your latest Guadalupe River Mitigation and Monitoring Plan, which was prepared in compliance with the conditions for certification under Section 401 of the Clean Water Act and hand-delivered to us on June 17, 1992.

The document is, overall, a thorough and precise mitigation plan, of the type which we believe should generally be incorporated into all Federal flood control projects. Your staff should be commended for their fine work. However, there are still a few specific deficiencies within the plan that require resolution before we provide our concurrence.

The enclosed comments address the specific deficiencies and should enable you to prepare a final document. My staff will continue to assist you by reviewing the final draft document in a timely manner. If you have any questions, please contact Michael Fris at (916) 978-4613.

Sincerely,

Wayne S. White
Field Supervisor

Enclosure

cc: ARD, FWE, Portland OR
Oscar Balaguer, SWRCB, Sacramento, CA

June 19, 1992 Fish and Wildlife Service
Comments on the Guadalupe River
Mitigation and Monitoring Plan that was
Hand-Delivered to the
Fish and Wildlife Service
on June 17, 1992

- p38. 2a. 2nd sentence. Provide information as to where and how many trees will be planted, and what percent of the lost overhead cover will be replaced by the replantings.
- p38. 2b. Last sentence. Groundwater tables indicate that it is likely in most areas, but not a certainty. As per the monitoring criteria, irrigation may be determined necessary after year 3.
- p44. There is no point in cumulative survival criteria when the success criteria are lower every year. Leave survival (cumulative) at 70 percent for all years.
- p50. (1) Last sentence. The 175 plants per acre should include only native riparian trees and shrubs. The criteria should also fall within specified species composition ranges.
- p51.b) Criteria should include "survivorship of plantings".
- p57.d. Project Failure Contingency Plan. Please provide verbiage showing that one or both of the project sponsors will assume responsibility for implementing remedial measures, if necessary.
- p68. Section (1)(a) 2nd paragraph. The 465 cubic yards of gravel may not be enough, if 25,190 square feet are lost. Please leave open the possibility that more than 465 cubic yards may be necessary for restocking.
- p69. Bottom paragraph. Please provide assurance that gravels will be stocked in areas with tree cover.
- p70. The secondary channel should include a fish screen at the downstream end to prevent entrapment of upstream migrating fish. Furthermore, we defer concurrence of all fish passage structure designs (weirs, channel stabilizer structures) to the National Marine Fisheries Service (NMFS). If NMFS provides concurrence on the Corps' designs, we shall concur.
- p81. Section f. 1st sentence. Further description of thermal impact mitigation is necessary. How many trees will be planted, what is their location, and how much of the lost shade cover will be replaced by the trees?
- p90. The budget included in the report should be itemized and projected past year 3.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region, HCB
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

June 29, 1992 F/SW022:MGT

Walter Yep
Chief, Planning Division
Sacramento District
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Dear Mr. Yep:

This is in response to your letter of June 15, 1992 concerning the Final Mitigation and Monitoring Plan for the Guadalupe River Project. I find the plan acceptable and will not oppose the Corps' proceeding with the project.

If you wish to discuss the project further, please contact Michael Thabault of my staff at: National Marine Fisheries Service, 777 Sonoma Avenue, Room 325, Santa Rosa, California 95404; telephone (707) 578-7513.

Sincerely,


James R. Bybee
Environmental Coordinator
Northern Area

cc: Oscar Balaguer, SWRCB



CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION

2101 WEBSTER STREET, SUITE 500

SACRAMENTO, CA 94612

(916) 464-1255



July 7, 1992

File No. 2188.07 (DCB)

Mr. Oscar Balaguer
P.O. Box 100
Sacramento, California 95812-0100

Subject: Guadalupe River Project, Final Mitigation and Monitoring
Plan

Dear Mr. Balaguer:

We have reviewed the Final Mitigation and Monitoring Plan dated June 22, 1992 and find it adequate and responsive to our concerns. It is our belief that if the U.S. Army Corps of Engineers and the local sponsor, the Santa Clara Valley Water District, diligently follow this plan and monitoring format, that mitigation success will be eventually achieved.

Sincerely,


Steven R. Ritchie
Executive Officer

cc

Mike Hoover, U.S. Army COE, Sacramento

DEPARTMENT OF FISH AND GAME

POST OFFICE BOX 47

MOUNTVILLE, CALIFORNIA 94599

(916) 944-5500

July 8, 1992



Mr. Mike Hoover
U. S. Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Dear Mr. Hoover:

Final Mitigation/Monitoring Plan, Guadalupe River Project
Santa Clara County

Department of Fish and Game personnel have reviewed the Final Mitigation and Monitoring Plan for the Guadalupe River Project prepared by the U. S. Corps of Engineers (COE). The following comments are provided to you at the request of the COE. Compliance for certification pursuant to Section 401 of the Clean Water Act requires approval of the Plan by the State Water Resources Control Board prior to initiating construction.

The Department provided preliminary review comments on the Final Plan to the COE in a letter of June 2, 1992. We received no response to the comments and concerns expressed in that letter. Many of the same concerns and questions remain. The following are the most critical concerns regarding the Final Plan:

1. The pre-project conditions are not valid baseline conditions because the local sponsor, Santa Clara Valley Water District (SCVWD), is largely responsible for the increase in water temperature and sediment load and the decrease in the anadromous fish population due to water diversion structures. These diversions and associated impacts need to be properly addressed. Thus, if the SCVWD completes their mitigation requirements, conditions should return to a level that is better than pre-project conditions in terms of decreased water temperatures, sediment loads, and barriers to upstream migration, and increased numbers of anadromous fish.
2. Surveys and maps of existing vegetation and fishery habitat were required to be part of this Plan. The detailed maps are scheduled to be completed later, and this mapping does not appear to include fishery habitat. Fishery habitat needs to be mapped and documented prior to construction so changes can be properly monitored.
3. The fishery mapping and documentation needs to include an accurate assessment of Shaded Riverine Aquatic Cover (SRA) derived from actual field measurements, not just empirical formulas. SRA is one of the most important features of the mitigation plan.

Mr. Mike Hoover
July 8, 1992
Page Two

4. The fishery surveys need to include the sampling of fish, invertebrates, leaf litter input, and stream habitat types. These surveys are pertinent to proper maintenance of the mitigation features.
5. Table D-2, Evaluation of Instream Aquatic Habitat Impacts, uses the word "potential" for all of the impacts. These impacts should be treated as true impacts and mitigated accordingly.
6. The gravel replacement program should be the mandatory alternative, as opposed to the spreader dams. The gravel restocking program is a more reliable method of creating good spawning habitat in the river, especially when the model to be used is not sensitive to measuring good spawning gravels. The model used to measure bedload movement includes fine material, such as silt, which is detrimental to spawning success.
7. The local sponsor, the SCVWD, needs to present their work plan for monitoring, mitigation, compliance, and budgeting for the revegetation and fishery program. The SCVWD is already involved in numerous projects, and the possibility exists that the SCVWD may be unable to properly complete their work plan. If so, there should be a way to subcontract the work to an alternate party. Also, the local sponsor is solely responsible for the work plan, not agencies such as the Department or U. S. Fish and Wildlife Service.
8. The programmatic mitigation feature of the Plan needs to be clarified. For example, what is required as the basis to request more information, or what is the assurance that the requested information will be collected, or is there any built-in leverage to requests, or how will the collection of additional information be funded?
9. The time frame of 10 years to release the local sponsor from their responsibility for monitoring and mitigation of the Plan is not long enough. The Department is now recommending 20-25 years of monitoring and with contingencies projects of this magnitude. The Department also requests clarification as to whether this proposed release of responsibility negates the "in perpetuity" clauses within the Plan.
10. The thermal model discussed in the Plan only addressed the winter months when water temperatures are cooler and, thus, not critical to salmonid survival. The spring and early summer months are actually the most critical in terms of adequate water temperatures for the early salmonid life stages. Other means of cooling the water need to be addressed, such as release of cooler water from the percolation ponds.

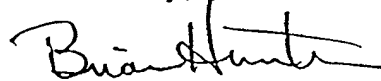
Mr. Mike Hoover
July 8, 1992
Page Three

11. Important to the overall quality of the fishery in the Guadalupe River system is adequate streamflow. A guarantee of streamflows needs to be part of the mitigation plan. The SCVWD should provide these flows as mitigation for cumulative impacts. Also, the flows required in the secondary channel are only empirical formulas. Actual field observations should be incorporated to insure that flows are adequate for fish migration.

The Guadalupe River is an important habitat for salmon and steelhead, as stated in the Plan. If the past, present, and future developments are adequately monitored and mitigated, then there will once again be a healthy fishery in the Guadalupe River system. Because the River is located in a highly urbanized setting, the return of more salmon and steelhead will benefit a larger number of people. The Department supports all efforts to maintain, enhance, and restore the fishery. In fact, it is the policy of the Department to require no net loss of salmon or steelhead habitat. In short, monitoring and mitigation for fishery impacts need to be brought up to the same standard as for vegetation impacts.

Department personnel are available to address our concerns in more detail. If you have questions regarding our comments, please contact Patricia Anderson, Fishery Biologist, at (408) 353-2275; or Carl Wilcox, Environmental Services Supervisor, at (707) 944-5525.

Sincerely,



Brian Hunter
Regional Manager
Region 3

cc: Mr. Oscar Balaguer
State Water Resources
Control Board

Mr. Mike Friese
U. S. Fish and Wildlife Service
Sacramento

July 10, 1992

Environmental Resources Branch

Mr. Wayne White, Field Supervisor
Fish and Wildlife Service
2800 Cottage Way
Sacramento, California 95825

Dear Mr. White:

The purpose of this letter is to formally document coordination efforts discussed by telephone on July 9, 1992 between our staffs regarding the Guadalupe River Mitigation and Monitoring Plan. Enclosed are our responses to concerns expressed in your letter dated June 19, 1992 (enclosure 1). Our responses (enclosure 2) shall be incorporated in the Final Guadalupe River Mitigation and Monitoring Plan.

If these attached responses meet with your approval, please provide notification of your approval to the State Water Resources Control Board as soon as possible. If you have any questions, please contact Michael Hoover at 916-557-6721.

Sincerely,

Walter Yep
Chief, Planning Division

Enclosure

cc:
Plng Div
ERB
Engr Div
Civ Proj Br
Civ Proj Sec C
PM-G

HOOVER/lj
gudriv2.1tr

KINDEL

MURPHY

ENG

BONNER

MYERS

NOLAN

YEP

July 9, 1992 Corps of Engineers
Reply to Comments from USFWS
on the Guadalupe River Mitigation
and Monitoring Plan

p.38 (a). The USFWS will be requested and funded under the Fish and Wildlife Coordination Act to provide field estimates of existing shaded riverine aquatic habitat (SRA), project impacts to SRA, and recommendations for mitigation methodologies within the project area prior to the commencement of each construction contract.

Project impacts to SRA shall be mitigated 100% at a 1:1 replacement ratio (measured in square feet of cover). As much of this mitigation as possible will be placed into gabion structures and adjacent-to-river plantings within the project limits. The exact locations and quantities of these plantings shall be decided subsequent to hydraulic modeling of the river. Any mitigation not provided within project boundaries shall be provided outside of the project boundaries along the Guadalupe River. Exact locations and quantities of all mitigation plantings will be determined based on recommendations to be attained from USFWS prior to the initiation of construction. Care and maintenance of this mitigation shall then be added to the Operations and Maintenance Manuals for the project.

p. 38 (b). "Irrigation may be determined necessary after year 3" shall be added to the plan appropriately.

p. 44. This criteria will reflect the lowest cumulative survival rate possible and repeat within all year categories.

p. 50. The items shall be added to the plan.

p. 51.b). The item shall be added to the plan.

p. 57 d. The item shall be clarified within the plan.

p. 68. The 465 cubic yards of gravel is an estimate of the quantity necessary to provide 12,190 square feet of gravel for project losses. The plan will emphasize that the square feet obligation must be maintained even if the quantity estimates become changed.

p. 69. Taking into account revegetation placements under mitigation features of this plan, the stocking of gravels shall be into areas with tree cover as much as possible throughout project areas.

- p. 70. The placement of a fish screen at the downstream end of the secondary channel shall be evaluated by NMFS and USFWS and a concept plan will be recommended for evaluation by the Corps. If found to be justified, it will be included into designs and constructed as part of Construction Contract 2.
- p. 81. This will be addressed by coordination between our agencies as stated in p. 38 (a) above. The baseline and impacts of project construction activities relative to riparian vegetation plantings and their related impacts, shall be evaluated by your agency and appropriate riparian vegetation mitigation both on and off-site established. Care and maintenance of this mitigation shall be then added to the completed Operations and Maintenance Manuals for the project.
- p. 90. Clarification of the budget processes were mutually agreed to by our staffs on July 9, 1992. No further information is needed in the Mitigation and Monitoring Plan.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

July 13, 1992

Environmental Resources Branch

Mr. Brian Hunter, Regional Manager
California Department of Fish and Game
Post Office Box 47
Yountville, California 95825

Dear Mr. Hunter:

The purpose of this letter is to formally document coordination efforts discussed by telephone on July 10, 1992, between our staffs regarding the Guadalupe River Mitigation and Monitoring Plan. Enclosed are our responses to concerns expressed in your letter dated July 8, 1992 (enclosure 1). Our responses (enclosure 2) shall be incorporated in the Final Guadalupe River Mitigation and Monitoring Plan.

If these attached responses meet with your approval, please provide notification of your approval to the State Water Resources Control Board as soon as possible. If you have any questions, please contact Michael Hoover at 916-557-6721.

Sincerely,

Walter Yep
Chief, Planning Division

Enclosures

cc:
✓ Plng Div
ERB
Engr Div
Civ Proj Br
✓ Civ Proj Sec C
PM-G

HOOVER/saa
gudriv2.ltr

KINDEL
Jm 7/15/92
MURPHY

ENG

BONNER

MYERS

MYLAN

YEP

cc:
Plng Div
ERB
Engr Div
Civ Proj Br
Civ Proj Sec C
PM-G

HOOVER/lj
gudriv2.1tr

KINDEL

MURPHY

ENG

BONNER

MYERS

NOLAN

YEP

DEPARTMENT OF FISH AND GAME

POST OFFICE BOX 47

FINTVILLE, CALIFORNIA 94599

(97) 944-5500

July 8, 1992



Mr. Mike Hoover
U. S. Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Dear Mr. Hoover:

Final Mitigation/Monitoring Plan, Guadalupe River Project .
Santa Clara County

Department of Fish and Game personnel have reviewed the Final Mitigation and Monitoring Plan for the Guadalupe River Project prepared by the U. S. Corps of Engineers (COE). The following comments are provided to you at the request of the COE. Compliance for certification pursuant to Section 401 of the Clean Water Act requires approval of the Plan by the State Water Resources Control Board prior to initiating construction.

The Department provided preliminary review comments on the Final Plan to the COE in a letter of June 2, 1992. We received no response to the comments and concerns expressed in that letter. Many of the same concerns and questions remain. The following are the most critical concerns regarding the Final Plan:

1. The pre-project conditions are not valid baseline conditions because the local sponsor, Santa Clara Valley Water District (SCVWD), is largely responsible for the increase in water temperature and sediment load and the decrease in the anadromous fish population due to water diversion structures. These diversions and associated impacts need to be properly addressed. Thus, if the SCVWD completes their mitigation requirements, conditions should return to a level that is better than pre-project conditions in terms of decreased water temperatures, sediment loads, and barriers to upstream migration, and increased numbers of anadromous fish.
2. Surveys and maps of existing vegetation and fishery habitat were required to be part of this Plan. The detailed maps are scheduled to be completed later, and this mapping does not appear to include fishery habitat. Fishery habitat needs to be mapped and documented prior to construction so changes can be properly monitored.
3. The fishery mapping and documentation needs to include an accurate assessment of Shaded Riverine Aquatic Cover (SRA) derived from actual field measurements, not just empirical formulas. SRA is one of the most important features of the mitigation plan.

Mr. Mike Hoover
July 8, 1992
Page Two

4. The fishery surveys need to include the sampling of fish, invertebrates, leaf litter input, and stream habitat types. These surveys are pertinent to proper maintenance of the mitigation features.
5. Table D-2, Evaluation of Instream Aquatic Habitat Impacts, uses the word "potential" for all of the impacts. These impacts should be treated as true impacts and mitigated accordingly.
6. The gravel replacement program should be the mandatory alternative, as opposed to the spreader dams. The gravel restocking program is a more reliable method of creating good spawning habitat in the river, especially when the model to be used is not sensitive to measuring good spawning gravels. The model used to measure bedload movement includes fine material, such as silt, which is detrimental to spawning success.
7. The local sponsor, the SCVWD, needs to present their work plan for monitoring, mitigation, compliance, and budgeting for the revegetation and fishery program. The SCVWD is already involved in numerous projects, and the possibility exists that the SCVWD may be unable to properly complete their work plan. If so, there should be a way to subcontract the work to an alternate party. Also, the local sponsor is solely responsible for the work plan, not agencies such as the Department or U. S. Fish and Wildlife Service.
8. The programmatic mitigation feature of the Plan needs to be clarified. For example, what is required as the basis to request more information, or what is the assurance that the requested information will be collected, or is there any built-in leverage to requests, or how will the collection of additional information be funded?
9. The time frame of 10 years to release the local sponsor from their responsibility for monitoring and mitigation of the Plan is not long enough. The Department is now recommending 20-25 years of monitoring and with contingencies projects of this magnitude. The Department also requests clarification as to whether this proposed release of responsibility negates the "in perpetuity" clauses within the Plan.
10. The thermal model discussed in the Plan only addressed the winter months when water temperatures are cooler and, thus, not critical to salmonid survival. The spring and early summer months are actually the most critical in terms of adequate water temperatures for the early salmonid life stages. Other means of cooling the water need to be addressed, such as release of cooler water from the percolation ponds.

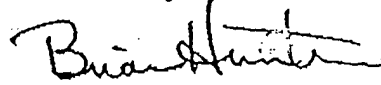
Mr. Mike Hoover
July 8, 1992
Page Three

11. Important to the overall quality of the fishery in the Guadalupe River system is adequate streamflow. A guarantee of streamflows needs to be part of the mitigation plan. The SCVWD should provide these flows as mitigation for cumulative impacts. Also, the flows required in the secondary channel are only empirical formulas. Actual field observations should be incorporated to insure that flows are adequate for fish migration.

The Guadalupe River is an important habitat for salmon and steelhead, as stated in the Plan. If the past, present, and future developments are adequately monitored and mitigated, then there will once again be a healthy fishery in the Guadalupe River system. Because the River is located in a highly urbanized setting, the return of more salmon and steelhead will benefit a larger number of people. The Department supports all efforts to maintain, enhance, and restore the fishery. In fact, it is the policy of the Department to require no net loss of salmon or steelhead habitat. In short, monitoring and mitigation for fishery impacts need to be brought up to the same standard as for vegetation impacts.

Department personnel are available to address our concerns in more detail. If you have questions regarding our comments, please contact Patricia Anderson, Fishery Biologist, at (408) 353-2275; or Carl Wilcox, Environmental Services Supervisor, at (707) 944-5525.

Sincerely,



Brian Hunter
Regional Manager
Region 3

cc: Mr. Oscar Balaguer
State Water Resources
Control Board

Mr. Mike Friese
U. S. Fish and Wildlife Service
Sacramento

**July 9, 1992 Corps of Engineers
Reply to Comments from CDFG
on the Guadalupe River Mitigation
and Monitoring Plan**

1. Although the Guadalupe River was of much higher value for migratory salmonids in the past, our authorizations and regulations require us to consider only the existing condition as the pre-project condition. Therefore, we can only use existing baseline conditions for project evaluations. We recommend you seek restoration of river flows with other agencies separate from this project. Restoration of habitat features not involving water flow modifications might be addressable under Section 1135 of the Water Resources Development Act (WRDA) 1986 (Attachment 1).

2. Surveys and maps have been performed and completed for Construction Contract 1. Riparian vegetation baseline quantities and locations can be found in paragraph 2 (Terrestrial Resources) on pages 1 and 2, and on Plates 1, 2, 3, and 4 of the plan. Fisheries baseline quantities can be found in paragraph 3 (Aquatic Resources) on pages 2 through 16 of the plan. A map and table containing anadromous fisheries gravel resources can be found on pages 11 and 12. Additional fisheries habitat information will be gathered prior to Contracts 1, 2, and 3 and documented as follows;

2.1 The USFWS will be requested and funded under the Fish and Wildlife Coordination Act to provide field estimates using the Habitat Evaluation Procedure (HEP) estimating existing aquatic habitat, project impacts, and recommending mitigation methodologies prior to the commencement of each construction contract.

3. Shaded Riverine Aquatic habitat (SRA) will be a measured parameter as outlined in paragraph 2.1 above. Methodologies will include field measurements of exiting SRA, estimation of project impacts, and recommended mitigation methodologies.

4. Environmental parameters such as the sampling of fish, invertebrates, leaf litter, and stream habitat types will be evaluated within HEP procedures as outlined in paragraph 2.1 above.

5. Within Table D-2, the word "potential" will be footnoted with the phrase "Impacts will be treated as true impacts and mitigated accordingly" at the bottom.

6. The spreader dam concept was included in the document to allow for its evaluation as a potential means of gravel replenishment to the lower Guadalupe River. If used, it will in no way preclude the requirement of providing 25,000 square feet of appropriate gravels to the system (or that determined appropriate by resource agencies if less).
7. The placement of this plan into project Operation and Maintenance manuals will require SCVWD perform these items as stated, including periodic reports to be submitted to the Corps.
8. Programmatic mitigation was mentioned in Mitigation for Other Fisheries Impacts, section f.,6. on page 82. "Other" impacts will now be better understood as a result of Fish and Wildlife Service's HEP analysis. Because of this, other impacts should no longer be programmatic.
9. The year-10 evaluation goal of the Mitigation and Monitoring Plan was not designed to release the local sponsor from their responsibility for monitoring and mitigation of the Plan. It was designed as a point in time to evaluate success or failure of the program. This determination will be made jointly by the Corps of Engineers, resource agencies and Santa Clara Valley Water District, as outlined on page iv of the Abstract. This section goes on to state if mitigation measures have not met success criteria and corrective measures are required, "corrective measures (are) to be negotiated at that time."
10. As in #1 above, our authorizations and regulations require us to consider only the existing condition as the pre-project condition, and this project cannot provide any additional flows to the Guadalupe River. Some further evaluation of project related thermal impacts during spring and early summer is planned.
11. As in #1 and #10, our authorizations and regulations require us to consider only the existing condition as the pre-project condition, and this project cannot provide any additional flows to the Guadalupe River.



DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:
CECW-PM

MEMORANDUM FOR ALL MAJOR SUBORDINATE COMMANDS

SUBJECT: Fiscal Year 1991 Section 1135(b) Proposals That Were Not Submitted to the Assistant Secretary of the Army (Civil Works)

1. The purpose of this memorandum is to provide revised criteria for and request resubmission of section 1135 (b) proposals.

2. Background

a. During late 1990, a panel consisting of representatives of Planning, Operations, Engineering, and Program Management met to review the 93 Fiscal Year 1991 (FY91) section 1135(b) proposals which had been submitted by the divisions. The criteria contained in the CECW-P/CECW-O 19 April 1990 memorandum subject: Implementation of Project Modifications for Improvement of Environment, Section 1135(b), Water Resources Development Act (WRDA) 1986 were used as the basis for evaluation of the proposals.

b. However, due to the limited FY91 funds and the desire to move out quickly with implementation of the program, two additional criteria were developed. The first was to consider only projects with a total estimated cost of less than \$2.5 million, so that one or two projects would not use all of the available funds. The second was to restrict the time frame. At the time of the initial review, this was still a demonstration program. Therefore, only those projects which could be completely implemented, including report preparation, within two years were considered. The goal, then and now, is to fund implementation and not reports and studies. After reviewing the proposals, 26 were selected for submission to the Assistant Secretary of the Army (Civil Works) (ASA(CW)) for approval of report preparation. This list was contained in the CECW-PM 10 January memorandum subject: Section 1135(b), PL 99-662, As Amended: Proposals Selected for FY91 Report Preparation.

c. With the passage of WRDA 90, the Section 1135(b) program is permanently established, and it is no longer a demonstration program. The goal is to eventually manage it in a manner comparable to existing Continuing Authorities Programs. For the present, section 1135 study proposals may be submitted to HQUSACE at any time and, thus, for the purpose of annual budget justifications, will no longer be individually identified as proposed new starts. The individual study proposals, however,

CECW-PM

SUBJECT: Fiscal Year 1991 Section 1135(b) Proposals that Were Not Submitted to the Assistant Secretary of the Army (Civil Works)

will be forwarded periodically, subject to the availability of funds, to the ASA(CW) for consideration for funding approval.

d. The criteria for reviewing proposals have also been revised and are enclosed for your use (Encl 1). The emphasis of proposed modifications of constructed projects must be on fish and wildlife restoration.

3. Resubmission. Enclosure 2 is a list of the FY91 proposals that were not originally submitted to ASA(CW) with brief notes as to why these were not submitted. Recently, six of the proposals that involved three years were submitted to ASA(CW) for approval of report preparation and these are marked. A number of the remaining proposals may be resubmitted for reconsideration with only slight modifications to meet the revised criteria. We now have the opportunity to initiate a few more project modifications with FY91 money and rapid resubmissions are encouraged. All proposals submitted for consideration must be accompanied by a letter of intent from the non-Federal sponsor. Proposals should be submitted to the appropriate regional branch, CECW-PE, PC, or PW. Additional program guidance, including a revised model Local Cooperation Agreement, is being prepared.

4. If you have any questions about the program please contact Ms. Ellen Cummings, CECW-PM, at 202-272-8532.



Enclosures
as

HERBERT H. KENNON
Acting Director of Civil Works

DISTRIBUTION:

Commander, New England Division
Commander, North Atlantic Division
Commander, South Atlantic Division
Commander, North Central Division
Commander, Ohio River Division
Commander, Missouri River Division
Commander, North Pacific Division
Commander, Pacific Ocean Division
Commander, South Pacific Division
Commander, Southwestern Division
Commander, Lower Mississippi Valley Division

ATTACHMENT 1

14 March 1991

Criteria for Section 1135(b)

The following criteria have been developed for use during review of the FY 92 Section 1135(b) proposals and any resubmitted FY 91 proposals.

1. The proposal must be for modifications in the structures or operations of a project constructed by the Secretary of the Army (that is a Corps project). When a feasibility study is ongoing, consideration should be given to the integration of environmental features rather than proposing separate modifications using Section 1135.

2. The proposed modification must be consistent with the authorized project purposes. Proposals which have as a primary output the addition of a new project purpose such as water supply, or the addition of waterborne recreation at a formerly dry reservoir will not be approved.

3. The proposed work must improve the quality of the environment:

a. The goal should be the restoration of habitat that could be expected to sustain modern historic fish and wildlife resources.

1. The modification should be clearly described and the expected results and importance discussed (for example 5 nesting islands will provide enough area for x broods). There should be a brief explanation of the necessity of the proposed modification. If the plan relates to regional or national plans such as the North American Waterfowl Management Plan this should be mentioned.

2. Work which is designed primarily to halt erosion will not be approved.

3. Work which is designed primarily to control sedimentation will not be approved.

b. There must be a clear connection between the location of the proposed modification and the original project. If work is proposed on lands not contiguous to existing project lands then the area must clearly be within the area impacted by the original project.

c. The acquisition of additional lands should be kept to a minimum.

d. Modifications may address non-project induced degradation as long as the resource is not restored beyond modern historic conditions and only existing project lands are required.

4. The modification must have tangible and intangible benefits (monetary and non-monetary) judged to exceed the tangible and intangible costs and this must be discussed in the proposal.

a. Any economic benefits from the modifications must be associated primarily with improvements to fish and wildlife resources.

b. Recreation can not be the direct output of the proposed modification, although increased recreation may be one measure of the value of the improvement in the fish and wildlife resources.

5. Non-Federal sponsors shall provide at least 25 percent of the implementation costs and 100 percent of the incremental Operations, Maintenance, Repair, Rehabilitation, and Replacement (OMRRR) associated with the project modification. The non-Federal sponsors shall provide any additional lands, easements, or rights-of-way required for implementation of the proposed modification. Costs associated with the provision of lands, easements, or rights-of-way will count as part of the total cost of the project and will be credited towards the Non-Federal sponsor's share of the implementation costs up to the twenty-five percent requirement.

6. Proposals must be accompanied by a letter of intent. Non-Federal sponsors should be public agencies. Private interests may qualify as a non-Federal sponsor for purposes of Section 1135(b), if there will be no requirement for future O&M. Large national nonprofit environmental organizations such as Ducks Unlimited or The Nature Conservancy may also qualify as sponsors.

7. It must be clear that a structural or operational modification will result from implementation of the proposal. Consideration should be given to using authority other than Section 1135 if operational only changes are proposed which can be accomplished without additional cost. A report or study, in and of itself, is not a modification for purposes of Section 1135(b). Therefore, study only proposals will not be funded.

8. The Federal cost limit per proposed modification for FY 91 and FY 92 will be \$2 million. This limit is being set to insure that one or two projects do not use all of the available funds.

DEPARTMENT OF FISH AND GAME

POST OFFICE BOX 47

MOUNTAIN VIEW, CALIFORNIA 94599

(916) 944-5500



July 15, 1992

Mr. Walter Yep, Chief
Planning Division
U. S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Dear Mr. Yep:

July 9, 1992 Corps of Engineers Reply to Department of Fish and Game Comments
Guadalupe River Mitigation and Monitoring Plan

Department of Fish and Game personnel have reviewed the responses to our letter of July 8, 1992 concerning the Guadalupe River Mitigation and Monitoring Plan. The response adequately addresses the concerns expressed in our comments. Of prime concern to the Department is the re-establishment of flows to the Guadalupe River sufficient to maintain and increase the anadromous fishery. Based upon your response and staff discussions, the Department recognizes that re-establishment of flows cannot be required as a part of the project since impact mitigation is based upon the condition of the stream at the time of project development.

Our concerns regarding the level of aquatic sampling to be conducted as part of the project have been satisfied by the incorporation of a Habitat Evaluation Procedure, conducted by the U. S. Fish and Wildlife Service, in the pre-construction impact assessment program. This evaluation will address our concerns regarding Shaded Riverine Aquatic habitat and the parameters to be sampled. It is our understanding that once the preconstruction assessment has been completed, the Department will have the opportunity to review the results and comment on the recommended mitigation.

The incorporation of the mitigation and monitoring plan into the project Operation and Maintenance Manual will address our concern that there is an enforceable mechanism to insure that the local sponsor implements the required mitigation and monitoring measures. The year-10 evaluation goal is understood to represent only a waypoint at which the success or failure of the mitigation will be determined and at which time decisions can be made to require remedial measures and additional monitoring if necessary.

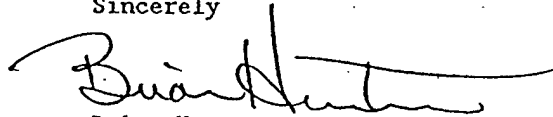
We anticipate that any deficiencies in the mitigation will have been determined by that time, and measures will have been instituted to correct them, including requiring extended monitoring.

Mr. Walter Yep, Chief
July 15, 1992
Page Two

In summary, our concerns regarding the Guadalupe River Mitigation and Monitoring Plan have been addressed. The Department accepts the Final Plan based on the responses to our comments and has no objection to the project proceeding. We look forward to working with the Corps, USFWS, and Santa Clara Valley Water District to assure that the requirements of the mitigation plan are fully implemented.

If you have questions concerning our comments, contact Carl Wilcox, Environmental Services Supervisor, 707-944-5525; or Patricia Anderson, Fisheries Biologist, 408-353-2275.

Sincerely



Brian Hunter
Regional Manager
Region 3

cc: Mr. Mike Frieze
U. S. Fish and Wildlife Service
Sacramento

Mr. Oscar Balaguer
State Water Resources Control Board

bc: Patricia Anderson, Keith Anderson

July 17, 1992

Environmental Resources Branch

Mr. Walter G. Pettit, Executive Director
State Water Resource Control Board
901 P Street
P.O. Box 100
Sacramento, California 95812-0100

Dear Mr. Pettit:

The purpose of this letter is to formally notify you of approval for the Guadalupe River Final Mitigation and Monitoring Plan by California Regional Water Quality Control Board, San Francisco Bay Region, California Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. National Marine Fisheries Service. The Corps of Engineers and Santa Clara Valley Water District have therefore meet requirements as outlined within Conditional Certification under the Clean Water Act Section 401, dated February 14, 1992.

The Final Plan and documentation of approval is attached as outlined within the certification. Appendix E contains resource agency application for modification of the Plan, Corps and sponsor additional commitments, and resource agency approval notifications. The Final Plan with modifications will be completed and distributed by August 30th., 1992. If you have any questions please contact Michael Hoover at 916-557-6721.

Sincerely,

Walter Yep
Chief, Planning Division

Enclosures

cc:
Plng Div
ERB
Engr Div
Civ Proj Br
Civ Proj Sec C
PM-G

HOOVER/lj
gudriv2.1tr

KINDEL

MURPHY

ENG

BONNER

MYERS

NOLAN

YEP

May 27, 1993

Environmental Resources Branch

Mr. Walt G. Petit
State Water Resources Control Board
901 P Street, P.O. Box 100
Sacramento, California 95812-0100

Dear Mr. Petit:

Enclosed for your review is a proposed revision of the Final Mitigation and Monitoring Plan (originally issued in June 1992) for the Guadalupe River project. The environmental commitments have not changed. We have made many editorial changes and several substantive changes in response to agency comments and recent developments. All substantive changes have been highlighted, with the exception of the section on Mitigation for Potential Thermal Impacts (Chapter VIII). The analysis for this section was redone to provide more meaningful results. Therefore, this entire section should be reviewed carefully.

Please provide any comments you may have on the proposed revisions by June 23. We believe that these revisions are not significant enough to affect our Section 401 certification for this project. We would appreciate your concurrence on this. If you have any questions, please contact Mr. Greg Mitchell of the Environmental Resources Branch at (916) 557-6719.

Sincerely,

Walter Yep
Chief, Planning Division

Enclosure



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

Col. Laurence R. Sadoff
District Engineer
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814-2922

Subject: CE-SAC Guadalupe River Flood Control Project, Comments on the Corps
of Engineers' May 1993 Guadalupe River Mitigation and Monitoring
Plan

Dear Colonel Sadoff:

Enclosed are the Fish and Wildlife Service's (Service's) comments on the Corps
of Engineers' (Corps) May 1993 version of the Guadalupe River Mitigation and
Monitoring Plan. These comments are provided pursuant to the fiscal year 1993
Scope of Work for the Sacramento District's Lower Guadalupe River Flood
Control Project. We received this revised Mitigation and Monitoring Plan for
review on May 28, 1993.

The Service appreciates the opportunity to provide assistance in all aspects
of this project. Should you have any questions pertaining to the comments,
please call Michael Fris of my staff at (916) 978-4613.

Sincerely,

/s/ Dave Fredricks

Wayne S. White
Field Supervisor

enclosure

cc (w/enc.):

ARD, FWE, FWS, Portland OR
Patricia Anderson, CDFG, Los Gatos CA
Mike Thabault, NMFS, Santa Rosa CA
Terry Neudorf, SCVWD, San Jose CA
USEPA, San Francisco CA
USACOE, San Francisco CA (Planning/Engineering Division)
Jeff Kozlowski, Jones and Stokes and Assoc., Sacramento CA
William Elsey, Habitat Restoration Group, Scots Valley CA
Greg Mitchell, USACOE-ERB, Sacramento CA
Oscar Balaguer, SWRCB, Sacramento CA
Dale Bowyer, RWQCB, Oakland CA

STATE WATER RESOURCES CONTROL BOARD

PAUL R. BONDERSOHN BUILDING

901 P STREET

P. O. BOX 100

SACRAMENTO, CALIFORNIA 95812-0100

(916) 657-0941

FAX: (916) 657-2388



AUG 17 1993

Mr. Walter Yep, Chief
Planning Division
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922

Dear Mr. Yep:

REVISED CONDITIONAL CERTIFICATION UNDER CLEAN WATER ACT SECTION 401:
U.S. ARMY CORPS OF ENGINEERS (CORPS), GUADALUPE RIVER FLOOD CONTROL PROJECT

Thank you for your May 27, 1993 letter requesting our review of proposed revisions to the *Final Mitigation and Monitoring Plan* for the Corps' Lower Guadalupe River Flood Control Project.

The State Water Resources Control Board (State Water Board) conditionally certified this project on February 14, 1992. Condition No. 2 of our certification required that, prior to the initiation of construction and after final design plans for the project are drawn, the Corps transmit to the State Water Board a copy of a *Final Mitigation and Monitoring Plan* and documentation of approval of that Plan by the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Water Board), the Department of Fish and Game (DFG), the U.S. Fish and Wildlife Service (USFWS), and the U.S. National Marine Fisheries Service (USNMFS). The Corps fulfilled this condition in a July 17, 1992 transmittal.

Because substantive changes to the Plan are now proposed, the State Water Board's February 14, 1992 certification condition requires that, prior to the start of construction, the Corps transmits to the State Water Board a copy of the revised *Final Mitigation and Monitoring Plan* with documentation of approval of the revised Plan by the Regional Water Board, DFG, USFWS, and USNMFS. I understand that USFWS and DFG have reviewed the proposed revised plan and are working with the Corps to resolve issues relating to the revisions.

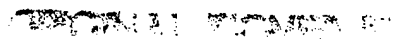
In a June 8, 1993 letter commenting on the proposed revised Plan, USFWS recommended that the Plan be revised again in late 1993. We understand that at that time construction plans will be substantially completed, USFWS will have completed the habitat analysis which will help determine some of the specific requirements for mitigation, and the Corps and reviewing agencies will have determined specific mitigation actions for impacts to shaded riverine aquatic habitat. This USFWS suggestion conforms to

Condition No. 2 of the State Water Board's certification, which requires that the *Final Mitigation and Monitoring Plan* be approved "after final design plans for the project have been drawn." The Corps may wish to defer obtaining approval from the four review agencies until a "final" Final Plan is developed.

Since further changes in the plan are expected and the review agencies have yet to concur, I am deferring my final decision on the 401 certification until these actions are complete.

Thank you for the opportunity of commenting on the proposed revised *Final Mitigation and Monitoring Plan*. The staff person most knowledgeable on this issue is Oscar Balaguer, and he can be reached at (916) 657-1025. You may also call William R. Campbell, Chief of the Nonpoint Source Loan Unit, at (916) 657-1043.

Sincerely,

 
Walt Pettit
Executive Director

cc: Mr. Steven R. Ritchie
Executive Officer
California Regional Water Quality
Control Board, San Francisco Bay Region
1800 Harrison Street
Oakland, CA 94612

Ms. Patricia Anderson
Department of Fish and Game
Yountville Office
P.O. Box 47
Yountville, CA 94599

Mr. Michael Thabault
U.S. National Marine Fishery Service
777 Sonoma Ave, Room 325
Santa Rosa, CA 95404

Mr. Mike Fris
U.S. Fish and Wildlife Service
Sacramento Enhancement Field Office
2800 Cottage Way
Sacramento, CA 95825

Mr. Clyde Morris, Chief (W-7-2)
Permits and Enforcement Section
U.S. Environmental Protection Agency,
Region 9
75 Hawthorne Street
San Francisco, CA 94105

STATE WATER RESOURCES CONTROL BOARD

PAUL R. BONDERSON BUILDING
901 P STREET
P. O. BOX 100
SACRAMENTO, CALIFORNIA 95812-0100
916/657-0941
FAX: 916/657-0932



OCT - 3 1993

Mr. Walter Yep
Chief, Planning Division
U.S. Army Engineer District
Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922

Dear Mr. Yep:

CLARIFICATION OF CONDITIONAL CERTIFICATION UNDER CLEAN WATER
ACT SECTION 401: U.S. ARMY CORPS OF ENGINEERS GUADALUPE RIVER
FLOOD CONTROL PROJECT

This letter is a followup to our August 17, 1993 communication regarding the subject project. In a May 27, 1993 letter, you asked the State Water Resources Control Board (State Water Board) to review proposed revisions to the June 1992 *Final Mitigation and Monitoring Plan* (Plan) for the Lower Guadalupe River Flood Control Project (Project) to be constructed in the City of San Jose. Our August 17, 1993 reply indicated that the State Water Board is deferring certification of the currently proposed changes until further anticipated Plan revisions are completed and approved by the review agencies. U.S. Army Corps of Engineers' (Corps) staff has orally asked us to reconsider the need for additional certification for the proposed and anticipated revisions to the Plan.

After review of this issue, and in consultation with Corps, California Department of Fish and Game (DFG), and U.S. Fish and Wildlife Service (USFWS) staffs, we have determined that the currently proposed and anticipated Plan revisions do not require further State Water Board certification. The basis of this decision is reviewed below.

The State Water Board's original February 14, 1992 certification of the project required that approval of the Final Plan be obtained from the California Regional Water

Quality Control Board, San Francisco Bay Region, DFG, USFWS, and U.S. National Marine Fisheries Service before the start of construction on the Project. The Corps documented compliance with this condition in a July 17, 1992 transmittal to the State Water Board. The currently proposed and anticipated further Plan revisions are the result of the Corps' responses to DFG and USFWS concerns regarding the draft June 1992 Plan. In order to obtain approval of the June 1992 Plan, the Corps committed to a number of actions in letters to the USFWS and DFG dated July 10, 1992 and July 13, 1992, respectively. In these letters, and in its July 17, 1992 transmittal to the State Water Board, the Corps specified that these commitments are part of the Plan. Since these commitments are part of the Plan, their implementation is required as a condition of the State Section 401 certification. Plan modifications within the scope of the provisions of the approved June 1992 plan do not require further State Water Board certification. The original condition that the Plan be approved by the review agencies prior to the start of construction does not apply to the proposed revisions because (1) the Corps obtained the required approvals of the June 1992 Plan prior to the start of construction, based in part on the commitments to future actions; (2) revisions to the Plan are now required for the Corps to fulfill these commitments and thereby to comply with the conditions of State certification; and (3) neither the Corps nor the other agencies specified a schedule for completion of the commitments.

Please continue to provide us with draft and final copies of the Plan as it is revised, and with documentation of the review agencies' concurrence with the changes. We commend the Corps for having developed and continuing to improve a comprehensive and detailed mitigation plan for the Project. According to the USFWS' June 3, 1993 letter-report to the Corps, there is continuing evidence that runs of chinook salmon and steelhead persist in the Guadalupe River. The importance of the Corps' mitigation commitments is underscored by the large number of salmonid redds observed in 1986 within the downtown San Jose Project reach of the River and ongoing subsequent sightings of adult salmonids and redds in the river. Preserving populations of anadromous fish within a leading metropolitan area, while constructing a major flood control facility, will represent a remarkable milestone in environmental engineering in California. We will monitor implementation of the Plan as a promising model for environmentally responsible flood control measures in other watersheds.

Thank you for the opportunity of further commenting on the proposed revised Final Mitigation and Monitoring Plan. If you require further assistance, please feel free to telephone Jesse M. Diaz, Chief, Division of Water Quality at 916/657-0756. The staff person working on this issue is Oscar Balaguer, who can be reached at 916/657-1025.

Sincerely,

Original Signed :

Walt Pettit
Executive Director

cc: Mr. Steven R. Ritchie
Executive Officer
California Regional Water Quality
Control Board, San Francisco Bay Region
1800 Harrison Street
Oakland, CA 94612

Ms. Patricia Anderson
Department of Fish and Game,
Yountville Office
P.O. Box 47
Yountville, CA 94599

Mr. Michael Thabault
U.S. National Marine Fishery Service
777 Sonoma Ave, Room 325
Santa Rosa, CA 95404

Mr. Mike Fris
U.S. Fish and Wildlife Service
Sacramento Enhancement Field Office
2800 Cottage Way
Sacramento, CA 95825

Mr. Clyde Morris, Chief W-7-2
Permits and Enforcement Section
U.S. Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, CA 94105



Cal/EPA

State Water
Resources
Control Board

Mailing Address:
P.O. Box 100
Sacramento, CA
95812-0100

901 P Street
Sacramento, CA
95814
(916) 657-1016
FAX (916) 657-2127



Pete Wilson
Governor

SEP 8 1997

Mr. Ken Myers
Senior Program Manager
Programs and Project Management Division
Sacramento District
U.S. Army Corps of Engineers
1325 J Street
Sacramento, CA 95814-2922

Dear Mr. Myers:

GUADALUPE RIVER DOWNTOWN FLOOD CONTROL PROJECT

As you know, the State Water Resources Control Board (SWRCB) granted conditional water quality certification to the subject project on February 14, 1992, pursuant to the provisions of Clean Water Act (CWA) Section 401. The U.S. Army Corps of Engineers (Corps) was the applicant and the Santa Clara Valley Water District (SCVWD) the local sponsor. Development of the required final mitigation plan has slowed. *Enclosure 1* reviews my understanding of the circumstances of the delay. This letter may provide a common reference point for concerned agencies and parties, and thereby help refocus the planning process. It will also help provide a basis for any future SWRCB actions.

The SCVWD has recently suggested an interest-based negotiation process to explore issue resolution. In my opinion, such a process might help the project proponents and others identify and address policy or process-related problems contributing to the delay. Of course, negotiation cannot substitute for the technical work which is needed to advance the project (see *Enclosures*).

Assuming any policy or process-related problems are adequately resolved, I believe the Corps can most efficiently proceed towards compliance with the certification conditions by responding to comments on the Corps' December 1996 conceptual mitigation plan (consistent with your subsequent changes to the mitigation concept), then continuing to develop the plan in ongoing consultation with the resource agencies and the public. I believe this approach is consistent with the Corps' original concept for the process. *Enclosure 2* is a collated outline of the written agency and public comments, prepared by SWRCB staff.



Recycled Paper

Our mission is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.

Assuming any policy or process-related problems are adequately resolved, I believe the Corps can most efficiently proceed towards compliance with the certification conditions by responding to comments on the Corps' December 1996 conceptual mitigation plan (consistent with your subsequent changes to the mitigation concept), then continuing to develop the plan in ongoing consultation with the resource agencies and the public. I believe this approach is consistent with the Corps' original concept for the process. Enclosure 2 is a collated outline of the written agency and public comments, prepared by SWRCB staff.

I suggest that future work be further focused by comprehensively outlining the expected elements of the final mitigation plan (consistent with certification Condition No. 2), systematically documenting and addressing outstanding issues (see Enclosures), circulating draft materials for review in advance of future meetings, circulating meeting summaries after each meeting, and methodically updating and amplifying the plan as it evolves.

This project presents a complex environmental challenge because of the habitat sensitivity, land use constraints, water supply issues, multi-jurisdictional involvement, and public interests associated with it. Based on my work with the Corps' interagency mitigation team, I believe that this challenge - to fully mitigate all impacts to aquatic beneficial uses - can be met. I look forward to continued work on this important project with the Corps, the SCVWD, the interagency team members, and the other interested parties. Please call if I can answer any questions or be of any other assistance.

Sincerely,



Oscar Balaguer
Nonpoint Source Certification and Loan Unit

Enclosures (2)

cc: (with enclosures)

Jim Ferguson
Executive Project Manager
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686

Margaret Roper
California Department of Fish and Game
P.O. Box 1723
Gilroy, CA 95021

Steve Schoenberg
Ecological Services
U.S. Fish and Wildlife Service
3310 El Camino Avenue, Suite 130
Sacramento, CA 95821

Ian Gilroy
U.S. National Marine Fisheries Service
777 Sonoma Ave, Room 325
Santa Rosa, CA 95404

Peter LaCivita, Chief
Environmental Planning Section
San Francisco District
U.S. Army Corps of Engineers
333 Market Street, Seventh Floor
San Francisco, CA 94105-2197

Ken Talbot
The Redevelopment Agency of
the City of San Jose
50 West San Fernando Street, Suite 1500
San Jose, CA 95113

Richard Roos-Collins
Natural Heritage Institute
114 Sansome Street, Suite 1200
San Francisco, CA 94104

Manual Morales
Division of Water Rights
State Water Resources Control Board
901 P Street
Sacramento, CA 95818

Teng-Chung Wu, Chief
South Bay Watershed Management Division
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612

Alan Solbert
Jones & Stokes Associates
2600 V Street, Suite 100
Sacramento, CA 95818-1914



Recycled Paper

Our mission is to preserve and enhance the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations.

State Water Resources Control Board

GUADALUPE RIVER DOWNTOWN FLOOD CONTROL PROJECT

BACKGROUND

The State Water Resources Control Board (SWRCB) granted conditional water quality certification to the subject project on February 14, 1992, pursuant to the provisions of Clean Water Act (CWA) Section 401. The project would provide flood protection to the City of San Jose. The project proponents are the U.S. Army Corps of Engineers (Corps) and the Santa Clara Valley Water District (SCVWD). The project involves channelization in a sensitive riparian system currently providing spawning habitat for chinook salmon. The SWRCB's certification was conditioned on, among other things, mitigation of impacts to anadromous and other fisheries in the Guadalupe River. The SWRCB required that the Corps' initial mitigation plan be approved by State and federal resource agencies. The mitigation conditions were subsequently amplified through commitments made by the Corps to the resource agencies as a condition of their approval.

Related Activities

The project proponents, resource agencies, and other interested parties are involved in other related activities within the basin, including:

- development of a flood control project for the upper Guadalupe River
- a water rights complaint to the SWRCB regarding provision of instream flows by the SCVWD
- a noticed CWA citizens suit against the project proponents alleging, among other things, failure to comply with the certification requirements
- discussion of a proposed joint SCVWD-Department of Fish and Game (DFG) project to cooperatively determine instream flow needs
- planned discussions between the SCVWD and environmental groups regarding instream flows needed for fish
- various water supply initiatives (e.g., consideration of reestablishing percolation ponds in Reach 12 of the River, using percolation wells, and discharging reclaimed City of San Jose wastewater to the River).

Species of Concern

The primary water quality-related impacts of the proposed project would be to fish and wildlife and their habitats. Mitigation planning is complicated by the diversity of species involved, e.g., the two potentially impacted anadromous fish species need different depths, seasons, and watershed locations of instream flows. Species of concern include:

- Chinook Salmon. Salmon are known to spawn in the Guadalupe River, with a concentration of spawning within the project reach. These fish may have originally been hatchery strays, but documentation of successful spawning indicates that the population may now be naturalized. These large fish spawning in downtown San Jose are a "charismatic species" of interest to local citizens groups.
- Steelhead Trout. The Guadalupe River probably supported steelhead historically. Whether it currently does so is uncertain, but it is at least potential steelhead habitat. The U.S. National Marine Fisheries Service (USNMFS) recently listed steelhead trout as "threatened" in Central California coastal streams.
- Warm Water Community. The Guadalupe River supports fish and wildlife associated with warm water habitats.

Development of the Mitigation Plan

The Corps initiated development of the required mitigation plan in July 1995, convening an interagency review team and holding the first of three subsequent public workshops. The team has met approximately 18 times. Participants include the project proponents and associated consultants, the Redevelopment Agency of the City of San Jose, DFG, the U.S. Fish and Wildlife Service (USFWS), USNMFS, and the SWRCB. Interested members of the public also participate. The Corp's consultant for the mitigation plan is Jones and Stokes Associates. The team has resolved a host of technical issues in a collegial and productive atmosphere.

In late 1996 the consultant determined that it was infeasible to directly mitigate project-induced thermal impacts in the project area. These impacts are critical because they would occur in a known salmon spawning area and would cause exceedance of maximum temperatures for salmon reproduction. In order to compensate, the consultant suggested a more system-wide mitigation approach that would include upstream measures to improve habitat conditions and access. A system-wide approach could yield a net environmental benefit for the Guadalupe drainage, since pre-project conditions in the impacted area are not ideal for salmon reproduction. However, such an approach introduces complexities

which make its' evaluation more difficult. The system-wide concept was included in a conceptual mitigation proposal presented at a December 12, 1996 public workshop in San Jose.

Comments on the Proposed Plan

DFG, USFWS, and the interested public provided written comments on the mitigation proposal in December 1996 and January 1997, as requested by the Corps. Notwithstanding the negative tone of some letters, resource agencies and other commenters were not opposed in principle to the system-wide mitigation approach. However, a number of valid technical questions were raised. Among the most fundamental of these was whether flows would be adequate to allow the fish to reach and effectively use the proposed upstream mitigation areas. (This concern was previously raised in a December 12, 1995 USFWS letter to the SCVWD).

Lack of Response to Comments

In a February 21, 1997 letter to interested parties, the consultant indicated that a package "that addresses all the comment letters" would be mailed "within the next two weeks", and that "a conceptual mitigation and monitoring plan" would be prepared "based on this input and further refinement of the mitigation package". In March 1997, SWRCB staff reviewed and commented on the consultant's draft response package. However, no further response has been distributed to commenters.

Recent Actions to Resolve Issues

- Proposal for Determination by the SWRCB

In March 1997 the Corps and the SCVWD considered formally asking the SWRCB to determine whether the proposed mitigation plan met the conditions of certification. SWRCB staff discouraged this approach because they believed it would be impossible for the SWRCB to make such a determination without resolution of outstanding technical issues, including responses to the concerns included in the written comments on the December 1996 conceptual plan (see Enclosure 2).

- Review of Temperature Model

A mathematical model was used by the consultant to predict the thermal impacts of the flood control project. Because the model outputs are important in determining impacts and mitigation needs, Corps staff asked the Corps' Waterways Experimental Station (WES) for a technical review of the model. WES staff has recommended that a sensitivity analysis of the model be conducted. The results of this analysis are pending.

- Interagency Team Progress Meetings

The team has met twice since the proposed mitigation plan was presented.

At the June 5, 1997 meeting, SCVWD staff expressed concerns about ecological restoration of "Reach 12" of the River, an important element of the conceptual mitigation plan, because it would interfere with possible reestablishment of percolation ponds in that reach. The team reviewed additional mitigation opportunities that could compensate for the loss of Reach 12 mitigation. The team also discussed maintenance of the low flow channel, mitigation for impacts to warm water habitat, issues relating to needed flows, and issues associated with mitigation in Alamitos Creek. A number of action items were identified.

At the June 24, 1997 meeting, the interagency team learned that the proposed mitigation in Reach 12 was unacceptable to the SCVWD; however, SCVWD staff presented a bypass concept for Reach 12 that might meet both mitigation and percolation needs and agreed to refine that concept for further review. A representative of the Redevelopment Agency of the City of San Jose indicated increased flexibility in pursuing previously foreclosed mitigation opportunities in the redevelopment area, and the team identified a number of other mitigation possibilities. It was understood that the project proponents and the consultant would further develop these alternatives. USNMFS and other resource agency staff agreed to confer and develop technical guidance to help address instream flow issues (this guidance was provided to the Corps in an August 4, 1997 letter.)

Since then, two tentatively scheduled progress meetings have been canceled.

- Proposed Interest-Based Negotiation

The SCVWD has recently suggested an interest-based negotiation process to explore issue resolution. Absent details, this proposal has raised concerns among some participants in the progress meetings. Such a process could help untangle policy or process-related problems contributing to the current delay. However, negotiation cannot substitute for the technical work which is needed to advance the project. Negotiation could be counter-productive if it were perceived as an attempt to avoid responding to the substantive concerns registered by resource agencies and the public.

State Water Resources Control Board

GUADALUPE RIVER DOWNTOWN FLOOD CONTROL PROJECT

COLLATED OUTLINE OF COMMENTS
ON 1996 CONCEPTUAL MITIGATION PLAN

This is a collated outline of written comments on the conceptual mitigation plan for the Guadalupe River Downtown Flood Control Project. The comments were presented to the U.S. Army Corps of Engineers after the conceptual plan was presented at a public workshop in San Jose, California on December 12, 1996.

Following each outlined comment is a reference in parenthesis. The reference includes an abbreviation identifying each commenting entity, the date of the letter in which the comment was made (month/day), and a hyphenated number which is unique to each commenter and the specific comment made in the letter. These comment-identifying numbers were assigned by Jones and Stokes Associates in their draft March 1997 review of the comments (except those for comment letters Nos. 8 and 9 which were assigned by SWRCB staff).

The following is a key to the commenter notations:

<u>NO</u>	<u>ABBREV</u>	<u>COMMENTING ENTITY</u>	<u>DATE OF LETTER</u>
1	DFG	Ca Department of Fish and Game	December 20, 1996
2	DFG	Ca Department of Fish and Game	January 14, 1997
3	USFWS	U. S. Fish and Wildlife Service	January 29, 1997
4	SC	Silichip Chinook	January 14, 1997
5	ASR	Aquatic Systems Research	January 16, 1997
6	NEI	Natural Heritage Institute	January 16, 1997
7	WWCC	Western Waters Canoe Club	January 15, 1997
8	LL	Libby Lucas	January 17, 1997
9	LL	Libby Lucas	January 23, 1997

Other abbreviations used are:

COLD	cold water fishery beneficial use
FCP	flood control project
HEP	habitat evaluation procedure
JSATEMP	Jones and Stokes' water temperature model
LFC	low flow channel
SJRA	Redevelopment Agency of the City of San Jose
SRA	shaded riverine aquatic habitat
WARM	warm water fishery beneficial use
Xref	cross reference to other specified comment

1. HABITAT EVALUATION PROCEDURE (HEP)

- A. Mitigation Deficiency for COLD (DFG 12/20, 1-3. WWCC 1/16, 7-2)
- B. Mitigation Deficiency for WARM (DFG 12/20, 1-4. USFWS 1/29, 3-10. Xref 2-3(h), 3-10)
- C. Mitigation (Specifically for SRA) Must be Determined per HEP (USFWS 1/29, 3-1)

2. SHADED RIVERINE AQUATIC HABITAT (SRA) AND RIPARIAN

- A. Temporal Loss (DFG 12/20, 1-2. NHI 1/16, 6-1. LL 1/17, 8-16)
- B. Cumulative Losses, FCP and Park; Design changes (LL 1/17, 8-2, 8-8. Xref 9-5)
- C. Need SRA downtown to capitalise on incidental flows (LL 1/17, 8-14. Xref 7-11)

3. THERMAL IMPACTS

- A. Thermal effects on COLD (ASR 1/16, 5-1)
- B. System-wide lowering of temps does not mitigate thermal impacts (DFG 12/20, 1-7; 1/14, 2-2. USFWS 1/29, 3-8)
- C. Thermal criterion for trout too high (COLD) (USFWS 1/29, 3-11)
- D. Raise in temp. violates Basin Plan, Thermal Plan, Anti-Degradation Policy (DFG 1/14, 2-2. NHI 1/16, 6-2)
- E. Shade over low flow channel may be reduced by channel maintenance required by increased sedimentation (USFWS 1/29, 3-3, 3-4. WWCC 1/15, 7-8. Xref 7-9, 8-3)
- F. Shade over Reach 10b may be reduced by wide channel (USFWS 1/29, 3-3)
- G. Problems with JSATEMP (WWCC 1/16, 7-10. LL 1/17, 8-12, 8-13, 9-3, 9-4)

- H. Groundwater upwelling and refuge pools (WWCC 1/16, 7-11...
LL 1/17, 8-3.)
- I. Anticipated SRA Cumulative Impacts (Xref SRA)
 - 1) SRA loss in Los Gatos Ck from SJRA project (LL 1/23, 9-5)
 - 2) SRA loss from bridge removal, Hwy 87 expansion, and Vasona lightrail (LL 1/23, 9-6)
- J. SRA on Guadalupe and Almaden Cks. will not lower downstream temps. (WWCC 1/15, 7-12)

4. EXISTING CONDITIONS AND IMPACTS TO CURRENT BENEFICIAL USES

- A. Current fish use (COLD) (LL 1/17 8-1)
- B. Impacts to current spawning area (SPAWN) (WWCC 1/16, 7-1)
- C. Wetlands to be impacted (LL 1/17, 8-18)

5. PROPOSED MITIGATION PACKAGE

- A. Regulatory requirements: 404(b)(1) Guidelines (LL 1/17, 8-4)
- B. Need "before and after maps" of mitigation areas (USEFWS, 1/29 3-9)
- C. Relationship of Lower and Upper FCPs:
 - 1) Access to Alamitos Ck (DFG 12/20, 1-5; 1/14, 2-1)
 - 2) Reach 10b (USEFWS 1/29, 3-9)
- D. Impacts to Chinook and Benefits to Steelhead (USEFWS 1/29, 3-12. WWCC 7/15, 7-4)

E. Flow and Fish Passage Issues:

- 1) Need for analysis of flow conditions (USFWS 1/29, 3-6)
- 2) Value of Reach 10b for Dry Years (USFWS 1/29, 3-7)
- 3) Flows in mitigation areas not guaranteed (USFWS 1/29, 3-11. LL 1/17, 8-11)
- 4) 401 requirements for flow and fish passage (NHI 1/16, 6-3)
- 5) Historical Flows (LL 1/23, 9-1, 9-2)

F. Alamitos Ck

- 1) Alamitos Ck, documentation of habitat value (DFG 12/20, 1-5; 1/14, 2-1. USFWS 1/29, 3-2, 3-5, 3-11)
- 2) Alamitos Ck value (shade) is limited by FC needs (USFWS 1/29, 3-5, 3-11. Xref 3-11, "out-of-kind")

G. Sedimentation Issues (Xref 3-3, 3-4, 7-7)

- 1) Sedimentation of LFC Resting Pools (WWCC 1/16, 7-9, 3-3)
- 2) Sedimentation not studied (LL 1/17, 8-3)

H. Gravel Replenishment (DFG 12/20, 1-6)

I. Mitigation must benefit native species in the main stem and major tributaries (SC 1/14, 4-4)

6. ADDITIONAL MITIGATION SUGGESTIONS

(DFG 1/14, 2-3 [(a)-(h) below])

- A. (a) Almaden L. - Remove (DFG 1/14, 2-3. ASR 1/16, 5-2)
- B. (b) Almaden L. - Bypass (DFG 1/14, 2-3. ASR 1/16, 5-2, 5-3)
- C. (c) Spreader dams - Eliminate (DFG 1/14, 2-3)
- D. (d) SRA Plantings - Maximize upstream (DFG 1/14, 2-3)

- E. (e) Biotech Features - Install in tribs. (DFG 1/14, 2-3)
- F. (f) Increased Flows - Release more conjunctive use flows (DFG 1/14, 2-3)
- G. (g) Increased Flows - Model thermal benefits of (DFG 1/14, 2-3. ASR 1/16, 5-2)
- H. (h) Pools - Provide through system to mit. impacts to WARM (DFG 1/14, 2-3. Xref 1-3, 3-10)
- I. WARM credit - give for surplus habitat value onsite (e.g., kingfisher); enhance offsite (e.g., Alamitos, Los Gatos Cks) (USFWS 1/29, 3-10)
- J. Bypass Channel - around downtown (WWCC 1/16, 7-13)
- K. Use Los Gatos Ck for spawning (LL 1/17, 8-9)
- L. Boulder armoring in mid-section of FCP (LL 1/17, 8-10)
- M. Restore west bank in Contract 1 & 2 (LL 1/17, 8-15)
- N. Find some way to anchor Coleman-Santa Clara w/o further destabilization (LL 1/17, 8-17)
- O. Implement less-impacting public-access design (LL 1/23, 9-7)
- P. Remove upstream barriers (SC 1/14, 4-1)
- Q. Sustain viable water temp for salmon (SC 1/15, 4-2)
- R. Mitigate for lost habitat with resting areas, spawning channel, and egg take facility (SC 1/14, 4-2)

7. PERCEIVED PROBLEMS AND VIOLATIONS OF FCP TO DATE

- A. Violation of 401 conditions, Contracts 1 & 2 (NHI 1/16, 6-4)
- B. Mitigation plantings, failed and not replaced
 - 1) Contract 3 reach, gabion plantings (WWCC 1/16, 7-5)
 - 2) Contract 1 reach and Trimble-Montague (WWCC 1/16, 7-6)

- C. Contract 2 design flaw; sedimentation and dredging (WWCC 1/16, 7-7. Xref Sedimentation Issues)
- D. Bypass Reach: reduction in riparian design resulted in washout (LL 1/17, 8-6)
- E. Flood control effectiveness of Contract 1 & 2 (LL 1/17, 8-5)
- F. Widened bypass bowl, recreation purpose compromised (LL 1/17, 8-7)

8. OTHER CONCERNS

- A. Water Quality: Mercury (LL 1/17, 8-19)
- B. Original EIR was deficient (WWCC 1/15, 7-3)



Peter M. Rooney
Secretary for
Environmental
Protection

State Water Resources Control Board

John P. Caffrey, Chairman



Pete Wilson
Governor

Executive Office

901 P Street • Sacramento, California 95814 • (916) 657-0941 FAX (916) 657-0932
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Internet Address: <http://www.swrcb.ca.gov>

SEP 10 1998

Scott McCreary, Ph.D.
Principal, CONCUR, Inc.
1832 Second Street
Berkeley, CA 94710

Dear Dr. McCreary:

GUADALUPE RIVER FLOOD CONTROL PROJECT: EXPRESSION OF INTENT TO IMPLEMENT DISPUTE RESOLUTION MEMORANDUM

The subject project will provide 100-year flood protection to the City of San Jose. The project proponents are the U.S. Army Corps of Engineers (Corps) and the Santa Clara Valley Water District (SCVWD). The State Water Resources Control Board (SWRCB) granted conditional water quality certification to the project as then proposed on February 14, 1992, pursuant to the provisions of Clean Water Act (CWA) section 401. The SWRCB's certification was conditioned on mitigation of impacts to beneficial uses in the Guadalupe River, including anadromous and other fisheries.

The Corps initiated development of the required mitigation plan in July 1995, convening an interagency review team and holding three public workshops. In May 1996, the Natural Heritage Institute filed notice of a CWA citizens' suit against the project on behalf of several environmental groups. In late 1996, the consultant determined that it was infeasible to mitigate project-induced thermal impacts to anadromous fish spawning in the project area. In August 1997, the federal government listed steelhead trout as "threatened" in central California. To continue development of the flood control project, the project sponsors and the City of San Jose asked the concerned regulatory agencies and other interested parties to participate in discussions to reconcile the need for flood protection with the goal of maintaining the anadromous fishery and other beneficial uses of the Guadalupe River. From October 1997 to July 1998, SWRCB staff participated in the meetings of the "Guadalupe River Flood Control Project Collaborative" (Collaborative) and in the meetings of the associated "Technical Fact Finding Subcommittee."

California Environmental Protection Agency

Recycled Paper

The Collaborative developed a "Dispute Resolution Memorandum Regarding Construction, Operation, and Maintenance of the Guadalupe River Flood Control Project" (Dispute Resolution Memorandum). Primary elements of the Dispute Resolution Memorandum include:

- A revised design for a major portion of the flood control project to be an underground bypass facility on the east bank of the Guadalupe River.
- Mitigation of impacts caused by the initial phases of the project before further construction.
- Development of a mitigation accounting system.
- Development by April 15, 1999 of a mitigation plan to fully mitigate foreseeable project-related impacts to beneficial uses and to include: needed hydraulic and geomorphic studies; replacement of impacted riparian vegetation; and maintenance (through flow augmentation or other means) of water temperatures suitable for anadromous fish.
- Development of an adaptive management program to include: measurable objectives; operation and maintenance procedures; monitoring; modification of design, mitigation, operation, and maintenance as needed; participation of Dispute Resolution Memorandum signatories; and implementation assurances.
- Agreement that if all organizations represented on the Collaborative express their intent to implement the Dispute Resolution Memorandum, the project proponents will prepare the necessary planning and environmental documents in which the bypass facility will be the proposed project.
- Agreement to support designation of cold water fishery as a designated beneficial use for the Guadalupe River in the San Francisco Bay Regional Water Quality Control Board's (SFBRWQCB) Basin Plan.

We commend the project sponsors, other members of the Collaborative, and CONCUR, Inc. for the Dispute Resolution Memorandum. In an October 8, 1993 letter to the Corps, I noted that "... there is continuing evidence that runs of Chinook salmon and steelhead persist in the Guadalupe River Preserving populations of anadromous fish within a leading metropolitan area, while constructing a major flood control facility, will represent a remarkable milestone in environmental engineering in California." We believe the Dispute Resolution Memorandum is a significant step toward this milestone. We support its implementation and will continue to monitor the progress of the project and participate as appropriate.

The Dispute Resolution Memorandum does not modify the duties or authorities of its signatories. As the project design has significantly changed, the SFBRWQCB and the SWRCB will reconsider the project for CWA section 401 certification when final design and environmental documents have been prepared. I look forward to the successful completion of this project in a way that will maintain the steelhead and salmon runs and other beneficial uses of the Guadalupe River.

If you require further assistance, please telephone Oscar Balaguer, the staff person most knowledgeable on this subject, at (916) 657-1025. You may also call Bill Campbell, Chief of the Nonpoint Source Certification and Loans Unit, at (916) 657-1043.

Sincerely,


Walt Pettit
Executive Director

cc: Mr. Michael Aceituno, Chief
Division of Habitat Conservation
U.S. Fish and Wildlife Service
3310 El Camino Avenue, Suite 130
Sacramento, CA 95821

Ms. Loretta Barsamian
Executive Officer
Regional Water Quality Control Board,
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612

Mr. James R. Bybee
Habitat Conservation Manager,
Northern California
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404-6515

Mr. Darrell Dearborn
Senior Deputy City Manager
City of San Jose
801 North First Street, Room 436
San Jose, CA 95110

Mr. James Ferguson
Project Manager
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Mr. Chris Mobley
Fishery Biologist
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404-6515

cc: (Continued next page)

California Environmental Protection Agency

APPENDIX B-2

Dispute Resolution Memorandum

DISPUTE RESOLUTION MEMORANDUM REGARDING CONSTRUCTION, OPERATION, AND MAINTENANCE OF THE GUADALUPE RIVER FLOOD CONTROL PROJECT

In order to resolve threatened litigation and other concerns, the Signatories support the construction, operation, and maintenance of the Guadalupe River Flood Control Project on the following conditions.

I. Recitals

1. This Dispute Resolution Memorandum concerns the Guadalupe River Flood Control Project (Project) authorized by P.L. 99-662 (1986) and P.L. 101-101 (1989), as further described in U.S. Army Corps of Engineers, Guadalupe River, CA, General Design Memorandum (December 1991), Environmental Impact Statement (July 1985), and Environmental Assessment (September 1990 and January 1991) (hereafter, Project Documents).

2. The Santa Clara Valley Water District (SCVWD), U. S. Army Corps of Engineers (Corps), City of San Jose, and City of San Jose Redevelopment Agency have substantially completed Contracts 1 and 2, between Interstate 880 and Coleman Avenue in downtown San Jose. Construction of Contracts 3A, 3B and 3C has not yet been accomplished. These agencies elected to enter into an alternative dispute resolution (ADR) process with the Guadalupe-Coyote Resource Conservation District (GCRCD), Trout Unlimited (TU), and Pacific Coast Federation of Fishermen's Associations (PCFFA), to resolve issues raised in a Notice of Intent to Sue issued by GCRCD, TU, and PCFFA dated May 22, 1996 and amended November 27, 1996, under the citizen suit provision of the Clean Water Act (33 U.S.C. §1365). The Notice of Intent primarily raised concerns about the adequacy of the environmental mitigation plan for the Guadalupe River Flood Control Project between Interstate 880 and Interstate 280. The U.S. Fish & Wildlife Service (USFWS), State Water Resources Control Board (SWRCB), San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), National Marine Fisheries Service (NMFS), and the California Department of Fish and Game (DFG) participated in the ADR process providing substantive input in their capacity either as experts on species and habitats affected by the project or as permitting agencies.

3. Through this Dispute Resolution Memorandum and subject to legal understandings set forth in Section VII, the Signatories intend to avoid litigation that would delay project completion and intend that the project will provide the authorized level of flood protection; will provide other community and environmental benefits consistent with the public interest in

the Guadalupe River; will comply with all applicable laws; will be cost-effective; will be fundable through secure sources; will be timely completed; and will allow for the restoration of the Guadalupe River and its tributaries. The Signatories do not intend for this Dispute Resolution Memorandum to increase, diminish, or otherwise modify the rights, duties, or authority of any public agency.

II. Proposed Project

1. Signatories state that for the purpose of starting further review as described in Section VI, the proposed project will be described as follows:

A. Construction of Contracts 1 and 2 has been accomplished generally in conformity with Project Documents, except that plantings to mitigate adverse impacts on Shaded Riverine Aquatic Habitat (SRA) will be undertaken as described in Sections III and IV below.

B. The design for Contract 3C, between Interstate 280 and Woz Way, will be as stated in Project Documents, except that removal or degradation of existing SRA will be avoided to the maximum extent feasible.

C. The design for Contracts 3A and 3B will avoid adverse impact on anadromous fisheries to the maximum extent feasible. The design will provide for a covered underground bypass facility. This facility will be presented as one of the alternatives analyzed in the planning and environmental documents necessary for completion of Contracts 3A and 3B.

(1) Subject to modification in the course of the further procedures described below, the design for the bypass facility will be two box culverts approximately 17-feet high by 25-feet wide east of the east bank of the river.

(2) The banks and channel between the inlet and outlet structures of this bypass facility will be maintained in a natural state to the maximum extent feasible. Inlet and outlet structures will be located and designed so as to avoid impacts on existing SRA to the maximum extent feasible.

III. Early Implementation

1. The Signatories state that, to the maximum extent feasible, the Corps, in cooperation with SCVWD, will mitigate existing SRA and other riparian impacts caused by Contracts 1 and 2 prior to final approval of the proposed project for Contract 3.

A. The Corps, in cooperation with SCVWD, will expeditiously complete any necessary planning and other work preparatory to actual construction of the mitigation measures.

B. To the maximum extent feasible, the Corps, in cooperation with SCVWD, will construct appropriate mitigation measures, including SRA plantings, in 1998; and will complete implementation of such mitigation measures in 1999.

2. Construction associated with Contract 3C, in whole or part, may proceed in advance of the proposed project for Contracts 3A and 3B, provided:

A. A mitigation plan substantially in conformity with Section IV is developed by April 15, 1999.

B. The Corps, in cooperation with SCVWD, has constructed mitigation measures as provided in paragraph III.1.

C. Impacts of construction of Contract 3C will be mitigated before or concurrent with such construction as allowed in Sec. 906 (a) (1) of Water Resources Development Act of 1986, P.L. 99-662 (1986).

D. The Corps, in cooperation with SCVWD, has obtained final approval for Contract 3C.

3. SCVWD may undertake mitigation in addition to that provided above, prior to final approval of the proposed project for Contract 3. Upon such final approval, the Signatories will review completed mitigation measures to compare their actual benefits with the mitigation requirements under the final mitigation plan.

4. In consultation with the other Signatories, SCVWD will develop and implement an accounting system for mitigation measures undertaken by SCVWD in this and future projects and activities which affect the ecological quality of the Guadalupe River and its tributaries. The system will track the benefits of such mitigation measures and will provide that benefits in excess of the requirements for this project can be credited by appropriate agencies for use by SCVWD on other projects and activities.

IV. Environmental Mitigation Plan

1. The Corps, in cooperation with SCVWD, will develop a plan for mitigation of adverse impacts of the proposed project on riparian vegetation, anadromous fisheries, and other beneficial uses in the Guadalupe River.

2. The plan will be designed and implemented to fully mitigate project-related impacts to beneficial uses as required for water quality certification and will comply with all other applicable laws requiring mitigation of environmental impacts. In satisfaction of this purpose, the plan will:

A. include any hydraulic or geomorphic analysis necessary to assure the viability of the plan. The Signatories anticipate that the ongoing study by Northwest Hydraulics, Inc., under contract with the Corps, will be adequate for this purpose and may be modified as appropriate in the course of the further review described in Section VI.

B. provide for replacement of existing riparian vegetation, including SRA, removed for project construction or operation. The replacement vegetation will have at least equal value for protection of the anadromous fisheries. Functional equivalency of value will be confirmed by application of the Habitat Evaluation Procedure (HEP).

C. provide for other measures necessary to assure that the project will not cause elevated water temperature or other project impacts in the project reach to harm anadromous fisheries and other beneficial uses, during project construction and over the entire project life including the transition period before replacement vegetation matures. The plan may include flow augmentation to reduce water temperature in the project area.

D. provide for adaptive management of the project by SCVWD to help ensure success of the mitigation measures and to provide for corrective action in the event of mitigation failure. The Signatories intend that the completed project, in combination with other efforts beyond the project scope, will allow for restoration of self-sustaining fisheries in good condition throughout the Guadalupe River and its tributaries.

E. account for mitigation measures undertaken for this project. The Signatories agree to compare actual benefits of completed early implementation measures against mitigation requirements of the final mitigation plan, and to credit any excess as provided in paragraph III.4.

V. Adaptive Management

1. SCVWD will operate, maintain, and otherwise manage the project in an adaptive manner. SCVWD, in consultation with the other Signatories, will develop an adaptive management program that will be included in the project, subject to the final approval as described in Section VI. The program will include the following elements:

A. measurable objectives for each project benefit. As to anadromous fisheries, the Signatories acknowledge that the measurable objectives will

relate to those habitat qualities impacted by this project and will not hold the project responsible for other environmental conditions which may limit the population or distribution of these fisheries.

B. operation and maintenance procedures intended to contribute to the achievement of such objectives.

C. systematic monitoring of actual conditions, and evaluation of whether the measurable objectives are being achieved. At least annually, SCVWD will report the monitoring results in an appropriate form to the other Signatories.

D. modification of project design, mitigation, operation or maintenance procedures, as appropriate, to remedy any shortfall in a project benefit.

E. appropriate mechanisms for the Signatories to participate in the implementation of the adaptive management program. Following project construction, the Signatories will meet at least annually for the purpose of exchanging information on the adaptive management program.

F. appropriate assurances for implementation of the program.

VI. Further Procedures

1. The Signatories will encourage their respective organizations to implement this Dispute Resolution Memorandum. By September 15, 1998, Signatories will confirm in appropriate written form their organizations' intent to implement this Dispute Resolution Memorandum. For the purpose of this Memorandum, the organizations who support such implementation will be Signatories following ratification.

2. Provided that all of the organizations represented by Signatories express their intent to implement this Dispute Resolution Memorandum, the Corps and SCVWD will prepare the planning and environmental documents necessary for completion of the proposed project, including the mitigation plan and adaptive management program; and will seek final approval of the preferred alternative chosen in the National Environmental Policy Act and California Environmental Quality Act process.

A. In such further review, the alternative described in Section II will be the proposed project.

B. The environmental documents will include an analysis of cumulative impacts of this and related projects, on the basis of information developed after publication of Project Documents.

C. For the purpose of this Dispute Resolution Memorandum, final approval means the receipt by the Corps and SCVWD of those permits, certifications, or other approvals or modifications of existing approvals, that they are required to obtain under applicable laws prior to construction.

3. To the maximum extent feasible, the Corps, in cooperation with SCVWD, will develop the mitigation plan described in Section IV by April 15, 1999. After that date, they may modify the mitigation plan as necessary to obtain final approval.

4. To the maximum extent allowed by law, the Corps and SCVWD will encourage the other Signatories to participate in the preparation of the planning and environmental documents described in paragraph VI.2. The Corps and SCVWD acknowledge that:

A. This Dispute Resolution Memorandum states general principles which will be expressed in more specific terms in the mitigation plan, adaptive management program, and other documents described in paragraph VI.2.

B. The participation of the other Signatories in the preparation of these documents will help further the purpose of this Dispute Resolution Memorandum.

5. To the maximum extent allowed by law, the Signatories will:

A. support applications necessary for project construction, operation, and maintenance in substantial conformity with this Dispute Resolution Memorandum;

B. support designation of cold water fisheries as a beneficial use of the Guadalupe River and any other conforming amendments to the SFBRWQCB Basin Plan; and

C. publicly express their support for final approval and necessary funding.

6. Provided the Corps and SCVWD obtain final approval of the construction, operation, and maintenance in substantial conformity with this Dispute Resolution Memorandum:

A. The Signatories will support such construction, operation, and maintenance.

B. GCRCD, TU, and PCFFA will withdraw their notice of Clean Water Act citizens' suit, dated May 22, 1996 and amended November 27, 1996; and

will not support or bring other litigation to challenge project completion, operation, and maintenance in substantial conformity with this Dispute Resolution Memorandum.

7. The Signatories will make best efforts to resolve any concerns that arise regarding implementation of this Dispute Resolution Memorandum.

A. Not later than September 15, 1998, the Signatories will meet and confer to obtain the advice of individual signatories regarding the status of the Project.

B. From September 16, 1998 through final completion of construction, the Signatories will meet and confer as needed in order to obtain individual advice regarding the Project and otherwise to assure continuing cooperation resulting in final resolution of the threatened litigation and other disputes described in Section I, paragraph 2. In preparation for such meeting(s), the Corps, SCVWD, and other Signatories as appropriate will prepare written status reports.

C. Following project construction, the Signatories will meet in accordance with the terms of the adaptive management program.

8. This Dispute Resolution Memorandum may be modified by mutual written consent.

9. The Signatories recognize that time is of the essence in implementation of this Dispute Resolution Memorandum.

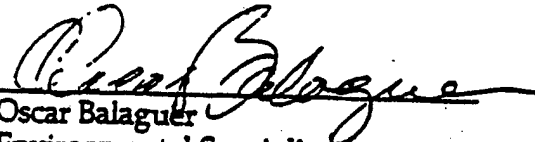
VII. Rights, Duties and Authorities

1. This Dispute Resolution Memorandum establishes procedures intended to result in final resolution of the threatened litigation and other disputes described in Section I, paragraph 2. It does not increase, diminish, or otherwise modify the rights, duties, or authority of any Signatory. All of the understandings of this Dispute Resolution Memorandum are subject to existing law, policy, authority, and availability of funds.

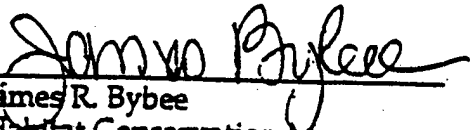
2. This Dispute Resolution Memorandum does not modify the allocation of responsibilities among SCVWD, Corps, City of San Jose, and City of San Jose Redevelopment Agency for project construction, operation, or maintenance, including funding thereof.



Michael Aceituno
Chief, Div. of Habitat Conservation
U.S. Fish and Wildlife Service
Sacramento



Oscar Balaguer
Environmental Specialist
State Water Resources Control Board,
Division of Water Quality



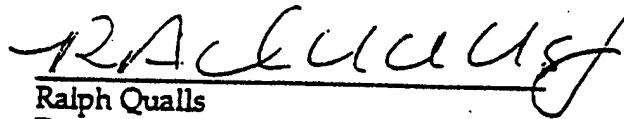
James R. Bybee
Habitat Conservation Manager,
Northern California
National Marine Fisheries Service



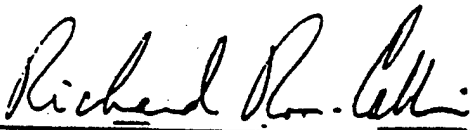
Darrell Dearborn
Senior Deputy City Manager
City of San Jose



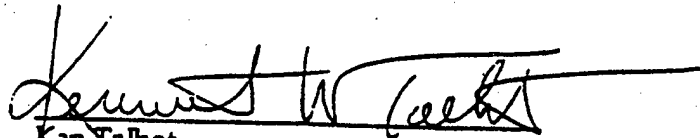
Mike Nolan
Chief of Civil Branch of PPMD
U.S. Army Corps of Engineers,
Sacramento District



Ralph Qualls
Director
City of San Jose
Department of Public Works



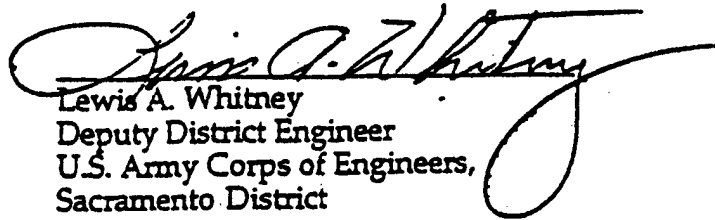
Richard Roos-Collins
Natural Heritage Institute
Attorney for Guadalupe-Coyote Resource
Conservation District, Pacific Coast
Federation of Fishermen's Associations,
and Trout Unlimited



Ken Talbot
Assistant Director, Project Management
City of San Jose Redevelopment Agency



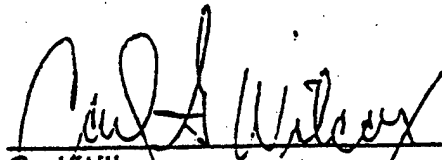
Kay Whitlock
Assistant General Manager
Santa Clara Valley Water District



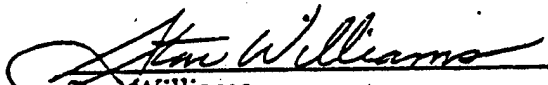
Lewis A. Whitney
Deputy District Engineer
U.S. Army Corps of Engineers,
Sacramento District



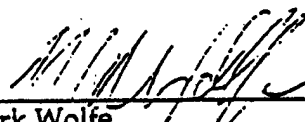
Richard Whursel
Chief, Wetlands Office
San Francisco Bay Regional Water
Quality Control Board



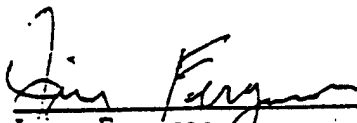
Carl Wilcox
Environmental Services Supervisor, Region III
California Department of Fish and Game



Stan Williams
General Manager
Santa Clara Valley Water District



Mark Wolfe
Natural Heritage Institute
Attorney for Guadalupe-Coyote
Resource Conservation District,
Pacific Coast Federation of Fishermen's
Associations, and Trout Unlimited



James Ferguson
Project Manager
Santa Clara Valley Water District

APPENDIX C

Shaded Riverine Aquatic (SRA) Cover Impact Analysis and Onsite SRA Cover Mitigation Plan

APPENDIX C

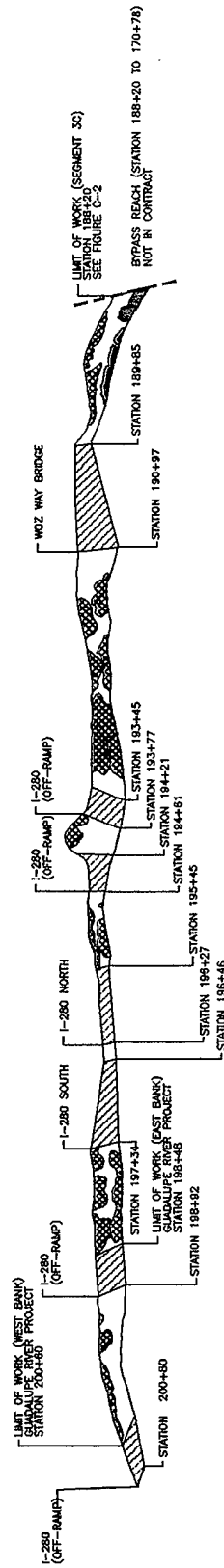
Shaded Riverine Aquatic (SRA) Cover Impact Analysis and Onsite SRA Cover Mitigation Plan

This appendix contains plan view figures (Figures C-1 through C-5) that identify SRA cover impact areas and onsite mitigation sites. The lengths of individual SRA cover mitigation sites are presented in Table C-1.

- Figure C-1 Segment 3C – Stations 188+20 to 200+60, Shaded Riverine Aquatic (SRA) Cover Vegetation Impact Analysis and Onsite SRA Cover Vegetation Mitigation Plan
- Figure C-2 Segment 3B – Stations 140+70 to 170+76, Shaded Riverine Aquatic (SRA) Cover Impact Analysis and Onsite SRA Cover Mitigation Plan
- Figure C-3 Segment 3A – Stations 119 + 23 to 140 + 70, Shaded Riverine Aquatic (SRA) Cover Impact Analysis and Onsite SRA Cover Mitigation Plan
- Figure C-4 Segment 2 – Stations 78+63 to 119+23, Shaded Riverine Aquatic (SRA) Cover Impact Analysis and Onsite SRA Cover Mitigation Plan
- Figure C-5 Segment 1 – Stations 64+92 to 78+63, Shaded Riverine Aquatic (SRA) Cover Impact Analysis and Onsite SRA Cover Mitigation Plan
- Table C-1 Length of Individual SRA Cover Mitigation Sites Located in the Onsite Mitigation Area

Figure C-1. GUADALUPE RIVER PROJECT
 SEGMENT 3C - STATIONS 188+20 TO 200+60
 SHADED RIVERINE AQUATIC (SRA) COVER VEGETATION IMPACT ANALYSIS
 AND ONSITE SRA COVER VEGETATION MITIGATION PLAN

STATIONS 188+20 TO 200+60



NOT TO SCALE

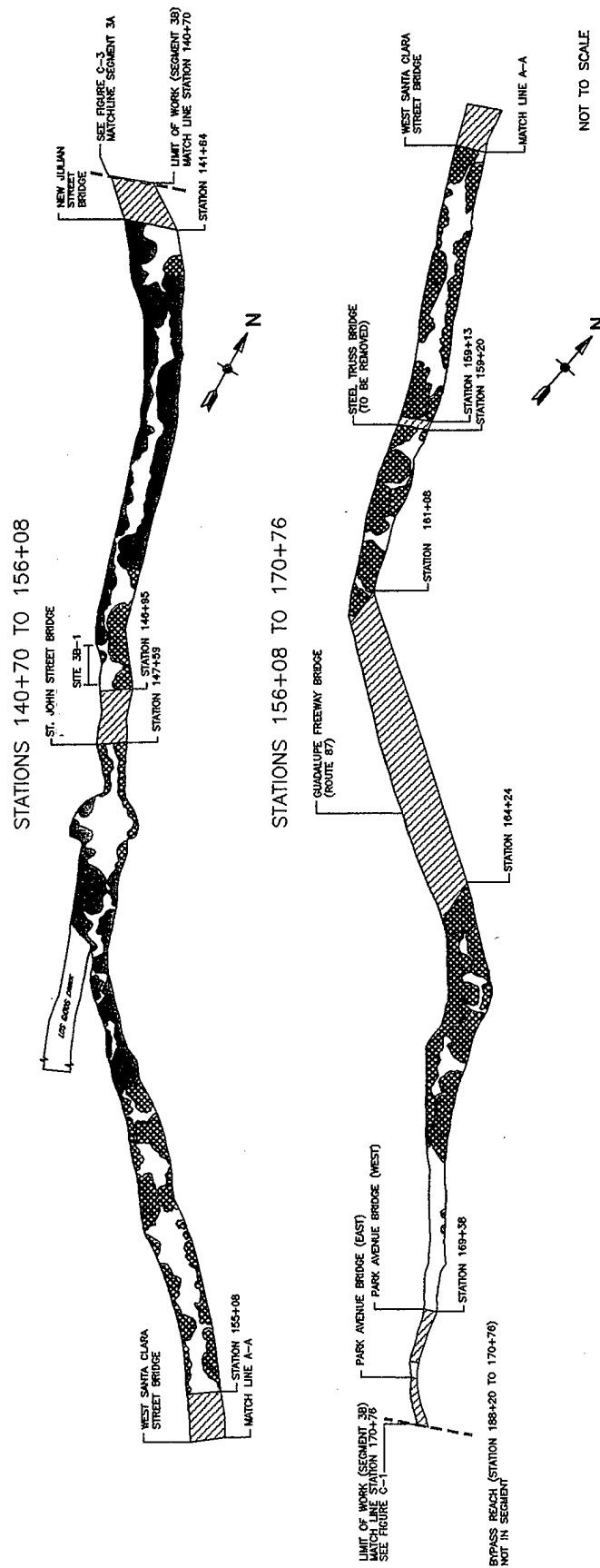
LEGEND

-  UNVEGETATED CHANNEL BANK/GUADALUPE RIVER
-  AVOIDED/PRESERVED SRA COVER VEGETATION
-  IMPACTED SRA COVER VEGETATION
-  BRIDGE CROSSING

THE SRA COVER VEGETATION IMPACT ANALYSIS AND ONSITE MITIGATION PLAN IS BASED ON CONCEPTUAL DESIGN DRAWINGS. THE FINAL IMPACT ANALYSIS AND ONSITE MITIGATION PLAN MAY VARY DEPENDING ON THE FINAL ENGINEERING DRAWINGS.

Figure C-2. GUADALUPE RIVER PROJECT

SEGMENT 3B - STATIONS 140+70 TO 170+76
 SHADED RIVERINE AQUATIC (SRA) COVER IMPACT ANALYSIS
 AND ONSITE SRA COVER MITIGATION PLAN



THE SRA COVER IMPACT ANALYSIS AND ONSITE MITIGATION PLAN IS BASED ON CONCEPTUAL DESIGN DRAWINGS. THE FINAL IMPACT ANALYSIS AND ONSITE MITIGATION PLAN MAY VARY DEPENDING ON THE FINAL ENGINEERING DRAWINGS.

Figure C-3. GUADALUPE RIVER PROJECT
 SEGMENT 3A - STATIONS 119+23 TO 140+70
 SHADED RIVERINE AQUATIC (SRA) COVER IMPACT ANALYSIS
 AND ONSITE SRA COVER MITIGATION PLAN

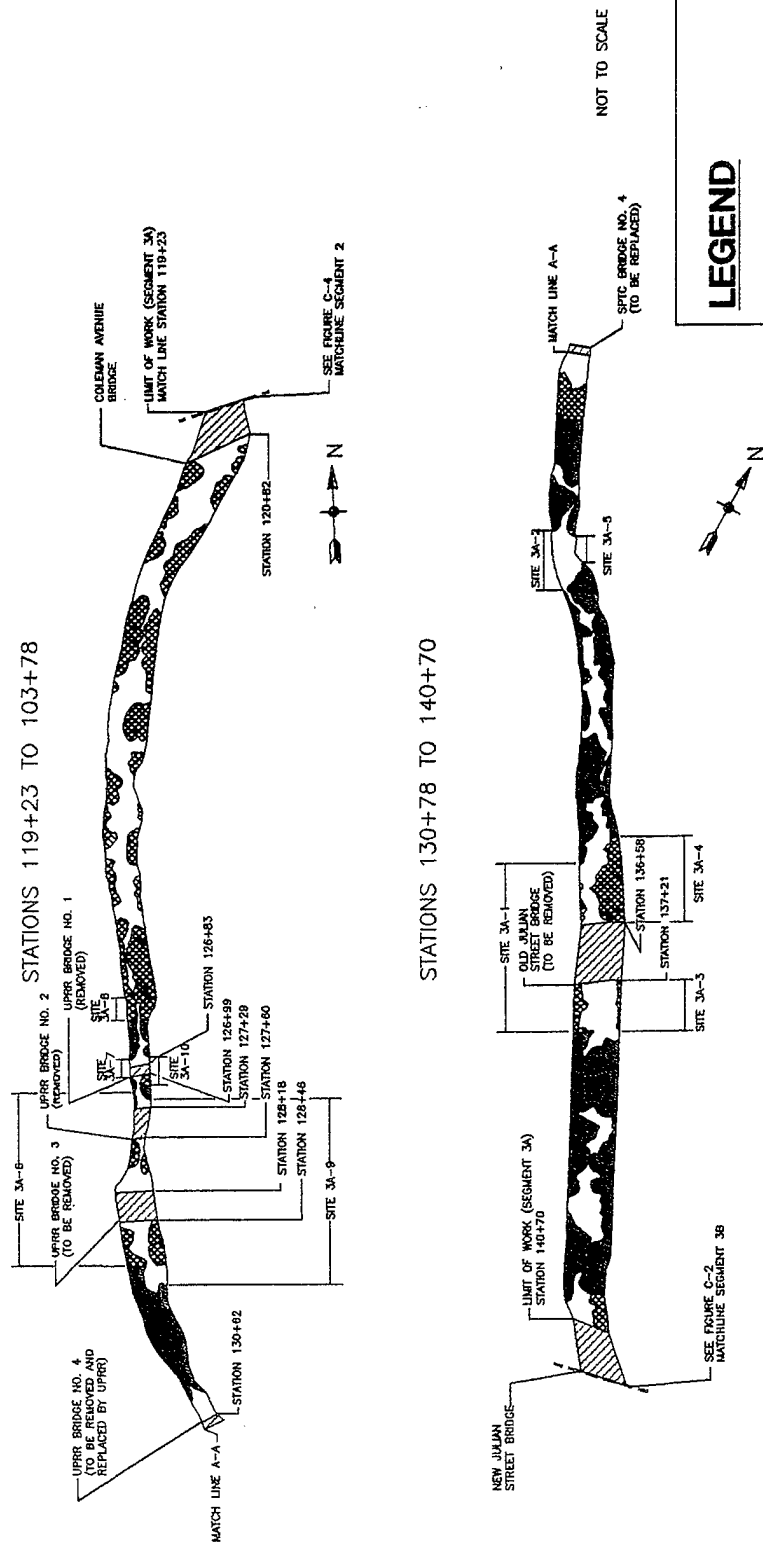
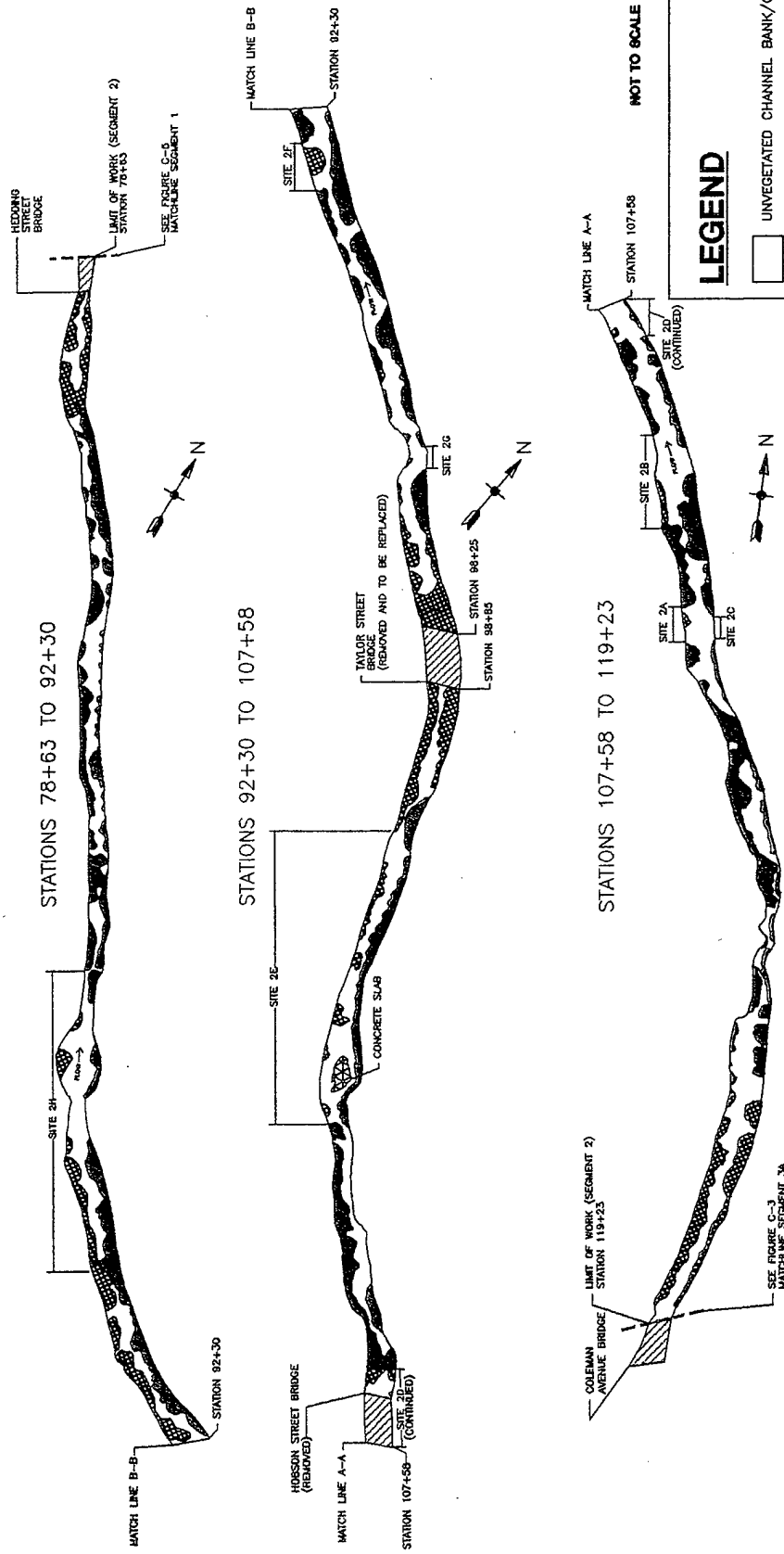
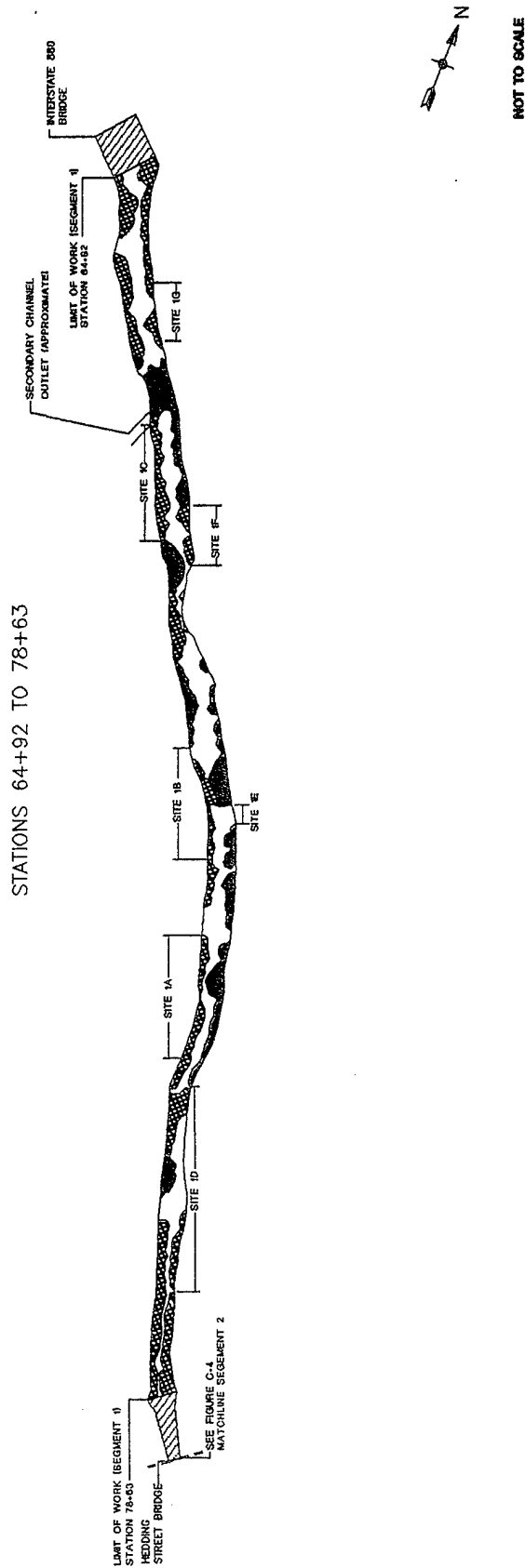


Figure C-4. GUADALUPE RIVER PROJECT
 SEGMENT 2 - STATIONS 78+63 TO 119+23
 SHADED RIVERINE AQUATIC (SRA) COVER IMPACT ANALYSIS
 AND ONSITE SRA COVER MITIGATION PLAN



THE SRA COVER IMPACT ANALYSIS AND ONSITE MITIGATION PLAN IS BASED ON CONCEPTUAL DESIGN DRAWINGS. THE FINAL IMPACT ANALYSIS AND ONSITE MITIGATION PLAN MAY VARY DEPENDING ON THE FINAL ENGINEERING DRAWINGS.

Figure C-5. GUADALUPE RIVER PROJECT
 SEGMENT 1 - STATIONS 64+92 TO 78+63
 SHADED RIVERINE AQUATIC (SRA) COVER IMPACT ANALYSIS
 AND ONSITE SRA COVER MITIGATION PLAN



THE SRA COVER IMPACT ANALYSIS AND ONSITE MITIGATION PLAN IS BASED ON CONCEPTUAL DESIGN DRAWINGS. THE FINAL IMPACT ANALYSIS AND ONSITE MITIGATION PLAN MAY VARY DEPENDING ON THE FINAL ENGINEERING DRAWINGS.

TABLE C-1. Length of Individual SRA Cover Mitigation Sites Located in the Onsite Mitigation Area

Segment	Individual Mitigation Site Designation	Length of Mitigation Site (lf)	Bank Aspect (E = east bank, W = west bank)	Comments
Segment 1	1A	120	W	Approximately 70 feet of bank was restored and planted by SCVWD in winter 1998-1999. Approximately 50 feet still needs to be planted.
	1B	123	W	Site preparation may include the removal of nonnative species.
	1C	100	W	SRA cover plantings will be planted in open areas (among native volunteer vegetation).
	1D	113	E	SRA cover plantings will be planted in open areas (among native volunteer vegetation). Site preparation may include the removal of nonnative species.
	1E	21	E	Biotechnical bank stabilization may be required.
	1F	35	E	
	1G	63	E	SRA cover plantings will be planted in open areas (among native volunteer vegetation).
Subtotal Segment 1		575		
Segment 2	2A	40	W	Biotechnical bank stabilization may be required.
	2B	105	W	Biotechnical bank stabilization may be required.
	2C	23	E	Biotechnical toe stabilization may be required.
	2D	140	E	Removal of the east bank bridge abutment from the Hobson Street bridge removal project may be required. Biotechnical bank stabilization may be required.
	2E	343	W	Biotechnical bank stabilization may be required following removal of abutment.
	2F	54	W	Biotechnical toe stabilization may be required.
	2G	24	E	Biotechnical bank stabilization may be required.
	2H	352	W	Bank was restored by SCVWD in 1998 and planted by Corps in 1999.
Subtotal Segment 2		1,081		

TABLE C-1. (Continued)

Segment	Individual Mitigation Site Designation	Length of Mitigation Site (lf)	Bank Aspect (E = east bank, W = west bank)	Comments
Segment 3A	3A-1	177	W	Old Julian Street bridge needs to be removed in order to plant entire mitigation site. Biotechnical bank stabilization may be required downstream from the existing bridge.
	3A-2	62	W	
	3A-3	58	E	
	3A-4	93	E	
	3A-5	29	E	
	3A-6	182	E	Assumes UPRR No. 3 bridge is removed.
	3A-7	27	W	
	3A-8	20	W	
	3A-9	191	E	Assumes UPRR No. 3 bridge is removed.
	3A-10	38	E	
	Subtotal Segment 3A	878		
Woz Way to Park Avenue Bypass Reach	Children's Discovery Museum Site	200	W	Bank was restored and planted by SCVWD in 1998.
	Rubble Removal Site	100	E	
	Auzerais Point Boulder Site	110	W	
	Subtotal Woz Way to Park Avenue Bypass Reach	410		
Total Onsite SRA Cover Vegetation Mitigation Planting Length		3,000		

APPENDIX D

**Downtown Guadalupe River Flood Protection
Project Offsite Shaded Riverine Aquatic
(SRA) Cover Mitigation Plans (Reach A and
Guadalupe Creek)**

APPENDIX D

Guadalupe River Project Offsite Shaded Riverine Aquatic (SRA) Cover Mitigation Plans (Reach A and Guadalupe Creek)

This appendix contains information on two offsite mitigation areas proposed to be used as part of SRA cover mitigation for the Guadalupe River Project: Reach A and Guadalupe Creek. For Reach A, a general map of the mitigation site (Figure D-1), conceptual cross sections (Figure D-2), and plan view figures (D-3 through D-5) are included. In addition, the lengths of individual SRA cover mitigation sites in Reach A are presented in Table D-1. For Guadalupe Creek, a vicinity map (D-6) conceptual cross sections (Figure D-7), and a summary of total mitigation length (Table D-1) are included.

Figure D-1	Reach A Mitigation Site
Figure D-2	Conceptual Reach A Cross Sections
Figure D-3	Reach A Mitigation Site – Conceptual Plan View of SRA Cover Vegetation Mitigation Sites (Interstate 880 to Approximately 1,650 Feet Downstream from Interstate 880)
Figure D-4	Reach A Mitigation Site – Conceptual Plan View of SRA Cover Vegetation Mitigation Sites (Approximately 1,650 to 3,850 Feet Downstream from Interstate 880)
Figure D-5	Reach A Mitigation Site – Conceptual Plan View of SRA Cover Vegetation Mitigation Sites (Approximately 3,850 Feet Downstream from Interstate 880 to Airport Parkway)
Figure D-6	Guadalupe Creek Mitigation Site
Figure D-7	Conceptual Guadalupe Creek Cross Sections
Table D-1	Length Of Individual Sra Cover Vegetation Sites in the Offsite Mitigation Areas: Reach A And Guadalupe Creek

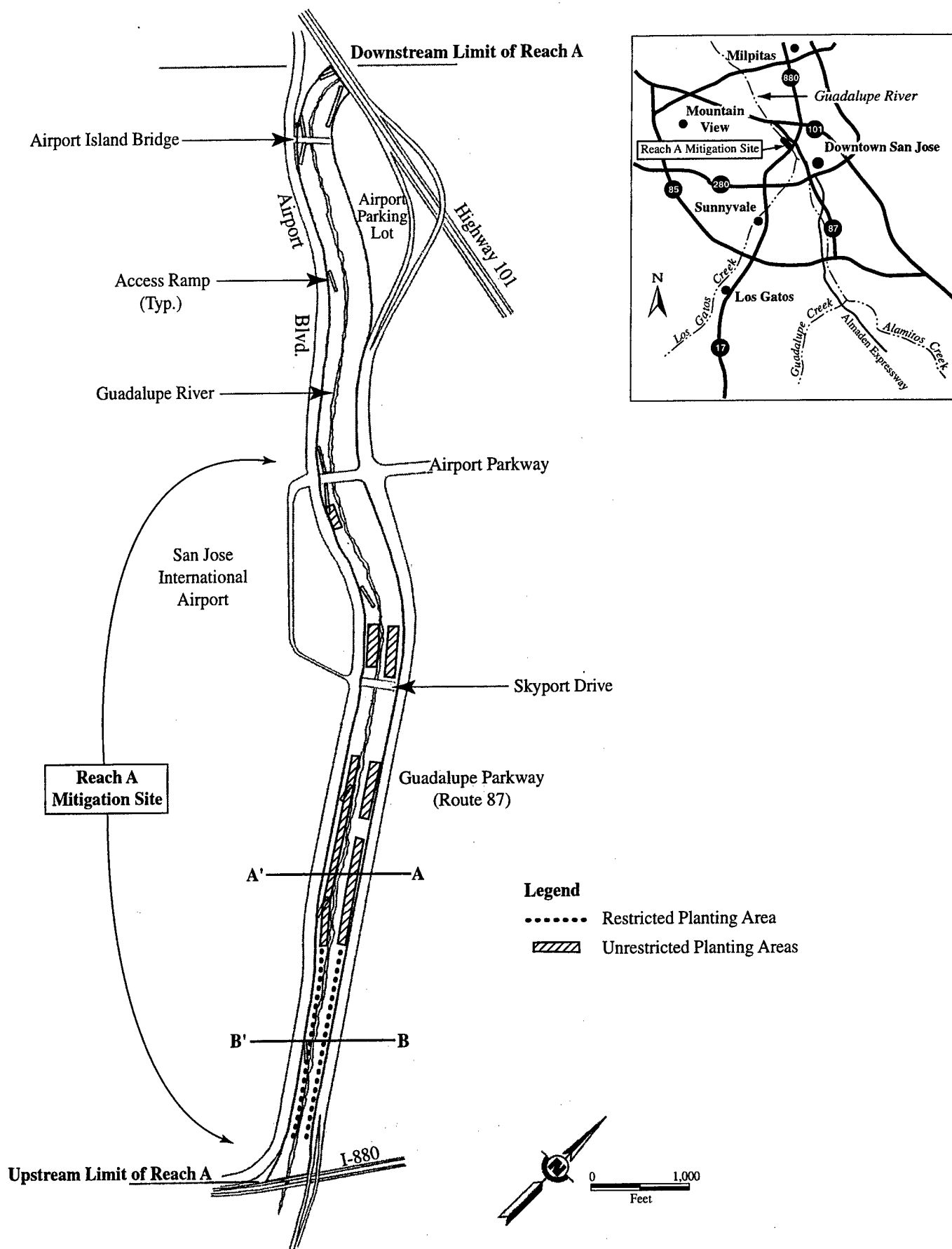
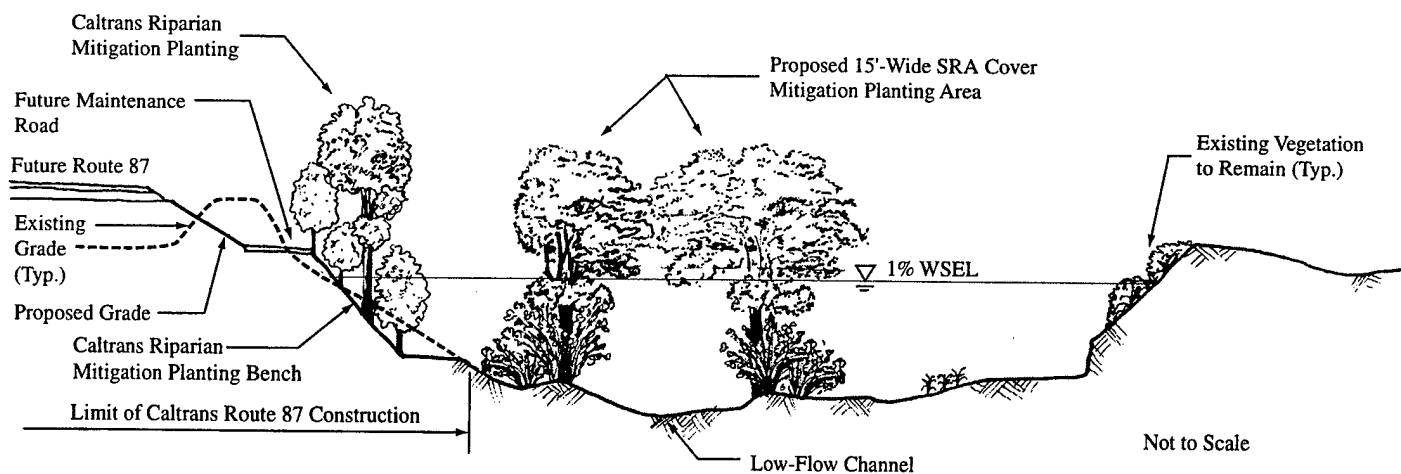
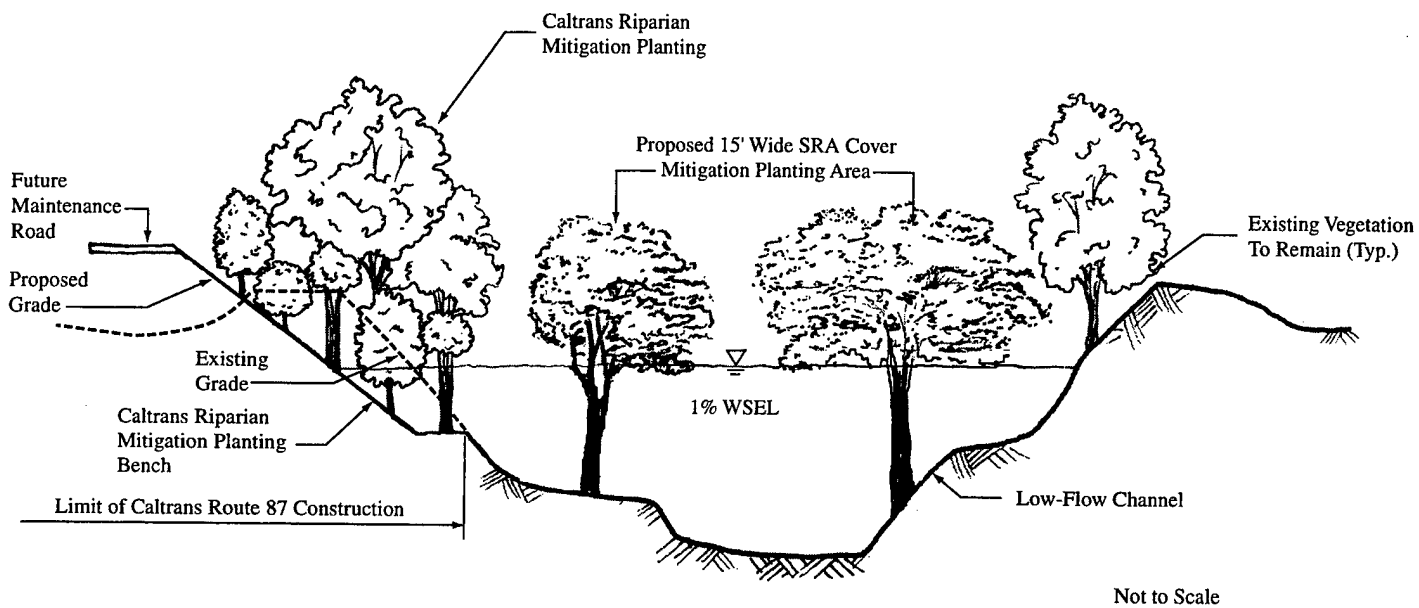


Figure D-1. Reach A Mitigation Site
Planting area locations are approximate.



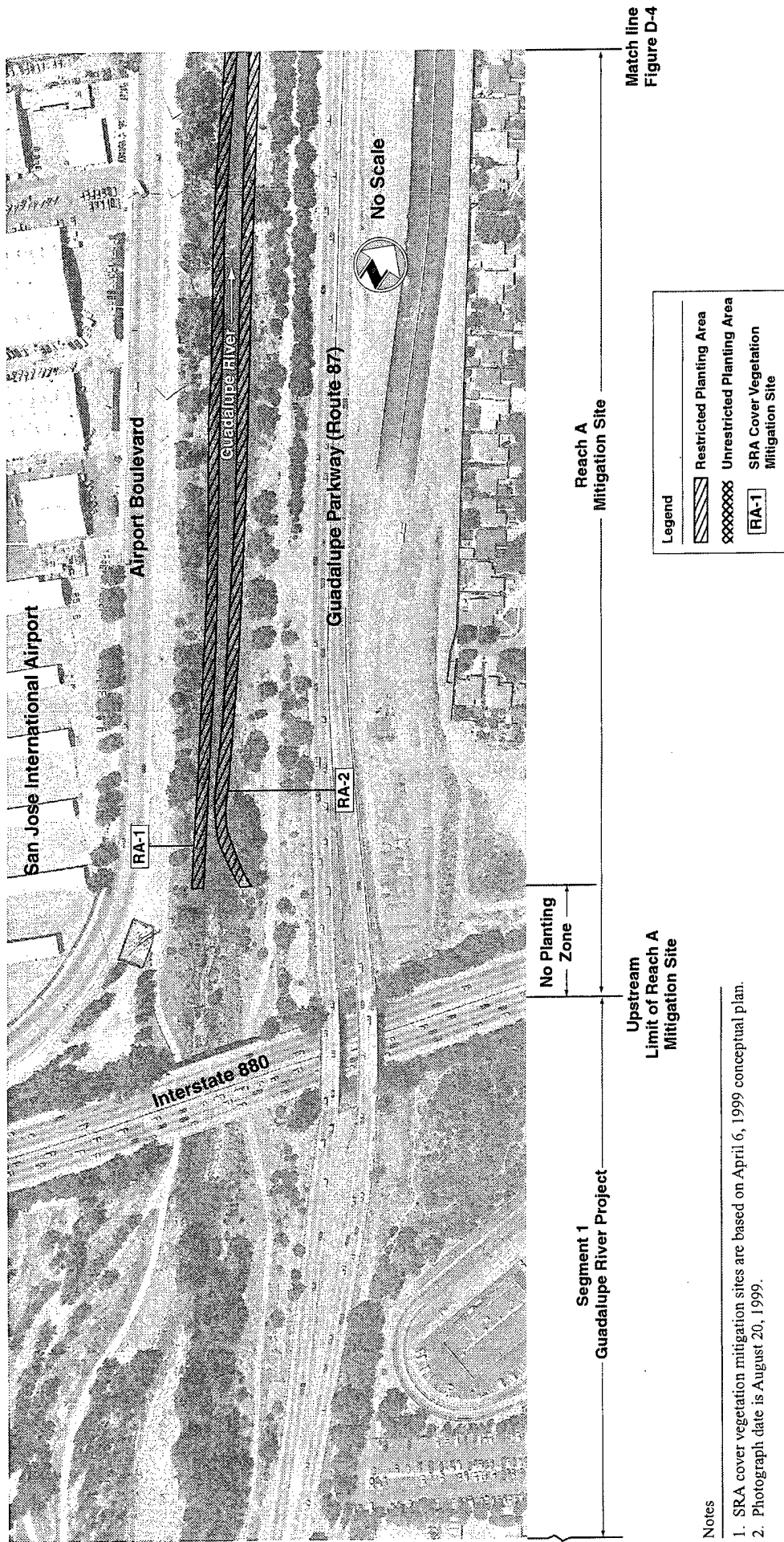
Typical Planting Areas Between Skyport Drive to 2,000 Feet Downstream of I-880 (A-A')
(Looking Upstream)



Typical Planting Areas Between 2,000 Feet to 300 Feet Downstream of I-880 (B-B')
(Looking Upstream)

Figure D-2. Conceptual Reach A Cross Sections

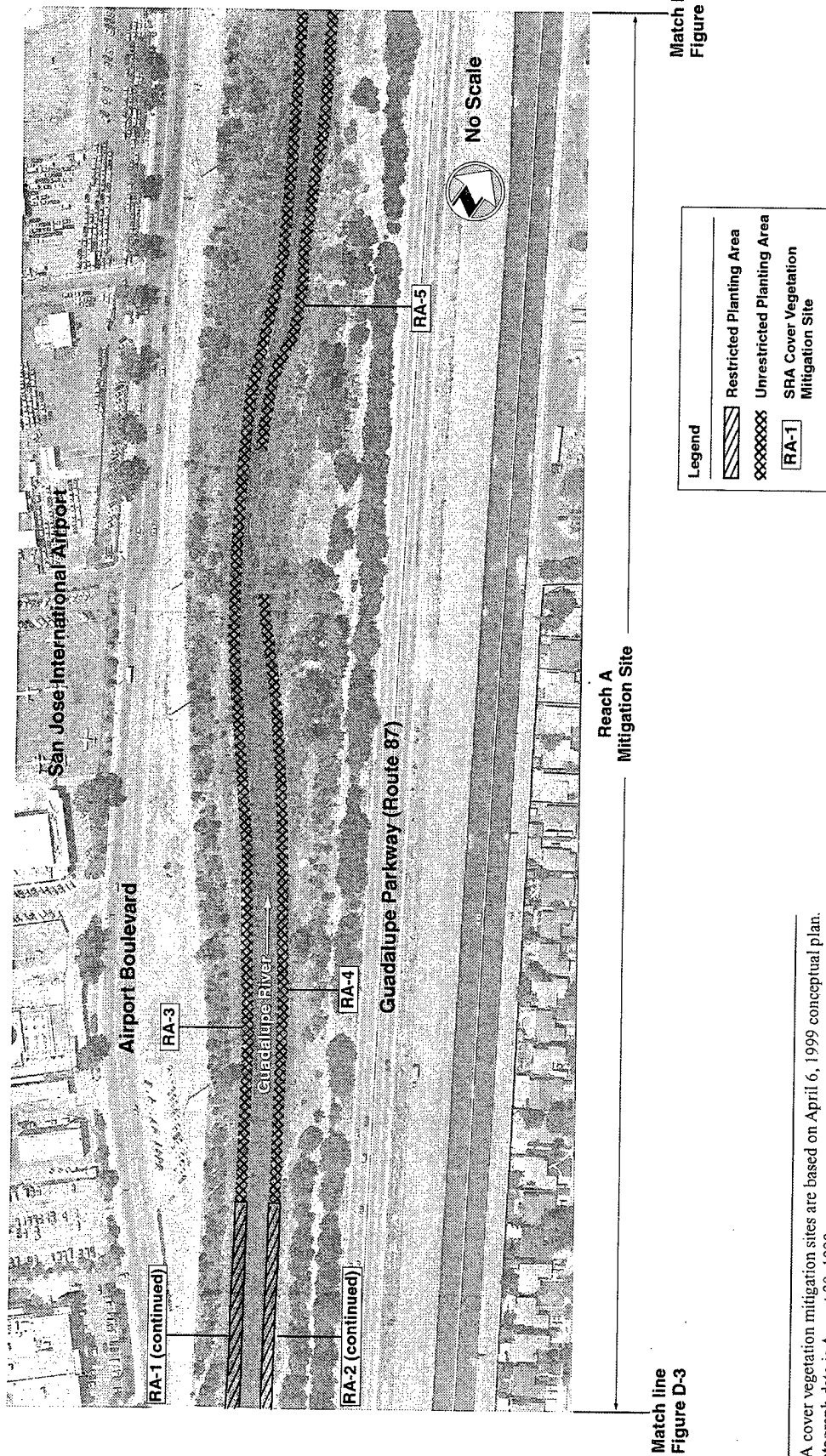
Cross sections are indicated on Figure D-1. Vegetation shown at maturity.



Notes

1. SRA cover vegetation mitigation sites are based on April 6, 1999 conceptual plan.
2. Photograph date is August 20, 1999.

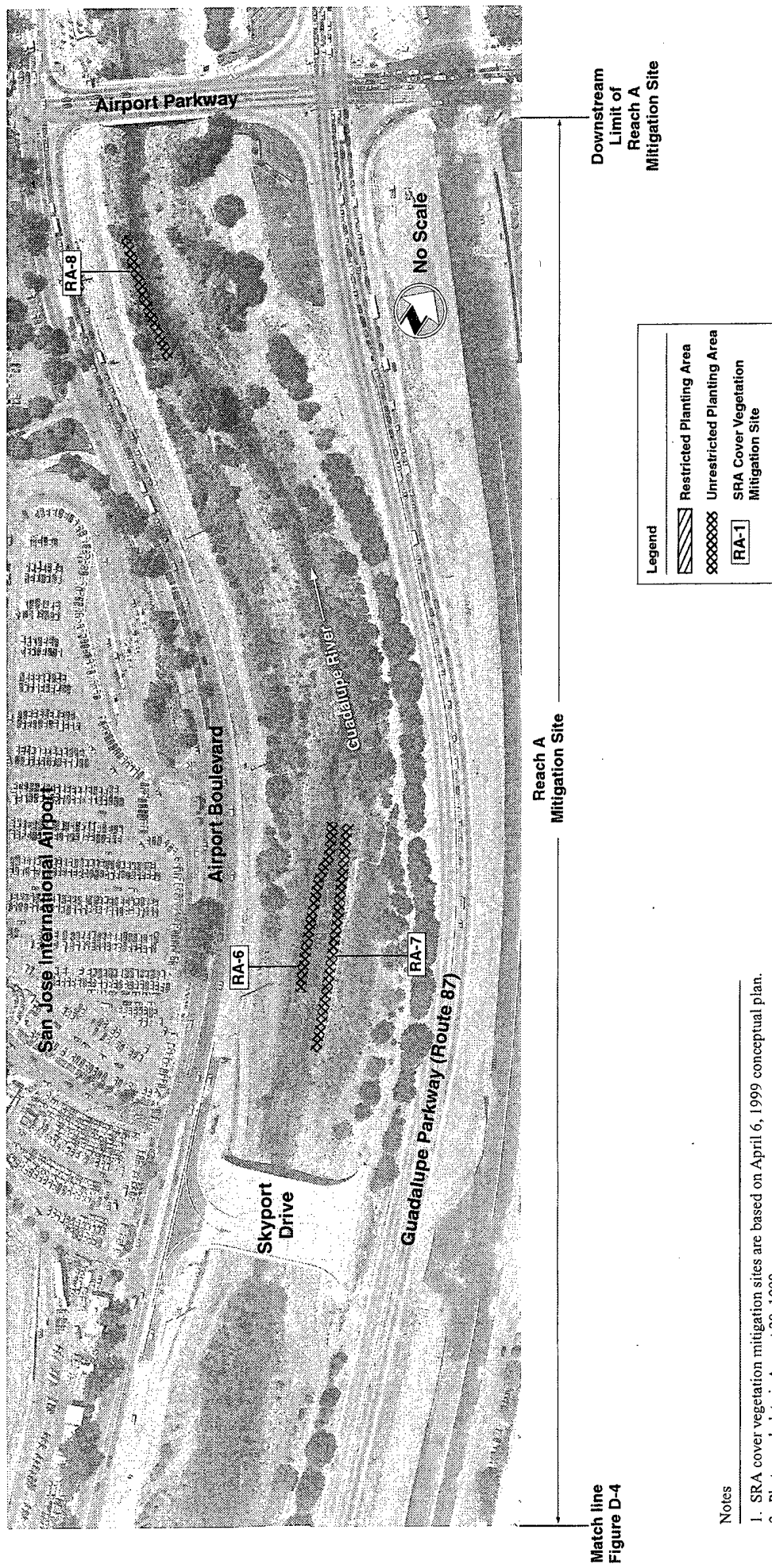
Figure D-3. Reach A Mitigation Site - Conceptual Plan View of SRA Cover Vegetation Mitigation Sites (Interstate 880 to Approximately 1,650 Feet Downstream of Interstate 880)



Notes

1. SRA cover vegetation mitigation sites are based on April 6, 1999 conceptual plan.
2. Photograph date is August 20, 1999.

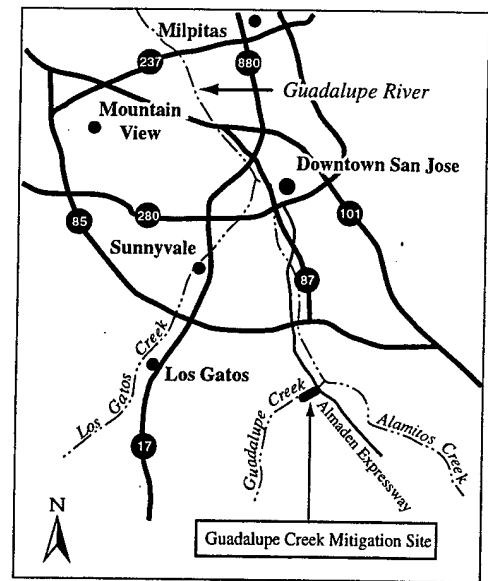
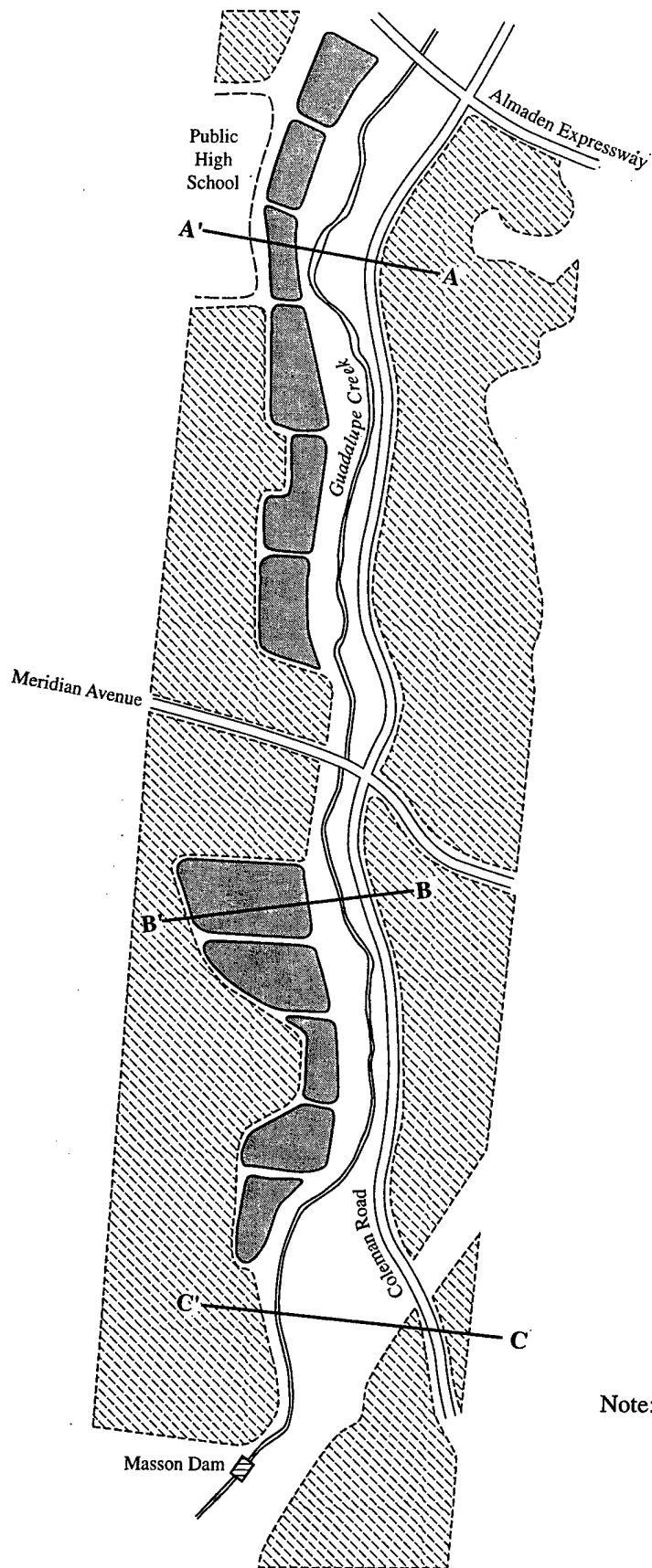
Figure D-4. Reach A Mitigation Site – Conceptual Plan View of SRA Cover Vegetation Mitigation Sites (Approximately 1,650 Feet to 3,850 Feet Downstream of Interstate 880)



Notes

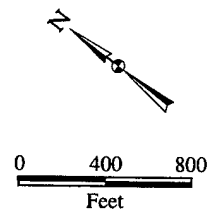
1. SRA cover vegetation mitigation sites are based on April 6, 1999 conceptual plan.
2. Photograph date is August 20, 1999.

Figure D-5. Reach A Mitigation Site – Conceptual Plan View of SRA Cover Vegetation Mitigation Sites (Approximately 3,850 Feet Downstream of Interstate 880 to Airport Parkway)



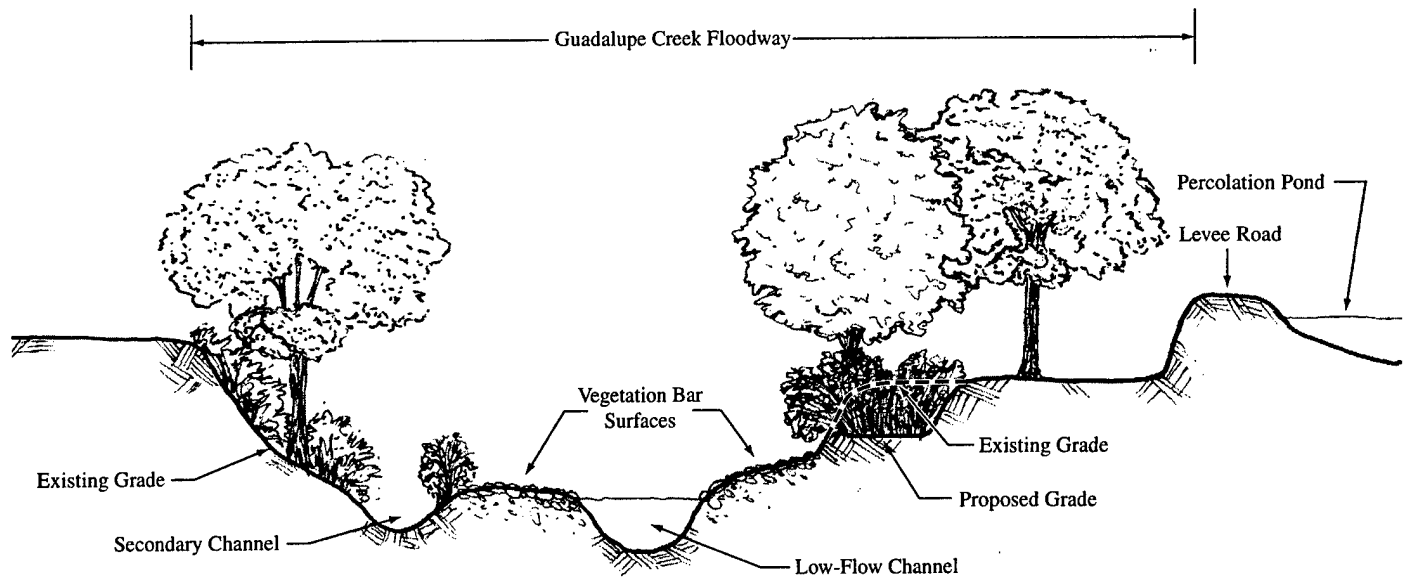
Legend

-  Percolation Ponds
-  Residential

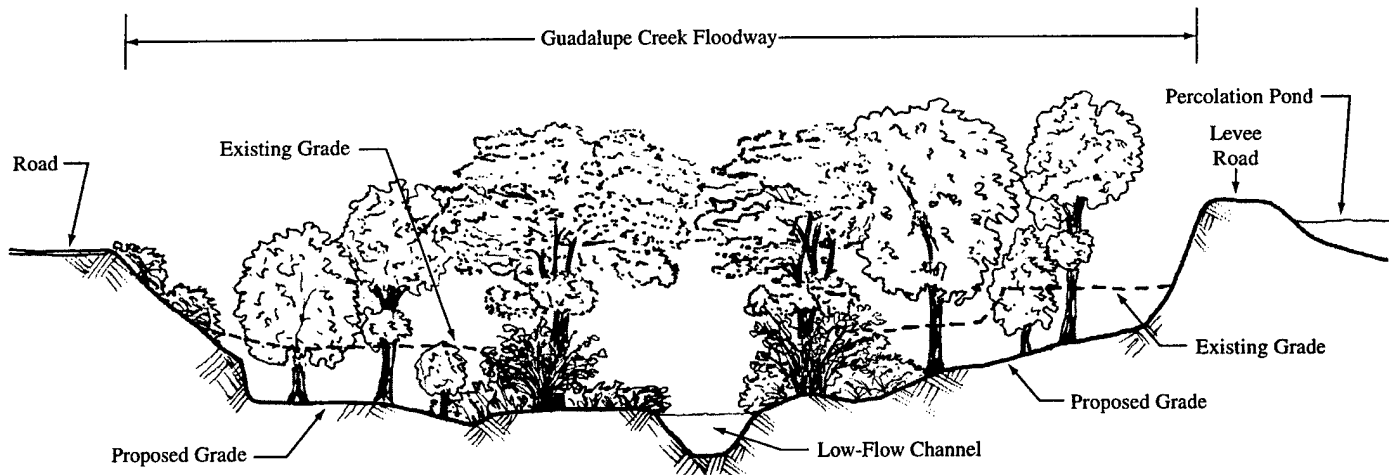


Note: This figure depicts the entire Guadalupe Creek Restoration Project area. A portion of this area will be used to mitigate for the Guadalupe River Project with Proposed Action.

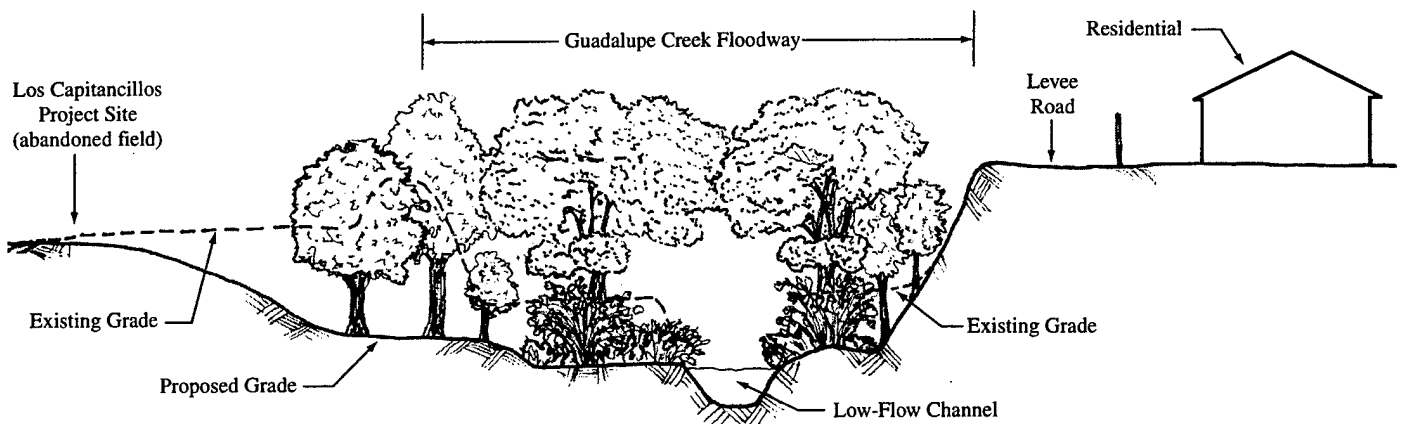
Figure D-6. Guadalupe Creek Mitigation Site



Upstream of Almaden Expressway (A-A')
(Looking Upstream)



Upstream of Meridian Avenue (B-B')
(Looking Upstream)



Upstream of Percolation Ponds (C-C')
(Looking Upstream)

Revised

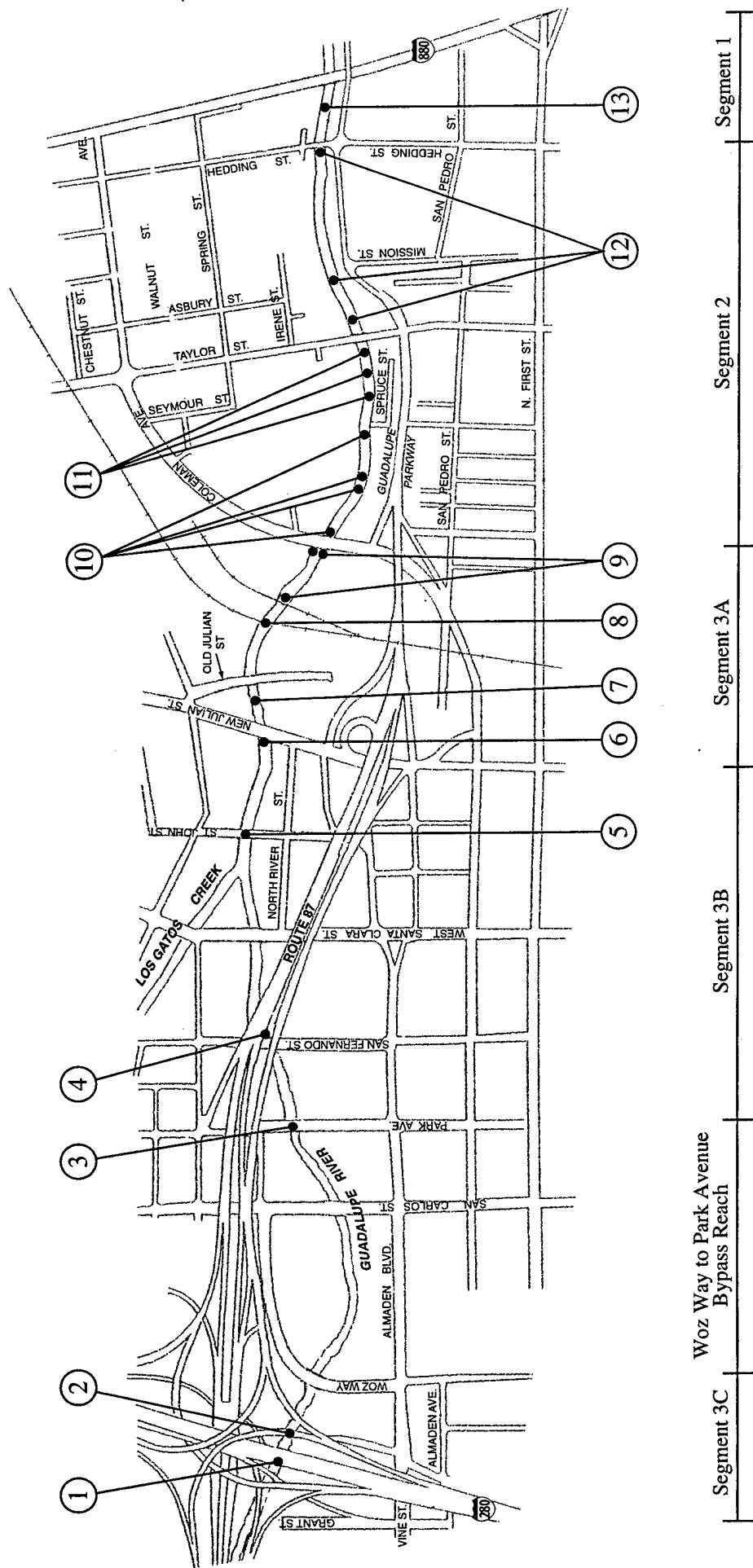
Figure D-7. Conceptual Guadalupe Creek Cross Sections
(Cross Sections are indicated on Figure D-6)

TABLE D-1. Length of Individual SRA Cover Vegetation Mitigation Sites in the Offsite Mitigation Areas: Reach A and Guadalupe Creek

Mitigation Area	Individual Mitigation Site Designation	Length of Mitigation Site (lf)	Bank Aspect (E = east bank, W = west bank)	Comments
Reach A	RA-1	1,673	W	Pilot planting site 5 is located within this mitigation site. The remaining SRA cover plantings at the site will be planted in open areas (among native volunteer vegetation).
	RA-2	1,673	E	Pilot planting site 4 is located within this mitigation site. The remaining SRA cover planting at the site will be planted in open areas (among native volunteer vegetation).
	RA-3	1,870	W	Pilot planting sites 2 and 3 are located within this mitigation site. The remaining SRA cover plantings at the site will be planted in open areas (among native volunteer vegetation).
	RA-4	984	E	SRA cover plantings will be planted in open areas (among native volunteer vegetation).
	RA-5	689	E	SRA cover plantings will be planted in open areas (among native volunteer vegetation).
	RA-6	331	W	SRA cover plantings will be planted in open areas (among native volunteer vegetation).
	RA-7	431	E	Pilot planting site 1 is located within this mitigation site. The remaining SRA cover plantings at the site will be planted in open areas (among native volunteer vegetation).
	RA-8	197	W	Biotechnical bank stabilization may be required at the upstream end of the site.
Subtotal Reach A		7,848		
Guadalupe Creek	N/A	12,044		SCVWD's Guadalupe Creek Restoration Project is in a preliminary design stage. Information pertaining to the lengths of individual mitigation sites and bank aspect are not available.
Subtotal Guadalupe Creek		12,044		
Total Offsite SRA Cover Vegetation Mitigation Planting Length		19,892		
N/A = not applicable.				

APPENDIX E

Spawning Habitat



LEGEND

- Spawning Substrate (numbers are cross-referenced in Table E-1)



Not to Scale

Figure E-1. Spawning Gravel Locations

TABLE E-1 Anadromous Salmonoid Spawning Substrate Within Project Areas

Locations	Anadromous Salmonoid Spawning Substrate (Est. by Beak Consultants Inc., 1991)
1. Hwy 280 to Woz Way Bridge (827 lf)	Gravel area too small for spawning.
2. Under Woz Way Bridge (112 lf)	200 sf of gravel that could be used for spawning exists around bridge columns.
3. Woz Way Bridge to San Fernando Bridge (2,717 lf)	500 sf of gravel that could be used for spawning exists around Auzerais Bridge columns.
4. San Fernando Bridge to Santa Clara Bridge (757 lf)	4,000 sf of gravel that could be used for spawning exists within 150 feet of San Fernando Bridge.
5. Santa Clara Bridge to St. John Street Bridge (812 lf)	700 sf of gravel that could be used for spawning exists around St. John Street Bridge columns.
6. St. John Bridge to New Julian Street Bridge (627 lf)	5,000 sf of gravel that could be used for spawning exists under New Julian Street Bridge.
7. New Julian Street Bridge to Old Julian Street Bridge (406 lf)	700 sf of gravel that could be used for spawning exists within area.
8. Old Julian Street Bridge to UPRR No. 4 Bridge (983 lf)	2,750 sf of marginal gravel that could be used for spawning; gravel is marginal due to sedimentation within area.
9. UPRR No. 3 Bridge to Coleman Avenue Bridge (760 lf)	650 sf of gravel that could be used for spawning exist at the UPRR No. 3 Bridge.
10. Coleman Avenue Bridge to Hobson Street Bridge (1,216 lf)	4,000 sf of gravel that could be used for spawning exists at the Coleman Bridge under the west abutment. 2,500 sf of gravel that could be used for spawning exists at the Coleman Bridge under the east abutment. 20 sf of gravel that could be used for spawning exists in pockets below the Coleman Bridge. 100 sf of gravel that could be used for spawning exists below these pocket areas. 400 sf of gravel that could be used for spawning exists on the inside bend of a lateral scour pool. 200 sf of gravel that could be used for spawning exists upstream from Hobson Street Bridge.
11. Hobson Street Bridge to Taylor Street Bridge (892 lf)	20 sf of gravel that could be used for spawning exists in pockets downstream from Hobson Street Bridge. 350 sf of gravel that could be used for spawning downstream in pocket areas.
12. Taylor Street Bridge to Hedding Street Bridge (1,952 lf)	200 sf of gravel that could be used for spawning exists upstream from the Taylor Street Bridge. 900 sf of gravel that could be used for spawning exists downstream from the Taylor Street Bridge. 1,000 sf of gravel that could be used for spawning exists below the pool currently existing within this reach. 200 sf of gravel that could be used for spawning exists 50 ft. upstream from the Hedding Street Bridge.
13. Hedding Street Bridge to Highway 880 (1,763 lf)	1000 sf of gravel that could be used for spawning exists 100 yards upstream from the concrete apron of the sewer/storm drain.

APPENDIX F

Vegetation Protection Plan Guidelines

Vegetation Protection Plan Guidelines

F.1 Introduction

Before the Project was implemented, the Project area supported 32.0 acres of riparian vegetation, including 16,657 lf of shaded riverine aquatic (SRA) cover. Dominant species included (from most to least abundant) Fremont's cottonwood (*Populus fremontii* ssp. *fremontii*), box elder (*Acer negundo* var. *californica*), black walnut (*Juglans californica* var. *hindsii*), willow (*Salix* sp.), western sycamore (*Platanus racemosa*), and blue elderberry (*Sambucus mexicana*). Of the preproject riparian vegetation, 13.77 acres of riparian vegetation and 8,315 lf of SRA cover have been or will be lost as a result of Project implementation. The remainder of the vegetation in the Project area will be avoided, including 16.7 acres of riparian vegetation and 7,836 lf of SRA cover. Although some of this vegetation is nonnative, much of it is native. In an effort to protect the remaining native riparian vegetation during Project implementation, general guidelines are presented in this appendix that incorporate standard construction practices used by the U.S. Army Corps of Engineers (Corps) and Santa Clara Valley Water District (SCVWD). A vegetation protection plan will be prepared as part of the Project construction plans and specifications. Vegetation to be preserved as part of Project implementation will be generally shown on the plans and specifications. (U.S. Army Corps of Engineers 1992 and 1999.).

F.2 Vegetation Protection Activities Before Construction

Before Project construction begins, a survey will be conducted to identify specific trees near or within construction-area boundaries that are to be avoided (in accordance with Project construction plans and specifications) and selected trees within construction-area boundaries that will be transplanted to a mitigation area (see F.4, "Tree Locations and Transplanting." The Corps will inspect and approve the survey work. After receiving approval and before the start of construction, orange plastic barricade fencing will be erected or similar measures taken along construction-area boundaries to identify stands of vegetation to be avoided. In general, plastic barricade fencing will be placed as close as possible to the actual limit of grading or construction (as far as possible from the forest edge), but at a minimum it will be placed outside the dripline of trees.

F.3 Vegetation Protection Activities During Construction

Any flagged, tagged, or otherwise protected trees and other landscape features scarred or damaged as a result of Project implementation will be restored as nearly as possible to their original condition. Trees not approved for removal that are damaged during construction

will be trimmed under the direction of a qualified arborist to minimize the risk of disease. Trees not approved for removal that are damaged beyond recovery during construction will be replaced with trees of the same species or another species listed on the mitigation plans and specifications in a riparian forest or SRA cover mitigation area. Replacement ratios will be determined with USFWS. Additional trees will be planted to replace the cover value provided by lost trees within 10 years. Areas replanted to mitigate for lost trees will be included in the overall project mitigation area and monitoring falls under the MMP, including the measurable objectives and remedial actions. Other tree replacement requirements may apply, including City of San Jose Tree Ordinance requirements.

F.4 Tree Relocations and Transplanting

To provide immediate shade to the river, some of the trees removed as part of Project implementation will be transplanted in SRA cover or riparian vegetation mitigation areas (see discussion above for "Vegetation Protection Activities before Construction"). Possible criteria for selecting trees for transplanting includes (in no specific order) species, health, size, age, location, time of year, accessibility, and cost. Transplanting will be coordinated with Project demolition and grading activities and will be done mechanically by an experienced tree-moving company. (U.S. Army Corps of Engineers 1992.).

F.5 Citations

- U.S. Army Corps of Engineers. 1992. Guadalupe River Project, Santa Clara County, California: final mitigation and monitoring plan. June. Sacramento, CA.
- U.S. Army Corps of Engineers. 1999. Guadalupe River flood protection project, downtown San Jose, California: Mitigation and monitoring plan. Revised September 1, 1999. Sacramento, CA. Prepared by Jones & Stokes Associates, Inc. Sacramento, CA.

APPENDIX G

Overview of Erosion and Sediment Control Measures

Overview of Erosion and Sediment Control Measures

G.1 National Pollutant Discharge Elimination System Permit Requirements

The Project is subject to Clean Water Act Section 402 National Pollutant Discharge Elimination System (NPDES) water quality regulations program. In California, the NPDES program requires any construction activity disturbing land areas of 5 or more acres comply with the Statewide General Permit, as administered by the State Water Resources Control Board (SWRCB). The purpose of the General Permit is to ensure that future storm water discharges are controlled by specifying specific erosion and sediment control best management practices (BMPs) and monitoring requirements. The General Permit requires (1) a Notice of Intent (NOI) be filed with the SWRCB two days before the construction activity is to begin; (2) elimination or minimization of nonstorm water discharges from construction sites; and (3) development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) for the site. This appendix provides an overview of general erosion and sediment control measures that may be used for the Project and incorporated into the SWPPP.

The SWPPP has two primary objectives: (1) to identify the sources of sediment and other pollutants that affect the quality of storm water discharges from the construction site; and (2) to describe and ensure the implementation of erosion and sediment control measures to reduce sediment and other pollutants in storm water discharges. The primary elements of the SWPPP include: (1) a description of site characteristics (including the Rational method runoff coefficient and soil erosion hazard) and construction procedures; (2) erosion and sediment control BMPs (shown for the Project area on a topographic map), including vegetative and structural practices; (3) spill prevention measures and reporting; and (4) construction site housekeeping practices.

In addition to the primary elements listed above, the SWPPP also specifies that the extent of soil and vegetation disturbance be minimized by control fencing or other means, and that the extent of soil disturbed at any given time also be minimized. The Corps will monitor implementation of the SWPPP during Project construction. The SWPPP must be retained at the construction site. When construction is complete or ownership has been transferred, the SWRCB will be notified by indicating all State and local requirements have been met.

Areas that will receive erosion and sediment control measures are those areas disturbed by excavation and grading above the base-flow water-surface elevation of the channel and all other disturbed areas within the Project area. Areas requiring erosion and sediment control measures and the particular measure necessary will be shown on the

Project's construction contract drawings and habitat mitigation and monitoring plans and specifications.

Weather conditions, river stage, and groundwater levels affect bank and channel bed excavation and grading work. Excavation and grading work for the Project will begin in the summer when river stage and groundwater conditions are low, thereby reducing flow diversion efforts in the channel related to Project construction. Excavation and grading will start at the downstream end of the particular contract reach that is being constructed.

In this overview, erosion control measures are divided into temporary and permanent measures while sediment control measures are primarily considered permanent measures. Temporary and permanent measures are discussed below.

G.2 Temporary Erosion Control Measures

Temporary erosion control measures¹ may be required during Project construction. An example of a temporary erosion control measure is application of straw mulch (e.g., oat or barley) on disturbed slopes. This measure would be implemented to protect soil during periods of construction inactivity. When a construction contract for the Project extends through the wet weather season, mulch would be applied on areas disturbed by construction operations but not completed by the subsequent wet weather season (defined as October 15 through April 15). Mulch would be applied to any given area remaining exposed for a period of 14 days or more until construction operations resume. These areas may include borrow areas, soil stockpile areas, cut and fill slopes, and other areas disturbed as a result of construction operations.

Based on the slope gradient, different application rates for straw mulch are used. On slopes shallower than or equal to 3H:1V, straw mulch (which should conform to California Department of Transportation Standard Specifications Section 20-2.06) is applied to disturbed areas using a straw blower or by hand application at the rate of 1.5 tons per acre. Immediately following application, the straw is secured by hydraulically applying a mixture of 80 pounds per acre of a vegetable gum-based tackifier and 300 pounds per acre recycled paper fiber.

On slopes steeper than 3H:1V, straw mulch is applied to disturbed areas using a straw blower or by hand application at the rate of 2.0 tons per acre. Immediately following application, the straw is secured by hydraulically applying a mixture of 100 pounds per acre of a vegetable gum-based tackifier and 300 pounds per acre recycled paper fiber.

Mulching provides a cost-effective way of temporarily protecting the soil from raindrop-impact erosion and promotes infiltration of rainfall, which reduces sheetflow runoff. Reducing runoff controls accelerated erosion and subsequent sedimentation.

¹ No temporary sediment control measures are prescribed because the soil disturbance that would be required to install and remove the measures could outweigh the sediment control benefits; also, the sediment control measures could become entrained by streamflows.

G.3 Permanent Erosion and Sediment Control Measures

G.3.1 Permanent Erosion Control Measures

Permanent erosion control measures may involve seeding and mulching or seeding and installation of erosion control blankets, depending on slope gradient. For slopes 2H:1V or shallower, seeding and mulching, is appropriate; this method is a three-step operation involving application of seed, fertilizer, straw, tackifier, and paper fiber in a slurry. For slopes 2H:1V or steeper, seeding and installation of erosion control blankets is appropriate; this method is a two-step operation involving application of seed, fertilizer, and installing of erosion control blankets. To implement these methods, tasks described below would be necessary.

G.3.1.1 Soil Preparation

The soil in disturbed areas is prepared for seeding, depending on site conditions, by either trackwalking a bulldozer up and down the slope or roughening with spike-toothed harrow to a depth of approximately 3 inches. Site preparation work should be conducted when the soil is as dry as possible, but sufficiently early to allow seeding, mulching, and other slope stabilization operations to be completed before October 15. The disturbed area is brought to a smooth, even grade to ensure a uniform, but not slick, surface.

G.3.1.2 Seed Mixture and Application Rates

Seed should be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of Invitation for Bids for a particular contract. Seed which has become wet, moldy, or otherwise damaged in transit or in storage would not be acceptable.

Mechanical spreaders or hydroseeding can be used to apply seed. The seed is applied 4 feet above the base-flow water surface-elevation, upslope to the uppermost area of soil disturbance. Seeding generally is conducted between October 1 and October 15. These dates may be adjusted based on the climatic conditions at the construction site at the discretion of the Corps. Seeding would not be conducted during rainy weather or when the air temperature is below 40 °F or above 80 °F. The seeding operations would be halted when conditions of high winds, excessive or lack of soil moisture, or other factors are not conducive to satisfactory results. The seed mixture will consist of primarily native species. Under certain conditions, nonnative sterile species may be necessary to use.

G.3.1.3 Fertilizer

Fertilizer is applied to help with the establishment of the seed. A standard rate of application is 300 pounds per acre of slow release, granular 16-20-10 commercial fertilizer.

G.3.1.4 Erosion Control Blankets

A variety of erosion control blankets are available, including BonTerra C2® or other biodegradable blanket capable of controlling erosion on steep slopes. The blankets are installed according to the manufacturer's instructions for particular slope gradients. Care should be taken to install the blankets such that they would not be entrained by stream flows.

G.3.2 Irrigation, Protection, and Maintenance of Erosion Control Areas

G.3.2.1 Irrigation and Protection

After erosion control measures are completed, the treated area should be thoroughly watered to a depth of approximately 2 inches. Water application rates that cause runoff should be avoided. The treated area should be kept continually moist for a minimum period of 60 days. Treated areas susceptible to vehicular or heavy foot traffic should be protected by erecting suitable barricades immediately after seeding is completed and/or by placing warning signs.

G.3.2.2 Maintenance

Vegetation Establishment Period. Upon completion of erosion control measures, the Corps would conduct an inspection to ensure that the work complies with the construction contract drawings. If the inspection indicates that areas have been skipped or seeded at less than the specified rate, additional seed, straw mulch, tackifier, or fertilizer, would be reapplied as required. Reseeding, conducted as necessary to fill in bare spots, would be accomplished utilizing the same seed mix specified for the initial seeding. The Corps' contractor would be responsible for the proper care of the treated areas for a minimum period of 60 days.

Vegetation Postestablishment Period. Upon the conclusion of the 60-day establishment period, the treated areas would again be inspected by the Corps. If the vegetation produced as a result of erosion control seeding is substandard or otherwise inadequate (defined as a cover of less than 75 percent), re-seeding would be conducted utilizing the same seed mix specified above and the establishment period extended accordingly until satisfactory results are achieved.

G.3.3 Permanent Sediment Control Measures

Permanent sediment control measures may involve installation of biodegradable sediment control fiber rolls (e.g., Straw Wattle® and Bio-D Roll®), which would also help to control erosion. For slopes 4H:1V or steeper, fiber rolls are appropriate. Fiber rolls are installed, prior to seed and mulch/blanket application and according to manufacturer's instructions. The lowermost roll is installed first, at approximately 3 feet above the base-flow water-surface elevation. Successive rolls are installed up the slope from the lowermost roll at spacings dictated by slope gradient and slope length conditions.